

Increasing user value through professional identity profiles, profile-based connection agents and games

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If we build it, will they come? Embedding employability through eportfolio assessment

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I. ePORTFOLIO

ePortfolio 2007 Conference
18th and 19th October 2007

CONTEXT OF WEB 2.0 AND BOLOGNA WITHIN THE CO-CURRICULAR STUDY PROGRAMME: PROBLEM –SOLVING COMPETENCIES

Thomas Sporer, Tobias Jenert, Gabi Reinmann (University of Augsburg)

Background

The term Web 2.0 describes a new understanding and utilization of the Web as a medium for social networks and communities. It represents a technology-induced movement which can produce change in the conception and practice of higher education. Its participatory nature promises a resourceful concretization of constructivist learning concepts and implements them through the use of ICT. Thus we consider Web 2.0 an important guiding idea indicating the challenge to learn and construct knowledge in a self-organized manner. This view of learning differs from other approaches as it highlights heterogeneity and favours an internal locus of control resulting in a high degree of autonomy for the learner.

Bologna refers to a process that aims at building a homogenous European Higher Education Area and strongly changes the landscape of our universities. This process requires accreditation and certification of various programs and institutions in order to offer comparability and transparency. In contrast to Web 2.0, it does not primarily refer to the level of the individual learner, but to the level of the university as an institution. Homogeneity in terms of comparability requires methods to evaluate the competencies that students acquire and results in a focus on the assessment of learning outcomes. Thus, striving for comparability via educational quality standards, Bologna is an important force in reforming the organization of higher education that adopts an external locus of control.

At conferences and meetings one can distinguish these two trends and might even argue that there is no connection between them. But the actual experience of students and teachers who want to meet the demands of both these trends differs from these opinions. Apparently certain requirements and expectations are inconsistent with each other. Resulting from this tension between the affordances of Web 2.0 and the constraints of Bologna, we face the challenge to resolve potential conflicts concerning the design of assessment, curriculae and incentives: Because if both trends influence our educational practices and are important for students and teachers alike, the important question is how to bridge the gap between them. At the University of Augsburg we try to couple the inherent structures behind Bologna and Web 2.0 without breaking the logic of both systems (see Reinmann, Sporer & Vohle, 2007).

Objectives

This proposal shows how we use E-Portfolios as an assessment instrument in the co-curricular study program “Problem Solving Competencies” (see Sporer, Reinmann, Jenert & Hofhues, 2007). Since assessment marks play an important role in attaining future job opportunities, students strive for certification and good grades. This is why they expect to learn and be taught in a manner that suits the prevalent forms of assessment. Educational practices like project learning and reflective thinking may thus be high educational goals, but problem-solving skills and social engagement are hardly assessed by typical forms of standardized performance tests.

The problem for the acceptance of new learning scenarios like project-based learning communities, in our view, is that how we assess strongly influences how students behave (Biggs, 2006). To overcome structural resistance due to inapt assessment methods, we try to foster the engagement of students in innovative educational approaches via E-Portfolios. Thus the aim of our current work is to develop an infrastructure for the integration of E-Portfolios as an assessment method into higher education that leverages the benefits of Bologna and Web 2.0: On the one hand assessment of competencies is a necessary element of external evaluation and quality management along with Bologna (assessment *of* learning). Reflection and peer reviews as self-assessment can be integrated in the philosophy of Web 2.0 on the other hand (assessment *for* learning).

Results

So far we have set up a platform that functions as a portfolio tool and implemented it in the program “Problem Solving Competencies” (see Sporer, Jenert, Strehl & Noack, 2007). Currently we are working on the development of a theoretical framework of competencies underlying the program and refining the structure of the portfolio tool. Although E-Portfolios are a useful multifunctional assessment method which can mediate between assessment of learning and assessment for learning, both functions are difficult to be realized at once. To combine assessment of learning with the assessment for learning, we thus designed a three-staged portfolio process which is based on different portfolio types (see Barrett & Wilkerson, 2004):

1) *Working-Portfolio*. With the Working-Portfolio students collect all materializations of knowledge (even very small artefacts) unfolding during the learning process. In this phase they document their working experiences within their learning projects which is a form of reflection-in-action (Schön, 1987). Weblogs and podcasts are used to reflect experiences in a simple manner that doesn’t require systematic arrangement. In addition the learner can comment on learning “products” such as text documents, drawings and photographs. This “private space” has no intention of beginning a dialogue with others and therefore reduces the timidity to articulate oneself (perspective of 1st person).

2) *Story-Portfolio*. With the Story-Portfolio students transform personal experiences into shared knowledge within a project group and arrange the collected materializations of knowledge. In this stage of the portfolio process a personal learning story is constructed presenting a form of reflection-on-action (Schön, 1987). This contextual embedding forces the learner to reflect more intensively and to structure the individual learning process along the meaningful dimensions of a coherent story. The social software system underlying the portfolio tool enables reciprocal commenting of the learning stories. This interconnection of the contents of the learners’ stories builds a “shared space”. The stories thus make personal learning experiences understandable for others and initiate dialogue with a real or fictive counterpart (perspective of 2nd person).

3) *Test-Portfolio*. The Test-Portfolio consists of the collected materializations of knowledge which the students choose to be used as indicators for achieving defined learning standards. Building on the previously described portfolio phases, this is not a form of reflection-on-action, but rather a form of reflection-on-reflection (Schön, 1987). Thus students make reflective decisions about what artefacts should be subject to the evaluation through a third person. In this context you leave the private as well as the shared space and finally enter a “public space” that gives a transparent account of your learning process and the resulting learning outcomes (perspective of 3rd person).

Conclusion

During the implementation of the portfolio platform in the program “Problem Solving Competencies” we learned that there are several barriers for the successful integration of new assessment methods in the every day life of students. Although students generally long for more practical engagements in higher education, problems concerning the use of E-Portfolios as an instrument for the reflection of learning experiences arise. On the one hand these barriers seem to stem from a lack in student’s skills and motivation for reflective thinking. On the other hand there are still some organizational structures/conditions that highly impact students’ acceptance of innovative learning and teaching approaches. Both barriers mutually influence each other:

a.) *Capabilities for reflection.* To reflect on their own experiences seems to be quite difficult for students. For many students, learning in educational institutions still is synonymous with memorizing pre-digested content in traditional classrooms. Hence they tend to focus on the instructed material rather than build the metacognitive capabilities necessary for reflecting one’s own experience. Because the “cash value” of reflective thinking is not immediately understood by them, this difficulty is reinforced unless reflective exercises are directly imparted into assessment strategies. Adding to these problems of inexplicit profitability and the added workload for students, motivation for reflective practices can be impaired by usability problems of the portfolio software. Summarizing our experiences with the deployment of E-Portfolios we notice that students use the portfolio system primarily as a tool for knowledge management within their project groups. If the benefit of using the portfolios is clear to them (for example to document the results of a group meeting), students find it much more easy to post articles in their weblogs.

b.) *Organizational structure.* Another barrier for the implementation of E-Portfolios is the curricular framework of the Bologna reform. Due to the modularization and its inherent logic of the ECTS-system it can become difficult to build coherent units of learning contents that enable students to engage in project groups that usually go beyond the standard unit of one course in one single semester. Busy time schedules for students further complicate the matter. Unless such basic conditions are adjusted the implementation of assessment methods like E-Portfolios remains problematic. As long as portfolio work is not institutionalized into the formal curriculum, the value of portfolios is not fully grasped by all students. Especially students with high levels of motivation for achievement may have to face the decision whether they should invest time and energy in portfolio work with a blurry outcome or if they should fulfil the calculable standards of traditional assessment measures.

To fully exploit the potentials of the trends outlined above for improving higher education, we argue for an increased use of E-Portfolios. The sole implementation of technology, however, does not automatically result in improved learning and teaching conditions. Didactical and institutional frameworks also have to be altered to meet the introduction of new technologies.

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THE ELECTRONIC LEARNING DOSSIER: A TOOL FOR THE WHOLE EDUCATIONAL CHAIN

Joke Droste, Lieneke Jongeling, Gerard van der Hoorn (CINOP / Elektronisch Leerdossier)

Context

The introduction of new educational developments in the Netherlands, such as 'competence-based education' and the emphasis on stimulating talent and preventing early school leaving, requires a more efficient exchange of student-related information on learning and learning results. In 2008, the ELD ('Electronic Learning Dossier') programme will make this feasible throughout the educational chain. ELD contributes to the notion that every school is an essential link in a long chain. And that standardisation and better collaboration is essential to be able to realise a continuous learning process.

The object of the ELD Programme – started by secondary schools in 2004 and funded by the Ministry of Education as the ELDvo project – is to develop a national standard and infrastructure for the digital exchange of validated student-related information on learning and learning results throughout the educational chain in order to facilitate a continuous learning process for the student from primary education to higher education. The solution: with one press of the button, the information for the ELD is collected from one or multiple system(s) at the delivering school, converted into a standard format, secured and sent through the National Switch Point to the requesting school(s).

Both the ELD and the ePortfolio focus on the digital exchange of information on learning and learning results. Both tools aim at the facilitation of continuous learning processes. One of the essential differences between an ELD and an ePortfolio is that in the ELD, the school validates the accuracy, integrity and completeness of the information agreed on, whereas the student decides what information the ePortfolio will include. However, since students frequently include validated learning results in their portfolios that are also part of the ELD, there is often an overlap of information.

It is our conviction that the two tools can be used as supplements by schools, labour market institutions and students. That is why we have harmonised the standard and specifications for the exchange of similar information with other projects in the Netherlands, such as ePortfolio, Studielink and e-Government. The use of tools that facilitate the continuous learning process should connect seamlessly. There should be interoperability in terms of inter-institutional transfer of information. The ELD, based on the 'IMS Specifications Learner Information Package (LIP) and The Reusable Definition of Competences and Educational Objectives (RDCEO), makes that feasible.

When e-portfolios are not only used to facilitate the coaching of the learning process in a specific school, there are some issues to solve that ELD had to reflect on:

- how to protect information that schools have to store by law,
- what is the best place to store an e-portfolio when students follow courses on different schools or in the school and on the job,
- how to guarantee that external parties have access to an e-portfolio (life long learning),
- how to facilitate the logistic processes.

Objectives

Seamless educational careers

The ELD programme aims to enable the seamless progression of students through their educational careers by facilitating the smooth transfer of student/learning process-related information among schools in the educational chain. ELD will reduce administrative burdens and facilitate continuous learning processes. It supports the policy of the Dutch government aimed at student dropout prevention and talent stimulation.

What effects will this programme have in 2008 and later years?

The ELD programme will result in the unambiguous, transparent, efficient and secure exchange of validated learning data. These exchanges will occur at the main junctions in the educational chain: from secondary to higher (vocational) education and from secondary (vocational) education to labour market trajectories. Although schools and institutes accredit the dataset, parents or the student (>18) must approve the exchange of an ELD before it can be sent to the next school or institute.

The architecture sets the stage for an even broader exchange of information, e.g. between schools and municipal government officials or healthcare institutions. In 2008, the first batch of schools will have access to the necessary data with one press of the button. The next batch will follow in 2009 and this will continue until 2011. The ELD will be a powerful tool for the early identification of talented students and students at risk. The effects will increase as schools refine the information on competences and guidance.

(Reference) Architecture

The reference architecture focuses primarily on exchanges among schools and institutes and does not concern itself with the structures within the institutes. However, the institutes must meet certain requirements, e.g. upholding certain agreements made on technical aspects of the institutes' connection to the system and the way the exchange is secured. The reference architecture is in line with the Netherlands Government Reference Architecture (NORA).

ELD exchange is facilitated by a number of joint services, which are consolidated under the National Switch Point (LSP) for education.

A few of LSP advantages:

- cheaper and more efficient: the high degree of privacy and security in the transfer of information requires an advanced technical infrastructure (certificate for the school, encryption, BSN/student number, which is needed for opening (files, etc.) It is not necessary for each individual school to provide for the expensive security that is needed for the connection with every other school, but only for a secured connection to the LSP,
- reduced workload: with one press of the button the bulk of the graduation records are sent to the LSP, which stores them until they are called up,
- dossiers are available for students (and their parents when they are < 18) by way of the web,
- dossiers are always available: also in the summer with varying holiday periods,
- option to add 'reference documents': to elucidate (and assess) test results or competences that cannot be interpreted in just one way,
- option available for collecting management information: e.g. information on school transfers.

Proof of Concept

In 2007, the concept of the digital exchange of ELDs through a national transfer and service centre (LSP) will be tested by a proof of concept (PoC) involving a group of pilot schools and 11 developers of software systems/commercial suppliers who cover the educational chain.

The PoC project is to prove that the infrastructure for the electronic exchange of learning dossiers is functional and technically sound in the primary-secondary, secondary-secondary, secondary-senior secondary vocational, secondary-higher professional and secondary-university educational chains.

All pivots will be demonstrated in the demo. The schools and suppliers were selected based on their representation of the field.

Summary of results

Key milestones

2004

- The project starts with a survey of national and international developments. The results are available on www.eldvo.nl

2005 and 2006

- Development of, testing of and agreements on the standard and the sets of data at each transfer point with study groups, expert groups and pilot schools from the whole range of the educational chain.
- Development of the reference architecture.

2007

- January: official agreement on the standard ELD and the sets of underlying data. Besides formal personal information, the ELD also contains information on school career, learning results, apprenticeships, competences and pedagogical approach (coaching/counselling/guidance),
- January: Official Agreement reached on the reference architecture. It remains frozen until the first phase of the proof of concept is completed,
- Test of the digital exchange in a proof of concept with suppliers and schools throughout the educational chain. The chain test results will be supplied at the end of the year,
- Start of project 'preparing implementation'. An impact research report on business processes provides information about the aid/facilities that we should give schools,
- Refined datasets on 'competences' and 'guidance/coaching',
- Standards and datasets on new transition points (secondary education-jobcentre, senior secondary vocational education- senior secondary vocational education and senior secondary vocational education - higher professional education),
- Validating the standard ELD 1.0 version and policy on further development and ELD standards administration, the architecture and the LSP,
- Preparation of a Declaration of Intention to stimulate the use of ELD with the sector organisations: Netherlands Association of Schools of Secondary Education, Netherlands Association of Schools of Senior Secondary Vocational Education, Netherlands Association of Agricultural Training Centres, Netherlands Association of Universities of Professional Education and the Association of Universities in the Netherlands.

2008-2011

- The Proof of Concept will be extended to include an increasing number of suppliers and schools,
- Parts of the programme will be transferred to existing organisations,
- Communication campaign will be intensified to inform potential users about the added value, convenience, profit and advantages to be gained with ELDs.

Conclusions and Recommendations

The ELD is a response to the need for more and more reliable data on the learning process and learning results of students. Based on the concept of continuous learning, educational programmes attempt to cater to pupils'/students' needs in order to prevent dropout and stimulate talent. The foundation for tailor-made programmes and guidance is having the right data available. ELD provides the basic set of data on a pupil/student who starts at your school or institute. You yourself or the student/employee can then build upon this set.

This is why it is important to use international standards in the exchange of information and adhere to the ELD standard that provides the basic information on a student's learning process and learning results. Take advantage of the infrastructure and standard that has already been developed:

- validated information (digital signature guarantees integrity and completeness). ELD uses a System certificate that only the managing director of an educational institution may request; every dossier is digitally signed and it is possible to see who was responsible.
- transparency (it is clear exactly what is being exchanged). ELD includes syntactic and semantic agreements.
- only information which it is legal to exchange (privacy) is available. ELD guarantees that the standard with the set of underlying data and the exchange process is in agreement with the privacy laws of the Netherlands.
- information is compatible with various systems (meta data insure interoperability). ELD uses international IMS specifications that function as a kind of uniform plug between systems that also employ these international IMS LIP specifications.
- can be linked with developments/systems such as ePortfolio and Studielink. ELD information can be linked with or in the future even integrate with ePortfolio and Studielink information.
- can be linked with other basic registration systems. The reference architecture is in line with the Netherlands Government Reference Architecture (NORA) which makes it possible to make connections with the Netherlands municipal basic administration for personal data, the register for certificates of qualifications and the register for companies.

'Ultimately, students benefit from it because schools now have a tool to track the student's learning history and provide tailored educational guidance'.

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THE COMPETENCE PORTFOLIO: FROM A COMMON BACKGROUND TO DIFFERENTIATED PRACTICE. TOWARDS THE E-PORTFOLIO IN THE VOCATIONAL TRAINING OF CANTON TICINO (SWITZERLAND)

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Keywords: Portfolio, Competencies, Vocational Training, ePortfolio development

Introduction

The Swiss Federal Institute for Vocational and Educational Training (SFIVET) of Lugano, has set up – in cooperation with the public administration of Canton Ticino (Division of Vocational Training) – a project aiming at consolidating and to coordinating some measures for supporting the transition of the young people attending vocational courses from the school to the job market. These measures are situated in the different phases of the training path: at the beginning – by promoting the creation of new workplaces for apprentices; during the training path – by promoting in the apprentices the capacity of identifying, arguing and of gathering information about their own skills and competencies; at the end of the training path – by supporting those who have difficulties in finding a job.

The present contribution, starting from a brief presentation of the Swiss Vocational Training system and the mentioned projects, intends to deepen the characteristics and the modalities of construction and diffusion of the Competence Portfolio Project in all the vocational schools of Canton Ticino, by describing how the tool and its methodologies have been differentiated, depending on the characteristics of each school, and by analysing its development towards an ePortfolio.

The characteristics of the Competence-Portfolio Project

The Competence Portfolio Project aimed to the conception, to the development and to the diffusion of a tool which allows the young apprentices to attest their competences. In this perspective both strategies related to the traditional *competence synthesis* and to the *learning portfolios* have been integrated. The goal was in fact to accompany in the identification of knowledge and competences achieved in prior learning and/or extra-scholastic situations and to allow the monitoring of those which gradually are acquired at school and at work.

At the end of the portfolio project, the young apprentices, besides to having achieved a set of meta-cognitive and argumentative capacities, are able to produce some documents useful to entering the profession. As support to the whole process of the Portfolio Project, a Guide and a CD-Rom with numerous didactical activities have been developed by the teachers. In particular, the accomplished Portfolio Project, intends to be an integration element of diverse procedures and didactical modalities, already used in the vocational training; therefore it is a tool aiming at the continuity and the meaning in the educational history of students and apprentices.

Elaboration and diffusion phases of the project

The prior experience (2001-2003)

The Competence Portfolio Project started from the necessity to overcome some limits of a previous unique portfolio tool that collected to the competences acquired the whole vocational training of Canton Ticino.

It was a complete and standardized guide, directed to all users (adults and young people of every origin field), formulated in an exaggerated specialized language, not adjusted to the target of the young people, lacking in didactical materials, and scarcely flexible. On the other hand the value and the scope of this initiative were appreciated, as the guide was a first attempt to develop an instrument for allowing everyone to process their own portfolio of competences. Moreover, it was an opportunity to open a lot of discussions and reflections among the teachers of every training curriculum about the changes acting in the actual professional world.

The concept and the operative proposals (2003-2004)

Taking into account the above mentioned limits and in particular the necessity of having didactical material as a support suitable for young people, a team of work, composed by some teachers, some institutional referents, and some specialists, has developed a project-concept based on some principles and has constituted an operative path. The main elements could be summarised in the following points:

A) Conditions of achievement:

- Safeguarding the inspiration principles and the finalities of the previous experience, taking into account the tools and/or the activities (e.g. European Languages Portfolio) already proposed in the field of the vocational training, aiming at the competence valorisation, the orientation of young apprentices, favouring the harmonisation among them,
- Taking into account the different terminologies related to the competence concept, existing in the vocational training,
- Taking into account the fact that those who elaborate the competence portfolio need a specific accompaniment which particularly considers the needs of those who have peculiar personal, scholastic and professional histories or who have specific learning difficulties,
- Taking into account the importance of instituting in every school a referent for the portfolio activities, able to coordinate them in general terms and to provide advice to the colleagues,
- Promoting some activities correlated to the portfolio training in the training enterprises,
- Connecting the tools for young apprentices and those directed to an adult target in general.

B) Operative proposals

Considering the necessity to 'scaffold' both the teachers and the apprentices, in the realisation activities of the competence portfolio, some proposals were identified:

- promoting some sensitizing activities or tools related to the problematic passage school-work,
- elaborating a complete guide for teachers,
- giving advice for the constitution of the personal competence dossier for the apprentices,

- elaborating an official competence dossier, directed to the adults and to the young people, with a support function for job searching.

The materials production, the experimentations, and the progressive diffusion (2004-2007)

A specific team edited in July 2004 a first version of the *Teachers' Guide*, integrated with a CD-Rom of didactical activities, both object of testing in the following years, in order to refine them and to allow a better integration. Afterwards the official competence Dossier, entitled "*Qualifications and Competences Dossier*" was developed; it is now in a testing phase with an adult target.

In the testing phase the *Teachers' Guide* has revealed the necessity of specifying and adapting the general indications, the activation and managing modalities of the portfolio course for different scholastic curricula so, the teachers involved were asked to analyse the characteristics of their scholastic curriculum (differentiated on the basis of the professional sectors), to build a discussion network of teachers of the same professional sector, in order to work out the guide-principles for the implementation of the Portfolio course in a coherent and functional way for a specific professional domain. In the definitive implementation a common framework with some peculiarities and some differences among the specific professional fields will emerge. In this specific context the necessity of introducing an *ePortfolio* clearly emerged, considering it as a logical consequence of the accomplished training path. For this reason, from the scholastic year 2007/2008 an experimental and research project about e-portfolio will begin, integrated for the moment in two schools with curricula particularly familiar with the ICTs usage.

One of the most peculiar aspects of this project was the teachers' involvement in the development of the project itself. Over the years different working team and teachers of different professional curricula participated: until now about 80 teachers have been directly involved, 12 of them with a referent function in the scholastic seats.

This allowed the gradual diffusion of the portfolio which, in the scholastic year 2006-2007, has been covering all the training system of the Canton Ticino, in all the different sectors and curricula of the vocational training. This means that currently the project involves the ensemble of the vocational schools, that is 4 commercial schools, 4 artisan and agrarian training schools, 4 industrial training schools, 1 artistic training school, 3 social and nursing training schools, for a total of about 8700 students (including both full-time school and alternation school-enterprise) and about 1200 teachers.

The participation of the teachers with specific referent function has allowed the progressive constitution a specific competence domain in the field of the counselling to young people for the orientation and support in the professional and training development

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EFFICACY OF E-PORTFOLIOS: A SYSTEMATIC REVIEW OF THE EVIDENCE

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Background

Portfolios are used by most health professions as an instrument and medium for formative and summative assessment, as well as for other educational activities and processes. As portfolios become more widespread across health and other professional sectors - and their content and potential becomes more complex - they have increasingly migrated to electronic format.

There is now a considerable body of evidence published across the health professions, including medicine, nursing, dentistry, pharmacy, clinical psychology and allied health, on the utility of (electronic) portfolios; however, these single studies vary widely in both their design, scope, quality and conclusions.

In clinical research systematic reviews are often employed to synthesise large amounts of disparate evidence. Educational research is very rarely purely quantitative though and at the 1999 Linköping meeting of the Association of Medical Education in Europe (AMEE) a group was formed to bring evidence based practice to medical education. The result was the BEME (Best Evidence Medical Education) Collaboration, an international partnership that has produced methodology to learn from both experimental and non-experimental educational research and promote best practice.

To date, a systematic review on the efficacy/usage of portfolios - electronic or otherwise - has never been conducted. This paper will discuss the findings of the recently formed BEME systematic on this topic which will provide a robust and objective synthesis of the large and increasing body of literature on this vital educational intervention.

Aims and Objectives

This research aims to combine all relevant evidence to determine the efficacy and utility of e-portfolios as educational instruments in healthcare settings.

This would:

- establish how effective e-portfolios are as instruments to support reflective practice,
- summarise the strengths and weaknesses of e-portfolios for conducting formative and summative assessment,
- synthesise the evidence on e-portfolio usage in the work place and how they can further education,
- ascertain whether e-portfolios can accurately determine the educational needs of learners.

Research Questions

- Are e-portfolios an effective and practical instrument for education, particularly formative and summative assessment?
- What are the advantages and disadvantages in moving to an electronic format from paper?

- What is the evidence that e-portfolios are equally useful across health professions, and can they be used to promote inter-disciplinary learning?

Methods/Summary of Work

The group has adopted the methodology of the Best Evidence Medical Education Collaboration and first conducted broad sensitive searches for all available evidence on the efficacy of e-portfolios in any setting; a second smaller subset of the evidence will be examined to look specifically at the efficacy of portfolios within the health professions. The search included the peer reviewed databases for health (Medline, Embase, CINAHL, Psychlit) and education (ERIC, TIMELIT, British Education Index), as well as a search of the grey literature.

The combined searches produced 2775 citations potentially relevant to the review. Pairs (blinded) then reviewed titles, and where necessary abstracts, to reduce the pool of potentially relevant articles to 225. These are currently being read in full by two reviewers who rate them independently for relevance against pre-determined criteria versus the review questions and quality of methodological design. A web-based tool for detailed appraisal of the papers and abstraction of relevant data has been developed to facilitate this process and ensure a consistent approach.

The research will also incorporate the findings of two evaluations of the United Kingdom's largest e-Portfolio system for healthcare workers - the NHS Education for Scotland (NES) e-Portfolio system, which provides e-portfolios for tens of thousands of health professionals across Scotland, England, Northern Ireland and Wales. In 2007 separate evaluations of the NES e-Portfolio software were undertaken by BECTA (British Educational Communications and Technology Agency) as well as a joint project between the Mersey Deanery and the Royal College of Physicians of London. The evidence from these evaluations will be treated as primary research and appraised identically to the rest.

Timeline for Completion

At the time of abstract submission, the group had appraised approximately 25% of the articles. Further potentially relevant evidence was continuing to be collected and appraised from cited reference searches and contacting authors, though in diminishing quantities (estimated 15-20 new papers will be included).

By the time of e-Portfolio 2007 the group is on course to have all data abstraction completed and will be able to present the synthesised evidence on each of the research questions. The results will be written up in late 2007 for publication in early 2008.

The group continues to work with a variety of interested parties on the project and welcomes any contact. BEME systematic reviews have a proven record of combining diverse evidence in a transparent, reproducible and objective manner and we would look forward to presenting and discussing our methods and findings, and their implications for best practice within health care and beyond.

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EPORTFOLIO FOR AN OLDER WORKER WHAT HAS AGE GOT TO DO WITH IT?

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Abstract: This document outlines the proposal for a workshop presenting the development of a work package designed to test and pilot an ePortfolio product in the context of support for older workers wishing to review their skills and abilities in a changing employment market. The SWOOP project is set in the context of the ageing population demographics of Europe and age legislation introduced in the UK in October 2006.

It will outline the work of SWOOP as an ESF/ Regional Development Agency funded programme targeted at testing and developing with partners, pilot activities aimed at helping older workers into employment and assessing the barriers to work this age group encounter. In addition SWOOP has worked with partners to raise awareness of age related issues with employers in the South West of England.

Keywords: older worker, research, enable, skills, reflection, ePortfolio, IT

Background

As interoperability and feature sophistication advance, ePortfolio technology is moving onwards. From their earliest eclectic days as relatively unstructured online archives, successive ePortfolio developments have gone almost to the opposite extreme with software tightly bound to the requirements of specific qualifications.

In contrast with rapid changes in software development, the profiles of 'typical' learners benefiting through use of ePortfolios have generally not diversified to anything like the same extent. There is a limited range of ePortfolio models across Europe in which student learners far outnumber those in non-educational settings. For these users, ePortfolios are often seen as electronic 'transcripts' or records of achievement replacing paper based student documentation.

Within the UK, ePortfolio uptake has been driven by higher and further education where Personal Development Planning (PDP) and Individual Learner Records (ILRs) have stimulated sector-wide initiatives. More extended models of longitudinal progression for youngsters as in the City of Nottingham Passport, are leaders in good practice. Other area based pilots also target younger learners but do not do much to promote social inclusion nor lifelong learning for adults.

For some employed adult learners, workplace ePortfolios are found as 'Skills Passports'. These act as a form of online assessment and validation of staff competencies and may incorporate progression routines for work based training. Selected industry sectors have adopted this approach differentially, depending on how suitable their occupational skills frameworks are for computer based tracking or to comply with staff training legislation requirements. The UK eSkills Sector Skills Council looking after IT industry training has its eSkills Passport, with sectoral comparators at state level in the US, South Africa, Australia and Canada. Closer to home, the Europass has long been established as a European standard, and European projects

supported by Leonardo da Vinci and EQUAL funding streams have been successfully piloting ePortfolio and e-assessment software.

In the UK the targeted use of European funding to develop such systems has been influential in trialling their use amongst those harder-to-reach groups not necessarily in work or learning. In common with the rest of Europe, the UK faces a 'demographic time bomb' with increasing numbers of older individuals needing to re-skill to resume or continue their working life. The UK Government has not actively promoted the use of e-learning or information, advice and guidance for adults, but through European funding, ePortfolios are beginning to show real promise to build confidence for older people as they expand their opportunities to build on existing skills and life experiences. This presentation chronicles the achievements of the EQUAL SWOOP (South West Opportunities for Older People) Project in the South West of the UK as it helps older individuals become empowered to take control of their prospects for work and learning.

The SWOOP project has focussed on researching a demographic conundrum. As a community across Europe we are ageing. Yet this ageing society still views the value and skills offered by an older worker as somehow less valuable than those of their younger co-workers. The older worker encounters doubts about their abilities and qualifications becoming less relevant and therefore less marketable over time.

Perceptions of older workers and their value to an organisation also colour the individual's ability to recognise and take advantage of opportunities for personal development in learning new skills, changing career or moving into a new role after a certain 'age'.

Objectives

The SWOOP project was established to test out a number of activities that might contribute to the continued employability of people in the South West of the UK over 45 years old, and to conduct research into the effectiveness and viability of these activities. SWOOP also wished to contribute additional relevant research and comment to the demographic debate. This testing involved a range of different support services to individuals and sought to engage both those employed and unemployed, and those who for whatever reason were unknown as job-seekers, but nevertheless might wish to take part in the labour market.

As part of the SWOOP project an internet based ePortfolio was tested as a tool in this process. Various scenarios were tested where individuals could use the ePortfolio tool along with information and guidance support. After some success, it was felt that to find what might be unique to the ePortfolio approach; a dedicated trainer should plan and conduct a series of ePortfolio workshops.

The software selected for SWOOP is a generic 'vanilla' version of an internet based ePortfolio supplied by ARC Software (www.arcsoftwareconsultancy.com). The project has chosen to focus on those aspects of the product such as interactive quizzes and tutorials that provide a starting point for personal reflection. The summary statements provide information for the individual to reflect on and consider how they can provide evidence for the skills identified. This can then be stored electronically within the system in a variety of formats and used to produce personal statements, CV's, action plans and individual learning plans.

Summary of results

Through a number of initial pilot site partners, it was apparent that the effectiveness of the ePortfolio was dependent on supported introduction through initial training materials and close mentoring. The issues that emerged to inform this view included:

- Seeing the ePortfolio as a quick way of generating CVs and being uninterested or unprepared to value it as a reflective tool,
- The software was felt to be overcomplicated and difficult to navigate unsupported and this negated the users desire to explore it,
- A lack of understanding about what the ePortfolio might contribute, both to the individual and to employers (involved in some of the piloting) as a result of insufficient planning, training and commitment at the introductory stage,
- Where there was one-to-one mentoring, clients and mentors were reluctant to use a product that they saw as distancing them from the personal approach.

The subsequent development of an outreach programme presented ePortfolio as an opportunity for ‘personal discovery’ for the client.

The training programme comprised three ½ day tutored sessions for groups of 6 to 8 persons spaced over 3 weeks.

They focused on two distinct aspects: the PRODUCT (ePortfolio software to produce CVs / application letters or Personal Statements) and the PROCESS: using ePortfolio to support older workers to identify their skills and experiences; to aid reflection; and then to support the ‘moving forward’ and decision making process.

To ensure the lessons learnt were effectively captured, a specific evaluation process was developed by the project researcher. The process allowed for feedback from the outreach participants during the sessions and some time later to assess the lasting effectiveness of the workshop.

Conclusions and recommendations

Older people have such a breadth and depth of experience to consider that completion of even basic details requires collection and collation of a lot of material. However, through evaluating the sessions, it became apparent that clients achieved more if they were taken right through the ePortfolio process and were encouraged to produce some documents even if not in ‘final’ format. This gave clients an insight into the potential of ePortfolio as an aid to production of CV / Application letter / Personal Statement as well as the opportunity to try uploading and downloading documents – critical to being able to use it effectively for job applications

ePortfolio was also set in context with clients being shown examples of ePortfolio for digital storytelling (H Barratt) as well as for self promotion (Learning Community / Bronson). This was received very positively and with much interest

Further facilitated sessions would be helpful to allow clients time to further build their ePortfolio, fully test the software potential and enable them to access support with any other technical problems or difficulties.

The workshops were particularly designed to cater for the over 45’s. Given the resource constraints clients needed to have basic IT skills and to be comfortable using the Internet.

However although the lack of IT skills were initially a perceived barrier to using the ePortfolio effectively, those with little or no IT skills seemed to benefit more from the experience as they treated this as a learning opportunity. This has identified scope for expanding ePortfolio workshops to deliver ICT training

The value of using the workshop approach in this context is the unintentional development of independent client support networks where experiences are shared and peer support is fostered. It would be of benefit to have an ongoing facility as part of an ePortfolio to support this as an online community forum

Group sessions were perceived as ‘non-threatening’ and gave ‘permission’ to take time to reflect on skills, experiences and possible future directions. This seemed particularly important for women who were often fulfilling caring roles and who commented that they found it a real ‘luxury’ to have the time to be able to think about themselves and their needs

There is scope to use these ePortfolio workshops as the start of a personal development ‘funnelling’ activity where clients are able to take initiative to move forward to other support agencies using the ePortfolio as the central reference tool in any consultation process.

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SMART USE OF E-PORTFOLIOS – HUMAN ASSET MANAGEMENT

Debbie Carlton, Martin Hedley Taylor (Dynamic Knowledge)

Abstract: The UK Fire and Rescue Services (FRS) face continuous new challenges. FRS as with industry and commerce has 85% of their budget absorbed by staff costs. Physical assets such as fire appliances and rescue equipment are subjected to rigorous asset management control, testing regimes and renewal programmes. The same rigour needs to apply to human assets management but how? Smart use of E-portfolios! The traditional approach to development of FRS staff has had to change to a model known as “the safe person concept”. The Integrated Personal Development System (IPDS) was introduced across UK FRS in 2003. IPDS was devised following investigations into a number of fatal incidents involving FRS staff. It uses roles rather than ranks with individuals undertaking role relevant development programmes to maintain ongoing competence. This paper will explore the crucial role that E-portfolios have in: (1) providing individuals with a system to join together their learning and vocational experiences; (2) provide managers with a facility to manage human assets; (3) provide a line of sight between the learners journey, organisational risk management and strategic planning; (4) provide a means to manage the transfer of skills and increase employability of individuals.

Keywords: the learners journey, national occupational standards, interoperability, common vocabulary, organisational development, strategic planning, standards, data mining, aggregation, components, role maps

Introduction

This case study will explore the confrontations, frustrations and dilemmas experienced in developing and introducing e-Portfolios to the UK Fire and Rescue Service (FRS), which comprise of 48 individual services. The following are key objectives and outcomes:-

- Providing individuals with a system to join together their learning and vocational experiences,
- Provide managers with a facility to manage their human assets,
- Provide a line of sight between the learners journey, organisational risk management and strategic planning,
- Provide a means to manage the transfer of skills and increase employability of individuals.

Background

The UK FRS are having to prepare for new challenges, as with industry and commerce they have 85% of their budget absorbed by staff costs. Physical assets such as fire appliances and rescue equipment are subjected to rigorous asset management control, testing regimes and renewal programmes. So how can the FRS manage human resources in the same manner? By the smart use of E-portfolios.

The traditional approach to development of FRS staff has had to change and is now driven by the ‘the safe person concept’. This requires that individuals are developed to meet the demands of their role and remain competent within that role. The learning and development for all FRS staff is now aligned to National Occupational Standards and where they exist, appropriate vocational awards can be achieved. The Integrated Personal Development System (IPDS) has been developed by national work groups from within the service and a dedicated project team

formed to assist implementation. In 2003 IPDS was introduced as the cornerstone of the Governments reform of the human resource management of the Fire and Rescue Service.

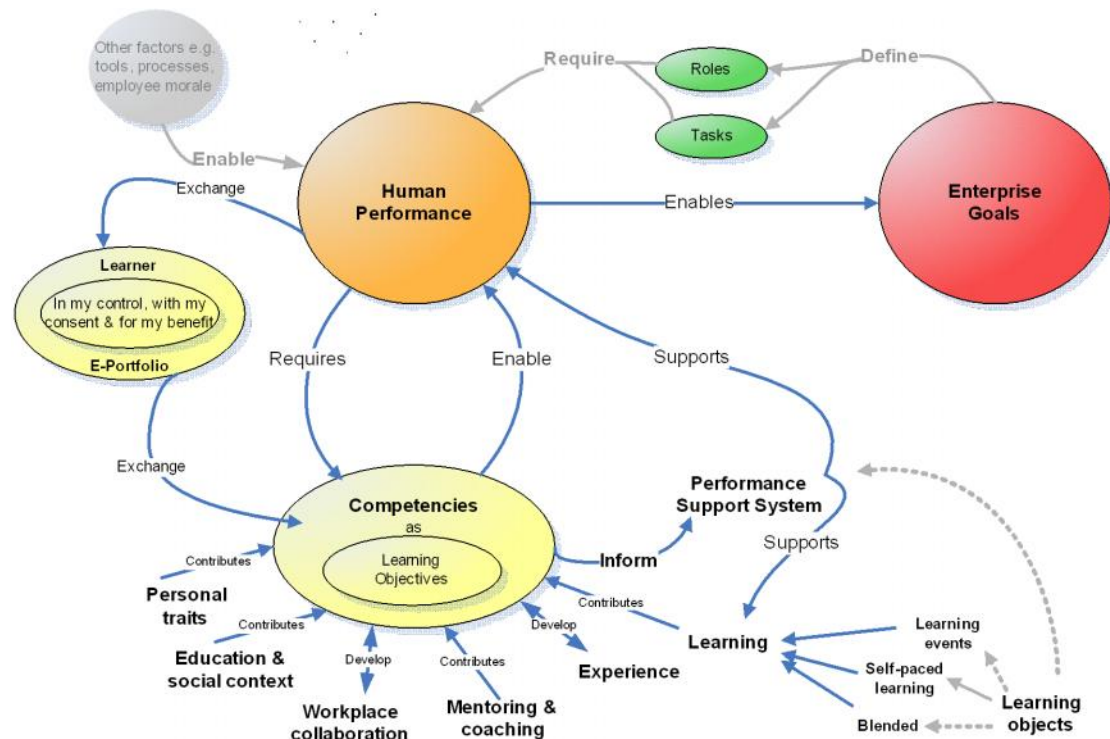
IPDS was devised following investigations and reports into fatal incidents involving FRS staff, where it transpired that basic training and assessment activities were deemed at fault. Subsequent Health and Safety Improvement Notices required:

- The identification of performance standards,
- A way of measuring firefighters against these standards.

The system moved the service into using roles maps (similar to job description) rather than the traditional rank structure with individuals undertaking role relevant development programmes to maintain ongoing competence. The key IPDS principles are:

- Everyone is developed, whether they want to stay in their current role or wish to progress,
- Progression is based on potential and competence rather than formal education or academic qualifications,
- The use of National Occupational Standards ensure fairness and consistency, establishing a level playing field for all,
- Objective and transparent assessment criteria underpin workplace assessment to measure and assess competent performance,
- Individual learning and development supports both the individual and the organisation in their achievement pre-set objectives.

IPDS provides an excellent organisational foundation to move to '*precision skilling*' and thus reduce the time to competency and increase predictive performance. Precision skilling concerns the ability to manage personalised and adaptive competency assessment and learning plans and the resulting assessment results, competency evidence and records that can be stored or reflected in a learner personal portfolio.



FRS thus needs capability that matches the FRS performance management needs (and key KPIs such as reduced time to competency) to learners needs to manage their own employability. As shown by the diagram above the e-Portfolio is at the heart of human performance management. The e-portfolio acts as an exchange mechanism between the learner and employer, as well as other bodies. The e-portfolio enables a *sharable point of view* of a learner's critical performance data within policy, security and legal constraints.

Providing individuals with a system to join together their learning and vocational experiences

Traditionally fire service staff received frequency based training on core skills not necessarily aligned to their job. This one-size –fits-all approach is time consuming and costly. Training based on inputs, not aligned to NOS and with no measure of increased performance or change of behaviour is not sustainable. Records of training events varied in consistency and only recorded what was undertaken and what was required. The recording of vocational experiences has been difficult for individuals and line managers to resolve. In general only successful outcomes are recorded, very seldom are development needs volunteered. Repeated entries for mundane tasks that prove nothing about the individuals competence in role, are recorded with great attention to detail.

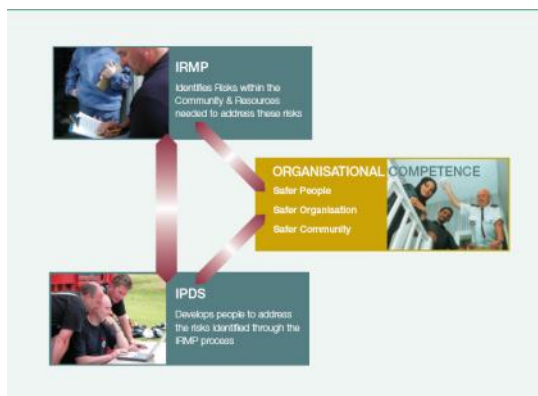
A review of the guidance concluded that an e-Portfolio technical specification be provided that supports FRS to develop or further develop existing PDR systems; and can be used UK Fire Service College *Managed Learning Service (MLS)* project to develop the e-portfolio component of their system.

Provide managers with a facility to manage to manage their human assets

The use of IT recording systems to assist individuals to gather evidence of competent workplace performance has been introduced with disappointing results. In general large quantities of information are gathered and stored. Some use is made of this information but it tends to be at a local level rather than a functional or strategic capacity. If the quality of information being recorded was learner centric against an accurate role profile, and comparable across a population norm, then this information would be relevant to managers through out the organisation.

Provide a line of sight between the learners journey, organisational risk management and strategic planning

Integrated Risk Management Planning (IRMPS) was undertaken by UKFRS to determine their Strategic Objectives (business plan), resource requirement and to set local levels of response. This was as part of a Government initiative to reform and modernise the FRS. The combination of IRMP to identify risks and resources and IPDS to develop people to address the identified risks provide organisational competence.



By aligning strategic, functional, team and individual objectives the learner can be developed against a defined role - *'precision skilling'*. If you know and understand what is expected of the organisation, it's functions and individual roles it will be possible to empower people to direct their own development. The e-portfolio is essentially a self-competency management and promotional tool.

Provide a means to manage the transfer of skills and increase employability of individuals

The UKFRS was formed by the Fire Service Act 1947 and created local authority controlled services. These were traditional hierarchal structures where promotion was gained firstly by a combination of passing statutory examinations and interview situations. Entry into this process was governed by the number of years served by individuals.

In 2004 the Fire and Rescues Services Act 2004¹ was introduced. The main purpose of this Act is to deliver a modernised Fire and Rescue Service that responds to the particular demands of the 21st Century. It increased the role of FRS to include Community Safety and all rescue activity including the setting up of Urban Search and Rescue Teams.

A Learning and Development Strategy document that sets out a framework for taking forward fire and rescue services' learning and development over the next ten years has been published. The aim of this strategy is to provide clarity in terms of what learning and development should be delivered at national, regional and local levels, and to ensure that standards are maintained. To assist with this the Fire Service College have a Managed Learning Services Project which will introduce a smarter and more flexible approach to delivering and monitoring learning and development within the fire and rescue service.

Progression in the service is now achieved via the Assessment and Development Centre process. This process has been designed to test whether people have the potential to work as firefighters and to test the potential of people to work in a wide range of managerial roles.

Change has come all at once to the FRS; managers and systems are having to cope with new demands at local, regional and national levels. Typical 'training' has been replaced by more family friendly practices that use an E-enabled approach. Peoples expectations of employment and employers have changed. As a result we will see direct entrants² joining the service bringing with them portfolios containing evidence of knowledge, skills and understanding from past employment. It is of paramount importance to supervise the identification and management

¹ Explanatory Notes to Fire And Rescue Services Act 2004 Chapter 21

² Direct Entrants. People may now seek employment in the Fire & Rescue Service without following the traditional route of joining first as a firefighter. By using the ADC process it is possible to recruit staff directly into role. As an example there are FRS which have strategic managers who have joined from an Industry and Commerce background

of transferable skills to enable staff to progress from role to role and increase employability on leaving the service.

The diversity of knowledge, skills and experience that an individual accumulates during their career needs to be gathered, sharable and in the case of critical performance data persistent. Here both the individual and the organisation can contribute to this process and use the data to their mutual benefit.

Conclusion

The modernisation agenda for the UKFRS as set by the Fire and Rescues Services Act 2004 is to '*deliver a modernised Fire and Rescue Service that responds to the particular demands of the 21st Century*'. For this to take place it is necessary to use 21st century thinking and technology. The solution to this is the provision and use of an e-Portfolio component that provides a *sharable point of view*.

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WHAT ARE THE FEATURES OF E-PORTFOLIO IMPLEMENTATION THAT CAN ENHANCE LEARNING AND PROMOTE SELF-REGULATION?

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Abstract: This paper presents a literature review focusing on the ways in which e-portfolios are currently used in teacher education and the potential of e-portfolios to support learning. Implications for processes and pedagogies will be identified, and the benefits of e-portfolios and issues of implementation will be considered. Mahara is a fully featured open source electronic portfolio, which was developed in 2006 by the New Zealand e-Portfolio Project funded by the NZ Tertiary Education Commission. Victoria University of Wellington College of Education has implemented Mahara with an entire cohort of first year students in the Bachelor of Teaching conjoint degree. The purpose of the e-portfolio is to assist students to advance their learning and improve their teaching through: (1) collecting and using evidence to critically reflect on their learning and teaching, (2) collaborating with peers and their mentor to critically evaluate their progress, (3) critically analysing their practice in relation to theory and research, (4) self directed learning by systematically setting and reviewing personal professional goals. The paper will discuss the features of Mahara in the light of the literature review, and the ways in which the implementation addresses some aspects of processes and pedagogies to support learning.

Keywords: teacher education, reflection, self-regulation

Introduction

The first part of this paper will report on the ways in which e-portfolios are currently used in teacher education. The potential of e-portfolios to support learning will be explored, and implications for processes and pedagogies will be identified. The benefits of e-portfolios and issues of implementation will be considered. The second part will report on the implementation of an e-portfolio within a teacher education programme at Victoria University of Wellington (VUW), and how this implementation considers and addresses some of these aspects.

Part 1: e-Portfolios in Teacher Education

The Purpose of e-Portfolios

There are many different purposes and ways of using e-portfolios which determine the format, structure and implementation. The use of e-portfolios in teacher education fall into three broad categories (Abrami, Barrett 2005; Smith, Tillema 2003; Wade, Abrami, Sclater 2005; Zeichner, Wray 2001). The first category is those portfolios which are used by institutions, organisations and providers as assessment tools to:

- ensure programme coverage,
- meet institutional / regional / national standards,
- determine whether a student has met the requirements for certification or graduation.

The second category is that of showcase or presentation portfolios which are used to present accomplishments and evidence of competence and may be used to put the 'best foot forward' in proposals and job applications. Teitel, Ricci and Coogan (1998) acknowledge that portfolios can be used in this way as public relation tools. In the third category are those portfolios which are designed primarily for the benefit or personal development of the author. These can be defined as learning portfolios (Wolf & Dietz, 1998), which Strudler and Wetzel (2005b) say are 'based on constructivist philosophy, where students may be expected to take responsibility for

selecting artifacts, making connections to standards, and interpreting their own learning' (p. 2). Learning portfolios, therefore, are more student-centred, with the potential to develop reflective and critical thinking skills. It is the learning portfolio that will be the focus of this paper, and the way in which the tools, processes and pedagogies can support and contribute to student learning.

e-Portfolios and Learning

A portfolio is defined by Shulman (1998) as 'a structured documentary history of a set of coached or mentored acts of teaching, substantiated by samples of student portfolios, and fully realised only through reflective writing, deliberation, and conversation' (pp. 36, 37). It would appear therefore, that it is the process of creating the portfolio, and not the product, that is the primary focus. Shulman (2004) highlights the virtues of the learning portfolio as a tool to examine a teacher's work over time, enabling critical evaluation of strategies and tools used. Key components of the learning involved in the process of creating and maintaining a portfolio are metacognition, critical reflection and collaboration (Klenowski, Askew, & Carnell, 2006). Blackburn and Hakel (2006) report that self regulated learning is a tool which can enhance metacognition, and they explore Pintrich's four stages of self regulated learning: goal setting; monitoring; regulation and reflection. Based on their findings, they recommend that e-portfolio processes and software should:

- encourage and make provision for students articulating their learning and development goals,
- incorporate self-monitoring and self assessment of progress towards goals, and include guidelines for self assessment,
- provide for mentor/advisor feedback and promote the use of feedback to inform future goals,
- encourage and make provision for students articulating strategies for attaining their goals,
- promote evaluation of, and linking feedback to self assessment and attainment of goals,
- prompt students to assess and reflect upon their portfolio entries.

Critical reflection is neither easy nor straightforward. Students require structured support and sensitivity, as engaging in personal development reflection can be an uncomfortable and frightening experience (Riedinger, 2006). Riedinger suggests some 'mining exercises' and workshop activities to introduce reflection and create a sense of ownership and 'ease the transition to more analytical thinking' (p. 97). According to Riedinger, the e-portfolio 'opens wide the possibilities for reflections of all types: in action, before action, after action, in solitude, in consultation with peers, in consultation with instructors, coaches, and advisers, written, spoken, videotaped, or graphically represented' (p. 93).

Boud's (2000) concept of sustainable assessment is one which he defines as 'development that meets the needs of the present without compromising the ability of the future ... which encompasses the knowledge, skills and predispositions required to underpin lifelong learning activities' (p. 151). Moving towards sustainable assessment therefore requires assessment to be put in the hands of the learners rather than the assessors, and requires learners to be able to undertake assessment of their learning throughout their lives. Learners, therefore, should be equipped to be lifelong assessors. He identifies some features that assessment tasks should promote if they are to be regarded as part of sustainable assessment. They include:

- exploration of criteria and standards which apply to any given learning task,
- active engagement with learning tasks with a view to testing understanding and application of criteria and standards,

- development of devices for self monitoring and judging progression towards goals,
- practice in discernment to identify critical aspects of problems and issues,
- access to learning peers and others with expertise to reflect on challenges and gain support for renewed efforts,
- use of feedback to influence new ways of engaging with the learning task,
- care in the use of language to avoid creating premature closure on ongoing learning.

The use of the e-portfolio in teacher education programmes has great potential to support Boud's notion of sustainable assessment incorporating the key components of learning (Klenowski, Askew, & Carnell, 2006).

Shulman (2004, p. 396) acknowledges the importance of collaboration, and Moseley and Ramsay (2005) cite Hilliard (1991), as emphasising: '[teachers] need to experience the joy of collaborative discussion, dialogue, critique, and research' (p. 36). Moseley and Ramsay suggest that this is also true for student teachers, and that peer collaboration and mentoring can add value to the e-portfolio process as a means of authentic assessment. The extent to which collaboration and mentoring takes place within the portfolio construction process, however, varies immensely from those who work largely on their own, to those who have significant peer and mentoring incorporated into the portfolio development process (Davis & Honan, 1998; Freidus, 1998; Zeichner & Wray, 2001).

Pedagogies and Processes of e-Portfolios

It is essential that whenever embarking upon implementation of an e-portfolio within a teacher education programme, the purpose should be absolutely clear to students and faculty: 'the power of e-portfolios and reflections can be squandered if their purposes are not clearly defined.' (Riedinger, 2006, p. 96). The purpose of the e-portfolio will determine the pedagogies and processes of implementation. Attwell (2006) acknowledges that 'there is not one generic approach but multiple approaches that are based on different pedagogic understandings of the purposes and processes of using e-portfolios for teaching and learning'. In Strudler and Wetzel's (2005b) study of universities with 'mature' implementations of e-portfolios; their recommendations for those in earlier stages of implementation included fostering faculty support, and clarifying and sharing the purpose for e-portfolios.

Challis (2005) suggests that the processes and pedagogies involved in e-portfolios are much different to those of their paper counterparts due to the ease of manipulation and interrogation of digital evidence/data and the ability to rework and reconsider material over time. She also identifies the enriched possibilities of interaction due to potential of global readership of web e-portfolios. It is important to consider, therefore, which aspects of learning the e-portfolio implementation is intended to promote, and which features of the tools and processes will contribute to that purpose.

Benefits of e-Portfolios

An e-portfolio provides a structured framework within which student teachers can present text, images, audio and video in a 'fluid' form which is easily edited and updated, with hyperlinks enabling ease of cross referencing. The digital portfolio can also incorporate online communications facilities (Abrami & Barrett, 2005; Wade, Abrami, & Sclater, 2005). The benefits of e-portfolios over their paper counterparts are centred on the multimedia, hypermedia and communications capabilities of the digital media. The ease of storage and accessibility allows for continuous documentation of lifelong learning and demonstration of growth over time. The power of multimedia to represent knowledge and experiences and to scaffold reflection on learning in real contexts is not fully realised yet, but e-portfolios provide the potential for authentic learning and professional development (Challis, 2005). e-Portfolios can reflect the multidimensional nature of a teacher's work in classroom contexts and are based on

self and collaborative assessment (Schwartz & Rolheiser, 2001). The choice of e-portfolio software and systems, however, impacts on aspects such as ownership, authorship, access and equity (Challis, 2005; Cooper & Love, 2001; Gibson, 2006; Tosh, Light, Fleming, & Haywood, 2005; Zeichner & Wray, 2001)

Jonassen (2000) urges the use of the computer as a Mindtool; an intellectual partner in the learning process, and he provides a model of integrating technology to engage learners in the learning process and facilitate constructive, critical, higher order thinking. He argues that multimedia authoring tools can be used for knowledge construction and reflection on learning. An e-portfolio, therefore, falls into the category of Jonassen's definition of a 'knowledge construction tool' (2000, pp. 205, 274).

Richards (2002) suggests that the use of the e-portfolio 'addresses the convergent need for an applied approach to different types of learning in the digital age' (p. 1). His model is significant in that it integrates ICT in education in a powerful way which engages the learner in an activity-reflection cycle. The e-portfolio framework provides a means of formative and summative assessment which addresses the acquisition of knowledge and skills as well as the higher order reflective processes. This aligns with Laurillard (2002) and her plea to move from the transmission model of learning and exploit the potential of new technologies to meet the demands of the digital age. She urges higher education educators to be creative with new technologies. She proposes the more progressive 'conversational framework' model by exploiting the communicative and adaptive capabilities of the new technologies.

Issues of Implementation

The use of the e-portfolio as an assessment tool can be fraught with difficulties of authentication, misrepresentation and validity. (Delandshere & Arens, 2003; Meeus, Questier, & Derks, 2006; Shulman, 2004). Jorgensen and Hansen (2004) cite the work of Borko, Machalic, Timmons, and Siddle (1997) reporting that combining the two purposes of assessment and learning can be problematic as there can be conflicts between level of prescription necessary for accreditation / assessment and the autonomy required for individual learning and self discovery. Cooper and Love (2001) also identify that inequity of access and skill level can have a significant and potentially adverse affect on assessment quality.

Battacharya (2001) cautions that in order for the process of action-reflection to be inbuilt in the formation of a digital portfolio, it must be organised in a deliberate and explicit programme of sequenced activities that lie at the core of the teacher education programme (Challis, 2005). Cooper & Love (2001) also contend that 'obtaining the enhanced outcomes possible using on-line portfolio-based assessment depends on a review of courses' pedagogical and assessment foundations and on teachers' assessment decisions being consistent with underlying pedagogical principles'.

Strudler and Wetzel (2005a; , 2005b) reported that none of the programmes in the six 'mature' e-portfolio users in their study featured moderation of assessment of portfolios by faculty evaluators, and training of evaluators was barely evident. They reported inconsistencies in assessment and identified the need for training and support of evaluators as one of the next steps identified by the universities.

Implications

The characteristics of e-portfolios offer an innovative and dynamic medium for recording and organising evidence/artifacts, and a powerful reflective tool to demonstrate growth over a period of time, with the potential to provide a foundation for long-term authentic professional development and lifelong learning beginning with the student teacher.

The ways in which e-portfolios are used within teacher education vary considerably, with different emphases placed on aspects of assessment, presentation and professional learning.

The extent to which processes such as metacognition, self regulation, critical reflection and collaboration take place within e-portfolio use is very much dependant on the way the portfolio is adopted and integrated into a programme of learning. In order that the processes of critical reflection and collaborative discussion are authentically integrated into e-portfolio use, the e-portfolio should be carefully planned in alignment with teacher education programme philosophies, conceptual frameworks and learning outcomes.

For those mandated implementations of e-portfolios, issues of equity of access and skills level need to be addressed. Barrett (1999) suggests that a simplistic approach to digital portfolio implementation is most beneficial, matching the level of technical skill required to that of the students and staff: ‘the value added of creating an electronic portfolio should exceed the efforts expended, and the faculty members should approach their use of technology conservatively’.

If it is the intention that beginning teachers will continue to develop their portfolio for their own professional development, it follows that the most appropriate tools to use would be those that are accessible to them when they embark on their careers. Another aspect which would impact on the usability of e-portfolios for lifelong learning would be the ownership, interoperability and transferability of the portfolio. The type of application used, therefore has to be considered very carefully with these factors in mind.

If careful consideration is given to the planning, implementation and assessment of the e-portfolio, it can provide a dynamic and engaging environment which will facilitate powerful learning and reflection as well as showcase achievements, and growing capabilities in using technology to support lifelong professional development.

Finally, there is a proliferation of literature on the use of e-portfolios in pre-service teacher education which focus on the types of applications used, and their use within the context of ‘assessment and showcase / presentation’ tools. There is much less on the use and effectiveness of the ‘learning e-portfolio’ to support metacognition, represent new knowledge and scaffold individual and collaborative reflection on practice. The potential of e-portfolios, therefore, to support lifelong professional learning is still being explored and, according to the literature available, is largely unrealised.

Part 2: Implementation of an e-portfolio

Background

For the past four years, the School of Primary and Secondary Teacher Education at Victoria University Wellington (VUW) has implemented an e-portfolio within the Bachelor of Teaching (BTeach) conjoint degree. The portfolio implementation process has been amended this year in consultation with BTeach course coordinators and in response to student evaluations and the external BTeach monitor’s report (Mutch 2006). The development of the e-portfolio process reflects many of the aspects outlined in the previous section of this paper.

e-Portfolio tool

During trimester 1, 2007, VUW conducted a pilot case study with first year students on a newly developed e-portfolio tool. Mahara (<http://www.mahara.org/>) is a fully featured open source electronic portfolio, which was developed in 2006 by the New Zealand e-Portfolio Project funded by the NZ Tertiary Education Commission’s e-learning Collaborative Development Fund. The project involved a number of New Zealand Universities and Polytechnics including Victoria University of Wellington (VUW). Mahara is a web-based e-portfolio, designed essentially as a learning portfolio which is owned by the user; includes collaborative and communication tools and supports lifelong learning and development. Mahara was designed with accessibility, ownership, interoperability and transferability in mind, facilitating the

adoption of Mahara as a lifelong learning tool. The design allows for uploading of multimedia files which can be incorporated as artefacts in any number of blogs or views and shared with other individuals or communities. The communications tools support Laurillard's 'conversational framework' (2002) and provide a global environment for collaboration and peer/self assessment which promote self-regulation and support the notion of sustainable assessment as outlined by Boud (2000). The design of Mahara, therefore, maximises the potential for the e-portfolio to be used to support authentic learning, assessment and professional development and reflect the multidimensional nature of student teachers'/teachers' learning and practice.

Rationale/purpose

The purpose of the e-portfolio process in the BTeach is to assist students to advance their learning and improve their teaching through:

- collecting and using evidence to critically reflect on their learning and teaching,
- collaborating with peers and their Professional Development Mentor (PDM) to critically evaluate their progress in learning and teaching,
- critically analysing their practice in relation to theory and research,
- self directed learning by systematically setting and reviewing personal professional goals.

This purpose is designed to reflect the aspects of learning such as metacognition, critical reflection and collaboration, incorporating goal-setting and self and peer assessment as discussed previously. It is also designed to support students in giving, and responding to, peer and mentor feedback. The conceptual framework for the BTeach degree currently incorporates the BTeach graduate profile and the New Zealand Teaching Council's Graduating Standards for Beginning Teachers (New Zealand Teachers Council, 2007). The student e-portfolio is closely aligned with the graduate profile, as are all other BTeach courses and assessments. All course assessments and terms tasks are therefore relevant to the students' development of their portfolio and add to the value of the portfolio as a formative assessment tool. Burke (1996) writes that the value of a student portfolio lies in its use with other assessment development.

In order to ensure the alignment with the underlying pedagogical principles of the degree, and that the purpose of the e-portfolio is shared by faculty; the process is being developed through ongoing consultation with BTeach associate directors and course coordinators and is explicitly linked to the BTeach programme learning outcomes and the graduate profile.

Pedagogy and process

The degree is made up of curriculum studies (CUST) and professional studies (TEAP) courses. The student e-portfolio is developed and maintained throughout the programme from trimester one in the first full year of the degree, and is a terms requirement of the TEAP courses. Students are not graded on their portfolio entries; however, if the terms requirements are not fulfilled, the students do not pass the associated TEAP course. For the final TEAP course in year four, following the final teaching experience, elements of the portfolio are selected by the student to be incorporated in a presentation portfolio which is graded as a summative course assessment.

In order to promote collaborative discussion and the notion of self and peer assessment, the entire cohort of students was split into groups of 7-9 students, and each group was allocated a member of faculty as their Professional Development Mentor (PDM). Each PDM group was created as a Mahara community with the PDMs assigned as tutors. Students are required to identify one aspect of their progress as a focus for reflection each trimester and relate it to one of the relevant course/programme learning outcomes. In meetings and/or online interactions

with their PDM and/or their peers, they are required to share their artefact and reflection; give and respond to feedback; reflect on learning and set professional goal/s for the following trimester. Students are provided with a template using Smyth's (1992) reflection model: describe; inform; confront; reconstruct. In addition; reflective journal summaries, similar to those used by Woodward (1998), are incorporated in the student reflections. The summaries are designed to help students reflect on their learning through collaboration with peers and mentors. The students are required to make two statements about what they have learned or experienced with their peer group or mentor; articulate what they perceive as their strengths; articulate any concerns, and identify next steps in response to feedback from peers and/or mentor. Boud (2000, p. 158) cites the work of Sadler with regard to response to feedback : 'The only way to tell if learning results from feedback is for students to make some kind of response to complete the feedback loop'. The portfolio entries are discussed by the students and formatively assessed by PDMs each trimester. Peer assessment is scaffolded by providing specific criteria for formative assessment and evaluation of peers' portfolio entries.

Early feedback from students indicated that, although some students found the portfolio process very valuable, others perceived it as 'tokenistic' and an 'add on' (Lamont, 2006). Possibly due to the lack of references to the portfolio in other courses, many students perceived the portfolio as low priority. Although the structure of the portfolio reflects the BTeach conceptual framework and graduate profile; the links and purpose were not made explicit enough for the students, and the portfolio was not established as an integral part of the course. As a result, the process has been reviewed to include portfolio workshops within some CUST and TEAP courses in order to make the links and purpose explicit and scaffold skills of feedback and critical reflection on learning. The workshops include implementation of Smyth's (1992) reflection model to scaffold students in critical reflection and analysis and providing constructive feedback. Subsequent TEAP and CUST courses throughout the programme will provide opportunities for students to share their portfolio entries with their peers and receive constructive feedback from peers and mentors. It is the intention that this will help students to make explicit links throughout the BTeach programme and provide a more 'dynamic and engaging environment which will facilitate powerful learning and reflection' as referred to earlier in this paper (p4). This is in line with Riedinger's (2006) suggestions for scaffolding critical reflection of personal professional development.

In its current form, there are no assessment criteria for the portfolio. The learning outcomes and structure for reflection serve more to give the portfolio definition and boundaries, as enunciated by Broadfoot, cited by Woodward (1998). The process is monitored and recorded by PDMs, therefore the task is duly completed and recorded as a 'pass', but neither process nor outcomes are summatively assessed. This practice of treating an element of assessment as a 'prerequisite' is one approach to peer assessment as offered by Boud, Cohen and Sampson (1999).

Evaluations

The students are currently in their second trimester of using Mahara. Case study evaluations were completed at the end of the first trimester. Forty-three out of forty-seven students completed the evaluation. Some of the results are shown in Table 1.

Table 1

Question	Percentage of 'Yes' responses
1. Did you find the e-portfolio a useful strategy for	
a) reflecting on your learning?	51
b) goal-setting?	33
2. Did you find your PDM meeting and online feedback a useful strategy for	
a) reflecting on your learning?	42
b) goal-setting?	19
3. Did you find peer collaboration and online feedback a useful strategy for	
a) reflecting on your learning?	72
b) goal-setting?	35

Negative respondents made comments on the following themes:

- PDM feedback was not timely,
- technical difficulties and user unfamiliarity with the software,
- goal-setting was not related to learning outcomes ; not enough guidance given,
- only one meeting with PDM at beginning of trimester,
- some peer feedback was outwith the e-portfolio application.

Commentary on findings

Since the first trimester was the pilot case study for Mahara, students and staff were trialling the first version of the software; therefore there were some technical difficulties and usability issues. The timing of the case study report also meant that the submission of portfolio entries was at a time in the course when other assignments were due. Although goal-setting was included in the portfolio template; it was not required to be related to the rest of the portfolio entry. At this point in the course, there was some scaffolding on reflection and feedback, but none on goal-setting and responding to feedback. These aspects are scheduled to be scaffolded in future BTeach courses.

Further research and development

Future developments will include moderation meetings each trimester for the PDMs from each cohort of students. It is the intention to examine a range of portfolio entries to identify to what extent the students are engaging in the key components of metacognition, critical reflection and collaboration (Klenowski, Askew, & Carnell, 2006). As the students progress through the BTeach programme, sessions are scheduled to allow time for PDM student groups to meet and collaboratively evaluate progress. There are also times scheduled for PDMs to meet with their groups to monitor and evaluate progress.

Further research is required to investigate the full system of e-portfolio implementation and the impact of the following on learning:

- organisational, academic and resourcing constraints,
- scaffolding of reflection, feedback and goal-setting,

- scaffolding of peer/self assessment strategies,
- mentor consistency, support and training,
- faculty and student perceptions of e-portfolio pedagogy and process.

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ONLINE APPROACHES TO REFLECTIVE PORTFOLIO LEARNING - INITIAL STUDIES

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Abstract: We are required to deliver portfolios, that contain evidence of skills competencies and reflective learning, within the UK's largest medical school, with 2000 students at university, and hospital sites dispersed across North West England. We are starting to use "Horus", an established education technology to introduce workplace learning management and portfolio services to the medical school's virtual learning environment, in the HeLM (Horus e-Learning Management) project. A major challenge is to use online facilities to support reflective learning for such large student numbers. We present initial investigations of online reflective discussions and the role of student facilitators. We have introduced an online discussion forum, using a WebCT platform. The students are divided into groups, each with designated student facilitators from the same year as the other students. They provide feedback to their peers on portfolios and facilitate online discussions on portfolio matters and specific issues we raise to stimulate debate on personal and professional development. The widespread use of this facility, preliminary results using the community of enquiry model and initial discussions with student facilitators indicate that reflective learning by this means is possible. Our long term aim is full integration of these online discussions with the HeLM project.

Keywords: online reflective discussion, peer assisted learning, virtual learning environment

Introduction

Portfolio Learning in the University of Manchester Medical School

Personal and professional development portfolios (referred to here as portfolios) have been used for many years in professions such as nursing and teaching, however, their introduction into the medical profession is relatively recent. For medical practitioners the portfolio must provide evidence that the individual is competent, abides by high ethical standards, maintains the standards the public and the medical profession expect and is thus fit to practice medicine. By this means individual practitioners can substantiate that they recognise the limits of their competencies and skills, deficiencies in their knowledge and understanding, and think critically about their experiences. The significance of this for clinicians throughout their careers both for patient safety, and for their own development is recognised, in the UK, by the General Medical Council's document "Tomorrow's Doctors (1). Portfolios for medical practitioners are therefore routinely based both on evidence drawn from practice and a reflective element or commentary on experiences(2). Such portfolios are now well accepted in post graduate medical education (3-5). Their introduction, together with personal and professional development, early on in the undergraduate curriculum, is a more recent innovation. Nevertheless, the GMC expects all medical schools to include portfolios and portfolio learning in their undergraduate curriculum (6):

Our vision is of a portfolio that will describe an individual student's maturation from year 1 to year 5, and integrate with their portfolio learning post graduation in the clinical workplace. We have recently introduced portfolios into the medical curriculum in the Manchester School of Medicine, beginning with Years 1 and 2. The medical school in Manchester is extremely large with around 380 students in each of years 1 and 2. This precluded the use of individual mentors to support the delivery of portfolio activities. We therefore used a system of tutor facilitators for groups of students. These tutor facilitators retained some of the functions associated with individual mentoring, but also utilised skills of group facilitation to emphasise aspects of

professional behaviour, reflective writing and practice and to explain the significance of personal and professional development. This approach emphasised discussion between and learning from peers, with the aim of sharing best practice and empowering students as independent reflective learners. The portfolio itself is a simple folder, divided into sections based on the GMC's 'Good Medical Practice' guidelines namely; maintaining good medical practice, good clinical care, relationships with patients, working relationships with colleagues, teaching and training, probity and health.

Challenges to portfolio development in the workplace learning environment

We are now extending the portfolio into years 3 -5 of the curriculum, where the focus is on workplace learning. Here we face a number of challenges:

- We have even higher numbers of students, with over 530 per year. Recruitment of tutor facilitators from clinical/academic staff was not an option,
- As this phase of the course emphasises workplace learning, the students are distributed over 4 geographically separate and distinct hospital sites, dispersed across the North West of England. Although each of these clinical centres has its own distinctive learning environment, the curriculum is that of the University of Manchester Medical School and is common to all students,
- The nature of clinical work place learning is such that timetabling is highly complex and there is little opportunity for face to face group meetings to discuss portfolio activities and personal and professional development as in years 1 and 2.

Technologies and Learning Approaches Available

We have a variety of elearning and pedagogic approaches which we are using to meet these challenges.

- 'HORUS': a suite of sophisticated learning management technologies developed and applied to several workplace learning opportunities including early postgraduate education of doctors, specialist medical postgraduate education and basic nurse education (7,8). To date HORUS has focused primarily on supporting learners' attainment of intended learning outcomes of objective-based curricula,
- Virtual Learning Environment a bespoke virtual learning environment, which supports problem based learning, "Medlea" already in use in the Manchester Medical School,
- Online web based discussions: The use of WebCT as a platform to support online discussions, already employed for interdisciplinary and interprofessional learning between students with disparate timetabling constraints (<http://www.campus.manchester.ac.uk/ceebl/projects/casestudies/9.pdf>),
- Learner led and student facilitated learning approaches The medical curriculum of the University of Manchester Medical School is problem based and the combination of this learning approach with traditional medical workplace learning is now being sited as best practice (9).

Research question

How can these technologies and learning approaches integrate to support workplace portfolio learning, in the context of a complex educational timetable, of large numbers of medical students, who are geographically dispersed? We present here interim Action Research into the development of such an undergraduate portfolio.

We investigate:

- The type online interactions, their development over time and their content,
- The role of the student facilitators.

Planning and Implementation

- 1) The HeLM project In the Horus e-Learning Management (HeLM) project, we are integrating HORUS on a pedagogic model of experience based learning with 'Medlea'. HeLM is supported by an integrated team of experts, each with responsibility for a discrete work package aimed at extending the technology to support life long learning. These include reflective learning, teacher development, integration of assessment, learning management in workplaces, transfer to education of other healthcare professions, project management and capacity building. This forms the basis of an electronic portfolio, which can be accessed by all students. Through this methodology the complexities of workplace learning within a problem based learning curriculum can be made explicit and amenable to e-Technology support.
- 2) Online reflective discussions. Our approach for enabling students to continue their reflective discussions, which supported their professional development in years 1 and 2, was to construct a web page, using WebCT as a platform, specifically for this purpose for students in year 3 which will be continued as they progress through the curriculum. The page has a designated area for general discussion, to which all students in the year can contribute. Students are divided into groups for reflective discussions. Each group was designated discussion board, which was private to its members but could be seen by the three members of the portfolio implementation team. It was made clear to the students that they were the only ones who could contribute to the discussion, implementation team members were non participatory.
- 3) Role of student facilitators - As the students were already familiar with facilitated discussion in groups which emphasised sharing of good practice, empowerment of individual students as reflective learners and learning from peers, we planned that these online discussion groups would be facilitated by students from Year 3 i.e. the same year as their peers. The facilitators have several roles namely to provide feedback and advice on portfolio matters and to facilitate discussions on specific issues raised, by the portfolio support team, to focus debate. There was no specific credit given to them for this activity, although its importance in providing material for their first job applications was not lost on the students. This was an innovative proposal for reflective learning with large numbers of medical students. Although online discussions have been supported by peers elsewhere in Higher Education, notably in teaching practice, it is generally used with small numbers of learners (10). In undergraduate medical education, peer assisted learning is generally applied to the teaching of specific skills to learners at a junior level by more senior students (11,12). This approach was not suited to our situation; year 3 students were the first to have experienced portfolio and reflective learning for the initial two years of their curriculum. Students in years 4 and 5 would have found it difficult to provide feedback on issues concerned with portfolio. We recognised that student facilitators required support, guidance and feedback on their activities. Our proposal was that a small group of clinicians termed "clinical mentors" would fulfil this role.

Results

- 1) **Usage of online discussions.** From November until mid July, online discussions were used vigorously; 98% of groups participated with 3,349 postings The discussions are being analysed for both thematic content and type of interaction. Initial investigations indicate that the online discussions were mostly concerned with issues arising from the

professionalism activity. There was some evidence that the content of portfolios was discussed within the groups online, but the implication was that these issues were dealt with mostly by face –face interactions.

The types of interactions are being analysed by the Garrison et al's community of inquiry model (13), from which 12% were at the integration and resolution levels of cognitive presence and 35%, 26% and 39% were group cohesive, emotional and open levels, respectively, of social presence, indicating increasing sophistication of interchanges.

- 2) **Role of student facilitators and online discussions.** In addition to analysis of the online discussions, we have used questionnaires, focus groups conducted with nominal group techniques,, individual semi-structured interviews and analysis of portfolios with both student facilitators and the other year 3 students. Initial analyses showed that students were positive; 'viewing' others' perspectives was beneficial, text based discussions were 'thought provoking' and empowered reflective learning, although the role of facilitators had to be clearly defined and making time for face to face interactions was desirable. Student facilitators raised the following points:

- Organisation of specific time tabled slots for face-face meetings; many thought that this would be helpful as an adjunct to their online discussions,
- Non participating students; some facilitators felt tentative over referring students who were not participating in discussions on to clinical mentors,
- More activities as a focus for online discussion: most facilitators wanted more issues raised by the portfolio implementation group as a focus for their discussion, to follow on from the "professionalism" activity. They concluded that without this stimulus, the web may not continue to be used widely.

Amendments

The first amendment to the original plan is the incorporation of further activities to initiate further online discussion. The first of these, which challenges the students to consider issues surrounding safe prescription of medicines, has now been introduced. Further amendments will be made following the results of our evaluations.

Future Goals

Our initial observations indicate that the online discussion facility provided by the WebCT platform was used by almost all Year 3 students, who were located on different hospital sites and that it is possible to support this with student facilitators, drawn from the same year. We were therefore able to provide reflective learning by this means, despite a complex educational timetable and large numbers of medical students, who are geographically dispersed. WebCT, however, is a separate platform to Medlea, the virtual managed learning environment, which supports HeLM. Currently there are links between the two, but this is not ideal and our overall aim is to integrate the two systems.

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LAYERING NETWORKED AND SYMPHONIC SELVES WITH ELECTRONIC PORTFOLIOS: A CRITICAL ROLE FOR EPORTFOLIOS IN EMPLOYABILITY THROUGH INTEGRATIVE LEARNING

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Abstract: The role of ePortfolio in promoting employability must be situated in a larger critical discussion about the relationship between citizens, employers and the state. While also helping individuals develop their employability, ePortfolios ought to contribute to creating agency, satisfaction, and meaning in their lives as a whole. The ability to develop and demonstrate transferable skills, flexibility, and self-direction, is necessary for obtaining and retaining gainful employment. However, as recent social theory suggests, these processes of self-development and self-representation help enact identities that contribute to the individualization of society in service of a neo-liberal globalization agenda. A key challenge for ePortfolio leaders is to both serve the immediate needs of individuals to secure employment while also challenging the sole equation of effective citizenship and meaningful identity with employability. In the United States, the discourse around integrative learning in higher education suggests a place to start. Integrative learning has two different styles, corresponding with two types of self, the network and symphonic. The network self suggests way for ePortfolios to promote employability, while representing the symphonic in ePortfolios creates space for a broader conception of what's important in a life. ePortfolio practices cultivating both kinds of selves need to be woven together.

Keywords: identity, discourse, integrative learning, lifelong learning, ethics

Introduction

In early 2006, over one million French citizens took to the streets to protest their government's attempt to institute a new employment contract that would make it easier for organizations to fire workers under the age of 26 during their first three years of employment [Agence France Presse, 2006]. The new contract was promoted as an attempt to decrease unemployment for young people by reducing how significant a commitment employers had to make in hiring new workers. This change, it was argued, would lead to a wealth of new jobs for youth. Its opponents viewed it as a first step towards the "at will" model of employment prevalent in the United States, one of a growing series of measures intended to dismantle the welfare state in Europe. Regardless of what one thinks about the specifics of the proposed contract, its rejection by the public highlights the fact that maximizing the number of people who match up with jobs created according to the needs of mobile capital can not be the sole focus of employment policy and programs. Increased employability is valuable only if in service of more meaningful and secure lives for all citizens.

This article suggests that the role of ePortfolio in promoting employability must be likewise situated in a larger critical discussion about the relationship between citizens and employers and the responsibilities of the state. While also helping individuals develop their employability, ePortfolios ought to contribute to creating agency, satisfaction, and meaning in their lives as a whole. The ability to develop and demonstrate transferable skills, flexibility, evidence of meeting professional standards, self-direction, and the like is most assuredly a necessity for obtaining and retaining gainful employment. However, as recent social theory suggests, these processes of self-development and self-representation may help enact identities that contribute to the individualization of society in service of a neo-liberal globalization agenda. A key challenge for ePortfolio leaders is to both serve the immediate needs of individuals for ways to help them secure employment while also opening a space to challenge the sole equation of effective citizenship and meaningful identity with employability. We need to carve out a critical

role for ePortfolios that both increases employability and shapes the conditions of citizens' relationships to employers and governments.

In the United States, the discourse around integrative learning in higher education, to which ePortfolio practice is strongly connected, suggests a place to start. Integrative learning has two faces, two different styles, which correspond with two different types of self, the network and symphonic. The network self may suggest ways for ePortfolios to promote employability, while representing the symphonic in ePortfolios may create a space for a broader conception of what's important in a life that pushes back against the idea that "life is to become a continuous economic capitalization of the self" [Rose 1999, p. 160]. ePortfolio projects have made exciting progress cultivating both kinds of selves. These works need to be woven together, layering the networked and symphonic, to create ePortfolios that promote employability while asserting the value of their authors as "whole human beings" irreducible to human capital.[Cambridge 2005a].

Discourse, Employment, and Learning

Contemporary social theory points to the power of the way the state talks about people and the ways in which they are able to represent themselves have in creating the identity that determines how society functions. Michel Foucault has shown that power in the modern world is constitutive, not just oppressive. Through discourse, through the way society represents and classifies people, they are created as subjects. The language used to talk about people establishes the shape of identities they may assume. It follows, then, that discourse about learning and employability make possible certain types of selves.

While the bureaucratic mechanisms of the state played a central role in many of Foucault's historical examples, his concept of governmentality points to the increasing role the individual plays in analyzing and representing him or herself in accordance with the societal discourse through which they have been shaped [Foucault 1991; Rose 1999]. The role of the government in monitoring and disciplining the individual has increasingly been delegated to the individual. This insight is further developed in the work of Anthony Giddens and Ulrich Beck on reflexive individualism, in which they argue that the imperative to examine and work on the self is a key means by which the social world is constructed in contemporary Western society and a primary element of contemporary identity [Beck, Giddens, Lash 1994; Giddens 1991]. As Claus Elmholt and Svend Brinkman put it, "in contemporary flexible capitalism, we are constantly encouraged to take a reflexive stance towards ourselves, which is not a natural capacity, but something historically new that we have been trained and disciplined into doing" [Elmholt, Brinkman 2006, p. 174].

The discourses of employment and learning play a central role in the training and disciplining required by these larger structures of power in post-bureaucratic society. Through the development of employability and lifelong learning policy and programs, individuals are shaped into means to fulfill economic objectives. In his further development of the concept of governmentality, Nikolas Rose charts the individualization for economic prosperity, both individual and societal, in late modernity. Rather than as a problem to be solved through creating jobs:

Unemployment [is] now conceptualized as a phenomenon to be governed ... through acting on the conduct of the unemployed person, obliging him or her to improve 'employability' by acquiring skills, both substantive skills and skills in acquiring work, and obliging the individual to engage in a constant and active search for employment. ... Each individual is solicited as a potential ally of economic success. Personal employment and macro-economic health is to be ensured by encouraging individuals to 'capitalize' themselves, to invest in the management, presentation, promotion and enhancement of their own economic capital as a capacity of their selves and as a lifelong project [Rose 1999, p. 162].

The ability of a nation to hold its own economically in the global economy shifts from an objective of collective action to an individual responsibility of each of its citizens. Rather than ensuring employment, the state encourages employability. The “enterprising citizen” makes reasoned choices aimed at accumulating the competencies demanded by globalized capital, in a manner paralleling how she acquires goods as a consumer, his or her other key role in supporting economic growth [du Gay 1996].

The promotion of lifelong and reflective learning, of which much ePortfolio activity is a part, are primary means for enacting this self as human capital. To achieve success, we must now become a “learning society,” but the measure of that learning, like the measure economic competitiveness, becomes the dispositions and capabilities of individuals, for which they are primarily responsible. In their analysis of lifelong learning discourse, Webb and Warren demonstrate how the enterprising citizen is made a “responsible learner,” vigilantly engaging in ongoing development through a series of rational choices designed to maximize employability: “Policy narrative and the bureaucratic reforms that have sought to realize the discourse through regulatory frameworks, institutional arrangement, curriculum reform and funding streams work on the bases of privileging the process of choice, and ensuring learning are making the right kind of choices” [Warren, Webb 2007, p. 10]. Each individual has a responsibility to continue to learn throughout life and in accordance with principles maximizing his or her value.

The power of this argument is strengthened through framing lifelong learning as an innate desire for self-development and self-actualization that aligns seamlessly with the needs of one’s employer in the discourse of the learning organization [Contu, Willment 2003]. Being a responsible learner requires self-reflection and self-evaluation, but such activity is portrayed as the result of a natural impulse towards self-discovery, rather than being more accurately characterized as “participatory surveillance” on behalf of the organization, so that “a shared interest in learning between the individual and the organization is taken for granted” [Elmholdt, Brinkman 2006, p. 174]. Such conflation of organizational and individual interests threatens to extend the power of organizations beyond work into the whole of human personality, leaving little space for anything else. Through their learning, employees “are asked to be specific kinds of people, rather than mere professionals with skills independent of their private personalities” [Elmholdt, Brinkman 2006, p. 176].

Because of the “seemingly benign and apolitical character” of invocation of our born identities as learners, it is particularly difficult to challenge this discourse, particularly as professional educators dedicated to promoting learning [Contu, Grey, Ötenblad 2003, p. 945]. Given the penetration of these individualizing discourses, an uncritical embrace of “learning” risks capitulating to the neo-liberal agenda they enact. However, as Foucault and other post-structuralists argue, there is no space outside of discourse from which to resist. This does not mean that resistance is not possible. Rather, “new human capacities may come into existence as effects of forms of domination, only to then become bases of resistance to those same forms of domination” [Elmholdt., Brinkman 2006]. The lifelong and reflective learning discourse, and the practices through which it constitutes reflective and lifelong learners, may also provide the means to contest the equation of individual and organizational interests.

We may need to oppose the potentially oppressive role of these discourses in ePortfolio practice through finding way to use individualized learning against the grain of the employability discourse. In the United States, these means for resistance may be found in the discourse of integrative learning in higher education, which can be seen both as a response to the need to increase the employability of University students and as a call the critical analysis that calls an exclusive focus on that need into question.

Integrative Learning and ePortfolios

In the United States, there is a growing consensus higher education policy circles that integrative learning should be a key educational focus. In a recent report, business and educational leaders gathered by the American Association of Colleges and Universities (AAC&U) write that cultivating a “high degree of integrative learning” may very well be the “key change” needed in higher education in the twenty-first century [American Association of Colleges and Universities 2007]. We live in a world where problems increasingly defy specialized solutions, where patterns of employment necessitate flexibility and independence, where knowledge and culture is constantly being remixed, where boundaries between the personal, professional, and civic are more difficult to draw. The capabilities that make up integrative learning, a growing chorus suggests, will help people succeed in this transformed environment. While the integrative has certainly been part learning from the beginning, it has received high profile attention in recent years.

The connection between electronic portfolios and integrative learning is inescapable. In gathering together different kinds of evidence from multiple contexts, making connections between them, and trying to explain to what they add up to and what to do on the basis of that understanding, portfolios exemplify many integrative habits of thought. Electronic portfolios often also incorporate multiple media, are created and managed with multiple technologies, and link a variety of audiences. It's unsurprising then, that nearly one-third of the 139 institutions applying to participate in the Carnegie Foundation for the Advancement of Teaching / AAC&U Integrative Learning project in 2005 included portfolios as a central element of their projects [DeZure, Babb, Waldmann 2005].

Because most portfolios focus on their author, they place the self at the center of this constellation of connections. Through their electronic portfolios, students enact selves. While these selves are enabled and constrained by the larger cultural discourse about identity suggested in the previous section, how educators frame the processes of composing and using portfolios can also influence the selves students create [Yancey 2004]. Through the design of ePortfolio programs, we take part in the larger discourses about employment and identity, either reinforcing the equation of selfhood and human capital or complicating it. In order to judge the effects of our ePortfolio work to date and to uncover possible routes forward, the next question to consider is, what kind of selves does integrative learning through portfolios suggest?

The Networked Self

To answer this question, a clearer picture of what is called integrative learning in the US higher education policy discourse is necessary. Carol Schneider, president of AAC&U, defines integrative learning this way: “[I]ntegrative learning is a shorthand term for teaching a set of capacities—capacities we might also call the arts of connection, reflective judgment, and considered action—that enable graduates to put their knowledge to effective use” [Schneider 2003]. As surveyed by Pat Hutchings and Mary Huber of the Carnegie Foundation for the Advancement of Teaching, the range of educational practices and philosophies aimed at these capabilities is vast. Connection and reflection are recurring themes. Students must be prepared to make connections that span traditional boundaries: between courses, across disciplines, between the classroom and the wider world, across the years of their undergraduate educations. Furthermore, through reflection, they need to learn why they should be making connections. They must become intentional learners, internalizing the imperative to make connections so that they continue to do so beyond graduation.

Much suggests that such intentional boundary-crossers are likely to be highly employable. Integrative learning proponents argue that the contemporary workplace requires considerable flexibility and continual learning. The rapid pace of change that accompanies advanced information and communication technology and a global, deregulated economy requires

workers who are able to quickly learn new skills, collaborate with a rapidly changing cast of others, make independent decisions, and find creative solutions. Increasingly, professional employment is based on projects, not steady jobs, and the boundaries between home and work are less well-defined or respected. Increasingly, successful professionals must know how to build the networks needed to market their abilities, demonstrate that they can apply their skills in diverse settings, and must be ready to shape their time around the demands of emergent responsibilities [Reich 2000; Sennett 1998; Candy, Crebert 1991]. In addition, the processes by which culture and knowledge are created may be changing, involving large-scale collaboration without centralized control and the recombination and interweaving of existing media content [Sunstein 2006; Lessig 2005; Weber 2005]. The very nature of learning itself may be changing too, suggesting that the unit of analysis for measuring learning might need to shift from individual minds to networks of people, tools, and texts [Hutchins 1995; Seimens 2005].

Student adept at both making connections and making choices about which connections are important to make are likely to be effective in such an environment. The incoming generation of college and university students may have a head start through the technologies that permeate their daily lives [Prensky 2001; Brown 2000; Oblinger, D. J 2005]. An increasing number of students are adept at articulating their social networks through systems like Facebook and MySpace, collaborating and competing with others in massively multiplayer online games and other immersive environments, managing information about themselves distributed across the Internet, remixing and critiquing visual culture on YouTube, and writing about their lives, evaluating their connection-making activities and drawing new connection to the writing of others, through blogs [Boyd; Nardi, Schiano, Gumbrecht, Swartz 2004]. This generation of students have also been educated within a system of schooling permeated by the discourses of learning and employability discussed earlier, further predisposing them to making connections that increase their personal and professional capital a primary objective.

These activities, in both their academic and recreational inflections, suggest a kind of self, one defined by connections and seeking them, focused on deciding where to go next. As in the discourses of employability and the learning organization, the network individual focuses on making rational choices that lead to the accumulation of links that make them more valuable. This is the first kind of self that is important to consider for integrative learning through portfolios, the Network Self, the self of making connections.

Electronic portfolios have a clear affinity with this way of expressing identity. From the beginning, portfolios have been about combining and recontextualizing diverse kinds of documents. The ability to create hyperlinks, both internal and external, is one of the most readily identifiable advantages of the digital medium. Many systems designed specifically to facilitate electronic portfolios include spaces for interaction that allow for collaborative connection-making, and social networking capabilities are increasingly finding a place in ePortfolio software and practice.

Capitalizing on these capabilities, ePortfolios can be used to promote employability and lifelong learning. However, they fall short of what distinguishes portfolio composition from other kinds of technologically-mediated self-representation. Portfolios distinguish themselves through another dimension of integration that produces another kind of self. It is in this second face of integrative learning and ePortfolios that we can see how portfolios might serve as more than a means to enhance employability that puts the ideology of individualized, reflexive identity into action. The portfolio is a highly individually-focused genre and is unlikely to be helpful in reversing the trend towards individualization. However, it can offer an alternative version of individualism that better accounts for the complexity of meaning and satisfaction in people's lives.

The Symphonic Self

The network self is richly connected, highly flexible, able to adapt, collaborate, and learn throughout life without much in the way of external direction. As such, it is well-suited to the many of the challenges faced by individuals serving the role prescribed by discourses of learning and employability, seeking to obtain and retain gainful employment in the contemporary workplace. However, a networked life may leave something to be desired. In *The Corrosion of Character*, Richard Sennett shares the lives of a variety of people working in the new environments for which integrative learning is to prepare students [Sennett 1998]. What these bread makers, bar owners turned advertising agents, and recently laid-off computer programmers have in common is a profound sense of disorientation and lack of meaning.

Even the most outwardly successful among them, Rico, a wealthy, globe-trotting business consultant—a master of professional networking, self-directed learning, and rapid collaboration—cannot connect what makes him good at his work with the story he wants to tell himself and his children about living an ethical life. What's missing is narrative:

Narratives are more than simple chronicles of events; they give shape to the forward movement of time, suggesting reasons why things happen, showing their consequences. Enrico [Rico's father, whom Sennett interviewed in the 70s] had a narrative for his life, linear and cumulative, a narrative which made sense in a highly bureaucratic world, Rico lives in a world marked instead by short-term flexibility and flux; this world does not offer much, either economically or socially, in the way of narrative [Sennett 1998, p. 30].

While Rico wants to tell a story about his life that centers around long term commitments and deep connections that take a long time to take hold, he cannot make his professional life fit. While highly reflective and intentional in that sphere, he has neither the conceptual tools nor the time and space to make sense of the whole of his life. Superior at making strategic connections, he's unable to step out and examine the big picture. He is highly employable, and highly skilled at enhancing that employability, but the sources of satisfaction and meaning he seeks exceed the sum total of his professional competencies, and the ways of making relationships and commitments these competencies encourage conflict with other values he holds more deeply. He lacks the ability to explore that conflict and to imagine ways to change himself and the organizations with which he works to resolve it. The multiple spheres of his life lack coherence, lack any unifying principle that gives them meaning. While he may be skilled at a certain variety of integration, his life lacks integrity.

This absence frames a second kind of self, a self focused on achieving integrity, the Symphonic Self. While deeply integrative, the Symphonic Self focuses squarely on the whole. The representative figure of this kind of self is the composer or conductor, whose job, Daniel Pink reminds us, “involve corralling a diverse group of notes, instruments, and performers and producing a unified and pleasing sound” [Pink 2005, p. 126]. While they must certainly be able to create and identify relationships between these elements, this “is not the ultimate goal of their efforts. What conductors and composers desire – what separates the long remembered from the quickly forgotten – is the ability to marshal these relationships into a whole whose magnificence exceeds the sum of its parts” through “the ability to grasp the relationships between relationships” [Pink 2005]. The Symphonic Self achieves integrity by forging meaningful and persuasive relationships between the relationships that constitute the Network Self.

The symphony is a powerful metaphor for self-representation – perhaps a better one than the story – because of its multi-vocal, episodic, multilinear structure. One limitation of a focus on life narratives is that most individuals develop their stories drawing on a relatively small number of models from the larger culture, most of which may be unsuitable to dealing with contemporary social realities in a critical fashion [Goodson 2005]. In light of the myriad changes in familial, social and economic relationships articulated by the proponents of the networked

self, it may no longer be possible for many to satisfy the longing for a linear and straightforwardly cumulative life narrative that Sennett's respondents expressed. Given these complexities, Mary Catherine Bateson suggests in *Composing a Life* that our best models may be lives rich with improvisation, interruption, and redirection, the lives of those who have mastered networked selfhood, but on their own terms, lives "where energies are not narrowly focused or permanently pointed toward a single ambition." However, to see such lives as without coherence is evidence of a failure of our aesthetic sense, our narrative imagination. "These are not lives without commitment, but rather lives in which commitments are continually refocused and redefined" [Bateson 1989, p. 9]. In her interweaved profiles of five highly successful women living such lives, Bateson demonstrates how each has found her "own kind of integrity" [Bateson 1989, p. 13]. There is an integrity found in emergent continuities rather than continuous trajectories, of both multiplicity and connection.

These women's stories, however, are harder won. They require periodic periods of sustained reflection and considerable creativity to achieve this integrity. While continuously revising their lives, they also step out from time-to-time to craft an account of the whole for themselves. This integrative reflection is particularly valuable at periods of transition, both professional and personal, and is often done in conversation with others. Seeing the relationships between the relationships they've skillfully cultivated helps them both discover the consistency necessary for a coherent sense of self and choose among the paths their network skills have opened for them. The sustainability of their network lives, and the satisfaction comes with it, is a product of their symphonic selves.

While each developed capacities that made them employable in creative and compelling ways, such development was not the primary focus of the paths they carved out for themselves. Their trajectories were guided by an emergent, iterative understanding of the whole of their lives, by intuition and desire as much as by strategic choices about marketability and status. Putting such stories of integrity, in which the ways in which the lives of individuals exceed their employability are foregrounded, in front of audiences accustomed to interpreting success the narrow lens of the dominant discourses of employment and learning through ePortfolios may be one way of using integrity to push back against imperative to work on the self solely on behalf of economic competitiveness.

Not just for these exceptional women, but also for many of University students, major transitions are more frequent and diverse in a networked world than they were in bureaucratic modernity that Sennett's subjects mourn. In addition to having the flexibility, agility, and self-direction necessary to prosper where they go next, students need to be able to situate the new within an integrated overall narrative of their lives. While this narrative may have a more complex structure and require more effort and skill to achieve than for past generations, it is no less essential. We need to prepare students to answer the question Bateson poses to herself and her respondents: "If your opinions and commitments appear to change from year to year or decade to decade, what are the more abstract underlying convictions that have held steady, that might never have become visible without the surface variation?" [Bateson 1989, p. 15].

Answering this question can be deeply meaningful to the individual. Through crafting a symphonic self, we can find patterns within our achievements and our intentions that help us feel at home and at peace. Beyond just that, however, integrity has a critical social component. It is through articulating enduring convictions and exploring their degree of alignment with the connections they make that students can develop a critical perspective on how their identity should serve social purposes and create self-representations that can shape their relationships to organizations, institutions, and communities. For these narratives to have an impact, and to avoid the stories contributing to individualization by obscuring collective circumstances that shape them, we need to create environments that allow for new narratives by understanding lives in context, in community with other learners [Goodson 2005].

Professional communities, which transcend the boundaries of organizations, might play a central role. One route to making the connection between individual self-actualization and collaborative excellence that is so seductive in the discourse of the learning organization without falling into the trap of equating individual and organizational interests may be through the idea of a profession. Higher education prepares many students to serve in professions. Integrity's ability to balance the personal and social is key to their health. Professions are granted considerable autonomy in exchange for serving the collective good of the society. At their best, engagement in professional life enables both personal achievement and social responsibility:

Professional occupations create recognized opportunities for individuals to make something of their talents and capacities. On the other hand, this is possible only through personal commitment to the disciplines of a community of practice. At its best, professional life enables individual freedom to find fulfillment as it advances the well-being of the larger society [Sullivan 2005, p. 284].

Situating life narratives within a profession allows individuals to represent their vocational development as more than simply employability, to chart a social contribution that isn't simply economic. Here too, articulating the balance between individual and social requires not just intentional connections and adaptations, but also the articulation of patterns and boundaries in one's participation in multiple communities of practice – those organized around a profession, situated within organizations, and formed through private relationships. By making a connection to a moral imperative higher than organizational success can contribute to the development of "ethical communities of practice" both within and beyond organizations that acknowledge the integrity of workers lives and their collective interests are part of a shared society [Nyham 2006].

Like connection making and intentional learning, this concern for the whole is also present in the discourse about integrative learning. In an environment where students move in and out of formal education in increasingly less predictable patterns and where many students take courses from multiple institutions, helping students find coherence in their undergraduate experience is an important objective [Huber and Hutchings; American Association of Colleges and Universities 2002]. In addition to drawing connections between their learning in and beyond the classroom, students need to be supporting in understanding their "learning careers" as whole, synthesizing these diverse experiences to add up to something greater than the sum of the parts [Chen 2003]. Student need to be able to represent and point to the importance of the whole of their learning, not just that which is formally sanctioned or which serves the objectives of the educational institutions with which they have relationships. Research in the learning sciences, too, points to the ability to see holistic patterns as a key to expert knowledge [Bransford, Brown, Cocking 1999]. Leading scholars of interdisciplinary studies argue that integration of diverse disciplinary insights into a unified whole is what distinguishes truly interdisciplinary from merely multidisciplinary practice [Klein 1996; Repko 2005]. Because of these deal focus on the networked and symphonic styles, integrative learning may provide a fruitful frame for thinking about ePortfolios and employment.

Electronic portfolios have their roots in such symphonic integrative thinking. In the US pedagogical tradition, in disciplines such as rhetoric and composition and teacher education, portfolios have traditionally been used to show how evidence of learning collected over time adds up to a whole greater than the sum of its parts to show development. The best portfolios present a theory or story that offers an integral representation of what an individual has learned, knows, and can do [Cambridge 2005b, 2006]. Helen Barrett's influential work has long argued for the centrality of narrative in ePortfolio practice [Barrett, Wilkerson 2004; Barrett 2006]. Research on the impact of ePortfolios on learner and organizational relationships in both US higher education and lifelong learning contexts points to integrity, the degree to which an ePortfolio maps the relationships between personal, academic and professional identities, as a key factor

cited by portfolio authors as responsible for richer learning and more powerful relationships [Cambridge 2005a; Eynon in press].

Networked and Symphonic Selves in ePortfolio Practice

While both representing styles of integrative learning, the networked and symphonic selves differ in the values they embody, the activities they suggest, the characteristics of the genres and technologies that support them, and the impact they have on individuals, organizations, and communities [Cambridge in press]. A full examination of these differences, which have implications for ePortfolios, is not possible here. Similarly, surveying the full range of existing ePortfolio practices that enact these two types of self is beyond the scope of this paper. However, a brief examination of two examples of ePortfolio programs designed to address needs for employability will begin to address how these differences play out and will point to what is left to be done for ePortfolios to help to develop both styles of integration, and, as a consequence, both increase employability and challenge the idea that increasing their employability is the primary social duty of individuals.

Nedcar and the Network Self

A first example is the Nedcar project, which provides ePortfolio services to employees of an auto manufacturer in Holland. The cancellation of a major project by one of the Nedcar company's clients required the layoff of over one third of its workers. Management saw this as a symptom of a larger trend to which they needed to adapt to remain profitable: The industry is moving from an "employment economy" to "project economy," making firing and hiring a regular part of business [Vervenne, Mensen 2006]. In order for the company and the industry to compete in the globalized marketplace, there was perceived to be a need for a "flexible, mobile, transparent labor market" that enables the regional exchange of employees. The company needed to be able to quickly evaluate workers "in terms of competency aggregation," to inventory evidence of the desirable skills they have and match them to projects and to improve their adaptability by pointing them to lifelong learning opportunities that match gaps in their competencies.

The Belgian firm Synergetics developed for Nedcar what is likely the most sophisticated competency-centered ePortfolio implementation in the world, producing a system that allows evidence to be assembled from multiple sources, linked to competencies, and searched and shared in a format compliant with open e-learning and human resources technical standards. Workers losing their jobs could make their competency profiles available to other industry employers, likely increasing their employability and easing the increasingly frequent transitions between jobs that are likely to be required over time. While employed, workers would have the opportunity see what desired competencies they lack and to reskill themselves to meet the changing demands of auto manufacturing.

Such a competency based system clearly opens new connections to individuals, allowing the more rapid negotiation of relationships with firms, and linking to educational experiences that might expand expertise valued by current and potential employers. In increasing workers ability to make connections, it builds their network selves, establishing them as lifelong learners able to adapt to the changing workplace. Such work has clear potential value to individuals in this industry facing the prospect of immediate unemployment and degraded job security over the course of their careers. Ongoing research by Synergetics and others on this and similar projects will likely yield valuable insights into how well this approach helps workers deal with the instability they face. This is clearly a valuable application of ePortfolios.

However, this way of representing individual through ePortfolios and associated learning services has limitations. First, the approach is "labor-market-centered." Primarily the initiative

of a profit-seeking corporation, it is focused on the needs of the organization and the industry of which it is a part. While the benefits to individuals are tangible, they are peripheral. The focus is not on the goals or aspiration of individuals or the qualities of their working lives except to the extent that these align with the objectives of business. The role of the individual is to present and develop him or herself as a resource to the industry.

Second, this kind of portfolio presents a very narrow representation of self. An individual is represented as a collection of competencies, and as flows of competency information between institutions. Only those competencies deemed valuable by the industry are presumably included, and they are aggregated, not synthesized. The systems allows portfolios audiences to ignore aspects of individuals' lives not perceived as relevant to increasing the profitability of the firm and the competitiveness of the regional industry. There does not appear to be any explicit capacity to examine how the whole adds up to more than the sum of the parts and to consider tensions between organizationally desirable competencies and personal values and commitments. This kind of portfolio does not help answer the question, how does employment serve the larger whole of the meaningful life of a citizen? While the seeming objectivity of viewing individuals as aggregations of competencies might help to eliminate bias in hiring and firing, it also reinforces the reduction of the individual to human capital.

eFolio Minnesota and the Symphonic Self

The eFolio Minnesota project, which provides the opportunity to create an ePortfolio to all residents of the US State of Minnesota, provides a second example. eFolio is run by the Minnesota State Colleges and Universities (MnSCU), a statewide system of higher education institutions, in collaboration with the State's Department of Labor, using software developed by Avenet. It shares with the Nedcar project the general goal of improving employability through providing ways to represent expertise and opportunities for lifelong learning. Over 60,000 individuals have created portfolios using the system and services provided by the project. Research indicates that, while these individuals have had more formal education than the State's population as a whole, they are representative in terms of age, race, and national origin [Cambridge 2005a]. Portfolio authors include not only those currently studying in schools, colleges, and universities, but also workers, teachers, and, in many cases, individuals inhabiting more than one of these roles, at once or over time.

While portfolios by default include categories that encourage the representation of competencies related to education and employment, the structure of an individual's portfolio is highly customizable, allowing him or her to include whatever material they like and to control the visual design and organization of the portfolio. Rather than impose a standardized format or process, MnSCU made the decision to leave it up to individuals how to structure and make use of their portfolios.

While many portfolio authors found eFolio helpful in presenting evidence of their achievements to employers in the process of obtaining a job, the portfolios had the most impact on their learning and relationship to others within their academic and professional organizations through situating employment with larger, integrated narratives of their lives. They saw their portfolios as "personalized documents for professional purposes" within which they chose to include "the pieces that [they] feel most accurately and positively reflect [their] whole human being," those which demonstrate their values and illustrate the challenges they face in balancing the different spheres of their lives and managing the relationship between their enduring commitments and evolving relationships. Beyond just demonstrating their competencies, they found it important to share with the audiences symphonic representations of their lives. In an interview with the author, one eFolio participant said:

I think it'd be difficult to separate completely, you know, who I am and what my immediate family loves are versus just me as a professional educator and nurse. ...

I am not someone who's isolated to the world of professional nursing education. I also have conflicting, or competing maybe, obligations within my life that I need to balance, just as students do and other professionals do, and I think that that's a good thing, to show ... people that are reading my sites, I have other obligations in my life, and I manage to hopefully balance them all and be able to perform to the best of my ability in all those domains.

Rather than masking the complexity of their lives from interpretation, she sees value in having her audience consider her achievements in this larger context.

The eFolio software's open structure supports this kind of individually-defined portfolio use well. However, it makes it difficult for employers to find the portfolios of appropriate job candidates when faced with thousands of possibilities and to compare them in relationship to job requirements. In interviews, too, eFolio participants expressed a desire for their portfolios to be searchable by competencies, much as those of the Nedcar employees are, in order for them to make new connections as well as represent their whole selves.

Employability in Layers

The future of ePortfolio and employment lies with applications that can cultivate both network and symphonic selves together, providing both the employability infrastructure of Nedcar and the ability to assert individual integrity of eFolio Minnesota. While very difficult to achieve with the current generation of ePortfolio systems, rapidly maturing semantic web technologies enable both individually-defined structure and standardized representations of competencies. Most systems are either based on rigid XML specifications, such as that used by Nedcar, or produce unstructured XHTML, such as that used in eFolio Minnesota. The next generation of systems can use RDFa or similar scheme to embed Semantic Web data that computers can index and analyze within unstructured Web pages designed for human readers [W3C 2007]. The technological barriers to an integrated ePortfolio system can be readily overcome.

The conceptual dissonance between two styles of integration and the two purposes is more challenging. Improving employability while simultaneously critiquing employability seems put ePortfolio to work on contradictory purposes. However, there is reason to believe that the nature of the digital medium and the structure of democratic society may both be conducive to keeping both in play in an integrated space. Richard Lahman argues that digital texts suggest two ways of reading, looking through and looking at. We look through electronic texts to consider their meanings, as we do with print, but we are also inclined to look at them, to examine their form and function [Lanham 1993]. These two seemingly contradictory ways of reading bind together into a "bi-stable equilibrium," and both are essential to our experience of such texts. Mary Catherine Bateson suggests that democratic citizenship itself requires such alteration of seemingly contradictory frames [Bateson 2001]. We must, for example, be committed to both the success of the candidates or policies we think best for the community and to the process of electing representatives and passing laws, even if that process may not end up favoring those leaders or programs. We must learn to think and act in "layers" to successfully fulfill our public roles.

As digital texts, electronic portfolios may also achieve a bi-stable equilibrium, one of participation and critique, both conveying employability and encouraging us to question the discourse that surrounds it. As tools within democratic societies, ePortfolios may prove to accommodate multiple layers of self-representation: Through making networked connections using structured information about competencies, portfolio authors can improve their employability; through representing these capabilities within symphonic narratives of the whole of their lives, they can critique the discourse that suggests that becoming more employable is solely their individual responsibility and should be a primary focus of their citizenship.

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INTRODUCING E-PORTFOLIOS ACROSS A PAPER-DOMINATED UNIVERSITY: STUDENT AND STAFF VIEWS TOGETHER WITH ATTITUDES TO THE VALUE OF CHANGE

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Abstract: E-portfolios are inherently suited to effective assessment for learning. An e-portfolio can be shared at any point with peers or tutors alike, formative feedback can be given at various points in the e-portfolio building process and following this the portfolio can be finally submitted for summative assessment. In this paper the use of e-portfolios across a range of subject areas is described and evaluated. This development in the use of an electronic means to present and assess student progress involved over 2000 undergraduate students and 25 staff. Their views on the effectiveness and value of e-portfolios were subsequently sought through a questionnaire and face to face interviews. Around half of the students stated that they found it easier to put their thoughts and feelings forward through an electronic interface, finding the process of creating an e-portfolio interesting and challenging. Many students believed that making an e-portfolio helped them to think more about what they had learned and achieved whilst a lower proportion thought that making an e-portfolio helped them to organise their thoughts or work. All of the staff involved found the use of e-portfolios of value and adapted well to the demands of marking electronic forms of students' work.

Keywords: assessment, feedback, ePortfolio, elearning, online marking

Background

Both the Tomlinson (2004) and Schwartz (2004) group reports stress the importance of information technology to learning in the 21st century and the need for learners to be able to tailor the evidence they use for assessment. An e-portfolio allows learners to collect, select, reflect and celebrate their learning and progression and have the freedom to use multiple forms of evidence both formal and informal.

An e-portfolio is typically made up of a digitised collection of resources and artifacts and can include text based materials, graphics and multimedia. In addition however an e-portfolio allows for an exchange of ideas between the owner and those who view and comment on it. This, coupled to the personal reflection of the owner, can create powerful opportunities for learning (Greenberg 2004). Compared to paper portfolios, e-portfolios offer a range of benefits including the capability to collect and present a wider range of resources, easier management of resources and enhanced flexibility with respect to access and feedback (Oduyemi and Ogston, 2006).

Partly as a consequence of the reports referred to above, e-portfolios are increasingly becoming part of the educational landscape; they have significant support from educationalists who consider them an important and more developmental form of assessment. Portfolios are essentially constructivist tools and so neatly fit with the importance that is attached to the work of Vygotsky (1978) in modern educational theory.



1. How ePortfolios have been used at Westminster

Blackboard has been used at the University of Westminster for over 5 years. However the content system component, which provides the e-portfolio functionality, was only introduced in the academic year 2006/7. In this academic year a total of 13 study skills based modules made use of the e-portfolio tool. They spanned all undergraduate levels and a number of subject areas. (Table 1) 25 academic staff and over 2000 students were involved, with all experiencing the use of e-portfolios for the first time. It should be noted that all portfolios were assessed and contributed to overall module marks.

Table 1 – The range of modules involved

Module name	Year	Percentage of Module Mark	Submission Method	N. Students	N. Tutors
Work Placement in a Legal Setting	2	100%	Assignment function	64	2
Studying In Higher Education	1	50%	Assignment function	345	9
Perspectives of Computer Science	1	40%	Sharing	256	8
Developing Your Professional Future	2	100%	CD	196	5
Employability and Work Placement	2	100%	CD + Paper	17	2
Cross-Cultural Work Placement	3	100%	CD + Paper	17	2
The ICT Practitioner	1	40%	Assignment function	122	2
Introduction to the Built Environment	1	50%	CD	123	5
Research Methods	2	30%	CD	22	2
Research Methods	2	30%	CD	40	2
Personal Development	3	100%	CD	72	2
Interpersonal Skills for Business	1	15%	Sharing	413	11
Interpersonal Skills for Business	1	15%	Sharing	411	11

Although each module listed in table 1 had unique learning outcomes, all of the e-portfolios had a number of common elements which supported Personal Development Planning (PDP) (Table 2). The majority of modules involved students undertaking a cycle starting with a period of self assessment; this was followed by action points, presentation of evidence and then finally reflection. The cyclical nature of PDP was well supported by the eportfolio tool as it offered content control back to the student.

Weekly tasks helped students in the PDP cycle and focused mainly on career and study skills. Students reflected on their learning styles, educational and career goals and learned to promote their achievements and evidence their skills development.

Table 2 – Common PDP based content

Welcome:	Should contain a brief welcoming statement to people viewing your ePortfolio. Write a short paragraph detailing what you hope your visitor will learn from your E-Portfolio and add an introduction to your and your educational career.
About Me:	Should contain a personal statement that explanations to your audience who you are, where you come from, and where you're headed in your life.
Self assess	Undertake the learning styles assessment and complete your skills matrix, including SWOT and SWAIN analysis
CMS	Career Management Skills is a resource developed by the university careers service to help students develop self-awareness in the context of career decision making
Educational Goals:	A reflection on your educational goals. This is your first opportunity to reflect on your educational goals following your career plans.
Action plan	Based on the previous self assessment and subsequent reflection, decide on your action points and schedule.
Evidence	Should contain selected coursework and reflections, display samples of your academic work to demonstrate your abilities and creativity.
C.V:	Produce an electronic version of your resume which can be interactive with hyperlinks.
Contact:	Should contain email information so that people can get in touch with you

The use of ePortfolios was new to the vast majority of students and staff, as a result extensive support was provided by a learning technologist. They assisted in the design and delivery of the modules using e-portfolio, with the support being a blend of face-to-face workshops and online support (summarised in figure 1).

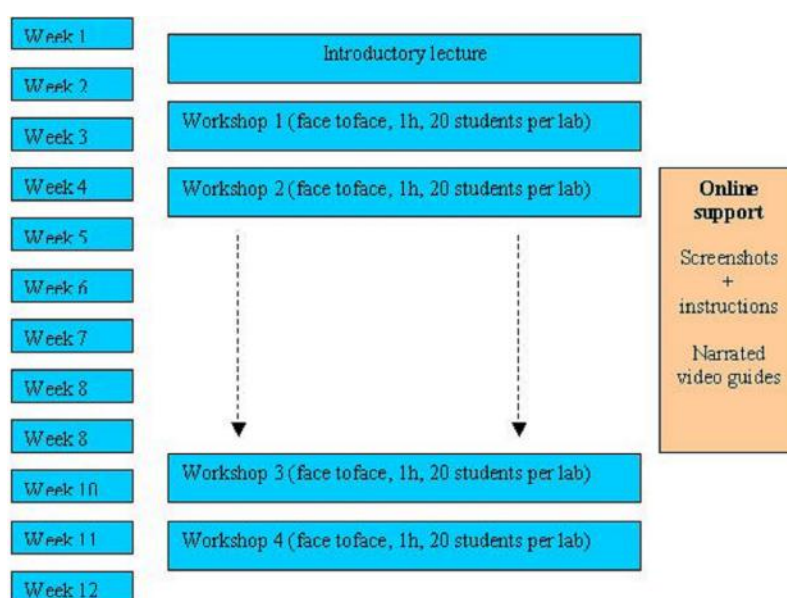


Figure 1 - Summary of the typical Module 1

2. Analysis of feedback on the use of e-portfolios from students and staff

General student feedback on the process of making an e-portfolio

Over 250 students completed a questionnaire designed to find out more about them as individuals, how they had worked to make their e-portfolios and to assess how valuable they had found making an e-portfolio. The majority of students (75%) indicated that they considered themselves to be sufficiently computer literate to use the e-portfolio tool with a minimum of training. Most of the students were generally positive about making their e-portfolio, collectively identifying the following points which in their view made their e-portfolio and the process leading to its generation of value to them:

- Opportunity to think more/reflect,
- Recognise/understand their achievements,
- Plan for future career or understand job opportunities/career path better,
- Determining strengths and weaknesses.

There were variations however across the undergraduate level. For example first year undergraduates were less likely than final year students to cite links to employment as a reason for valuing the -portfolio (30% 1st years versus 60% 3rd years). Naturally the likely reason for this is the increasing importance that final year students would attach to course content that could help to find employment on graduation.

The Graph below (Figure 2) clearly shows the increasing value that students attached to the PDP process and use of ePortfolios as they progressed through the university. There are a number of contributing factors; perhaps most notably is the pressing need for employment but also significant is the very exam orientated nature of our students as they enter the University.

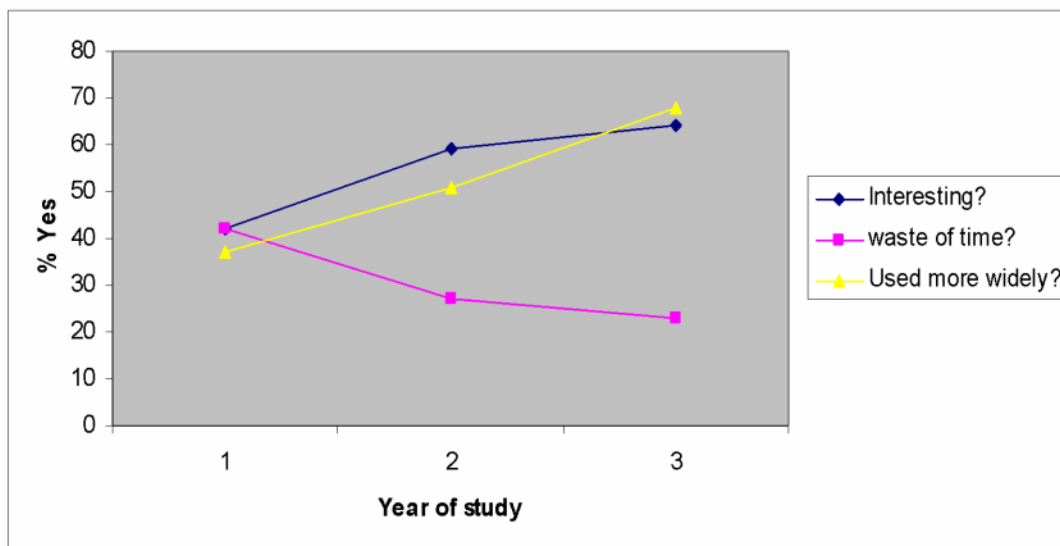


Figure 2 - Relationship between year of study and views on the value of making an e-portfolio

Use of multimedia in e-portfolios

One potential advantage of e-portfolios over paper based coursework is the capability to include audio-visual artefacts/evidence. A high proportion (66%) of students used images in their portfolios, although only 5% of students included audio or video files, which was initially surprising and significant. Amongst the reasons cited for not using audio/video were:

- Lack of confidence in the value of using multimedia for assessment,
- Lack of IT skills,
- Prior learning experiences.

Table 3 – Shows students preferred medium of reflection

How do you prefer expressing/ recording ideas or thoughts	% preferred
Text	72
Drawings/graphs/tables	20
Audio	1
Video	7

Most clearly prefer text with only a small minority indicating that they would find it easier to express themselves through visual or audio media. Clearly it is not safe to assume students will automatically use multimedia when given the choice. It is likely that student use of multimedia will change slowly and will clearly be dependant on the tasks given and whether learning outcomes are best delivered through such media. If the use of multimedia is to increase then tutors will have to make it clear why multimedia solutions provide value added within the assessment regime being used.

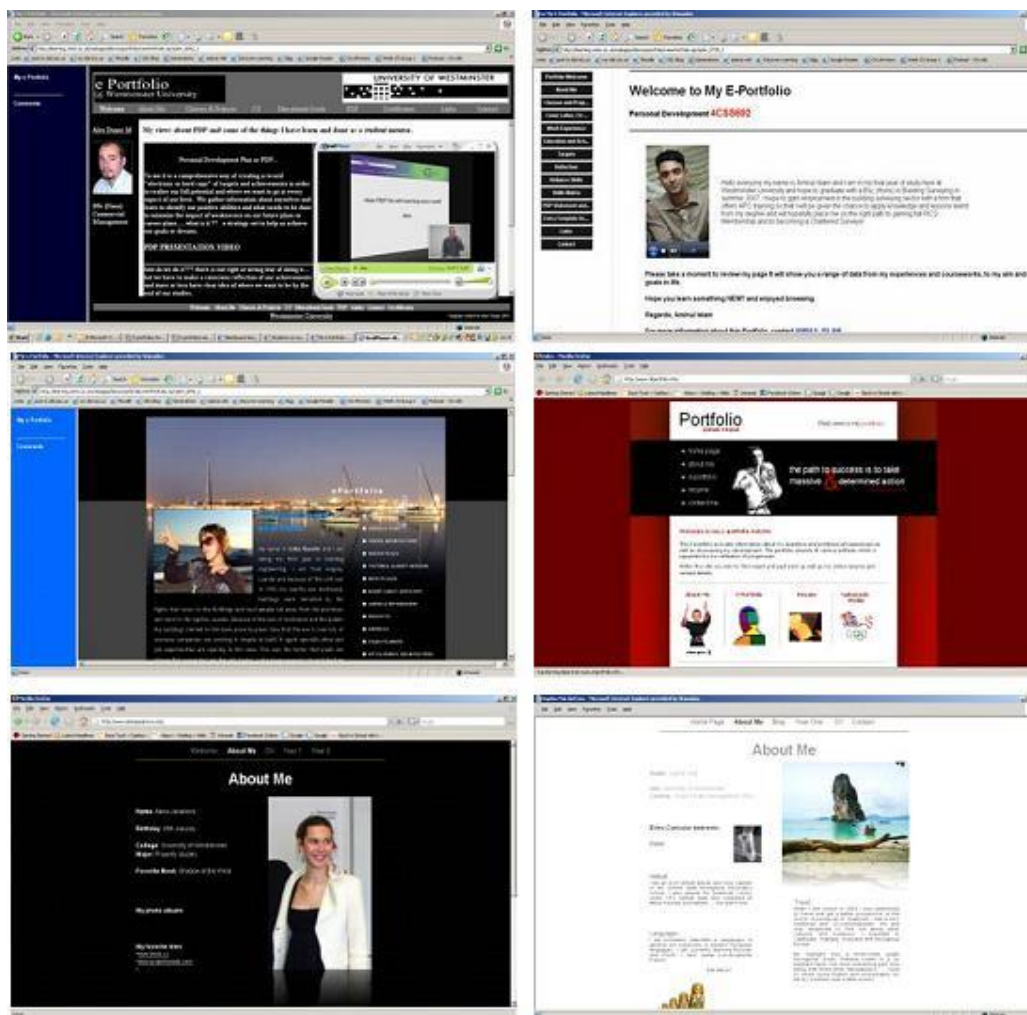
Table 4 - The student's comments/reasons as to why they used audio/video/images

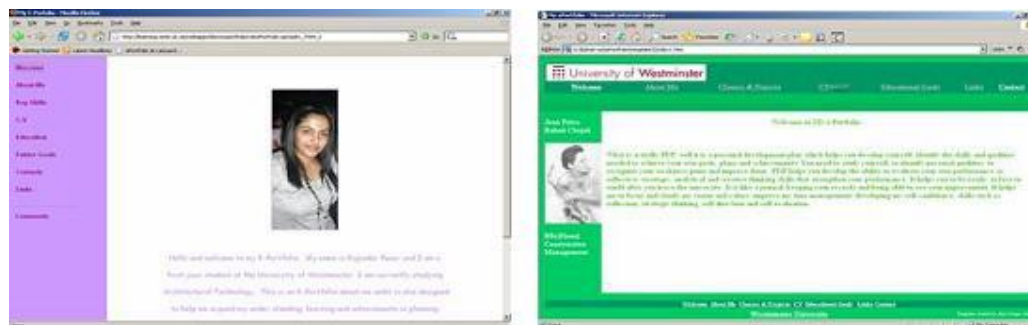
Audio	Images	Videos
<ul style="list-style-type: none"> – To help explain and set the scene about the aspect I was talking about – Audio was used to make the page a bit more lively with some music – I added sound to give my portfolio an atmosphere, so that when you read it, you feel relaxed – I explained how PDP was useful – Audio was a music track I liked 	<ul style="list-style-type: none"> – To make it look better, more colourful and interesting – To decorate the welcome page – To be more creative – So I could demonstrate that skill – There's a think in retail called "impact items", that's what the photos are for – To show a relative image to the text I typed – I felt the images made the portfolio more welcoming to the user – To show who I am, I think it's important for people 	<ul style="list-style-type: none"> – As a welcome note – To make the portfolio more creative looking – To show related topic about my dissertation – I think it's more catchy than plain text – I thought I get extra marks – So the reader can get a better understanding of me – Another way of showing info

It was also interesting but perhaps not too surprising to note that there was a significant difference in the preferred reflective medium for students from different courses. There was a marked increase in the value attached to multimedia when computing students were asked as compared to those from the social science faculty. Such variation may be affected by learning styles and familiarity with technology, but is also likely to be related to the nature of the tasks in each module.

When asked whether ePortfolios should be used more widely, 70% of computing students answered positively as opposed to 26% of those from social science. Clearly the use of e-portfolios needs to be carefully matched to the skills and students being assessed and the methods being used for assessment.

Examples of students' e-portfolios





3. Analysis of feedback from staff

All of the staff surveyed (15) and interviewed (5) agreed that e-portfolios had been useful to the teaching of their course, collectively highlighting the following as reasons for the success of e-portfolio use:

- Made it easier to identify struggling students requiring additional support,
- Easier for students to submit their work,
- Easier for the tutor to view work quickly,
- Developed student IT skills,
- Helped in the monitoring of student progress,
- It provided templates to enable scaffolding of student progress,
- No large paper e-portfolios to carry,
- Facilitated provision of both formative and summative feedback,
- Allowed students to be more creative,
- Saved time when collecting work,
- Accessible from anywhere,
- Students found e-portfolio interesting and motivating.

One significant feature of the use of e-portfolios for staff was the possibility of marking the work electronically (91% of all e-portfolios were marked on screen as opposed to working with a printed version). Three different submission routes were used across the 13 modules (Table 1) including; CD (30% of the modules), via the assignments function of Blackboard (60%) and through the e-portfolio sharing mechanism also in Blackboard (10%). The majority of staff returned feedback to students on their final e-portfolio through some electronic means (either by email or via the assignments function).

4. Challenges arising

Although staff identified the sharing function as potentially useful for formative feedback during the construction of a student's e-portfolio, in practice very few students shared the portfolio with their tutors early enough for this to be overtly beneficial, this was a shame and will require further development. There may also be a need to introduce some mid point assessment to further scaffold the process as some students did not build their portfolios gradually.

Although all staff managed to mark on-screen, there were certain difficulties raised. Apart from the obvious problem of getting used to working on-screen (as opposed to on-paper) several staff experienced difficulty opening the portfolios (which were zipped files) from CD and those using sharing as a mechanism for submission were wary of the fact that shared portfolios could not be 'frozen' at the date of submission. (i.e. a student could still make changes post submission date) Several staff also stated that they would have liked to mark on-screen by

leaving text annotations at appropriate points next to the content in the portfolio rather than compiling cumulative feedback at the end of the portfolio.

Overall, staff felt that the use of e-portfolios had been advantageous to them. However a majority clearly felt that they had spent insufficient time re-designing the activities undertaken by students, to take into account the technological changes.

5. Conclusions

An e-portfolio is typically made up of a digitised collection of resources and artifacts and can include text based materials, graphics and multimedia. In addition however an e-portfolio allows for an exchange of ideas between the owner and those who view and comment on it. This, coupled to the personal reflection of the owner, can create powerful opportunities for learning (Greenberg 2004). Compared to paper portfolios, e-portfolios offer a range of benefits including the capability to collect and present a wider range of resources, easier management of resources and enhanced flexibility with respect to access and feedback (Oduyemi and Ogston, 2006)

It is possible for staff and students, who are used to working with paper portfolios and assignments, to rapidly change to making use of e-portfolios and generally accrue advantages from doing so. However to be successful it is clear that a proportion of students, as well as the staff, require extensive support at key points in the process and that students will not exploit the full potential and flexibility of e-portfolios unless encouraged to do so. It is also significant that undergraduates in the final year are more likely to immediately see the benefit of making an e-portfolio given the direct and indirect links to future employment. Naturally there are differences between subject disciplines in for example the use of multimedia and the degree to which students would like to see e-portfolios used more widely through the curriculum. By and large staff adapt well to the demands of marking on-screen and collectively identify a broad range of advantages that e-portfolios offer over paper based alternatives.

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THE E-PORTFOLIO CITY

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Abstract: Our intention in this paper is to explain the Idea of a light-weight and easy understandable electronic learning Portfolio (ePortfolio) - Framework for the usage in an entrepreneurial environment. The main focus of the framework is to support Human Resources Management, especially HR-Recruitment, Management and Development. This framework is based on central ideas of the JISC ePortfolio Reference Model[1] and augments them to fit an enterprise HR environment. To make this Framework intuitively comprehensible, we used the analogy of a city – so we create the electronic learning portfolio city, ePortfolio-City, to represent the different parts of the framework. To show how the framework works, we will guide the reader through different scenarios in the city, represented by six days, each day representing a new scenario.

Keywords: ePortfolio, Lifelong learning, Lifewide learning, Model

Introduction

Current research on the use of electronic portfolios is characterized by a number of questions which their structure, ownership, supporting services etc. – i.e. their embedding into real life. This paper approaches these questions by means of a thought experiment. This experiment is motivated by the following considerations.

There is wide agreement that electronic portfolios have the potential to considerably affect the ways lifelong learning is planned, supported and documented. The history of education suggests that such changes are unlikely to happen overnight with a broad and radical change of educational practice. It is more likely that electronic portfolios will first enter general usage as simple replacement of paper based portfolios where they offer improved versions of already appreciated values – for example a better presentation, simplification of copying or ease of transmission. These electronic portfolios in place then may offer additional possibilities not inherent in paper based portfolios. Creative learners and teachers will take up these new possibilities where they offer short term advantages, thus slowly enriching pedagogies with new forms of learning, teaching and collaboration. In a further step the availability of large quantities of electronic portfolios will enable new qualities of service inside and outside of education.

But let's step back to present times. If our thesis is correct that electronic portfolios will be first taken up where they replace existing portfolio practice, then it is worth considering current practice and to explore, how it may be affected by electronization. So, let us take a week off, observing people in fictive "ePortfolio City". This city is not very different from existing cities; in fact the only difference is that standard paper-based communication processes are all electronic.

With this thought experiment we hope to achieve four objectives.

- Identify existing processes and needs which may benefit from the use of electronic portfolios and where, therefore, electronic portfolios are most likely to be accepted and used,
- Identify existing institutions which may play a role in the broad deployment of electronic portfolios,
- See which portfolio related services are offered by these institutions and how they may be augmented or replaced by electronic services,
- Explore, how some of the aforementioned open questions may be answered if the answer is sought as close to existing practice as possible.

We shall not complete this work in this paper. This visit in ePortfolio city is just an expedition into another world in order to observe behaviour – to collect process models if you prefer a more technical term. Analyzing these data is a further step to be gone.

A word of caution seems appropriate: We do not wish to suggest that ePortfolio systems should be built as an electronic model of a city. Deriving service oriented software architecture from a collection of process models requires the aforementioned analysis. There is no reason to assume that the existing paper based infrastructure of a city is also optimal for supporting electronic processes of information exchange. However any software architecture may increase its chance for wide uptake if it is compatible with the existing infrastructure.

To get a grip what's going on in this paper, we'll start with a citation of Helen Barrett: "The lack of a common understanding for what a portfolio actually is makes it difficult for those who seek to research electronic portfolios or make wise decisions about their use." [2] Marilyn Heath writes, that one of the basic considerations of ePortfolio development is for what specific purpose and audience they are developed [3]. Therefore we will first make clear what our framework is meant to do and what kind of Portfolio it is meant to support.

This framework is designed to connect people in an entrepreneurial environment through electronic Portfolio technology. It is meant to identify competencies of people, to exploit their strengths, to help them discover their weaknesses and to help them improve. By using portfolio technology, it also should support lifelong and lifewide learning, to help people use all of their competences, not only those closely tied to a work environment.

For usage in this paper, we need to make a distinction: There are ePortfolio Systems, and there are ePortfolios. The systems work with ePortfolios, while the ePortfolio itself is meant to be an artefact created by the ePortfolio Systems from data to be taken from one or more repositories.

The Electronic Learning Portfolio City

On startup, our ePortfolio-City is a normal City. Some of the institutions in the city, which we shall discuss in detail below, provide services for portfolios... ePortfolio Systems could interact through a variety of services, so some service providers are selected as an example, to show how different systems could interoperate. There are many installations in a normal city which we do not need in our ePortfolio City – we shall abstract from these. Therefore, we first define of which components the ePortfolio City consists and how they work. We will also give an example to what ICT-System an installation could correspond to. These are the different "installations" in our ePortfolio-City:

The People: In our ePortfolio City, people are the ones who use services. Everything is focused on people and made for the people. They are the reason why there are installations in our City, which provide services for the ones who want to use them. People can use every service the installations in the city provide. If a service is used, as a result, a letter is sent. Letters are artefacts, which are created by the installations of the city. Of course, the letters are electronic in ePortfolio City. They are in fact ePortfolios.

The Bank: Every citizen of our City has an account in the bank and has access to the bank – but only to his own bank account. The bank in the ePortfolio City is of a special kind, as are the assets in the bank. The assets consist of letters, which can have all content a normal letter can have. In our ePortfolio City, those assets can be transferred by letter and only by letter. We describe assets as letters and not as financial assets since the owner has the legal right to copy them. The Bank also provides access to all services of the other installations in our ePortfolio City through the Personal Bank Account. The Bank account is the pendant to a personal electronic Portfolio system.

When ePortfolio City grows, several banks might enter the scene and the citizen could decide to work with one or many of them. In that extended scenario a personal electronic Portfolio system would rather resemble a home banking programme through which the citizen can inspect their assets and initiate banking transactions like the transfer of assets. For the current initial visit we assume that each institution exists only once.

The Post Office: Communication in the ePortfolio City is only done through letters, which are transmitted by a Postal Service. Every installation in the City has its own Post Box, which is attached to the Post Office and is used to send and receive letters. People in our ePortfolio City cannot be senders and receivers of Letters by themselves – only the installations can be senders or receivers of letters. But only the people are capable of initially invoking processes of communication, which result in the interaction of installations through letters. The Post Office could be a document-management system or simply a network, to which the other installations are connected.

The Copy Centre: As every installation has its own Post Office, every installation has its own Copy Centre, too. The Copy Centre always copies letters which are sent to other installations. This contributes to the fact that technically, transferring data to a sink does not eliminate them from the source.

The Training Centre: At the training centre, everyone gets the education she wants. Regardless whether it is compulsory or higher education, and regardless of the type of competency which is taught – here, everyone can get learning courses about any topic. Provided services: Provides courses to help acquiring competencies. A training centre could be any kind of service to improve competencies.

The Archive: The Archives stores data. It stores data for a long period of time and can store different versions of data – for our ePortfolio City, it can only store letters. These letters can be sent to the archive, and it can create letters on behalf of the people. Archives could be every kind of storage system.

The Police: In a city, there are rules. The law in a city is enforced by the police. In ePortfolio-City, Police ensures that the rules are followed and that no one can do what he is not allowed to do. The Police correspond to an access control, authorisation and authentication service which is able to handle the different situations which could arise from the life in the city, which means the usage of the systems while they interoperate.

The Library: People can send letters to the library to show things, which they have stored in their bank account or in the archive. In a library, letters of people are compiled into books. People can decide what letters they want to compile, and how. These books can be seen by everyone who is allowed to do so – by the people. Everyone can search through and read every piece of information, which is available to him. Therefore, the creation of a book is the act of ePortfolio compilation for every thinkable reason. A Library is some sort of share point, on which services are offered and requested, information is exchanged and people get together. This share point can be a good extension point for external service providers, who operate outside of the scope of this framework. At this point, they could provide services, which are not accessible inside of the participating systems.

A week in the ePortfolio-City

Because daily life in a city can be very complex, we will keep track of some examples of actions which take place in our ePortfolio city, to get a feeling how everything runs. We will also explain how these examples could correspond to specific types of ePortfolios. For this purpose, we will use the ePortfolio Typology specified on the homepage of the European Institute for E-Learning – EIfE-L[4].

Day One

On the first day, someone works at a specific project and needs help. He decides to find someone to work with. Since he has a very detailed idea of what competencies he needs, he compiles a letter in which he states what he wants to do and what competencies a possible team member has to have. He triggers the Post Office Service to transfer the letter to the library, where his request is populated for everyone interested to see. This scenario corresponds to a reflective portfolio scenario, since someone reflects on his (or his organizations) set of competencies and identifies needed competencies.

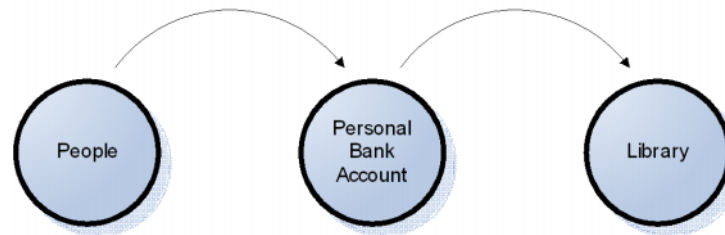


Fig. 1. The first day

Day Two

On the second day, someone is searching the library for information about interesting projects. He finds the letter which the person of the first day has placed, and is interested in the project. He then decides to write a letter in which he shows his competencies. For this purpose, he accesses his Bank Account, and compiles letters which contain evidence of his competencies. Soon he finds out that he has not all letters in his bank account – some are stored at archives. So he accesses the archives, selects the letters of which he thinks that they will show his competencies the best, and uses a library service to compile them into a book. He then transfers the book to the library. He transfers a note to the author of the offer that he wants to assist him and provides information, where to find his book of competencies in the library and authorizes him to read it. This corresponds to an assessment ePortfolio.

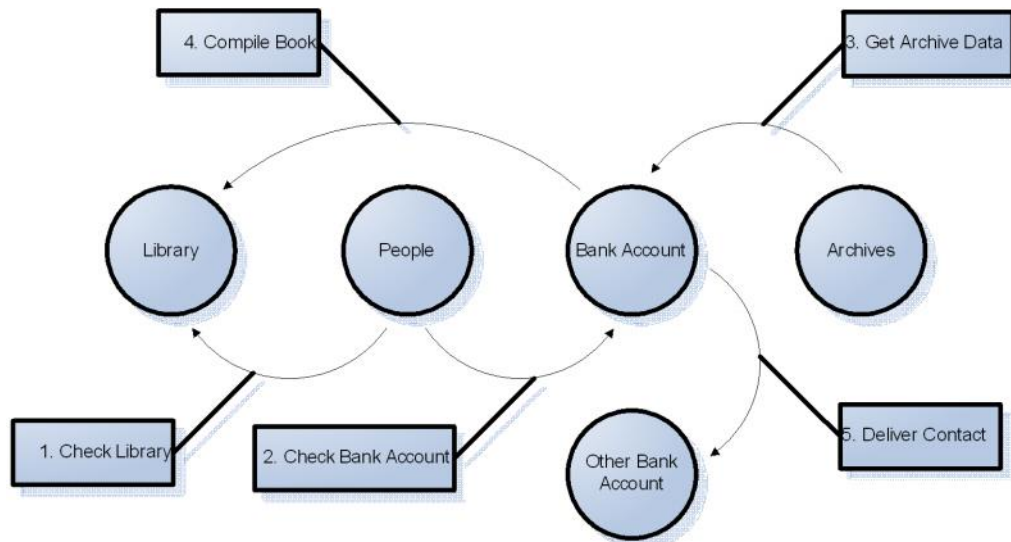


Fig. 2. The second day

Day Three

On day three, the person from day one, who sent the letter of needed qualifications to the library, sees the message in his Personal Bank Account. He accesses the library and transfers the book to his own Bank Account. He now assesses how the qualifications in the book match the qualifications he needs. After this assessment process he adds the assessment result to the book and transfers it back into the library, before transferring a note to the original author. In this example, the new member is invited into the team – and starts working on the project. This is in fact a combination of ePortfolios, in which the reflective Portfolio from Day One and the Assessment Portfolio from Day Two are put together, are reflected upon, and then put back into an archive – which could be a special library.

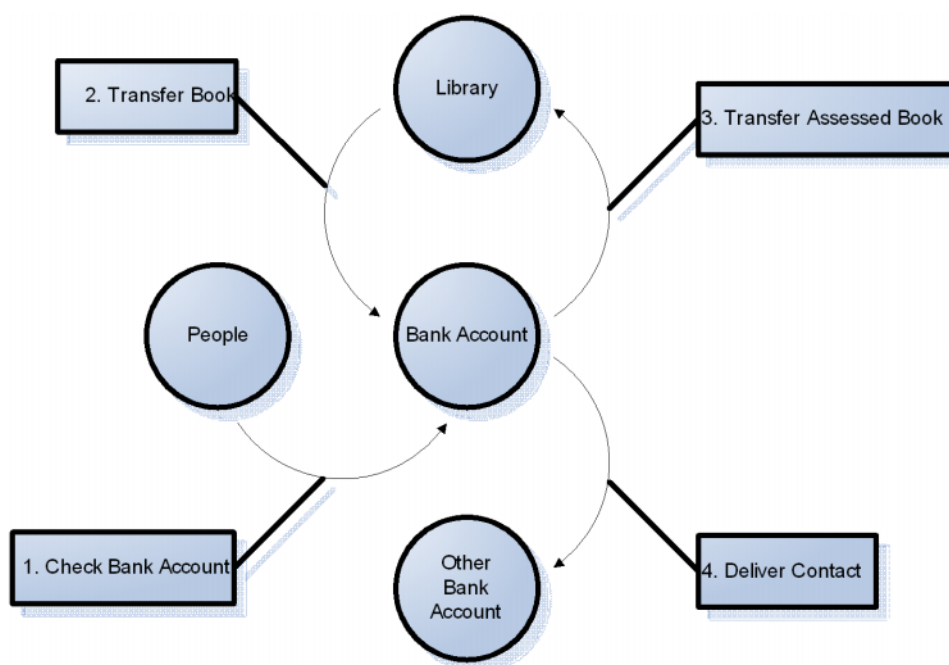


Fig. 3. The third day

Day Four

On the fourth day the new member in the team wants to improve some competencies. So he accesses his Personal Bank Account to look what competencies he has and what to improve. After that, he uses the search service of the library to find books which contain knowledge about potential courses, which can improve the competencies he needs. He finds books in the library offering courses of study, written by the training centre. He selects some courses the training centre offers. The training centre automatically creates a book with goals and envisaged learning outcomes, using the library service, and transfers the book into the Personal Bank Account of the learner. After his course of study is completed, evidence is transferred into an archive. This is an example for a reflection ePortfolio.

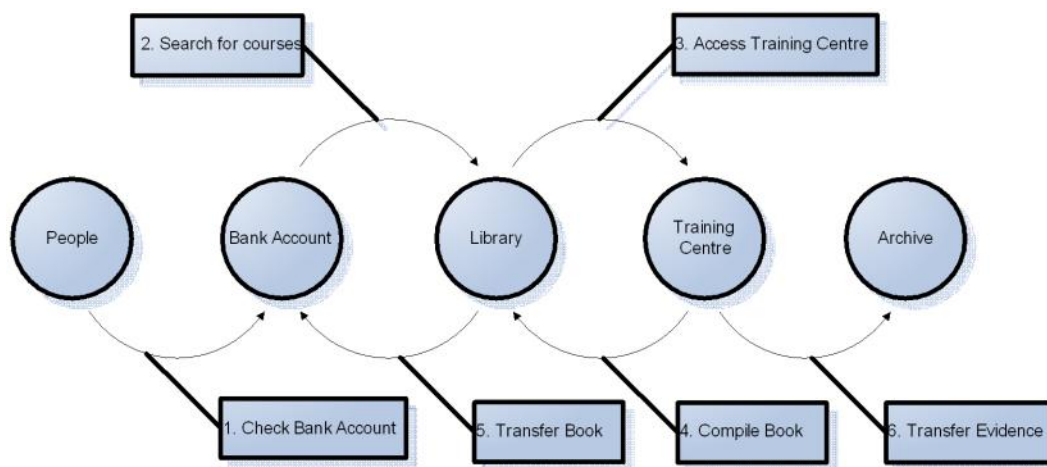


Fig. 4. The fourth day

Day Five

As the learning progresses, the learner keeps track of his progress by reflecting on the things learned. He does so by commenting on the course of study and his personal experiences. These reflections are written on letters, placed his Personal Bank Account. Optionally, the learner can transfer his experiences to the library for others to see and to comment on it. This could be a combination between a reflection and a showcase portfolio.

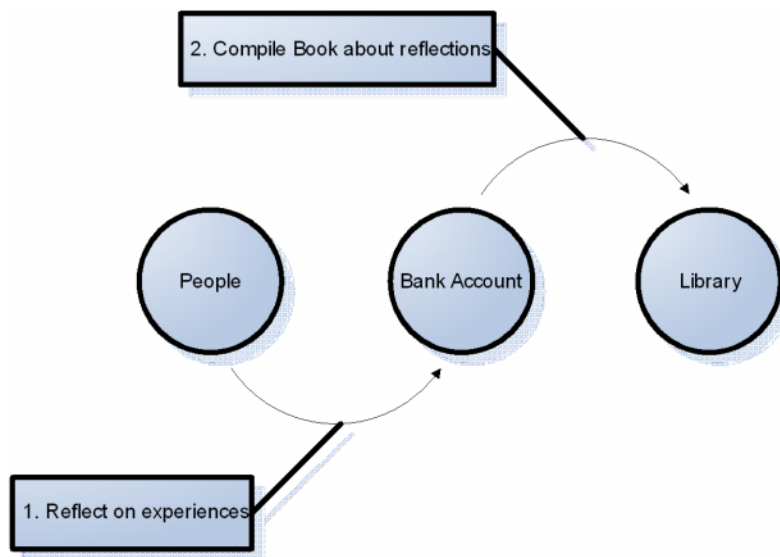


Fig. 5. The fifth day

Day Six

The new team-member has learned much and has acquired many competencies. He now wants so show how great the competencies are, by writing a book about it. He does so, by compiling information taken from many sources. He collects evidence from the Bank Account, where his own reflections are stored, collects information from the archive of the place he is working and the archive of the training centre. He then compiles the information into a book using the library services, and places the book in the library as a showcase ePortfolio for everyone to see.

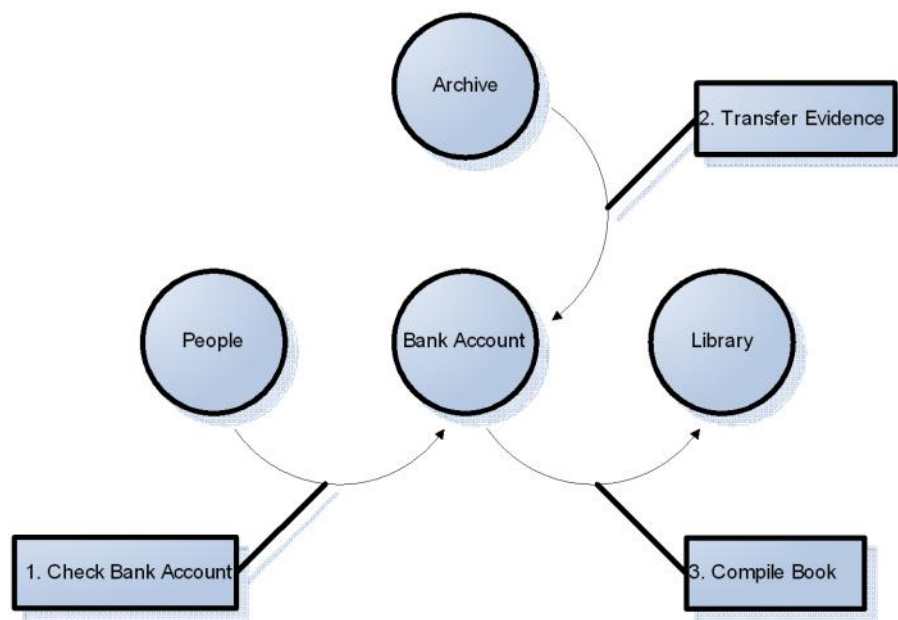


Fig. 6. The sixth day

Conclusion

This paper states a vision. Electronic Portfolios clearly have the power to significantly change how HR management, learning, development and recruiting could be handled in companies and in learning institutions. Better connecting people and tasks, this framework could make available qualified data for people to base their decisions on. It could have the power to improve the matching between people and jobs, better finding the right people for organizations and supporting both: The interest of people to find the right job for them, and the interest of organizations to find the right people for their needs. This can even lead to an environment, in which teams are dynamically created by the use of the ePortfolio information. In a learning context it can help matching the right people with the right learning opportunity, even for creating the right, personalized, learning opportunities for people.

We have seen how an ePortfolio system could be distributed to a network of already existing institutions. Bringing ePortfolio City into reality could ease the acceptance of ePortfolios in society as the central tool for documenting learning occurred and competencies achieved. It has also become apparent that this may need a gradual transformation of existing institutions or the creation of new ones with similar capabilities.

Clearly, special business processes are needed to implement such a framework, and systems should be used which are already in place, to make the best use of information which is already there. These systems have to be able to interoperate too, and there is a common consent about ePortfolio, that interoperability is one of the greatest issues. The IMS ePortfolio Interoperability specification was designed to be an approach to handle this task [5], so this could be a good base to start.

There are plenty of advantages, but also many disadvantages which we need to take into account. One of the greatest issues is the protection of data privacy, which can be quite difficult when it comes to ePortfolio usage – a strong police guided by the interests of the portfolio owner is a necessity. Easily digestible Numbers and scores for assessment may now be expressed in words and sentences, which are not that easily digestible. This means that more text does not necessarily mean more information.

Future prospects and open questions

We have discussed how systems of different types can interoperate in order to realize the benefits of electronic portfolios. Inevitably, in reality there will be a variety of such systems which act on their own and which are connected over public or private networks. Taking our metaphor further, this leads to an ePortfolio region. Often regions have their governments which set up rules for handling of assets. These rules must be reflected in the activities of ePortfolio City and it needs to be explored how these rules can support inter-regional interoperability.

Since there are already specifications like HR-XML, which are designed for many cases of HR-activities, it would be very interesting to see how the various HR-XML specifications and the IMS ePortfolio Specification could be combined.

Another open question is, how the different artefacts of competencies can be matched. Clearly, a system needs to be able to handle different taxonomies and different sets of competencies, which have to be put together.

Another open question is which processes could support such a framework and how such processes fit into an organizational environment, to actually implement such a framework in daily use. A good first step could be to look at processes which are already there, and see how electronic portfolios can support those processes. Evidently, we can support a standard recruiting process by using the IMS ePortfolio specification [6]. But it is not clear yet, how we can manage to support more complex environments like HR Development and HR Management.

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INVESTIGATING THE ROLE OF EPORTFOLIOS AND ONLINE COURSES IN A COMMUNITY OF PRACTICE: ASSISTING BULGARIAN SPECIAL EDUCATORS WITH LIFELONG COMPETENCY DEVELOPMENT

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Abstract: Research and development for an Internet-facilitated distributed community of practice (DCoP) for special education in Bulgaria is in its final phase. The DCoP is called Special Education Bulgaria. Results from the needs assessment indicated that special education researchers, practitioners, and parents in Bulgaria would benefit from such a community and that there is sufficient Internet access. Formative evaluation results directed website usability and sociability improvements and the incorporation of Moodle, a popular course management system. An effectiveness evaluation is currently underway to investigate the DCoP's effect on the job performance and satisfaction of special educators. Preliminary results indicate that though a DCoP has begun to coalesce, it may remain unclear if it helps special educators do their jobs better. Partnership with the European Union 6th Framework integrated project, TENCompetence, may help address this finding. The expected outcomes of such a partnership include the implementation and testing of ePortfolios and online courses to assist Bulgarian special educators with lifelong competency development.

Keywords: competence development, lifelong learning, special education, Bulgaria, community of practice

Introduction

It is often assumed “that learning is an individual process, that it has a beginning and an end, that it is best separated from the rest of our activities, and that it is the result of teaching” (1999, p. 3). It has also been argued, however, that learning is a social phenomenon resulting from regular interaction with others throughout our daily lives. Based largely on this argument, Lave and Wenger (1991) proposed a social learning model that involved habitual interaction with what they termed a *community of practice* (CoP) (M. K. Smith, 2003, January). “Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). Professionals that regularly meet for lunch to discuss their jobs are part of a CoP. The parents of children involved in a sport, who advise each other about parenting, are also part of a CoP. Similarly, with regard to special education in Bulgaria, CoPs already exist. Some are challenged geographically by distance and regional boundaries and others have the potential to form but do not because of the requirements of daily living or separation across cities.

Special Education Bulgaria (SEB) is a CoP for special education researchers, practitioners, teachers in training, and parents. It is facilitated by a website. SEB's central purpose is to connect extant geographically-dispersed special education communities in Bulgaria. The website, <http://www.specialeducationbulgaria.com/> has been updated progressively throughout three phases of research (see Figure 1). The design-based research approach has guided each phase (Brown, 1992; Collins, 1992; Design-Based Research Collective, 2003; Peterson & Herrington, 2005; Reeves, Herrington, & Oliver, 2005; van den Akker, 1999). Theoretical underpinnings originate from the CoP concept but more specifically relate to the *distributed community of practice* (DCoP) concept described by Wenger et al. (2002).

When the SEB project began in 2005, it was not known if the development of a DCoP facilitated by the Internet would be feasible to establish in Bulgaria. Results from the first two phases of research, however, indicated that it was not only possible, there was a great deal of interest. The website has grown from an initial group of 20 users to more than 200. Further, it

appears that this is just the type of project that the European Union (EU) is interested in pursuing (Bulgarian National Assembly, 2001; Commission of the European communities, 2005, December; R. Koper & Stefanov, 2006).

reliminary results from the third and final research phase, however, indicate that a DCoP alone may not meet the needs of Bulgaria's special education community. Though the SEB website appears to facilitate community building, it remains unclear if it significantly helps special educators do their jobs better. To address this finding, SEB has looked to the EU's 6th Framework integrated project, TENCompetence³). It is anticipated that the success of a TENCompetence-SEB partnership will depend primarily on the implementation and testing of *ePortfolios* and *online courses* to assist special education professionals with lifelong competency development. This paper briefly summarizes the SEB features consistent with TENCompetence concepts of competency development, lifelong learning, and professional networking. It then describes, in detail, the features needed to expand SEB from a DCoP into a suitable TENCompetence pilot. It concludes with a discussion of the benefits of a TENCompetence-SEB partnership⁴

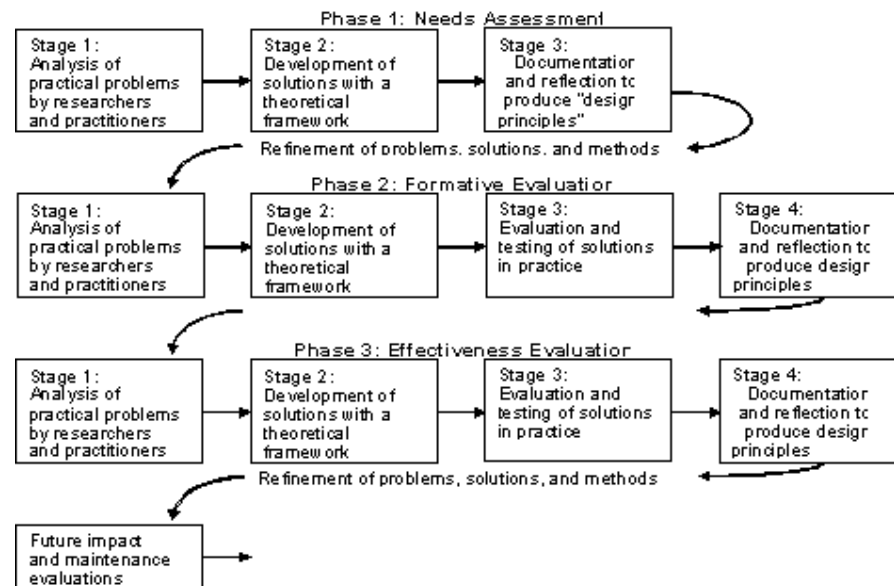


Fig. 1. Design-based research phases based on Reeves's *development research* diagram (2000, p. 25) and Reeves and Hedberg's methods for interactive learning systems evaluation (2003)

³ TENCompetence seeks to research and develop innovative methods and technologies for lifelong learning and competency tracking, development, and assessment that will be applicable to a wide range, if not all, professions in the EU (see Figure 2).

⁴ At the time of publication, it was not known if an SEB pilot, as currently proposed, would be accepted by TENCompetence. Regardless, expansions will continue as planned as they are predicted to be vital for the long-term success of SEB.

New objectives

SEB project objectives correlate closely with several of the TENCompetence objectives (see Figure 2). The website provides discussion forums; chat rooms; a document, photo, and links repository; online voting; RSS news feeds; and other tools and meets all of the necessary DCoP criteria laid out by Preece (2000) and Wenger et al. (2002) including, among others, ease of navigation; and quick, secure access. What appears to be missing, however, is a direct link to standardized competencies and ways of developing such competencies. Hence, to better address all four TENCompetence core objectives, SEB will host online courses targeted at teaching and assessing special education competencies and ePortfolios for substantiating such competencies. The next two sections of this paper explain how online courses and ePortfolios will be integrated.

Online courses

The SEB website is powered by a dependable course management system, Moodle⁵ that is widely praised for its ability to host online courses. To date, however, only the social networking, “learning community,” aspects of Moodle have been employed by SEB (Dougiamas & Taylor, 2003; Dougiamas & Taylor, 2002, January; Moodle community, n.d.). The following section discusses the competencies to be targeted by SEB and how online courses will be integrated to better address TENCompetence objective number 3 (see Figure 2).

Objectives currently addressed by SEB:

1. “Methods and technologies for the creation, storage, use, and exchange of *knowledge resources*”
2. “Models, methods and technologies for the creation, storage, use, and exchange of *networks of competence development programs*”

Objectives to be addressed after the addition of online courses and ePortfolios:

3. “Standards-based methods and tools for the creation, storage, use, and exchange of formal and informal *learning activities and units of learning*”
 4. “Methods and technologies for the creation, storage, use, and exchange of formal and informal *competence development programs*”
-

Fig. 2: TENCompetence project core objectives (Rob Koper & Specht, 2007, p. 232)

Targeted competencies

SEB co-supervisor, Tzvetkova-Arsova, is a widely recognized expert on the education of the visually and multiply impaired. Hence, the decision about which competencies to target for a trial online course was relatively easy. The principle standard that she adheres to is from the United States, and titled, *Perkins School for the Blind Competencies for Teachers of Learners Who Are Deafblind* (McLetchie & Riggio, 1997)⁶ The following competencies are addressed by the Perkins document:

1. Effects of deaf-blindness
2. Personal identity, relationships, and self- esteem

⁵ Moodle is an open-source course management system that was created in 1999 by Martin Dougiamas during his PhD candidature at Curtin University of Technology in Perth, Western Australia. It has since evolved substantially and is available for use in more than 50 languages, including Bulgarian (Moodle community, n.d.).

⁶ Though the Perkins competencies have not been updated since 1997, the School does not intend to update them in the near future as they are still quite valid (S. Sullivan, personal communication, May 2007). There is a companion document

available for paraprofessionals, but the original 1997 document is still the best choice for the trial course.

3. Concept development
4. Communication
5. Auditory and visual systems
6. Orientation and mobility
7. Environment and materials
8. Professional issues

An appendix to the Perkins document is included that lists a comprehensive set of competencies essential for all beginning special education teachers regardless of their specialization. The appendix is an excerpt from an international standard published by the Council for Exceptional Children (1995; 2003). The additional competencies addressed include:

1. Philosophical, historical and legal foundations of special education
2. Characteristics of learners
3. Individual differences
4. Instructional strategies
5. Learning environments and social interactions
6. Language
7. Instructional planning
8. Assessment
9. Professional and ethical practice
10. Collaboration

Development and deployment plan

Initially, online course development will coincide with a month-long professional development course offered by Sofia University's Department of Special Education. The course specifically targets unemployed Bulgarian teachers interested in retraining as special educators. Ten students are anticipated to enrol for each course and attend five days a week for four weeks. Two 150-academic-hour modules will be covered during each intensive course. The modules available include education of the hearing impaired; education of the visually impaired; education of the intellectually disabled; and speech therapy. In addition, 300-academic-hour modules are available for adapted physical activities; and social work. The total number of month-long courses offered will depend on demand.

Lectures that address the target competencies listed above will be videotaped and posted to SEB. A password-protected Moodle course module has been created to host the videos. Students in the course will be able to review videotaped lectures from the previous week and discuss them online. A double-sided postcard handout was created and will be distributed to students that explains how to register for SEB and how to access the online course. The pedagogical principles followed will vary because each lecture will be delivered by a different department member. The various pedagogical principles used will be reviewed during the development period (see Figure 3). The most appropriate principles as well as the most appropriate units of learning will be decided upon during this period.

In addition to video, the learning materials provided in the course will be posted to SEB. As course materials are posted, relevant IMS specifications will be kept in mind (IMS Global Learning Consortium, 2007). The latest version of Moodle, 1.9, does not fully support IMS content exporting. Full support is expected later this year (Moodle community, 2007b).

Cycle 1 pilots	Run pre-pilots		Run pilots	Analysis and reporting					
Cycle 2 pilots (not finalized)	Initial planning	Planning	Implementation of pilots, development of instruments		Run pilots	Analysis and reporting	Cycle 3 pilot planning		
SEB cycle 2 pilot (proposed)	Initial planning for <u>blended course</u> (both in class and online)		- Develop course materials and instruments - Preliminary testing with SU professional development		Run <u>pilot A</u> , SU spring session		Run <u>pilot B</u> , SU summer session	Analysis and reporting	Initial planning, <u>distance course</u> for cycle 3 pilot
			- Website development - Integration and testing of TENCompetence PCM client software						
			- Video collection, lectures from professional development and undergraduate courses at Sofia University (SU), Dept. Special Education - Online content development and posting, IMS specifications followed						
			- Elgg / *Mahara ePortfolio integration and testing, example templates - Elgg / Mahara online help translation						
		Initial planning, ePortfolios cycle 3 pilot							

*Mahara, rather than Elgg, is to be formally integrated with Moodle version 2.0 (Moodle community, 2007b).

Fig. 3: SEB cycle 2 pilot development, deployment and validation schedule mapped to preliminary TENCompetence pilot timetable (Arenales et al., 2006, November; TENCompetence, 2005, March)

During SEB *pilot A*, access to online materials and discussion forums will not be strictly required (see Figure 3). The new TENCompetence personal competence manager (PCM) client software will also be piloted. During *pilot B*, online course access will be required to a greater degree, but a blended approach will still be required. Future courses may be offered only at a distance, possibly during cycle 3. The distance approach would support teacher training in authentic work environments accompanied by peer tutoring. The approach would also suit current trends in Bulgarian special education. Such trends include the integration of students with special needs into regular schools and transitioning role of teachers currently employed in special schools. Refer to the “Win-win” section below.

The cycle 1 pilots, now approaching the analysis and reporting stage, include ICT teacher training, coordinated by Sofia University; and Digital cinema professional training, coordinated by the Universitat Pompeu Fabra, Barcelona. The cycle 2 pilots proposed, among others, include a medical pilot on colorectal cancer; pilot for training via gaming simulations; and water management training pilot. The SEB proposal, described herein, is for a pilot on teacher training for education of the deafblind and multiply handicapped. All cycle 2 pilots will test the new TENCompetence PCM client software (Arenales et al., 2006, November; Stefanov, Naskinova, & Nikolov, 2007).

ePortfolios

Key to the competence development process described by Schoonenboom, Tattersall, Miao, Stefanov, and Aleksieva-Petrova (2006) is the use of ePortfolios. The process is described as follows.

As a learner starts with competence development, self assessment will be the most prominent, if not the only, form of assessment. This orientation stage is followed by a stage of evidence collection, which is supported by e-portfolio building. In a third stage, the learner is judged by others, and in this stage organisations make use of assessment forms such as on-the-job assessment, 360-degree assessment and assessment centres. In the fourth stage, the learner performs competence development activities. (Schoonenboom et al., 2006, p. 1)

ePortfolios are critical to the success of this model and to the TENCompetence project (TENCompetence, 2005, March). SEB will provide formal opportunities for competency development as described in the “Online courses” section above. The following section describes the types of ePortfolios relevant to SEB and how they will be integrated. ePortfolio integration is intended to help SEB better address TENCompetence objectives numbers 2 and 4 (see Figure 2).

Types of ePortfolios

“Very simply put, a *portfolio* is a collection of evidence that is gathered together to show a person’s learning journey over time and to demonstrate their abilities” (Butler, 2006, October, p. 2)⁷. For SEB, ePortfolios will be used to showcase the credentials and lifelong learning path of professionals in a specific discipline. Summarizing Butler’s (2006, October) literature review, it can be argued that there are four types of portfolios:

- Showcase or dossier portfolios: show achievements in study or in the workplace for job selection, promotion, or professional networking,
- Learning, process, or training portfolios: document learning over time,
- Credential or assessment portfolios: for evaluation, registration, or certification purposes,
- Personal development, self-directed, or reflective portfolios: document self-directed learning.

Butler argues that “the varying ways of typifying a portfolio all serve to emphasise the importance of deciding upon the purpose and audience of the portfolio” (2006, October, p. 3). The first type of portfolio listed, *showcase portfolio*, is most relevant to SEB’s target audience, which includes:

- Students preparing to enter the special education workforce,
- Practising special educators,
- Teacher trainers,
- Researchers.

Development and deployment plan

At this time, Moodle does not offer ePortfolios, but code is available to integrate Elgg (Moodle community, 2007a). Elgg is a popular open-source program for social networking and ePortfolio creation. Essentially, it allows for the creation of websites similar to MySpace or Facebook, two of the most popular websites on the Internet. According to Alexa Internet, MySpace is the 6th most visited website and Facebook the 17th (Alexa Internet, 2007; Andrews, 2007, April 19; Eduspaces community, 2007; Elgg community, 2007; O’Hear, 2006, March 7). To SEB users, integrating Elgg with Moodle will only mean clicking the portfolio link from the main menu on the homepage. From there, users will be directed to example portfolios. SEB ePortfolios are anticipated to include resumes; descriptions of educational certifications, work experience, and competencies; photos; documents that validate achieved competencies; learning plans for desired competencies; academic and professional references; accolades; published and unpublished works; and anything else relevant to a special educator’s academic and professional career. The timeframe planned for Elgg integration is listed in Figure 3. At present, it is uncertain if Elgg development will include conformance to IMS ePortfolio specifications. Conformance is important because ePortfolios must be portable, meaning that users can take their content and easily reuse it on other systems. TENCompetence

⁷ Arguments have been made that ePortfolios are basically electronic versions of paper portfolios. Butler (2006, October) cites a work by Barrett and Knezek (2003) to support this claim. Butler tends to use the terms portfolio and ePortfolio interchangeably but attentively discusses the additional considerations, namely technical, required to implement ePortfolios.

argues that ePortfolios must be owned by the user and standardized across Europe so that they can easily be shown to any employer or learning provider (TENCompetence, 2005, March). Nonetheless, Moodle is scheduled to formally integrate an ePortfolio system⁸ in the near future and Moodle's roadmap includes provisions for compliance with IMS specifications (Moodle community, 2007b).

Win-win

There are many reasons why the SEB expansion described herein is a win-win opportunity for Bulgaria, special educators, special needs students, TENCompetence, and the EU. For one, the expansion suits Bulgarian and EU plans to implement lifelong learning solutions facilitated by information technology (Bulgarian National Assembly, 2000; Commission of the European communities, 2005, December). Secondly, TENCompetence requires cycle-2 pilots that address non-technical competencies; address competency development in authentic work environments; can test the new TENCompetence PCM client software; are sustainable after research completes; employ open-source, standards-based technologies, such as Moodle; and attract long-term associate partners, such as Sofia University's Department of Special Education and Bulgaria's Ministry of Education and Science (Hemmje, Majek, Massy, & Westhoff, 2007, February). Furthermore, Bulgaria is transforming continually to meet EU requirements. The EU currently focuses on judicial system reform and organized crime and corruption (Commission of the European communities, 2006, September). As the Bulgarian government attends to these front-page concerns, other issues, such as Bulgaria's faltering university system (Popkostadinova, 2007, May), may be overlooked. Other examples include the need to improve the quality of support available to disabled children; integrate special needs students into the regular school system; and integrate Roma children (Rowling, 2006, February 5; N. Smith, 2005, October 9, 2006, April 16, 2006, April 28, 2006, October 01; Tzvetkova-Arsova, 2004; UNICEF, 2007, May; UNICEF Innocenti Research Centre, 2005). The Bulgarian Ministry of Education and Science has published an official strategy for integration, but this is only the first of many steps to come (Bulgarian Ministry of Education and Science, 2004, June). Integration in any country is a very difficult task. Moreover, integration is only the first step toward inclusion⁹ (Peterson & Konza, 2006). As Bulgaria transitions to a system of integration, it faces many challenges. Such challenges include the restructuring of hundreds of special schools and institutions and the retraining of special educators and general educators nation wide (Cholakova & Georgieva, 1996; Peterson & Konza, 2006; Tzvetkova-Arsova, 2004). It follows that integration will catalyze a major shift in the competencies required for the practice of special education in Bulgaria. Thus, the integration process has the potential to create unstable demands on the education system unless effective competency development programs, such as those proposed by SEB and TENCompetence, can be provided.

Conclusion

This paper discussed a potential partnership between two research projects SEB and TENCompetence. Both projects seek to engage Internet technologies, e.g., ePortfolio, online course management, and Web 2.0 social networking software, to facilitate professional

⁸ Mahara, rather than Elgg, is currently planned for integration with Moodle (Moodle community, 2007b). Mahara is a recent open-source ePortfolio project that, from the outset, has been designed to integrate with Moodle (Mahara community, 2007).

⁹ An appendix to the Perkins document is included that lists a comprehensive set of competencies essential for all beginning special education teachers regardless of their specialization. The appendix is an excerpt from an international standard published by the Council for Exceptional Children (1995; 2003). The additional competencies addressed include towards a full inclusion model where everyone is considered normal.

development and lifelong learning. SEB requires competency-development tools to better support its members, and TENCompetence requires long-term associate partners. Moreover, both projects expect that early and continual focus on sustainability will lead to long-term adoption of research outcomes. For TENCompetence, sustainability will largely depend on the number and diversity of associate partners recruited. For SEB, sustainability will depend on the quality and relevance of professional development tools and resources provided to its members. Hence, the development of an SEB test pilot for TENCompetence is a win-win opportunity. If successful, similar approaches may be taken for the professional development of special educators in neighbouring Balkan countries, especially those new to or soon to enter the EU.

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TOWARDS EMPLOYABILITY: THE EPORTFOLIO AS A LINK BETWEEN RPL AND PFL

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Abstract: In this work in progress, the researcher is exploring the suitability of ePortfolio development as the process and content of an applied management course towards a bachelor's degree in business. Students undertaking the course are typically adults in full-time employment. The researcher posits that the design of the course should be consistent with a concept of learner-worker employability and an approach to learning that is reflective, contextually relevant, framed appropriately, and deep rather than surface. There should be aspects of richness and reach. Also, the model should recognize prior learning (RPL) and enable preparation for future learning (PFL). It should be consistent with enlightened research on formative, summative, and - in particular - sustainable assessment. The researcher considers the worth of Howard Gardner's (2007) 'five minds for the future' conceptualization as a framework for the development of ePortfolios and concludes that it holds much promise. Essentially, the conceptualization can provide an ongoing link for the ePortfolio developer between RPL and PFL.

Keywords: employability, ePortfolio, RPL, PFL

Introduction

The concept of *employability*, or *employment security*, has been defined as "being qualified for currently available work, whether with a present employer or elsewhere" (Sheckley, Lamdin, & Keeton, 1993, p.4). Typically, it applies to the sustained well-being of learner-workers in increasingly complex, uncertain and dynamic environments.

Certainly, learner-workers live in a world of accelerating change. No longer can they sit back and take life as it comes. No longer is it business as usual. The knowledge and skills of yesterday are not the knowledge and skills of today or tomorrow. Redundancies threaten. With support from employers and educators, learner-workers need opportunities to reflect, be proactive, and be opportunistic.

An applied management course that is part of a business degree programme can provide appropriate opportunities for learner-workers. The learning can be both for employability and academic credit. It can be 'deep' rather than 'shallow' (Marton and Saljo, 1984). This means that the learner-workers will be aware of the understanding that develops while they are learning rather than being mindless about purpose and strategy. Importantly, they will be interested in the course content rather than being anxious about material of little relevance.

Such considerations are basic to the design of a rich and rewarding course of study for a learner-worker. They lend themselves to ePortfolio development.

The ePortfolio as a basis for course design

As a product of the electronic era, the ePortfolio accompanies opportunities in education for *richness* (that is, the overall quality of information) and *reach* (the overall number of people involved in the exchange of information) in contrast to richness *or* reach (Weigel, 2002, pp.41-44). This means that rich information can now be shared by many different types of people in a wide variety of locations. The possibilities are as wide as the imagination. It is a matter of taking opportunities that are appropriate to contexts and circumstances.

Gone is the need for learning exclusively within the classroom that is based on simulated exercises and contrived case studies. Through electronic and other means, the thrust of education can be on real-life projects (including the development of ePortfolios) in the real

world. This ‘bricks and clicks’ approach enables learners to make meaningful contributions to work – and life in general – while earning academic credit. Also, crucially with a supportive ePortfolio, it prepares them for future work. The fit is good for the design of the applied management course in question.

Reflective learner and teacher approaches

From facilitator of learning (or a researcher) perspective, a ‘practise what we preach’ or a ‘reflections on reflections’ approach is appropriate. The facilitator can develop his or her own ePortfolio in parallel with course members and have a set of reflective questions.

Drawing upon the research of, for example, Black & Wiliam 1998, Boud & Falchikov 2006, Bransford & Schwartz 1999, Doyle 2004, and Gardner 2006, it is suggested there is much to be gained by conceptualizing education as an ongoing process that enables an adult learner – including the teacher as learner - to undertake reflected and recorded excursions from *recognition of prior learning* (RPL) to *preparation for future learning* (PFL).

RPL, in relation to this consideration, is “a process that enables people of all ages, backgrounds and attitudes to receive formal recognition for skills and knowledge they already possess” (Simosko, 1991, p.11). Also it can be portrayed as in Figure 1 (Hornblow, 2002). It is a spiral concept of life-long learning opportunities.

PFL is transfer of learning in specific and/or general and simple and/or complex ways (Bransford & Schwartz, 1999, Doyle, 2004). It is a process of learning that is sustained beyond the short-term (and the context of a learning institution if that is where it occurs) and is applicable to real-life settings and situations.

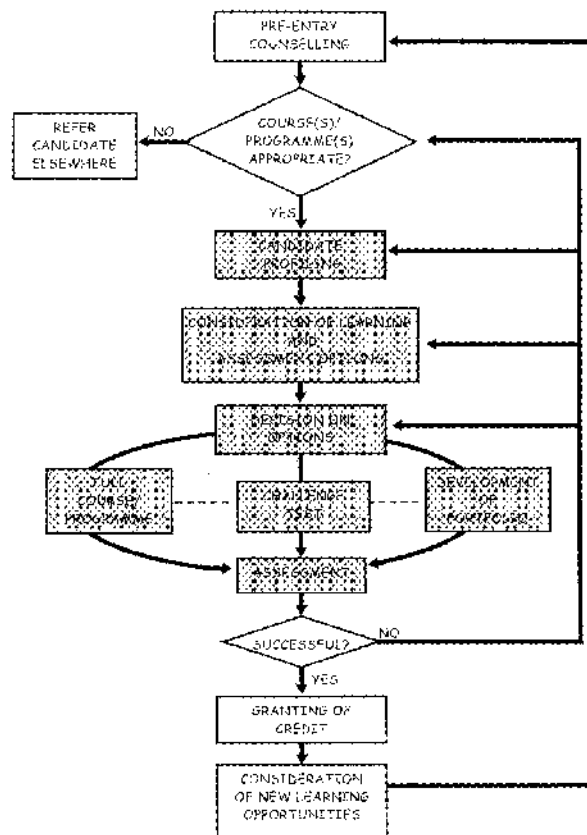


Fig. 1. Flexible Assessment Model

Five minds as a framework

Having an appropriate framework for the ePortfolios is vital. Krueger (1990) and others have found that adult learners need and welcome support in planning and framing their learning.

It is suggested, for example, that the ‘five minds’ of Howard Gardner (2007) can act as a framework for ePortfolio organization that is amenable to improved employability. In his conceptualization, the ‘disciplinary mind’ relates to mastery of a major school of thought (such as science, arts, economics, politics, or ethics) and at least one professional craft. The ‘synthesizing mind’ evidences an ability to integrate ideas from different disciplines or ‘territories’ or ‘worlds’ into a coherent whole and to communicate that integration to others. The ‘creating mind’ indicates a capacity to uncover and clarify new problems, questions, and phenomena. The ‘respectful mind’ shows an awareness of and appreciation for differences among human beings. The ‘ethical mind’ is a signpost to fulfilment of responsibilities as a worker and a citizen.

For the learner-workers of the applied management course, evidence relating to each of the five minds can be accumulated.

Other frameworks could be used of course. However, Gardner’s conceptualization is timely, well justified, and appropriate to employability. It is noted with interest that Stefanakis (2002) has used Gardner’s theory of multiple intelligences (from which the ‘five minds’ stem) as a conceptual basis for ePortfolio development by children.

Alignment with enlightened theory and practice

Do the critically reflective approach and the use of a framework such as Gardner’s for ePortfolio development align well with the research referred to in the introductory paragraphs of this paper (namely, Black & Wiliam, 1998, Boud & Falchikov, 2006, Bransford & Schwartz, 1999, Doyle, 2004, and Gardner, 2006)? Are there indications that the teaching and assessment (and more importantly the learning) will be appropriate and enriching?

Black and Wiliam (1998), in a review of hundreds of articles, identify many issues that had not been fully addressed in assessment practice such as focusing assessment on learning, separating grading and feedback, and using self and peer judgements. Certainly, through the development of an ePortfolio, there is a focus on real-life learning. Also, there is a separation of academic grading and overall purpose.

Drawing upon the findings of Black and Wiliam and further evidence from a variety of countries and contexts, Gardner (2006, p.197) (‘J’ not ‘H’, note, in this instance) argues the case of ‘assessment *for* learning’ rather than ‘assessment *of* learning’. He finds the use of ‘for’ rather than ‘of’ “a compelling conceptualization” (ibid.). The ‘for’ in this specific instance relates to the workplace and real-life development for employability. This is in contrast to the assessment ‘of’ learning typical of ‘3-hour examination’ approaches. As stated by Doyle (2002, p.370): “If knowledge is encoded and stored for the end-of-course examination questions, or to address an essay topic, then they are the future uses knowledge will be available for.”

Boud and Falchikov (2006, p.399) make a case for ‘sustainable assessment’ to build on ‘formative’ and ‘summative assessment’ to foster longer-term goals. They propose that “students need to become assessors within the context of participation in practice, that is, the kinds of highly contextualized learning faced in life and work”. ePortfolio development as the basis of the applied management course measures up very well. The focus is on life-long learning. It is an ongoing critically reflective practice.

Conclusion

Reflections captured in ePortfolios represent a deep rather than shallow approach to learning. They are compatible with formative, summative, and, importantly, sustainable assessment.

At the start of the course, the facilitator can provide an environment in which the students can reflect on their past and present: Who am I? What is my experience in formal education and training? How do I like to learn? What is my experience in life in general? What is my experience in business? What is my experience as a manager? What is my plan of action for completion of the course? During the course, the focus of learning is on real experiences in a real world. Using Gardner's (2007) framework, for example, a learner-worker's ePortfolio could provide evidence of disciplinary, synthesizing, creating, respectful, and ethical minds. By the end of course, it can be expected that the students will have developed abilities and attitudes that they can transfer to business and life and use on an ongoing basis.

The conceptualization of education as reflective and recorded excursions from *recognition of prior learning* (RPL) to *preparation for future learning* (PFL) holds promise. It is compatible with the employability interests of the learner-workers.

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THE USE OF EPORTFOLIOS WITHIN ACADEMIC PROGRAMS

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Abstract: Portfolios are generally considered a suitable tool to structure and support the academic education. First experiences, however, show that the added pedagogical value of portfolios is not always optimized. A framework was developed for (1) portfolio outcomes (What is mentioned in the literature as the added value?), (2) academic objectives (What can be used as a generic description of academic objectives?) and (3) portfolio learning environment (Which features are known as enhancing the intended outcomes?). A questionnaire was developed and distributed among 14 academic universities within the Netherlands. The results are representative for the current portfolio use. As main function of portfolio is mentioned the stimulation of students to take the direction of their learning process in their own hands. In general, the portfolio learning environment is poorly developed, i.e. requirements for the steps of the reflection process, standards for learning lines, frequency of usage, use of peer feedback and training of tutors' coaching skills. Systematically the results were in favour of portfolio usage for professional behaviour, compared to academic functioning and study career management. Requirements for the quality of the reflection process are probably a crucial factor. On the basis of this survey a *Checklist Portfolio learning environment* has been developed.

Keywords: academic functioning, professional behaviour, self-steering

1. Introduction

Since the Bachelor-Master structure has been implemented, we see a growing need to stimulate critical reflective thinking in order to distinguish academic programs from vocational-oriented bachelor and master programs. At the same time, communication skills, learning skills and professional behaviour need to be given more explicit attention, this in addition to cognitive learning goals. Portfolios are generally considered a suitable tool to structure and support the education in those skills. However, the first experiences with portfolios for academic goals show that the added pedagogical value of portfolios is not always optimized.

2. Research questions

These experiences have led us to formulate the following questions: Are the advantages of the instrument used in an optimal way? Are the learning objectives, for which portfolio is used, in itself seen as relevant by students and tutors? And, are the learning environments appropriate to reach these objectives? To answer these questions, we examined the ways portfolio is used at academic universities within the Netherlands.

3. Development of a generic framework for portfolio outcomes, academic objectives and the learning environment

In order to develop a generic framework for portfolio outcomes, academic objectives and the learning environment, we did a quick scan of the Dutch literature on these subjects. (We did restrict ourselves to the Dutch situation: the portfolio usages within the Netherlands have generally less to do with career management than in the UK or USA for instance.) The main goal of this scan was to figure out:

- What is mentioned as the *added value of ePortfolio* in general? Or, in other words: which specific learning objectives or *student outcomes by using portfolio* are found?
- What can be used as a generic description of *academic objectives*?

- Which features of the *portfolio learning environment* are currently known as enhancing the intended outcomes?

3.1. What is mentioned as the added value of ePortfolios?

ePortfolio is an instrument with which a student can document and organize feedback on his development. The archive function and the communication function are the core features of the tool.

The archive function allows a student to document and analyse a variety of comparable products and experiences. In this way he is able to discover patterns in his functioning, his style, the underlying views and attitudes. *Recognition of patterns* is a necessary condition for a self directed growth. Students learn to analyse experiences, to get a deeper understanding of connections, of their own role in and contribution to the common achievement en to draw conclusions on a higher level of abstraction.

The communication function is useful in two ways. Firstly, it enables the student to compare the estimation of his capacities and ideas about the direction of his further development with the opinions of others and to ask for the specific guidance he might need. Secondly, students can show their portfolio for the sake of, for instance, (midterm) assessments and applications. “From the qualitative research into the functions portfolio can fulfill, we conclude that those functions mainly can be found in the communication which arises with students about the demands for ‘self-steering’ and development of competences, in depth as well as breadth” (Elshout-Mohr et al, 2004).

If one wants students to take more responsibility for their learning process (self-steering), one has to design adequate training tasks and make use of standards for the assessment. Only in this way students can be obliged to properly pass through every phase of the reflection process. When they do this regularly, the self-steering ability will grow. The reflection process is made up of several parts (steps), which have to be carried out successively. It starts with an estimation of one’s competences in relation to specific standards; this implies an orientation on the specific learning goals and end qualifications (step 1). The self-evaluation is based on a series of products and learning experiences in relation to the standards (step 2). The third step is identification of patterns in one’s own functioning. This identification of patterns will be substantially better when a student is obliged to underpin his claims systematically by a *selection* of the evidence from all the ‘rough’ material (Van Tartwijk et al, 2003). The last phase in the reflection cycle is the planning of the next step in one’s education. In practice, the requirements for the reflection process often end with step 2, the self-evaluation (Elshout-Mohr et al, 2004). When a student has to meet clear requirements for each step, reflection will become more profitable and less ‘vague’. Asking and giving feedback enhances further the quality of one’s self-evaluations and contributes to a culture in which students get used to take responsibility for their development. Moreover, students become more conscious of standards for their performance and products. From learning psychology we know also that learning is a social event and as such peer feedback can be used to enhance the outcomes.

Requirements for the reflection process reflect the principles of coaching: in the coaching process the support is directed on the recognition of patterns in someone’s behaviour and taking responsibility for one’s contribution or role, within the context of specific goals and standards (Lingsma et al, 2003). Therefore, tutors have to know these principles as well and get trained in coaching skills.

By making good use of the two mentioned main functions of portfolios, a student is better able to steer his own development. Academic objectives, however, determine the *direction* of this development. Therefore a clear view on what is meant by academic qualifications is indispensable. Without a frame of reference, communication about development is pointless.

3.2. What can be used as a generic description of academic objectives?

Since the implementation of the Bachelor-Master structure, a generic framework for the academic objectives has been provided by the Dublin descriptors: these give a description of the (end) qualifications of an academic graduate. These descriptors were internationally accepted in 2004; they are formulated by a group of experts and adopted by the Dutch-Flemisch Accreditation Organisation (NVAO).

The qualifications are described as five distinct competence domains: knowledge, application of knowledge, (reflective and critical) judgment, communication skills and learning skills. They are, however, highly interdependent: reflective judgment, for instance, cannot be shown without a solid knowledge base and communication skills. One of the demands for the accreditation of academic programs is that faculties make transparent in which ways students do obtain the end qualifications. This demand appeared to be a huge stimulant for the thinking in terms of learning paths or learning lines.

The Dublin descriptors are applicable to all sorts of academic disciplines, the more professional (with an extra accent on “learning to do”), the more research-oriented (with an extra accent on “learning to become a researcher”) and the humanities (with an extra accent on “learning to think”).

3.3. Which features of the portfolio learning environment are relevant for enhancing the intended outcomes?

Good use of portfolio makes its own demands upon the learning environment. From the experiences up till now we can distil several elements, which seem important.

Several years ago, together with the implementation of the Bachelor-Master structure, the board of the University of Utrecht decided that all faculties should use portfolios to support the development of academic skills. A survey in 2005 about portfolio use within this university did show that the users experienced the lack of explicit learning lines and lack of standards as the main problem. Also the (lack of) coaching of the student’s reflection skills and unclear status of the portfolio within the study program were reported as a problem. In general, the respondents from medical studies were more positive about portfolios than from the other faculties (Rubens and Oost, 2005). According to Oost portfolios were introduced too early in many faculties: the vision on academic education according to the new demands of the Bachelor-Master structure was not yet sufficiently crystallized (conclusion in his key note at a conference at the Vrije Universiteit Amsterdam, June 2006).

Because the Dublin descriptors are closely connected, the best way to acquire the qualifications is by training in authentic tasks. Ideally, a program consists of series of comparable, but varied authentic tasks (Merriënboer, 2005). A student can only learn to look for patterns in his own functioning if he gets sufficient experience with authentic tasks. In arts and sciences, where “learning to think” and “learning to become a researcher” is the main goal of academic development, authentic tasks are for instance: the organisation of a mini conference, a research project, design task (Milius et al, 2001). In studies where “learning to do” is more central, one could think of doing consultations in the practice of a general practitioner, “where the student can smell, see and feel the practice” (Jansen-Noordman and Merriënboer, 2002). In this way students learn from the start to use knowledge, skills and attitude integrally.

According to Merriënboer (2005) transfer to situations in practice is stimulated in this way. Portfolio would enhance this transfer still further because self-evaluation, reflection and self-steering tasks are inherent to portfolio. Experience based learning can be improved by systematic observation tasks.

In short, a clear view on end qualifications and learning lines, translated into sufficient and varied authentic tasks, a clear and well communicated view on the specific place of portfolio

tasks within the total program and tutors trained in coaching techniques seem to be minimally required.

4. Questionnaire and method

In order to address the research questions, a questionnaire was developed on the basis of this framework – with the intended learning outcomes, (end) qualifications as frame of reference and the demands on the learning environment. The questionnaire has been tested among four portfolio experts from the Vrije Universiteit Amsterdam, two from departments and two from the Centre for Educational Training, Assessment and Research (CETAR). The revised version was once again filled in, this time by a fifth expert from CETAR.

The final version has been electronically distributed among the staff, involved in portfolio-usage at department level of all 14 academic universities within the Netherlands.

From the results five examples of ‘good practice’ were selected, based on duration of usage and high valuation of the benefit. Secondary criteria were: phase of the program (one bachelor and one master program) and main objective (academic functioning and professional behaviour). Staff and panels of students involved were interviewed in order to get a better insight into crucial factors for success. Citations from the interviews will be used by way of illustration.

5. Results

5.1. General results

Response

We got information about 43 portfolio applications; we missed maximally 5. At ten (of the 14) academic universities the response was 100%. In short, the data are representative for the ways portfolio is used at the moment at academic universities within the Netherlands. The range of applications is 0 to 14 per university (spring 2007). In the tables in the following section we use numbers instead of percentages: the number of applications is relatively small and the number of variables high.

Explanation of the categories used in Table 1 to 9. Main objectives for portfolio and types of programs.

We classified the main objectives for portfolio as follows:

- Academic functioning: learning to do research/to design, and communicate about it in a critical way; development of an independent, critical attitude,
- Professional behaviour: learning to practise an academic profession, independent, responsible and critical,
- Study career management: reflection on study motivation and study choices.

Accordingly, we made a distinction between sciences and arts on the one hand and professional studies on the other. (Reason for this distinction: portfolio for professional programs is more often evaluated positively than in more scientific programs.)

- *Arts & sciences* (arts and literature, social sciences, sciences, technical sciences etc.),
- *Medical studies* (medicine and dentistry),
- *Teacher-training programs* (for pre-university education and HE),
- *“Other of professional studies”* (master pedagogy, bachelor of law and bachelor of pharmacology).

Table 1. Number of usages of portfolio objective and type of program

Type of program	Portfolio objectives			N
	Academic Functioning	Professional Behaviour	Study Career Management	
Arts & sciences	16	5	5	26
Medical programs		4		4
Teacher-training program		8		8
Other of professional programs	2	2		4
N	18	19	5	42

Portfolio is used nearly as many times for academic functioning as for professional behaviour. In Master's programs the main objective is mostly professional behaviour (6 of totally 7). Portfolio for study career management is exclusively used in the Bachelor's phase.

5.2. *Intended educational benefit and perceived relevance of main objectives*

What was the intended result of portfolio use?

Most respondents answered this question with phrases like: "to give students the direction of their own learning process", for all three types of objectives. Faculties try to influence the study attitude, to make students more responsible for their own achievements. According to a (science) tutor: "We want students to study actively, we want them to learn to ask for the feedback they need, get insight into the objectives of the program and their level of mastering the subject matter in relation to the end qualifications."

We were interested to hear some perceptions of the students themselves about the outcomes. One chemistry student: "Peer review was useful. I was not inclined at all to ask feedback. For me it's OK that I had to do it. Now, in our third year, we still ask each other, while it is not obliged anymore".

A medical student told us: "You remember the points you are told you have to improve and you try to pay attention to them. Also, you see the changes in the way you see yourself as a practitioner in the future. You can follow your self, experience your development by seeing that your image is becoming richer. Now it feels quite natural to think about yourself and how you are functioning in practice."

Another student mentioned the tutor groups as a useful supplement to peer feedback and peer reviews: "We got a very open discourse about ourselves and the quality of our work."

Perceived relevance

Do users perceive professional behaviour as a more relevant objective for portfolio use than academic functioning or study career management?

Table 2. Relevance of objective as perceived by students and tutors

Objective perceived as relevant by	Portfolio objectives						N	
	Academic Functioning		Professional Behaviour		Study Career Management			
	Students	Tutors	Students	Tutors	Students	Tutors	Students	Tutors
Minority	10	8	3	2	4	1	17	11
Half	6	6	10	2	1	2	17	10
Majority	2	4	6	15		2	8	21
N	18	18	19	19	5	5	42	42

According to the respondents, students as well as tutors more often see the relevance of portfolios for professional behaviour than for the other two main objectives. One remarkable outcome is that tutors in general think more favourably about the relevance of portfolios than students. This is the case for all types of objectives. Students are reported as the most 'sceptical' when portfolios are used for academic functioning and for study career management.

When asked to mark the educational benefit for the students on a scale from 1 (extremely negative) to 10 (extremely positive), about two third gives a mark higher than 6. The marks vary from 2 to 9.

In general, portfolio use for academic objectives gets lower marks than for professional objectives. *Within* these categories, however, there is a huge variety.

In the following we will try and find explanations for these differences by looking closer at some specific features of the (portfolio) learning environment.

5.3. Features of the learning environment and valuation of the learning outcomes

In this section we will zoom into the aspects of the learning environment we mentioned before. Does portfolio practice differ on these features and is this reflected in the valuation of the estimated learning outcome (the marks given by our respondents)?

Requirements for the steps of the reflection process

We assumed that, when a student has to meet clear requirements for each step in the reflection process, reflection will become more profitable and less 'vague'. Therefore, we asked if students have to meet requirements, for each step specifically.

In Table 3 is mentioned how often a positive answer has been given (to each question/step). For example, three times identification of patterns is required for reflection on specific aspects of academic functioning.

Table 3. Frequency requirements are made upon step 1 to 5 of the reflection process

Steps	Portfolio objectives			N (N=42)
	Academic Functioning (N=18)	Professional Behaviour (N=19)	Study Career Management (N=5)	
1. Requirements for reference to standards (end qualifications/ competences) in self-evaluations	6	10	1	17
2. Requirements for incorporation of products and learning experiences in self-evaluations	7	16	1	24
3. Requirements for identification of patterns	3	11	1	15
4. Requirements for systematic underpinning of claims	1	11		12
5. Requirements for planning of the next stage of development	6	11	2	19

To summarize, systematically more requirements are made upon the reflection process for professional behaviour than for academic functioning.

Valuation of learning outcome

Only 8 times students have to meet requirements for (almost) all steps, i.e. 4 or 5. All 8 times professional behaviour is concerned. In all these cases the learning outcome is valued high by the respondents (mean score of nearly 8).

The meaning of reflection tasks is given

Before making requirements upon reflection tasks, one has to explain the meaning of the task, i.e. why students have to reflect at all.

Table 4. Explanation of reflection and portfolio objectives

Reflection explained	Portfolio objectives			N
	Academic Functioning	Professional Behaviour	Study Career Management	
No	13	8	1	22
Yes	5	11	1	17
N	18	19	2	39

Predominantly, where professional behaviour is concerned, attention is paid to the meaning of reflection, this in contrast to portfolio use for academic functioning. No relation has been found with the estimated learning outcomes by portfolio use.

Standards for learning lines are used

For reflection and self-steering students need a frame of reference: standards for the various levels. Do they exist, in theory and in practice?

Table 5. Learning lines and portfolio objectives

Learning lines	Portfolio objectives					
	Academic Functioning		Professional Behaviour		Study Career Management	
	exist? N	used? N	exist? N	used? N	exist? N	used? N
In progress	8	8	5	2	1	2
Yes	3	2	7	9	1	1
N	11	10	12	9	2	2

Only 2 times clear standards are used in practice for academic functioning and 7 times for professional behaviour. In all programs in which a clear frame of reference is used, the learning outcome for students is valued high (mean of almost 8).

Embedding of portfolio within the program and frequency of use

A change in attitude (“becoming the director of one’s own learning”) does not come about by incidentally performing a (marginal) task. We assume that students only can acquire the desirable disposition by regular and integrated use of portfolio within learning paths.

We categorised types of portfolio use as:

- limited: just for study career management or connected to one or two subjects,
- integrated: portfolio used as educational and assessment tool within substantial learning path(s).

Table 6. Embedding within the program and main objectives

Embedding	Portfolio objectives			N
	Academic Functioning	Professional Behaviour	Study Career Management	
Limited	11	6	3	20
Integrated	7	12	2	21
N	18	18	5	41

Limited and integrated use are found equally. For professional behaviour integrated use occurs the most, for academic functioning limited use.

Table 7. Frequency of portfolio use and main objectives

Frequency of use	Portfolio objectives			N
	Academic Functioning	Professional Behaviour	Study Career Management	
Incidentally/ once or twice every year	10	4	2	16
Regularly/ minimally once every month	8	9	2	19
Intensive/ weekly		5		5
N	18	18	4	40

Portfolio is used more frequently for professional behaviour than for academic functioning. Intensive use occurs only for professional behaviour (portfolio is used also more often as assessment tool or skills dossier).

Valuation of the learning outcome

Integrated use is generally valued positive; only 4 times a negative mark was given. The learning outcome is mostly valued high, when students use their portfolio every month or week; only 3 out of 24 marks were negative.

Use of peer feedback and requirements on the feedback

Table 8. Use of (criteria for) peer feedback and portfolio objectives

Peer feedback	Portfolio objectives			N
	Academic Functioning	Professional Behaviour	Study Career Management	
Peer feedback is used	4	8		12
Criteria for feedback are used	2	5		7

The opportunities we mentioned in 3.1 to stimulate the quality of the reflection processes by use of peer feedback are seldom used in practice. We even have to put into perspective the cases where peer feedback was given. According to the students, the feedback is often superficial, restricted to technical aspects. Furthermore, the feedback is often given too late and therefore less useful than it would have been when given immediately. A student told: “At the end of the year we found, oh there is missing five feedback reports on my presentations. John, can you remember my presentation in October? Can you give feedback on it?” They report the phenomenon of gathering feedback just before the finish. Besides, students are not always happy about the form peer feedback takes – with checklists. “Sitting together works, filling in the form not. Talking about working together and your role in the group is not common and that is really a big plus of tutor groups”. Another student adds: “Sometimes you are extremely surprised how other people look at you and that’s a very important educational aspect of it”.

Preparation of students and tutors

Table 9. Preparation of students and tutors

Preparation	Portfolio objectives						N	
	Academic Functioning		Professional Behaviour		Study Career Management			
	Students	Tutors	Students	Tutors	Students	Tutors	Students	Tutors
Written & oral information	16	11	15	10	4	4	35	25
Use of ePortfolio	6	1	8	1	2	2	16	4
Training in coaching		2		5		0		7

Generally, tutors are less informed about and trained in the use of ePortfolio’s than students. Only 17% is explicitly trained in coaching skills. This training has to be put into perspective as

well. In interviews we were told that training was not obligatory and coaching skills were not the main focus of the training.

In practice, tutors often do execute their role in an informal way. As one student told us: “In the USA tutors are made responsible for the outcomes of their students. Here a tutor said: “Tutoring is taking too much time. Next year I will not do it anymore.”” The students interpreted this as a signal that portfolio was seen by the tutor as an irrelevant part of the program.

Even in teacher training programs, where portfolio was first implemented, the coaching has not been fully developed yet. According to a tutor: “We should relate the feedback more to the main roles of teachers.” He hoped that, by doing so, tutors would concentrate less on feedback on details of the performance and give more support to deep learning (get insight into connections, causes, underlying views).

6. Conclusions and discussion

The number of portfolio applications is relatively small, while at the same time the number of variables is large. Although it is impossible to make more sophisticated analyses on our data, interesting conclusions can be drawn for the improvement of portfolio use in practice. We found that in many cases the advantages of the instrument are not used in an optimal way. Systematically the results were in favour of portfolio use for professional behaviour. This goes for the appreciation of the portfolio outcomes as well as for the suitability of the learning environment.

The main reason being given for the use of portfolios, is stimulation of students to take the direction of their learning process in their own hands. In practice this is realised better for professional goals than for academic functioning or study career management. We suppose that this has to do partly with a difference in the *urgency* to improve one's achievements. Where professional behaviour is concerned, students reflect mostly on experiences in authentic situations, for instance handling of anxious patients in a dentistry practice, subjecting patients to an anamnesis, giving a series of lessons, going through a pedagogical apprenticeship, doing archaeological field research. These experiences in the 'real world' can be quite confronting and distressing. Reflections on academic functioning on the other hand, have mostly to do with products and experiences like a research project, a design task, essay writing, presentations. This is generally done within the faculty, i.e. a relatively safe environment, compared to an external practice.

Besides urgency to improve one's functioning, the *requirements* of the quality of the reflection process are probably a crucial factor as well: they are systematically higher for professional behaviour.

Tutors seem to see more often the relevance of ePortfolios than students. This holds good for all three types of portfolio objectives. An explanation for this finding might be that tutors are confronted with a group of students who know better than their predecessors what they want and what sort of guidance they need. ePortfolio enables tutors (and students) to prepare themselves better for discussions. Furthermore, many tutors see a positive difference with their own study: nowadays there is much more explicit attention for communication skills and professional or research skills integrated in the whole program.

Students on the other hand, can't make any comparison with a previous situation. Also, students usually don't appreciate and put effort in ('soft reflection') tasks when they are not obliged, not assessed seriously and barely given feedback. And this is exactly what happens all too often, even more so when portfolios are used for academic education and student career management rather than for professional behaviour.

In many cases ePortfolio has been implemented, while the learning environment wasn't sufficiently prepared for it. On the other hand, ePortfolio has often been a stimulant to screen programs on coherence within learning lines and place of skills and reflective thinking within the program.

The relatively negative results concerning ePortfolio use for academic development do not imply that ePortfolio's shouldn't be used for these objectives. This would be a premature conclusion, because generally learning environments are not fully developed yet.

Finally, various applications do show that ePortfolios can be used to the complete satisfaction of students and tutors.

For the further development of the ePortfolio learning environment the following checklist can be used.

Checklist Portfolio learning environment

1. The portfolio has a clear status / is connected to substantial learning lines.
2. Learning lines involve core competences of university graduates and not just separate skills. The objective is academic and professional education, in breadth and in depth.
3. Clear levels and standards within the learning lines are communicated.
4. Comparable experiences are necessary for pattern identification. Within learning lines students get sequences of varied learning experiences in authentic situations.
5. In order to enhance the self-steering process, portfolio tasks / reflection tasks are given after sequences of practical experiences (academic and / or professional).
6. Students are trained to reflect upon their functioning, and requirements are being put upon pattern identification and formulation of the next step in the development ('self-steering').
7. Students organize and get feedback on their functioning or products immediately after their achievements.
8. Systematically students bring forward evidence for their progression on the learning lines.
9. The requirements for reflection reports by students are mirrored in the requirements for tutor skills (i.e. a tutor has to be dedicated to the goal, be an expert as well as a coach).
10. The performance of the tutors is part of a plan for improvement and control of the quality of educational programs: they are being trained and assessed.

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PORTFOLIO FOR ASSESSMENT OF PRIOR LEARNING: DESIGN ISSUES

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Abstract: Assessment of prior learning (APL) introduced recently in Dutch educational system supports employability and lifelong learning by validation of competences developed in various contexts and providing broader access to formal education. The paper presents results of a pilot study in which APL took place in the academic settings and portfolio was used as an assessment instrument. Applied design principles and heuristics are presented and discussed.

Keywords: portfolio, assessment of prior learning

Introduction

Lifelong learning perspective implies major shifts in the educational landscape. Curriculum driven education gives way to learner centered approaches, personal competence development and employability gain acceptance as legitimate educational goals (Koper, Rusman & Sloep, 2005). Those lacking an official certificate or a diploma but with sufficient competences, knowledge and skills get the chance to fulfill learning aspirations and ambitions through alternative routes as assessment of prior learning (APL) (Colardyn & Bjørnavold, 2004). APL supports validation of competences developed through informal and non-formal learning, professional and voluntary activities etc. It helps to define the acquired competence level and opens access to education of desired level in formal education and training systems. Besides APL contributes positively to employability. By creating a transparent overview of persons' capabilities it promotes mobility between branches and sectors.

Successful implementation of APL requires design of appropriate methods and instrumentation, development and validation of these methods, procedures and tools. Portfolio is generally accepted as a method for presenting evidence of the achieved level of knowledge, skills or competence in general (Barrett, 2003) and in evaluating competences acquired in informal or non-formal contexts in particular (Bjørnavold, 2001). As such portfolio fits in the APL approach and is generally recognized as an APL tool (Joosten-ten Brinke, Sluijsmans, Brand-Gruwel & Jochems, 2007). APL methods and tools are accepted for years in vocational education but are less frequently applied in academic curricula (Scholten, et al, 2002). Recently a series of pilot studies at the Open University Netherlands (OUNL) attempted to fill in this gap and investigate how APL can be applied to broaden access to formal academic education. For these pilots APL portfolios were developed and tested.

This paper presents one of these pilot studies, the APL study conducted at the faculty of Educational Science of the OUNL (Master of Science program of Active Learning). The paper describes the curriculum involved as the setting of the pilot, provides an overview of portfolio design principles, presents the APL portfolio designed in this pilot and discusses applied design principles and heuristics.

Objectives

The main goal of the conducted pilot was testing feasibility of the APL concept in the context of a university curriculum at the Masters' level. APL portfolio design constituted an important sub goal thus forming the focus of this paper.

Method

This section introduces the actors involved in the APL portfolio design and testing, briefly describes the procedure followed and gives an overview of the educational program used as the pilot setting.

Pilot participants

Eight applicants to the Master of Science through the APL procedure, two tutors who provided support and guidance to the participants, two assessors and a researcher were involved in the pilot.

Curriculum related issues

Curriculum requirements and the curriculum competence map served as input for defining the APL criteria for the APL procedure in the pilot and for portfolio construction.

The Master of Science in Active Learning is an academic competence-based distance program in Educational Science offered by the Open University Netherlands to educational practitioners in the Netherlands and Flanders with a professional bachelor degree. Academic bachelor degrees in Educational science or Educational Psychology provide direct access to the program while graduates at professional bachelor level in teacher education, pedagogy or related disciplines follow one of the available transitional programs first. The composition and length of the transitional program depend on the educational background of the applicant and may include up to nine bachelor level courses in Educational Science, Learning Theory, Social Science Research Methods, Academic Writing etc. In the standard application procedure access to the program is granted based exclusively on diploma evaluation.

Competence attainment in the areas of educational research and instructional design at the Master of Science level constitute the curriculum goal. Both competence areas are defined and described in detail at the entrance (bachelor) and graduate level. For the purpose of the APL procedure an additional competence level description was compiled for the start of the transitional program of the maximal length. Based on this description the APL criteria for pilot applicants could be defined.

The APL procedure in the pilot

The APL portfolio template was designed by the two assessors and the researcher in several iterations with the tutors providing feedback on these iterations. Then the portfolio was validated by the applicants who filled it in as part of the APL procedure. Two participants did it independently, six turned to their tutors for feedback. In two cases the tutors provided feedback on several versions of the portfolio.

The APL portfolios filled by the applicants were then submitted for assessment. In four cases portfolio's provided sufficient information for the decision-making. In one case the applicant was requested to provide additional information and argumentation. Based on the portfolio assessment four assessment interviews were held. In these cases decision-making was based on the assessment of the APL portfolio and interview results. In the course of the pilot evaluation several improvements in the APL portfolio were made.

Results

Pilot results reported in this paper pertain to portfolio design. Portfolio evaluation by the users as well as feasibility study results are discussed elsewhere (Joosten-ten Brinke, et al., 2007).

The APL portfolio designed in the pilot was based on theoretical instructional design principles applied to a particular case of a Master of Science program. The resulting portfolio reflects both. This section dwells on the portfolio design principles, describes the resulting APL portfolio and provides an underpinning of the choices made based on the theory and on the practical experience.

Portfolio design principles

The portfolio design requirements as deduced from the literature formed an important point of departure in the APL portfolio design process. General principles and criteria for portfolio design were derived from a literature study (Joosten-ten Brinke, et al., 2007) and from prior experiences with portfolio construction and use in similar settings (Joosten-ten Brinke, Stijnen, Van de Vrie, Lemmen, & Kees, 2006). These principles are translated into the specific requirements for this particular APL procedure.

As demonstrated in other studies the APL portfolio should:

- provide clear descriptions of knowledge, skills and competences to be presented in the portfolio,
- include examples of both evidence and argumentation,
- state possible outcomes of the APL procedure,
- include templates and formats for argumentation purposes (Joosten, et al, 2006).

Principles applied in portfolio construction include:

- Provision of guidance in structuring and presenting results of prior learning (Colardyn & Bjørnavold, 2004) and the process of portfolio construction (Ministry of Economic Affairs, 2000; Scholten, Teuwsen & Mak, 2003; Scottish Qualifications Authority, 1997; Thomas et al. 2000; Wheelahan, Miller & Newton, 2002),
- Scaffolding through clear portfolio templates and worked out examples to help structure the evidence and support the applicants' claim (Nyatanga et al., 1998; McMullan, Endacott, Gray, Jasper, Miller, Scholes et al., 2003).

The evidence in the portfolio should fit the following criteria:

- educational relevance (Aarts et al., 2003; Scottish Qualifications Authority, 1997),
- transferability (Cantwell & Scevak, 2004), validity (Bateman & Knight, 2003; Colardyn & Bjørnavold, 2004; Day, 2001a; Fahy, Periin, & Ferrer, 1999; Starr-Glass, 2002)
- authenticity (Day, 2001a; Konrad, 2001; Scottish Qualifications Authority, 1997).

It should be of appropriate level (Aarts et al., 2003), be based on recent experiences (Konrad, 2001) and be sufficient (Scholten & Teuwsen, 2002; Scottish Qualifications Authority, 1997).

Portfolio description

The resulting APL portfolio includes the following sections:

- personal data,
- self assessment in the form of a quick scan,
- argumentation template based on the STARRT model (STARRT standing for situation, task, activity, result, reflection and transfer),
- product archive for artifacts and documents collected as evidence to support the claims done in the self scan and STARRT form,
- summary of application request.

Self assessment scan and argumentation through STARRT form the core of the APL portfolio and include:

- part 1 to be filled for all applicants,
- part 2 to be filled by applicants to the Masters' directly or through a variable individualized pre-masters' arrangement.

Design of both parts is identical though the part one Quick scan includes general criteria as affinity with the educational field, general writing skills, personal organizational skills while the part 2 Quick scan is based on competence specific criteria defined in the curriculum. The STARRT template is filled per criterion or for several criteria of the quick scan to support claims made and demonstrate the competence level. Finally, artifacts and documents collected in the product archive serve as illustration.

User evaluation

According to the pilot evaluation the applicants found the instrument and instruction clear and easy to use. They appreciated availability of templates and examples. They required advice on specificity of descriptions, examples and argumentation and found the two-layer structure of the quick scan complex and not transparent. The portfolio provided a good picture of the competence level of the applicants from portfolio assessment so that an accelerated procedure could be applied (without interview). The portfolio made important bottlenecks and potential hindrances visible and helped formulate additional specific comments and further questions that assessors could pose.

When an interview was held, portfolio provided sufficient input for in-depth inquiry. Desired improvement aspects concerned completeness of information on the applicants' background and explicit preference of individualized pre-masters' arrangements.

Upon completion of the study minor changes based on the evaluation results were carried out. The APL portfolio is accepted for further implementation.

Conclusion and discussion

The portfolio designed for the study provided sufficient insight in the achieved competence level and the learning potential of the candidate applicants. The pilot demonstrated the general usefulness of portfolio as an APL instrument and provided validation of general portfolio design principles and heuristics in the context of APL. Specific APL oriented heuristics include specificity of argumentation and support of claims through templates; multi layer structure and a combination of self assessment and argumentation tools.

In the pilot a MS Word document served as portfolio template and completed portfolios included print-outs, audio-visual and hypermedia materials on cd-roms. For the time being institutions may require hard cover formats for APL portfolio for accountability purposes. As learner support however web-based format seems more appropriate. Applying APL portfolio design principles to e-portfolio design can be seen as the next challenge.

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THE USE OF ELECTRONIC PORTFOLIO IN INITIAL LANGUAGE TEACHER TRAINING AS AN ASSESSMENT AND EVALUATION TOOL

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Abstract: In this study, an electronic portfolio application in initial language teacher training is investigated as an assessment and evaluation form of instrument for the practice course, which is compulsory for the last semester of the initial teacher education program.

Keywords: Electronic portfolios, initial language teacher education and practice teaching

1. Introduction

In the time of millennium, the societies have been reshaped and introduced reforms to their social, economical and political systems. Through revisiting the existing systems and improvising them, the communities are supposed to have better life conditions, work opportunities and educational qualifications. All these can be put into practice by the strategical planning of educational reforms, the use of technology and adaptation of it to national educational systems. The qualification for redefined standards in education is required when the technology is utilized in education. Current trends such as new technology blended teaching and training, content and language integrated learning through multimedia tools, and alternative technological assessment instruments like e-portfolios have come into use. These trends have brought not only applications but also new responsibilities on teachers and social agencies for developing skills to cope with mass media application in education and to meet learners' needs in individualized context.

While new regulations and standards are enacted, the new challenges that expect much creativeness and a high standard of teaching have appeared as an unavoidable outcome. Present teachers find themselves coping with the changed classroom atmosphere with technology, more diverge group of learners and new policies demanded by national education system. So as to develop the qualification of teachers, the teacher training program has been improvised and hands-on experience has taken the place of passive transfer of knowledge from the supervisor to the teacher candidates. Traditional sense of teacher education refers to training with courses and assessing the knowledge and practice through tests, essay-type exams and observations, which is considered to be "inadequate" to reveal out an accurate extent of teachers' competency. In the modern sense of initial teacher education, the technological applications are welcomed and the integration of technology into initial teacher education is accelerated so that the growth of pre-service students' skills, knowledge and attitudes toward teaching can be monitored on the basis of progressive development and the quality of teacher training system can be better. The instrument for such teacher education is the use of e-portfolio. Several studies mention this kind of application in terms of professional development and gains of skills through new learning opportunities. In her study, Barlett (2000:1) state that "each stage of the portfolio development process contributes to teachers' professional development and students' lifelong learning". Barrett and Knezek (2003) indicate that the use of electronic portfolio in teacher education serves to the aim of securing evidence of professional and personal growth, progression, and mastery of expected outcomes from the teacher education programmes. For the general use of e-portfolios in teacher education, Wood and Nanlohy

(2004) also underline that use of e-portfolio could provide “new learning opportunities” by giving choice and variety in terms of the organization, presentation and documentation of the learnt items. They conclude that in regard with new opportunities, technical skills and understanding through e-portfolios has been helpful in presenting the learners’ knowledge.

The present study is done after the revision of the benefits of e-portfolio implementation in teacher training and aims to seek a possible way of e-portfolio application in initial language teacher education. The following sections explain how the research practice is done.

2. E-Portfolio Application in Initial Teacher Training Education

This study is designed for twenty two pre-service students who were majoring in the Department of Foreign Language Education at Mersin University, Turkey in the academic year 2006-2007. The design is created in order to help language teacher candidates gain hands-on experiences in creating and developing e-portfolios in their practical teaching course. The aim of the course is to provide teacher candidates with opportunities for practice teaching before they are qualified as a teacher candidate. While they have such a practice opportunity, the e-portfolio application is added to the curriculum of the initial teaching program for the fact that during the practice teaching period, the teacher candidates cannot only gain skills for using technology in their education but also monitor their own professional development through progressive evaluation.

For the beginning of the 2007 spring term, the course outline and the e-portfolio application process were explained to the pre-service students. They were required to participate in the workshop which was taken place in the computer lab and an educational technologist from the same university together with the researcher explained how to create e-portfolio through a free online tool called *google page creator*. This tool was particularly selected as it is free and user friendly. The steps below were followed.

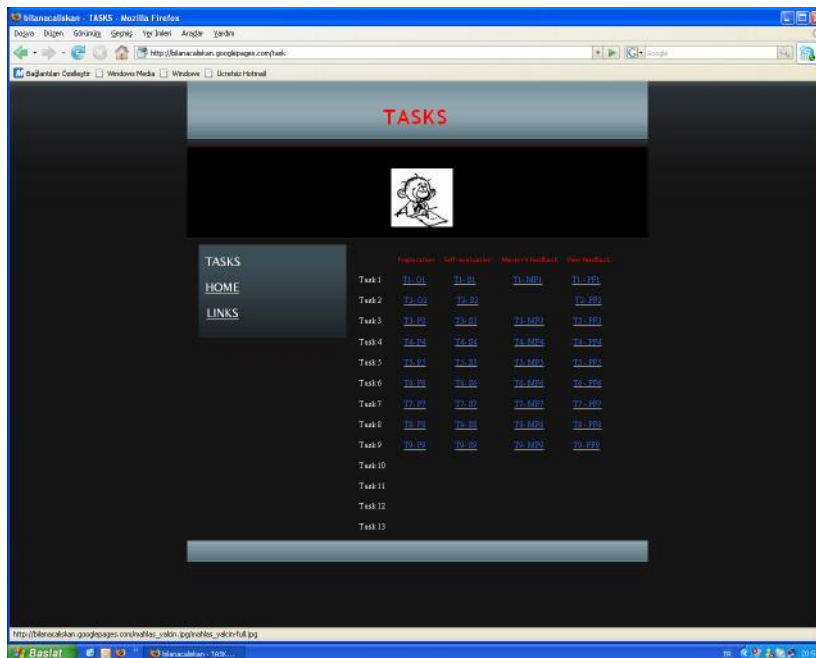
- The pre-service students were asked to have an account with anomous name or nicknames they like.
- After that, they were asked to create pages for brief information about who they were, tasks that they were required to complete for practice teaching and their optional preference such as links, academic journals, etc. Under the task page, the students opened up a space for Lesson Preparation (P), Self-evaluation (S), Mentor's Feedback (MF) and Peer Feedback (PF). For the lesson preparation, an outline for what the pre-service students were expected to do in the state school they would do practice teaching was distributed. For the first two weeks, they were asked to fill in the checklists for the classroom teacher and write an evaluation for the teacher. For the rest of the weeks, they were asked to prepare a skill-based lesson plan with teaching activities. For the last two weeks in the schedule, pre-service students prepared grammar and art craft lessons respecti-vely. They organized their space according to the schedule given.
- Pre-service students were assisted to create their own e-portfolios during the workshop. The educational technologist and the researcher first showed how to do it via OHP and then went to each student’s place in order to check if they needed help.
- When finished creating e-portfolios in the workshop, the pre-service students were told to upload related files and publish them for their supervisors to review right after they had done their practice teaching for that week in the schedule. The office hours were specified for the consultation and feedback.

Samples for homepage and task display are given below. The pre-service teacher candidates publish their artifacts through such e-portfolios created.

Image 1: A sample home page for the e-portfolio



Image 2: A sample task page for the e-portfolio



3. Results and Implications

The language teacher candidates in our study were asked to express their opinion about it after the implementation in practice teaching course. The e-portfolio implementation in initial language teacher education was said to provide them with several benefits. All of them (22 out of 22) stated they benefited somehow from the process: they learnt multimedia applications in the process of e-portfolio creation, that is, they gained technical qualifications such as creating pages with online tools, using converting word documents into PDF files, uploading files, scanning the photos and publishing them, etc. Moreover, they were willing to use this experience in the future for assessing the students' performance in English classes through e-portfolios. Almost all of them (20 out of 22) stated that the application made them be aware of each step in their teaching practice and the published self evaluation task made them voice out for how they felt about their own teaching. Most of them (18 out of 22) found the overall process very beneficial for gaining practice in the use of technology, and efficient for self monitoring over their performance in teaching practice. This implementation was found to have a major drawback which was lack of an interactive feedback tool in the e- portfolios. The *google page creator* as a free product does not include a component for giving interactive feedback between the supervisors, the pre-service students and their peers. The implementation could have been better if the interactive tool had been added so that the feedback could be more efficient than merely publishing the mentors' feedback. By this way, the review and feedback session could be immediate and autonomous in a sense that the feedback is published when submitted online and without the pre-service student's responsibility to publish it.

As a consequence, the use of e-portfolio in initial language teacher education is possible with various online tools like *google page creator* and it is efficient in order to show the integration of technology into the initial language teacher education so that the teacher candidates can have hands-on practice and experience for their teaching in the future. Additionally, this implementation can afford the candidates with awareness in being reflective during the practice teaching plus technical qualifications at the stages of e-portfolio development. This study supports the studies which advocate for using e-portfolios in teacher education and highlights the feasibility of the e-portfolio implementation in language teacher education.

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FROM AN EPORTFOLIO MODEL TO EPORTFOLIO PRACTICES. SOME GUIDELINES

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Abstract: Eportfolio is being considered a useful tool to increase reflection and to foster awareness in teachers and students both in initial training and in on-service training. Recent researches show that ePortfolios use benefits are weakened by difficulties due to the lack of motivation in teachers and students, the heavy weight of creation and revise the ePortfolios, the tool rigid structure. This kind of problems are hardly perceived if the authors of the portfolios are adults, workers, people employed and running a professional course. To answer these emerging issues, the paper shows how to cope with the above mentioned questions, by modelling the structure and the use of ePortfolios, proposing an ePortfolio able to fulfil the users needs and to be perceived as an extremely usable and motivating tool. Motivation is a core question, but, at the same time, a learning path is needed for reflection. It requires both individual and collective times and spaces, different actors and learning activities. After five years of experimentation and over 200 ePortfolios analyzed, the paper describes lessons learned and suggest some guidelines that could be useful to plan the introduction and the implementation of an ePortfolio in post degree courses and for adult and on service learning.

Keywords: models, on-service training, lifelong learning

Introduction

A portfolio is a meaningful documentation of a learning path, either for assessment or for formative purposes (Ravet, 2007; Barret, 2005). The assessment portfolio would include all the results and credits obtained during a course or in a formal education process. It would present the formal and informal learning path and the working achievements with the related acquired competences. A portfolio with a stronger formative orientation, instead, would allow the individual to reflect on the ongoing learning process, on the learning styles, on the competences he/she is acquiring so that it will improve the planning of his/her learning path.

In the following research, we will identify some guidelines for designing formative portfolios. In our research, the ePortfolio was inserted in the learning process. The international theoretical researches set the standards (Barret, 2004; Danielson & Abrutyn, 1998; Ravet, 2007). Also in Italy, many are the authors who underlined the formative value of portfolios and its importance for the learning awareness (Varisco, 2004; Pellerey, 2004; Comoglio, 2003; Castoldi, 2005; Rossi, 2005; Rossi & Giannandrea, 2006).

A formative portfolio documents the learning path and activates reflective processes on it. Different reflection levels (Donnay, Charlier, 2001), times (Schon, 1983) and objects (Perrenoud, 1998) exist. The objectives to be reached through the reflective practice can be summarized as follows:

- reflection in/ on action, where theories and experience-based practices interact,
- critical awareness and comparison with previous knowledge before entering a new context,
- transfer of competences and analysis of the meaning of your personal skills,
- identification of improvement areas and of possible development actions.

Even if the learning path develops through formal steps, they are continuously elaborated from the individual according to his/her own world, his/her own perspectives as a result of learning also in informal and not formal contexts. Every learner builds personal perspectives and personal meaning perspectives (Mezirow, 1991) that are put under discussion when they meet other action proposals and different points of view. To recognize changes in the personal way

of thinking and acting in relation to a task, two paths are activated which are strictly interconnected:

- the review of narrations or descriptions created by the subject;
- the validation of the change from the community of speech (Pontecorvo et al., 1995) or of practice (Wenger, 1998).

Therefore, a learning path is needed for reflection. It requires both individual and collective times and spaces (Rossi et al., 2007), different actors (tutor, teacher, peers, the subject) and different multiperspective learning activities (Rossi, 2006). Such paths are highly recommended for adult and on service learning.

In the last five years, also in the wake of web 2.0, different personal learning environments (PLE) developed (Tosh, 2004; Actwell, 2006). We consider such tools useful for communication, for community building, for production of free writings (diaries, blogs) while it has not been proved yet the effectiveness of such tools to support reflection and thus the auto-direction in the learning path. We have to underline that most of the times the individuals decide themselves to use such tools. These types of “voluntary”, “free” actions represent an added value to the objectives and to the learning process taking place in the ePortfolio.

Guidelines

From our initial experiences the following guidelines emerged. Some refer to the structure of the portfolio and to the related activities, others refer to the context and to the general learning process which includes the building of the ePortfolio. The structure of the portfolio suggested by Danielson & Abrutyn (1998) and reviewed by Barret (2005) largely satisfies the above mentioned premises¹⁰; such a structure provides a scaffolding to the creation of the ePortfolio and encourages the reflection processes.

But, to reach the mentioned objectives and, at the same time, to plan a portfolio that has to be “sustainable and effective”, not only the suggested structure, but also the following guidelines should be kept in mind:

- **the ePortfolio contains structured (compulsory) activities and non compulsory activities.** The construction of the ePortfolio expects structured activities (and relative spaces) and other activities that the student can decide to fulfil with no obligation; there are free writings, blog-diaries and narrations both in writing and audio,
- **the ePortfolio has redundant and flexible tools.** The ePortfolio gives access to the users to different tools allowing them to follow different processes or similar functions with different media and languages; the user chooses the tool according to the personal needs and styles and, thanks to the tool’s flexibility, it can be used in customized modalities,
- **the learning path is coherent with the reflection objectives.** The learning path, in which the ePortfolio is included, is coherent with the objectives of the ePortfolio itself; for example it establishes reflective processes, adds value to the professional skills, it suggests cyclical paths between theory and practice; moreover it foresees an

¹⁰ In the environment we propose every student has a link in his/her own personal page to access directly to the ePortfolio. The portfolio is structured in three main sections, according to the structure proposed by Helen Barret (Selection, Reflection and Projection). There is also a blog-diary and a rubric. The **selection** consist of a tool to upload documents of every kind. It is possible to associate a comment to each document selected explaining the motivation of the choice. The **reflection** requires the creation of a map while in the **projection** the student needs to fill in a form with three fields, explaining the objectives, the level reached and the level to reach. The **blog-diary** allows to insert messages in diachronical order while the **rubric**, inserted by the teacher, put in evidence the competences addressed by the learning path: such a rubric can be customized by each student choosing the competences in which he/she wants to be knowledgeable.

osmosis between the collaborative activities and the individual reflection,

- **the experts provide scaffolding.** The experts (teachers, tutors, experts) provide scaffolding with two modalities: they suggest studying materials to clarify modalities and functionalities of the reflection and of the ePortfolio and they encourage, at least during the initial phase, the acquisition of auto-evaluation and reflective competences.

Therefore, in the ePortfolio, you will find spaces to add value to the subjectivity (free spontaneous writing, representations, significant choices and documents), that stimulate the collaborative activities, requiring an interaction between theory (knowledge acquired during the formal path), practice (interpretation of the theoretical knowledge in the daily practice) and the theory born from the practice. There will also be structured spaces with compulsory tasks, where the filling out of a questionnaire guides the reflection.

The hypothesis to provide and separate the spaces for a “guided” and formalised reflection (present in the projection and in the reflection) from those created for a free and off-the-top-of-the-head reflection (blog-diary) finds its roots in a previous research (Giannandrea, 2006) in which we stated the different connotations of the structured ePortfolios compared to the “free” ones. The first ones facilitate and guide the reflection during the path, while the portfolio-diary seems to facilitate a deeper investigation and a complete personal reflection, not only related to a specific professional field or a specific content. The reflective practice develops in two different modalities: a reflection aimed to an improvement of the practice and to the building of a shared knowledge and a reflectivity connected to a personal project (Donnay, Charlier, 2001; Magnoler, 2006).

Research Path at the University of Macerata

Our first experiences, already documented in the previous congresses on ePortfolios, have taken place at the Department of Education of the University of Udine. The ePortfolio used in 2002 was simply composed of a narration and of a selection of significant artifacts (Rossi, 2003). The following year we modified the project but the format we created was too complex and too structured. In fact, the students had sometimes used the ePortfolio not in the way proposed by the structure due to the amount of work requested, the difficulties in understanding the meaning of the activities related to their professional objectives and due to the lack of usability of the tools.

Later on, at the University of Macerata, we experimented with portfolios in the post degree programmes (2004, 2005) and from such experiences are born the guidelines previously described that we tested in the academic year of 2006/2007. The reading of the produced ePortfolios (over 200) confirms the effectiveness of the guidelines described above for the following reasons:

- the reflective processes has been activated and the awareness of the students is growing regarding the benefits of making explicit their personal learning path,
- the non-compulsory activities in the programme has been widely completed from a number of individuals.

The experiences that we are going to describe are referred to “training courses” (learning paths during the working life of an individual) aimed to acquire professional competences and involved teachers, free lancers, graduates looking for a job and State employees. The learning paths where it was requested to complete the ePortfolio were offering not only studying activities but also simulations, project work, case studies, collaborative activities in which it was possible to experiment with key elements of the professional skills.

We will present, in chronological order, according to their realisation, the description and the analysis of the three different courses:

- Master in *Open Distance Learning* with 24 students with different jobs and cultural backgrounds;
- Master in *Model and didactical strategies* for 116 teachers of different school levels (from kindergarten to high school),
- Specialisation course to acquire competences in *On line tutoring* with 70 students.

The ePortfolios used have the same structure, while the instructions to complete the portfolio were different.

A very structured ePortfolio (February 2006-February 2007)

Target and learning path

The learning path of the **Master Open Distance Learning**, run by the Universities of Macerata, Camerino and Udine in Italy, was composed of 11 modules totally online. The objective of the Master was to build competences in the planning of learning environments and e-learning paths. We worked on three different competences: technological, educational and communication that could be acquired in two different levels (base or expert level) according to the interests and motivation of each individual participant. We asked the students to monitor their learning path and we gave them a rubric with the details of the indicators referring to each knowledge/ability/competence. There were 24 students in the Master's programme, all employed in different fields (8 teachers, 5 in adult education and the remaining employed in private companies operating in the economic field).

Instructions for the creation of the ePortfolio

The tasks were defined as the following:

- to write up a project at the end of each module to monitor the personal learning,
- to fill out two "reflections" during the period of the master,
- to implement the "selection",
- to use the blog-diary for personal notes and for the dialogue with the tutor.

Productions

Reading the writings in the ePortfolio allowed us to identify different and interesting aspects regarding the adult education.

Examining in detail the materials stored in the **Selection**, with an average of 25 materials for each student, we found:

- materials selected by the students between their personal productions in the requested activities,
- materials selected between those suggested by the teachers or found in the net and considered meaningful for their own learning,
- materials produced by the student on the master's themes to facilitate his/her own studying (summaries, maps),
- materials produced by the student to reflect on his/her own learning path to tell about his/her experiences (both in writing or in audio recordings).

The **Reflections** were considered too difficult and only 10 students tried to build them and they considered them too time consuming.

The **Projections** (requested 10, produced 7 average for each student) have been reported in different styles and levels of depth. They can be summarized in different types:

- the projections do not clearly refer to the rubric and do not allow to track the path because the elements taken into consideration are always the same or rarely change (2 students),
- the projections report only some of the indicators of the rubric and give a discontinuous and fragmentary picture of the competences' building (2 students),
- the projections totally follow the structure of the rubric and explicit the level reached; two different modalities emerge:
 - one modality expresses the level reached for each competence and indicator; the student, compare him/herself with the indicators to define his/her level of learning and commitment discovering limitations and potentials (initially 6 students, of which 4 of them continued to use the integral rubric for all the projections),
 - in the other the student selects the most representative competences and indicators for his/her own learning project and according to such choice he/she describes the reached level (14 students to which 2 more joined later and they were the ones that initially were using all the indicators of the rubric).

The **blog** have been used only by 5 students. They produced free writing to build a personal model of the concepts, to insert personal comments on the path and on their expectations.

Comments

According to the evaluations in the final questionnaires, all of them defined the ePortfolio “demanding”, full of requests but also useful to monitor and to customize the learning. The rubric has been considered important, and for many students helped a lot in the orientation, while for others was only a starting point to monitor their learning.

Some students produced “narrative communication” inserted sometimes in the selection, sometimes in the projection (instead of the selection) to connect the knowledge they were building and to give to it a context in their daily job; it is the basic need to integrate the knowledge acquired in formal contexts with the knowledge acquired in non formal or informal contexts.

In the “selection” it is the need to communicate in a narrative form, in some cases in oral form, inserting an audio file, expressing their point of view on the situation. The materials, the written and the audio files with the recording of their reflections was representing almost the bridge, a reconstruction of meaning between the elements that apparently seem fragmentary and not homogenous. It was almost showing a constant and necessary interaction between the “external” materials and the personal ones. We are finding ourselves therefore in front of an improper use of the selection. The reason was the difficulty met in using the reflection tool but it also highlights an element already mentioned in the introduction: if, on one hand, the spaces are often used in a personal way, on the other hand there is a need to rebuild the personal learning path with the narration; using audio recordings instead of texts for the narration highlights a personalisation of the language and it brings us to the same conclusion.

A first review for better flexibility (October 2006 - April 2007)

Target and learning path

The path of **Master in Model and Didactical Strategies** offered by the University of Macerata in collaboration with the Ifor of Matera is composed of three theme areas based on the professional skills of the teacher. The learning activities have been delivered according to a blended model, contemplating mainly online work and three face to face meetings.

116 graduated students enrolled for the Master and mostly were already working as teachers. Their objective was to study in depth and to improve the transversal competencies needed for their jobs as teachers. Between the motivations there was also the possibility to acquire extra credits for their teaching career.

Instructions for the creation of the ePortfolio

The use of the ePortfolio was suggested by the designers of the Master in a gradual and customized way:

- the space “selections” has been used as an ongoing repository to insert the reflections on the path of the project work,
- the “reflection” was optional and it was suggested to represent through a map the representative elements of the learning path and of the reached competences,
- for the “projection” it was requested a free text and a list of pretty detailed guideline questions was given as a scaffolding for the reflection path,
- it has been proposed to note up-the-top-of-your-head in the blog-diary sensations, emotions, foot notes of the ongoing experience. The completion of this section was absolutely free and not compulsory for the students.

To meet all the needs of the working students, we felt it necessary to “lighten up” the quantity of material requested for the completion of the ePortfolio, giving more flexibility to the whole structure and allowing the students to focus more on the reflection activity instead of filling out many forms. Instead of thinking to reduce the quantity of work to do, following the indications of a previous experience, we thought to not limit reflection to predefined structured moments, but to suggest a rethinking path according to the developed practice to carry along together with the learning path, in which the moments of selection/rethinking and reflection partially interconnect.

The compilation of the ePortfolio is moreover connected to the activity of project work. To support a transformative learning (Mezirow, 1991), there is the need for a continuous connection between the realisation of new experiences in the learning or working field and the effort to give them meaning through reflection, modifying the action schemes already consolidated.

Productions

At the end of the learning path 43 students on 116 (37% of the total number) decided to use the blog-diary for free reflection and for narration of the project work experience.

At a first reading of the texts inserted in the blog-diary, the categories containing the biggest number of messages are those related to the notes on the activities carried out, with a particular eye on the attention shown by the students, the monitoring of the personal project, their feelings and personal decisions to take regarding their future.

Past activities (also organization of the class)	19
Observations on how the students learn and behave	14
Interest shown by the students	10
Monitoring of their personal project	10
Personal feelings (satisfaction, frustrations...)	8
Results obtained with the students	5
Decisions on what to do in the near future	4
Observations on the effectiveness of the materials (maps, questionnaires..)	4
Reflections on strategies	4
Reflection on redesign	3
Selection of materials to use (texts, questionnaires, maps...)	3
Reflections on their own learning process	3
Relation with peers regarding activities and project	2
Final reflections on the project (problems, used resources, effective strategies)	2

Comments

From the reading of the most structured sections, the emerging notes are aimed to the description of the practice, to their explicitation and sharing, to the search of a group shared and formalized knowledge inside the course. In the texts inside the blog-diary we found on the other hand, between the others, elements with a more autoreflective and personal approach. The analysis of the activities highlights the need for narrations and for building a personal reinterpretation of the past learning path. From the final comments it emerges that teachers have been gradually acquiring the awareness of the importance of the ePortfolio for their personal and professional development. From further contacts with the students at the end of the Master we discovered that many of them chose to use the tool and to experiment it in their professional context.

EPortfolio in the specialisation course for on line tutors (January 2007 – June 2007)

Target and learning path

The specialisation course in *Online tutoring* has been designed later than the others and was keeping into account the previous experiences described. The course was attended by 70 students, all graduated and for the majority employed in the school system. The course was requesting a commitment of 600 hours (while the Master had 1500 hours) during 7 months, from December 2006 to June 2007. This meant a smaller commitment compared to the previous learning paths. Moreover, for many students was important the extrinsic motivation to acquire credits for their career.

The objective of the course was to become an online tutor but the path itself was requiring a reflection on the teacher's professional skills in their broadest sense.

The ePortfolio has been introduced since the beginning of the learning path in parallel with the other themes. In the welcoming phase a document was presented explaining the role and the objectives of the ePortfolio and the importance of the reflection in the learning process (Rossi et al., 2007).

Instructions for the creation of the ePortfolio

For the population of the ePortfolio it was requested to carry out 4 projections, one for each module while it was suggested, but with no effect on the evaluation, to implement reflection and selection. Here are the required tasks:

Use the ePortfolio to document the evolution of your perceptions on the role of the tutor and to describe your path in acquiring the competences related to this role.

- Fill out the section **Projection**, structured in three fields:
 - **Objectives to reach:** in this phase of the course what are, according to you the objectives you would like to reach? Regarding the tutor role, which objectives do you have?
 - **At what level am I?** Always reflecting on your competences (the ones you think to have in this moment) and in relation to the online tutor's role, insert here the indications regarding your level of competences you think to have in this first phase of the course.
 - **Which will be my next level?** Insert here the level you would like to reach, that means the level immediately after the reached objective. Which are the competences I would like to acquire or that I think I will acquire in the near future?
- Beyond this compulsory activity you can collect your most significant productions in the section **Selection** or you can use the **Blog-diary** to note down your reflections, impressions or to put other materials in. The blog is totally private and personal. It can be visualised only by the teacher or the tutor.

There was therefore a compulsory but structured task (to complete a projection at the end of each module) while it was suggested (with no obligation and no effect on the evaluation) the filling in of the section selection and of the blog-diary. The student would have carried out the task if he/she thought this could be an advantage for his/her professional skills.

Production

Here below we provide a quantitative evaluation of the data to give later a qualitative evaluation of the materials produced.

	Total	Percentage
Number students	70	100%
Number projections	70	100%
Selections implemented	29	41%
Average number of documents per selection	4,4	
Students who filled out the blog-diary	33	47%
Average number of reflections per student	6	
Students performing both selection and reflection	18	26%

In relation to the reflections in the blog we have the following data:

A	Reflections	3,3
A1	Average number of posts in A	5,9
B	Reflections with more than 300 characters	15
B2	Average number of posts per student in B	7,4
B3	Average Number of characters in every blog	7036
B4	Max characters per post in B	15248
B6	Average number of characters per post in B	1112
B7	Max average characters per post in B	3638
B8	Min Average characters per post in B	396

The qualitative analysis resulted in:

- the content of the selections are of three kinds: materials produced by the student, materials produced by the group, materials proposed by the teachers and considered significant for the personal preparation of the student,
- 62% of the students who filled out the selection have also carried out the reflection and this testifies an awareness of the objectives and aims of the ePortfolio,
- the modalities used to fill out the reflections are very different such as the number of posts per student (from a minimum of 3 to a maximum of 15) and the length of the single posts (from an average minimum of 396 to an average maximum of 3638 characters, to an absolute maximum of 15248). Some students did small reflections in action, others long reflections on action.

The analysis focused on the reflections with more than 3000 characters (that means on 15 reflections equal to 22% of the total and to 47% of those who filled out the blog). In most cases the activity started one month after the beginning of the course and ended in April. Only two students did not post any message after February.

What did they talk about in the blog-diary? In essence, there were the following kinds of intervention:

- what is a tutor and what literature says about it,
- what kind of tutor I would like to be,
- what kind of problems I encountered at work,
- what am I learning,
- how this learning experience is modifying in general my way of looking at education.

The most relevant aspect has been however the relation between the different points: the effort in most cases in the blog-diaries was to connect what has been theoretically said about the tutor's role to the experiences they were having in the course and to their own competences. The attention was focused on testing if what experimented in the course could be read according to the theoretical in depth studying. Moreover, it was often highlighted a particular attention to understand how the personal perspectives and the personal way of being could change.

Comments

Also in this case we can notice a big number of actors feeling the need to perform a selection and a narrative reflection on the ongoing learning path even if those activities were not required by the path. Another element to notice, that we encountered also in the two previous experiences: at the end of the path many of the interested subjects found that the filling out of the ePortfolio was useful and that helped them to acquire a better awareness of the learning path.

Conclusions

The three programmes involved more than 200 students. The analysis of the produced materials suggested useful advices for the implementation of the ePortfolio in education programmes requiring a review of the practices in relationship to the associated theories, in the learning paths providing competences to improve the professional skills.

In common the three analysed programmes have the coexistence of formal and informal spaces, structured and unstructured spaces, the localisation of key questions in the projection and the role of the projection itself, like an axis on which the whole ePortfolio rotates.

We are reporting here the guidelines presented in the introduction to evaluate the effectiveness of them in the conscious and partly voluntary design of the ePortfolio.

- **the portfolio has an organic structure providing scaffolding for its implementation; the model we are referring to is divided in three sections: selection, reflection and projection,**
- **the portfolio has compulsory, structured activities and voluntary activities,**
- **in the portfolio there are redundant and flexible tools,**
- **the learning path requires a reflective practice as added value,**
- **the experts provide a scaffolding and motivate the students to implement the portfolio.**

The effectiveness of the guidelines has been demonstrated by the fact that 100% of students delivered the compulsory tasks and about 50% of them implemented also the voluntary parts of the ePortfolio. This became an added value if we consider that many of the students were working full time and were very busy and they had sometimes a low intrinsic motivation at the beginning of the course. Moreover, none of them had ever used the ePortfolio before.

Another aspect validating the proposed model comes from the quantity of materials inserted by the students. From the materials we can deduct that the reflective practice has been encouraged and this is confirmed by the following elements encountered in the students' writings:

- awareness of the strategies put in place,
- critical discussion on the effectiveness of the strategies,
- analysis of the errors and problems encountered,
- connection between theoretical aspects and practice,
- availability to change opinion and to accept different points of view in the group confrontation,
- perception of their own professional identities and of the changes of positioning inside the group.

The portfolio we propose allows to work on the reflection and improves the existence of different levels of analysis in the learning paths (from the out-of-the-top-of-the head reflection on the action to the perspectives of personal meanings); and it allows also to build a framework for the professional skills.

The rubric, when present, added a meaningful contribution to the reflection. The questions placed in the projection have been very important, both when they were not strongly connected to the path (Tutor Course and Master ODL) and when the questions were connected to the specific learning path (Master in Model and Didactical Strategies).

The modalities used to implement the portfolio gave us advices on how to set up the ePortfolio and allowed to specify some of the aspects of the guidelines. The analysis of the portfolios highlighted a personalised use of the tools thanks to the possibility to have not very structured, flexible and redundant tools (for the same function different tools were available). For example the review of each individual's learning path and the connection between the different productions and the acquired competences could be done with narrations inserted in the selection (in text or audio format), in the diary format in the blog or using a series of projections to describe the experiences and the in-depth analysis performed. Sometimes, some students used the tools with different operational modalities from those foreseen in the project phase.

Some individuals modified their operational modality during the course. A student affirmed, in the middle of the course, after having decided to not use the blog anymore:

I downloaded the documents of the course in the selection like if it was my blog and I chose this method... I don't know why, maybe for not providing comments on the documents and on the productions defining the learning path. But I realised that the projection and the blog have two different functions: the projection is an auto evaluation document while the personal blog is more similar to a travel diary.

Another student which intensively used the blog for two months decided not to post anymore after that period because:

I realised that to elaborate in detail my projections allowed me to fully expose my reflections, so I decided to dedicate more time to them and I didn't put any more materials in the blogs.

Finally, the need for a strong balance between scaffolding of the teachers and free activities. Entering texts focused on the role, the function and the advantages in using the portfolio surely had an impact on motivation; on the other side, unstructured activities and the possibility to enter free writings allowed to include in the environment the reflections on the programme.

In this article we would like to focus on the guidelines. Choosing this focus we do not want to underestimate the importance of the ePortfolio model we are referring to in the initial phase but we would rather highlight that from the model we cannot extract a rigid and fixed structure, to apply both in different contexts and in the different phases of the learning path.

It is now left to decide the modalities to apply those guidelines to build a sustainable learning path. The education designer prepares the environment assembling the existing tools according to the context, to the available resources and to the target's needs. And he/she sets up a learning path in which enters the specific activities to implement the ePortfolio. In the design of the environment we have to take into consideration elements like: the background of the students, their motivation, the resources they have access to and in particular their available time. In relation to the learning path the designer should instead consider the importance of reflection in the path (how important is it for building that competence and how?), the importance of the meaning attribution given from the students (do they consider useful to save writings?) and the need to build a different evaluation system.

The variables on which we could operate will define the tasks, the use of more or less structured phases, the use of more or less flexible tools, the choice of compulsory or voluntary

activities and the choice of different learning paths according to the cognitive style of each individual.

In the next months the research group will verify the validation of the guidelines in different contexts, in relation to the initial background of the students and in the learning paths which last longer to verify in a more detailed way if the use of the ePortfolio can facilitate the transformative learning and the autonomous design of a more mature professional identity.

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THE COMPETENCE PORTFOLIO: REFLECTION FOR ORGANISATIONAL RENEWAL

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Abstract: The reflective exercise inherent in a portfolio process is key for organisations as much as individuals to gather a vision of their past, present and future. This paper shares the experience of accompanying a self-run art centre in Quebec in the development and implementation of its organisational ePortfolio. At the heart of the process is the evaluation of the organisational competences of the art centre via a competence reference framework and performance indicators. The resulting ePortfolio serves as a tool to be integrated into the regular functioning of the organisation and is a source of pride for the organisation. In this case, the ePortfolio was used for strategic development of the organisation, specifically in the areas of communication, maintaining the organisational memory and integrating technological practices to enhance efficiency and visibility. The experience should contribute to the long-term sustainability of the organisation. In the end, the development and use of an organisational ePortfolio is somewhat similar to the development and use of an individual ePortfolio except that it applies to an entity, in this case an art centre, and is carried out by a representative group of persons rather than an individual.

Keywords: organisations, competences, strategic development

Context

Using ePortfolios as a tool to help document and develop one's competences can be a valuable and empowering exercise for an individual. The same can also be true for a team or an organisation. This paper introduces the concept of self-reflection and portfolio building in the context of an organisation undergoing a retrospective of their 25 years of accomplishments.

The reflective exercise inherent in a portfolio process is useful for organisations to collectively take stock of how they developed over time. The ePortfolio can serve as a tool to help the organisation strategically move forward to ensure sustainability and success. We would like to share the experience of accompanying a self-run art centre in Quebec through such a process: (1) evaluating the organisations' competences, (2) using the exercise to develop the organisational ePortfolio, and finally, (3) using the ePortfolio as a tool for organisational development. While similar to an individual ePortfolio development, the exercise focuses on the organisation's collective competences as well as the services and the internal processes that enable it to fulfil its mandate.

Organisational Culture

The process begins with an ethnographic act of understanding the organisational culture by (1) visiting the organisation, (2) analysing core documents and (3) working with a group of representatives to clarify questions. In the case of the art centre, the working committee was comprised of junior, senior and founding members, key employees and representatives from the board of directors. The clarifying session was focused through two questions: "What brought you to the organisation initially?" and "Why are you still here?". The result was the following general portrait of the organization.

Created in 1982, the art centre has grown organically over 25 years, in its effort to fulfil its mandate to encourage the production and distribution of printmaking. The art centre manages a dynamic balance between the preservation and transmission of the timeless techniques of printmaking and stimulating creative expression and experimentation. For the first 20 years it was really about access to quality space and equipment. The keystone of the centre is the

master printer who provides technical assistance. All autonomous artists, with basic mastery of printmaking techniques, may become members for a small fee. The self-run art centre is a far cry from a product or service based organisation striving for performance or market edge. Rather, it deals with a humble, dedicated group, committed to principles of accessibility, non-elitism, and freedom. Overtime the organisation matured: they now run their own gallery, are projected into the larger scene of printmaking, organise contests, host international artist residencies, maintain an education program with schools, offer courses etc. In short, they are becoming a cultural institution, yet they are still run on a mixture of volunteer energy and part-time employees.

Competence Frameworks

The European Network on Competence defines a competence as a “disposition of an actor”, a “latent attribute”, that is situational and “defined in a community of practice”. A competence framework lists all the competences of an entity and provides a common set of vocabulary for describing each. Finding, developing and adapting an appropriate competence framework can be a simple or complex task depending on the community of practice and the context of use. Fortunately, there exists a competence dictionary for self-run art centres developed by the Quebec ministry of employment. Given that it’s intent was to describe the job of director of an art centre, the framework required some tweaking to be able to apply it to the organisation at large. To develop their familiarity with the competence framework, committee members participated in an activity of placing the competences in order of importance with which the organisation addresses each competence, both for its present functioning and its future ideal functioning. It became evident that artistic production was the heart of the organisation and should remain as such, but that artistic orientation and management needed to be better addressed in the future.

Activities Inventory

The competence reference framework is then used to methodically document current and past activities of the organisation for each competence. For example, supporting the artistic production involves the provision of space, equipment, expertise and assistance. During the 25 years of the organisation there has been significant improvement in this realm. Today the art centre occupies a large space (11,000 square feet) with all the appropriate equipment (12 different types of printing presses, scanners, an in-house store etc.) with employees who provide expertise. Enumerating the broad range of activities of the centre in such a thorough manner helps the organisation to see the significant work it has achieved over time and develops a sense of pride for its members and employees.

This collective memory serves to better understand the logic and history underpinning different orientations of the organization over time. It also helps to identify fragile zones: for example, the master printer, key to the functioning of the art centre, is a rare expertise in Québec and would be difficult to replace if one day the need arose. Much of the work in this phase was carried out by the committee members in small groups; however, an outside perspective was helpful in identifying activities that members often take for granted.

Evaluation of Competence

Competences can only be evaluated by first determining performance indicators for each area of competence and then rating each using impressions and objective evidence. The evaluation part of the process means leaving the daily “state of business” and taking a step back to analyse the organisation’s success in each of its areas of competence. Given the level of objectivity and distance required for this type of exercise, it is best led by a third party. Rating each of the

competences via the performance indicators generates a portrait of the strengths and challenges of the organisation. For example, the art centre excels in supporting creativity and research but struggles with communication of information, decision-making and the integration of the internet into its practices.

ePortfolio

Evaluating the organisational competences is an intense process involving a significant time investment from many people. It is essential then that the results not be simply archived, but recorded in a way that the process becomes an on-going facet of the organisation. This is where the ePortfolio serves a key role. We entered the mass of information in a protected wiki belonging to all members of the art centre. The diverse realities and needs of the centre would have difficulty fitting into predetermined boxes and the wiki technology is a simple technical solution that affords the necessary flexibility to allow the ePortfolio to grow organically, with offshoots as needed. The intention is that the ePortfolio become a tool for the organisation, for example to help prepare the board of directors in its reflective processes. New orientations should find their place in the organisation's collective memory, accessible by all, an organisational knowledge management system of sorts. The art centre members were highly supportive of the process, recognising the various advantages for the organisation.

Practical use of the organisational ePortfolio

This rich organisational portrait can be put to use for various purposes: from clarifying roles and responsibilities of individuals to strategically thinking the future. In our case, we had decided to use the exercise to analyse the art centre's use of the web to fulfil its mandate. By analysing the web site, competence by competence, all sorts of useful realisations became apparent. The web site was not reflecting artistic production, the primary competence of the art centre, nor was it being used by the primary clients of the art centre, the artists. Different propositions, linked to the development of the organisation, were made to adjust the web presence of the art centre, from included images from each of the artist members, to uniting the divers activities in a single calendar, to presenting the different techniques mastered by the art centre. The web presence would be used to provide credibility and visibility of the multiple expertise and activities of the centre developed over time, projecting it further into its role as cultural institution and facilitating financing.

Keys to success

Adaptation and innovation are the challenges of all organizations. An ongoing organisational reflective memory in the form of an ePortfolio can help organisations learn from their activities and strategically plan for the future. At the heart of its development is an analysis of the organisation's competences, ideally with a competence reference framework. For internal credibility the process needs to be collective and work with consensus. To be accepted, the content need to belong to all, and therefore be editable by more than one person. Indeed, the more the ePortfolio is kept up to date the more it will be a useful tool and a source of pride for an organisation. For maximum benefit, the ePortfolio needs to be used for organisational development.

Conclusion

This brief paper has illustrated the process and potential benefits of identifying and evaluating competences in an organisation's ePortfolio. As with personal portfolios, the value of the

portfolio is in its use as a reflective planning document as well as an archive of past accomplishments and current capabilities. Introspection should be an investment in the future.

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FOLIO THINKING FOR FIRST-YEAR COLLEGE SUCCESS & CAREER MATURATION: PARTNERING THE KSU ONLINE CAREER PORTFOLIOS WITH THE KSU 1101: FIRST YEAR SEMINAR

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Overview

Research and reports are plentiful on the importance of “career maturation” to the retention of college students. The partnering of the Kennesaw State University First-Year Experience Program with the Kennesaw State University Career Services Center is addressing the importance of career maturation on our campus through the student use of the KSU Online Career Portfolio. The KSU Online Career Portfolio features the ability to record academic experience, international experience, technology experience, employment experience, community service while utilizing a grid which features the transferable skills needed by college graduates – leadership, communication, technology, problem solving, creativity, team building, which we triangulate with the learning outcomes of the First-Year Seminar. We call the process of creating the KSU Online Career Portfolio – *Folio Thinking*.

The folio thinking process prepares students for life-long continued career development, which demands an entrepreneurial approach of managing ones, own progress as a knowledge worker in the 21st century. In our presentation we will share the academic approaches to creating e-portfolios as passports to student success, career maturation, and global citizenship.

The folio thinking process has five continual phases of development which help one design, deliver, and continually assess the learning history and learning plans: *Reflect, Assess, Collect, Connect, and Express – RACCE Portfolio Process*. By going through these continual phases of development of folio thinking the students will have (1) a distinct archived history of their learning and plans for their future learning, which results in a *Reflective Portfolio/Private Portfolio* and (2) have the baseline to design and develop a *Best of Show Portfolio/Public Portfolio* to present their learning story and learning plans to society for career search, graduate school, community work, entrepreneurial endeavors, and community service.

We will feature the ways we have partnered the Kennesaw State University First-Year Success Program and Kennesaw State University Career Services for supporting student success, through career maturation with the strengthening of retention of college students.

As of fall 2006, all KSU 1101: First-Year Seminars have used the Kennesaw State University Career Services Online Career Portfolio in their coursework. In fall 2006, 75 sections of KSU 1101 were offered and in spring 2007, 24 sections of KSU 1101 were offered. Every KSU 1101 class works closely with Career Services to ensure every first-year student meets a professional from the Center, either by classroom visits by a CSC professional or tours of the actual Center. Every KSU 1101 faculty member has been trained on the usage of the Online Career Portfolio. The Director of the KSU Career Services Center developed a Career Exploration section of the FYE, which she taught for the first time this past fall and hopes to teach every fall. The eventual plan is to allow every Career Services Center professional to teach a section to increase further the career maturation of our first-year college students.

As of fall 2005, Dr. Joan E. Leichter Dominick, Department of University Studies, was named Director of Portfolios for Student Success Programs, she is the departmental archivist for the KSU Online Career Portfolios used in KSU 1101: First-Year Seminar and all the subsequent Student Success Programs in the department.

The *Folio Thinking* Process for First-Year Student Success: Reflect + Assess + Collect + Connect + Express

The folio thinking process is the life-long process of archiving learning for honoring, understanding, and connecting one's learning from self to global society. The archiving process results in the design and constant development of an ePortfolio, in the case of college students at Kennesaw State University (KSU), a KSU Online Career Portfolio. As previously stated, the *folio thinking* process prepares students for life-long continued career development which demands an entrepreneurial approach of managing ones own progress as a knowledge worker in the 21st century. In our presentation we will share the academic approaches to creating e-portfolios as passports to student success, career maturation, and global citizenship. The folio thinking process results in the creation of a college student portfolio. The *KSU Online Career Portfolio* is a document that best displays what the student looks like starting their undergraduate experience. The portfolio is a process and a baseline that captures their past accomplishments, allows for analysis of your work, provides a path for your future, and bests of all, honors their accomplishments during the undergraduate journey.

The design and implementation of a portfolio is a learning process that results in the production of concrete evidence of accomplishments. The portfolio process helps students make the best decisions about honoring who they are, where they are going, and how to share their learning story! Creating a portfolio provides concrete evidence of learning and acts as a decisional base for doing career search and academic major choices. The *folio thinking* process prepares students for life-long continued career development which demands an entrepreneurial approach of managing ones own progress as a knowledge worker in the 21st century. In our presentation we will share the academic approaches to creating e-portfolios as passports to student success, career maturation, and global citizenship.

The folio thinking process is implemented using the RACCE College Student Portfolio Process, which stands for Reflect + Assess + Collect + Connect + Express, developed by Dr. Joan E. Leichter Dominick (copyright 2002). These are the first stages for building the *Reflective Portfolio* and the *Best of Show Portfolio*. The *Reflective Portfolio* is your private portfolio, which moves through the stages of Reflect + Assess + Collect. These three stages help the students reflect on their learning experiences, learn how to assess their work, and how to continue to collect learning evidence. Once the students have established their *Reflective Portfolio*, they will begin the process of developing their *Best of Show Portfolio*, which is their public portfolio. There are two stages for this portfolio which are Connect + Express. The two stages help them connect and express their learning story through the production and presentation of the *Best of Show Portfolio*. This public portfolio showcases their learning story, connects their societal roles in career and global community, and helps to highlight their future learning goals. Here is the RACCE College Student Portfolio Process grid:

The Folio Thinking Process: RACCE College Student Portfolio Process Grid

Reflect + Assess + Collect + Connect + Express [Available from:

www.joandominick.com/foliothinking.html]

Reflective Portfolio (Private) & Best of Show Portfolio (Public)

R	Reflect	Mapping Your College Learning Self-Assessment Instruments	Reflective Portfolio
A	Assess	Self-Assessment + Faculty Assessment + Peer Assessment + Stakeholder Assessment	Reflective Portfolio
C	Collect	Collect Evidence of Your Learning Set up a Reflective Portfolio File	Reflective Portfolio
C	Connect	Develop the Mission, Design, and Format Portfolio	Best of Show Portfolio
E	Express	Present Portfolio to Public <i>Best of Show Portfolios are used for presenting your learning story publicly:</i> <ul style="list-style-type: none"> ▪ Academic Advising ▪ College Scholarships ▪ Internships/Co-ops ▪ Study Abroad ▪ Part-time Employment ▪ Career Interviews ▪ Post Graduate Internships ▪ Graduate School ▪ Employment Reviews for Promotion ▪ Entrepreneurial Endeavors 	Best of Show Portfolio

The KSU On-line Career Portfolio Defined

The Career Services Center at Kennesaw State University has created the On-line Career Portfolio (OLCP) to encourage the success of our students. For a sample of the portfolio consult: <http://olcp.kennesaw.edu/CoverPage.aspx>

- By utilizing the OLCP, you will have a better understanding of how your experiences both on and off campus develop skills that prepare you for your career after college,
- The OLCP allows you to reflect and record experiences that you might otherwise overlook in the learning journey that is college.

Benefits of the On-line Career Portfolio

- Gives you the ability to communicate your skills in interviews for both jobs and graduate school admittance,
- Offers you an effective way of reflecting and commenting on the relevance behind your classroom and outside experiences,
- Allows you to use a results-oriented method of displaying work. For example, not just, "I sold cookies"; instead, "I sold 500 cookies every day",
- Helps you in planning your college experience based on skills rather than chance. Assists you in understanding which courses will best prepare you for your career,
- Provides you with the ability to easily retrieve, and refer to, valuable documentation of your experiences.

Conclusion of Work in Progress

Combining the developmental theory behind RACCE with the application process of the Online Career Portfolio, we are able to provide our students with the tools essential in their career maturation. The end result will hopefully be retention of our students who have clear career goals in sight and timely progression towards graduation. They will then, hopefully, become successful in their chosen careers and contributors to our society.

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E-PORTFOLIO FOR ARTISTS AT THE UNIVERSITY OF ARTS BERLIN

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Abstract: The pilot project has the title “Kompetenzplattform for Artists” and aims at providing artists who work as freelancers or are self-employed with an interactive, multilingual internet platform for e-portfolios, information and further education. The platform is an up-to-date, problem-oriented and manageable tool for information and education, which supports to acquire the necessary skills to work and present oneself. The CTC analyses formal and non-formal competences of its students and alumni to provide further assistance for their employability as well as setting itself up as a mediator between the individual artist and the local economy/cultural sector. The competence tool (e-portfolio) includes: (1) providing guidance services, (2) identifying gaps in provision of training and professional development (3) advocacy and representation (4) secure involvement of practitioners and education providers for the purposes of developing, piloting and evaluating materials (5) promote the competence tool. The e-portfolios for the artists does encourage the students to develop their skills and to build their own personal portfolio as a life-long learning tool.

Keywords: self-directed learning, artists, career center, competencies, self-management

Background Information

The Universität der Künste in Berlin¹¹⁾ was the first university of the arts in Germany to tackle this problem by opening a Career & Transfer Service Center (CTC) in 2001. The CTC provides services related to planning a curriculum or a career, such as workshops and training complementing the artistic university education, information and coaching for start-ups, self-employed artists and freelancers, and a job portal. The CTC management decided to launch a project with the overall objective of widening the scope of the CTC’s services and to develop an E-portfolio for its users, embedded in a ‘Competence Platform for Artists’.

Development and Management

The entire Competence Platform has been developed in a two-year project by an interdisciplinary partnership. The development procedures in this project were innovative in that they differed from traditional software development projects as the users were repeatedly involved in the development and testing. The typical steps of a software development project – requirements, specification, software architecture, code development, testing – were not as ‘isolated’ and sequential in this project as they often are. More feedback loops and iterations were done in this project in order to link the users’ needs with the technically feasible. It was therefore crucial for the success of the project to have team members that were able to translate between the languages of art and technology.

The CTC is responsible for the overall project implementation and management. We have the necessary expertise and the organisational experience. The idea of Career Centers in Germany in general is new and innovative. Until one or two years ago, this service was totally neglected by German universities.

The pilot project is a regional partnership comprised of cultural sector practitioners/employers, training providers in Higher Education, and cultural sector support agencies.

¹¹ Berlin University of the Arts

The pilot project will develop a digital web portal of multidisciplinary material. For the City of Berlin, the activation and promotion of the potentials in the art and culture sector especially of their artist target groups, and the stabilisation of small businesses is of central interest. With an high unemployment rate on the one hand but with a very lively and growing number of students at art schools and artists, the city and the region has decided to focus on the potential of the cultural sector.

Since 2001 the Career & Transfer Service Center at the University of Arts (CTC) analyses formal and non-formal competences of it's students and alumni to provide further support and assistance for their employability as well as setting itself up as a mediator between the individual artist and the local economy and the cultural sector.

The purpose is to enhance opportunities for training and ongoing professional development by accepting and taking into account that:

- the nature of learning changes,
- the needs of the learners are changing,
- the needs and dynamics of a knowledge economy are permanently changing.

The e-portfolio as an instrument to compete and to present

The e-portfolio is named the 'Competence Portfolio'; the online- tool is designed to support artists to document, to analyse and to present the competencies that he or she has developed during formal education and in working experiences. It builds on the traditional showcase tool of artists, the Portfolio, which is a collection of artefacts demonstrating the achievements and abilities of its owner. An e-portfolio is the digital representation of a Portfolio, offering a variety of modes to publish its contents such as a personal website, DVD, in print etc. The 'Competence Portfolio' goes beyond this: it was also designed for the user and owner to analyse and reflect his or her skills and competencies, thus providing the basis for planning further educational steps or career decisions. An e-portfolio is the digital representation of a Portfolio and contains electronic artefacts such as texts, sound files, images, certificates, reviews etc., each of them representing a work completed, the results of a project, an educational step or other achievements. The Competence Portfolio tool developed in this project offers the (infra)structure to collect and to present competencies and work completed to prospective employers, sponsors, agencies etc. There are various modes to do so such as a personal website, a CD-ROM or DVD etc.; the structure of the portfolio follows the Europass guideline¹² and is therefore internationally compatible. Equally important, the Competence Portfolio was also designed as a tool for the user and owner to analyse and reflect his or her skills and competencies, thus providing the basis for planning further educational steps or career decisions.

The use of new media and digital learning tools and the development of online-services was an opportunity to seek and based on the general development in education the observation, that the nature of learning as well as the needs of the learners are changing. In the 'knowledge economy' a person's ability to systematically develop and demonstrate his or her knowledge and competencies is crucial to improve employment opportunities – an ability that needs training and support beyond the traditional university education. This observation triggered the idea to develop the new "Competence Portfolio" tool. The Competence-Portfolio developed in this project is the first e-portfolio developed and implemented at a university of the arts and specifically tailored to the needs of artist and art students in Germany and probably even in Europe.

¹² <http://europass.cedefop.europa.eu/>

The competence tool is:

- providing guidance services,
- identifying gaps in provision of training and professional development and working with partners to address the gaps,
- advocacy and representation: bringing the needs of the cultural sector and the target group to the attention of key stakeholders,
- secure involvement of practitioners and education providers for the purposes of developing, piloting and evaluating materials,
- promote and or make e-learning materials available on our website and through our website (the competence tool).

The intended task of the implementation of e-portfolios for the target group is to encourage the students and the participants to develop their skills and to continue building their own personal portfolio as a life-long learning tool.

In a knowledge economy, the most valuable resource is obviously knowledge. A person's ability to express his/her knowledge effectively (through artefacts, examples of work, progression of growth, and instructor comments) improves opportunities for employment and access to education. A portfolio permits the learner to display competence, outside of a static transcript.

Learning is now a process of living. Formal education is only a stage of learning. Learning continues in virtually all aspects of life. Schools assign grades to demonstrate competency. Learning through life experiences creates artefacts instead. The ability to include these is an important motivation for E-Portfolio development.

The E-Portfolios of the participants of the Career & Transfer Service Center includes elements of:

- Personal knowledge management,
- History of development and growth,
- Planning/goal setting tool,
- Assist programs for making connections between learning experiences (formal and informal learning),
- meta-elements and information needed to support participants in planning career paths by identifying best practice examples,
- shared content areas,
- Preparing learners for life-long learning.

Users

The main participants of the E-Portfolio development process are: students, alumni, instructors, and institutions. The end-users of E-Portfolios are: prospective employers, instructors (for assessment), and award granting agencies, sponsors etc.

Implementation and usage

Implementing an institutional approach for E-Portfolios can be a difficult task. To be effective, the concept needs to be embedded into the process of instruction and assessment.

The implementation in an educational institution in the field of arts the E- portfolios possess the following characteristics:

- The portfolio is viewed as a personal, learner-in-control tool,
- It is treated as assessment process,
- The artists are introduced to the concept, and instructed on how to use the system (both from a technical and from a “how will this help you” perspective),
- The portfolio is used for assessment of learning objectives. feed-back can be integrated back into the portfolio and treated as an artefact,
- An E-Portfolio culture exists: companies and the cultural sector will both use it,
- Dialogue, debate, discussion, and examples of E-Portfolio use are common,
- Technical details are well managed, resulting in a simple, positive end user experience.

Portfolios have long been the showcase tools of artists – expressions of competencies and work completed. E-Portfolios and webfolios are digital enactments of portfolios. The cultural sector and its artists are always faced with many challenges resulting from the reform of labour market policy and changes in the structure of the employment market, to offer for a larger and in certain respects newly defined target group more and even better quality employment and integration opportunities. Existing structures are not adequate to achieve this extended mission and existing general regulations and support structures will also lose in part their validity. The task of this pilot project is to together with the companies in the cultural sector and their partners to build and architect new structures, to develop model solutions for their sustainable development and to win new cooperation partners for a newly defined regional mission.

The institutions like Career Centers are required to support the target group in adjusting and coping with the changed demands of a self organising and self regulating employment market behaviour. Current solutions often miss the real chances of this group and they are pushed out of the competition.

The cultural sector will be taking on a new role in the newly structured regional labour market politics. Their target group will increase, the general regulations under which they operate will change and they will have to accommodate a greater flexibility. They will receive new cooperation and contracting partners and they must examine their existing services and elicit new areas for employment. They need support in adjusting to these new structures and to changing processes. Artists have few resources to communicate their mission and innovation not only outbound but also within the culture sector itself. This is however indispensable if they are to build new cooperation with and to strengthen their ties with other economic branches, to create and maintain jobs and to strengthen their market position.

The extensive use of the tool at the CTC is a sign of the short term and mid-term success of its implementation. In terms of employability, qualifications, internationalisation and the increase of self-employment it has already shown its capabilities on the individual level.

The short- term perspective on an individual and institutional level is the learning area. The short-term perspective did show already an increase between university and a growing partner of enterprises, the network itself did increase and the cultural sector is an intensive user.

The mid-term and long-term perspective still has to be shown and depending on ongoing input on technical and content level.

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USING THE E-PORTFOLIO - AN AWARDING BODY'S PERSPECTIVE, CASE STUDY

Jonathan Robert Freeman, Andrew Stone (City & Guilds)

Abstract: City & Guilds, the UK's leading awarding body for vocational qualifications, outlines the particular requirements of awarding bodies for the use of e-portfolios (in this context, e-portfolio management systems) for assessment and verification purposes. Market research and the experience of centres and learners have identified both benefits of and barriers to using e-portfolios. It is likely that a blended approach to learning and assessment will lead to the growth of the uptake of e-portfolios in the future.

Keywords: awarding body, assessment, verification

Introduction

National structures for external qualifications vary from country to country, not just across Europe but even within the UK. Not everyone within EifEL's network, therefore, will necessarily be familiar with the system we have in place in England, Wales and Northern Ireland. We have a National Qualifications Framework (NQF) which is regulated by three authorities QCA (England), ACCAC (Wales) and CCEA (Northern Ireland). There is a separate structure for Scotland. These regulatory bodies review and accredit not only the qualifications themselves but also the external awarding bodies which deliver the qualifications. An awarding body must gain recognised status before it can submit qualifications for accreditation within the NQF. In short, an awarding body is a body approved by a regulatory authority for the purpose of certifying learners' achievement

City & Guilds, a business founded 130 years ago, is the UK's leading awarding body for work-related qualifications. Twenty million people in the UK have City & Guilds qualifications and the organisation awards a further 1.5 million qualifications to learners every year. It has around 7000 approved centres in the UK. Of the main types of vocational qualification, the most significant are National Vocational Qualifications (NVQs), introduced some 20 years ago, which use a methodology based on competence and learning outcomes. City & Guilds has over 56% share of this market. An awarding body's prime consideration for the NVQ process is the collection of evidence towards a particular qualification.

Within EifEL there has been much discussion on the definition of an e-portfolio, ranging from a 'simple paperless portfolio to sophisticated e-portfolio management systems'¹³.

An awarding body's interest in e-portfolios is focused on the capability to record and manage evidence mapped to the standards required for the qualification. In this context, therefore, the meaning is closer to that of EifEL's 'e-portfolio management system (organisational)' definition and 'e-portfolio' is used in this sense for this case study. Although individual learners working towards a qualification may well have their own personal learning spaces, for an awarding body the most essential features of an e-portfolio are:

¹³ For an ePortfolio enabled architecture – Position Paper. EifEL 2007

- storage and presentation of learner achievements over time,
- proof of learner competence,
- a record of achievement over a lifetime of learning,
- gathering evidence to show competence,
- mapping of that evidence against national occupational standards quality assurance.

Background and history

Some nine years ago a company which had developed a CD-ROM-based electronic portfolio approached City & Guilds to seek feedback. This was an informal and relatively cursory assessment of whether the product met our quality assurance practices. It did however make us realise the extent of the potential benefits that paperless portfolios could bring to all parties concerned in the assessment and verification processes.

Other companies developing web-based e-portfolios started to approach us in 2003-04 which led to City & Guilds introducing set criteria for meeting quality requirements and formal endorsement of systems that met the standards. There are now four suppliers whose products have met the rigorous criteria and are now endorsed by City & Guilds¹⁴.

Benefits

Typical first impressions of paper-based assessment are that bureaucracy has buried the learner value and e-portfolios can help to rectify this. Three key stakeholders benefit from the use of e-portfolios - learners, centres and verifiers:

- Learners: candidates registered for a qualification at an approved centre,
- Centres: centres, usually further education colleges and training providers in the private and public sectors, approved to offer particular qualifications. Centre staff who can especially benefit from e-portfolios are assessors and administrators who allocate candidates to assessors,
- Verifiers: internal verifiers within a centre who monitor the assessments and external verifiers, appointed by the awarding body, who monitor a range of centres.

In late 2005 City & Guilds commissioned market research across a sample of approved centres in order to determine both the benefits of and barriers to using e-portfolios. The research identified the following benefits:

- learner 'ownership' of learning programmes (as opposed to the traditional assessor-led paper-based NVQ process),
- integrated learning (via extra features such as diagnostic/placement and formative/practice tests and assessment,
- learner retention,
- faster, more efficient learning programmes (greater throughput of candidates),
- greater transparency for funding agencies,
- greater transparency for quality assurance (in terms of having a secure audit trail that is date-stamped and impossible to amend or lose),

¹⁴ see www.cityandguilds.com/eportfolios

- reduced bureaucracy (less paper and automated notification to relevant parties of when evidence has been submitted for assessment or verification).

Examples of feedback from centres

Benefits

‘Forty per cent reduction in the administration of candidate’s work. Learners can see exactly where they are you can see people who are falling behind much earlier and comment or help them.’

‘It saves on the amount of paperwork you have to move from one place to another. It also gives the candidate more access and freedom to do their own work... you can see exactly where someone is on a particular piece of work. You as an assessor can give instant feedback... the major benefits are administrative.’

‘Looks good for the college, forward thinking.’

Barriers

‘Not everyone has easy access or the ability to use it the system took six months to set up and customise to this organisation’s needs.’

‘We have had a huge number of updates – we have to have it upgraded continually and I don’t think it should have been set up until it was ready.’

‘Trying to interpret what the awarding body requirements are, eg, signatures on work, ink and electronic signatures.’

‘Changing staff mindset – when different students use different systems it creates confusion.’

City & Guilds’ approach

The market for e-portfolios in the NVQ environment is still not mature but demand is growing. With so many products on the market and limited guidance from awarding bodies and other key players, centres have to be cautious when buying licences for e-portfolio systems. Additionally, some external verifiers have viewed e-portfolios with caution, particularly those systems with which they were not familiar. As a major awarding body City & Guilds felt an obligation to make its position known and to offer guidance to centres to help them make the right decisions when investing in a new e-portfolio system.

Initial considerations did include adopting a branded single-product approach but this would have been difficult to achieve. As new entrants to the marketplace we lacked the expertise to build our own e-portfolio system and in any event internal IT resources were heavily deployed on existing projects. As many e-portfolio suppliers have developed products to meet the particular requirements of niche occupational areas (eg, business administration, care) it would have been difficult to identify one supplier whose products suited all sectors.

It was considered better to support centres in finding a product that best meets their individual business needs and this could be achieved through the current endorsement policy, where City & Guilds works closely with several suppliers.

Products presented for endorsement are put through a rigorous quality assurance process by an internal team and external consultants. This is to ensure that City & Guilds does not endorse

any system that compromises public perceptions of its brand. Suppliers seem to appreciate the rigour of the quality assurance process – it can be fairly lengthy but it has resulted in better products since any potential problems have been resolved before release.

What makes a good e-portfolio?

The quality assurance evaluation process focuses on the following areas:

- suitability for City & Guilds systems,
- assessment and verification,
- security,
- reliability of the system,
- commercial viability.

Endorsement is City & Guilds' guarantee to a centre that its external verifiers will happily use the system. If centres use non-endorsed products, the onus is on them to ensure that the external verifiers are familiarised with their system.

The future

The rate of uptake of e-portfolios will increase further for the reasons outlined above and also because of likely future regulatory requirements. The main awarding bodies for vocational qualifications in the UK are beginning to offer an e-portfolio as part of a blended learning and assessment package or total learning system. The goal is to enhance student retention and achievement as well as to gain from the efficiency benefits of an e-portfolio. One such example is ProActive Hospitality & Catering, an innovative learning resource that City & Guilds has developed with the educational publishers, Harcourt. ProActive includes textbooks, e-learning content and e-portfolio assessment, all linked through a single portal. Another awarding body, OCR, has introduced a similar kind of package, iMedia, for its media technology qualification.

As the market develops, City & Guilds will remain responsive to the needs of its centres and learners.

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CREATING A RESEARCH NETWORK FOR A SUCCESSFUL E-PORTFOLIO DESIGN AND IMPLEMENTATION

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Abstract: The presence of e-portfolios in educational centres, companies and administrations has emerged strongly during the last years by creating very different practices coming from different objectives and purposes. This situation has led researchers and practitioners to design and implement e-portfolios with little reference to previous knowledge of them; consequently, developments are disparate with many of the processes and dimensions used both in development and use being unnecessary complex. In order to minimize the inconveniences, unify these developmental processes and improve the results of implementation and use of e-portfolios, it seemed necessary to create a network of researchers, teachers and trainers coming from different universities and institutions of different kinds who are interested in the investigation and the practice of e-portfolios in Spain. Therefore, *The Network on e-portfolio* was created in 2006, funded by the Spanish Ministry of Education and led by the Universitat Oberta de Catalunya. Besides the goals associated with the creation of this network and which we wanted to share with other European researchers and experts of other continents, we will also present in this paper some data concerned with the first study carried out on the use of e-portfolios in our country that shows where we are and which trends are the most important for the near future.

Keywords: network, pedagogical design, assessment, competences

Contextual considerations for the creation of a network

There are a great diversity of typologies of e-portfolio (Kimball, 2002), but in spite of this diversity, the e-portfolio, in all cases, is an instrument that has, as a common goal, the selection of samples of excellent work or its improvements and the publication of evidence that shows the attainment of personal and professional objectives. All these artefacts organised and presented in a certain way allow for reflection on the different practices (Barberà, 2005). In this sense, the performance of each person who creates an e-portfolio is necessarily subject to self-evaluation and the external evaluation of others (Barberà, et al. 2006).

If we understand the reflection on one's own work or process as a skill that constitutes the axis of an e-portfolio together with the skills of analysis, structuring, anticipation and argumentation applied to the range of e-portfolio accomplishments, this justifies, cognitively and socially, the joint association of the members proposing the network.

After different experiences that UOC has developed around e-portfolios and to consider the need of collaboration between more practitioners and researchers, a group of professors decided to agree with other Spanish institutions to present a project –summer 2006- to the

Spanish Ministry of Education in order to constitute the Network and work collaboratively. Why create a network of researchers and education practitioners on e-portfolios?

The facts behind the creation of a network in such a new subject are multiple. It is mainly argued by the peak of the *e*-portfolio system in the sense that it looks for securing the most rational and ordered growth possible and by the utility it displays in very different fields of human activity. Apart from the intrinsic characteristics of the instrument for personal and collective goals, we mention two basic reasons for the creation of the NET:

- At this moment, e-portfolio practice is very fragmented since it is very incipient, but it is very remarkable and many resources are being invested in the creation of very local initiatives that should be made more extensive and shared in order to have a bigger impact,
- There is little or no presence of Spanish entities in academic and professional forums in the European framework in comparison with other neighbouring countries (i. e. France, Italy and England) and for this reason, a network could bring greater visibility to those initiatives that are being developed but which do not have a big enough presence to access or collaborate with others.

The arrangement and the rational growth of the e-portfolio system will take place within the framework of European initiatives that are being carried out like EIFEL (<http://www.eife-l.org/>) which is committed to an e-portfolio for all European citizens in 4 years (e-portfolio for all 2010).

What are the main goals of the network?

1. Carrying out a map of *e-portfolio* practices that includes most of the Spanish state (MAP).
2. Establishing the basis for a permanent observatory on *e-portfolio* initiatives that have been *carried out* and for the follow-up of *their* development, paying attention to different dimensions (goals, procedure, areas of development, *addressees*, costs, impact, etc) and reporting regularly (OBSERVATORY).
3. Designing an informative web page that gathers together accurate information and useful resources on the subject of *e-portfolios* to spread awareness of *its* potential uses and to provide instruments for the autonomous development of e-portfolios (WEB SITE).
4. Drawing up basic guidelines on the development and use of the *e-portfolio* for pairs of users and beneficiaries according to *their* field of application (student/professor; employee/employer; citizen/associations) (GUIDE).
5. Creating a prototype that contains the elements that constitute an e-portfolio (PROTOTYPE).
6. Developing a line of innovation and shared research among the network's participants the goal of which should be the development of reflective *writing* within the framework of the elaboration of academic, professional and civil *e-portfolios* (LINE).
7. Holding conferences with foreign guests in which the different results of the net are *presented* and where formative *actions* are contemplated (CONFERENCE/TRAINING).
8. Extending the network with new, significant contributions including the Latin American area to have a wider and more varied spectrum of perspectives, realities and practices and be able to integrate different needs and new features of interest *in* the development of *e-portfolios* (EXTENSION).

Who is taking part in the network?

The network is formed by *teams* of *researchers* and education practitioners from different educational institutions in Spain with experience in some type of *action* related to the development or implementation of *e-portfolios*. There should be a certain balance between fields of application and study that do not only look after the presence of different interests, but also achieve a true integration of knowledge into the development of the proposals, incorporating *researchers* in the area of social sciences (concretely, psychology and pedagogy) and technology, preferably, although areas of specific knowledge should not be forgotten.

Other researchers involved in this network who are working in the "knowledge Management System, Corporate and Personal, processes oriented: SURICATA Platform" project funded by the Ministry of Education are working on the process of creating digital identities for individuals –like professionals, citizens, students, or professors. In this sense, the digital identity is a very important aspect to consider in the design of e-portfolios. This new general vision of the e-portfolio concept is a point of convergence between the mentioned project and the goal of the NET e-portfolio that has allowed an enriching synergy to be created.

Data produced by the NET in its first preliminary study

As we mentioned before, one of the first goals of the NET has been to develop a MAP of projects that have been carried out in Spain. This first report has been created from the collection of 69 projects or case studies.

The methodology used in this preliminary study was a questionnaire with 5 main dimensions – Description (Context), Technological characteristics, Application (purpose, approach, the main teaching and learning objective...), E-portfolio structure, Evaluation (in terms of evaluating the experience)-. The mentioned questionnaire was answered by 69 experiences basically contextualized in Higher Education. Some of the data that has been analysed is as follows:

- 57 projects (86,4 %) have been applied in degree programmes, 2 of them in doctorate programmes, 2 in postgraduate courses, 1 in a primary school and the rest in other types of *training actions and contexts*,
- Of these, 22 projects (36,1 %) were piloted through self-created software, 14 (23,0 %) by *Moodle*, 5 (8,2 %) by *open source* (such like *ELGG*, *wikis*, *Claroline*, etc.) and others (basically commercial software),
- The most common application of *e-portfolios* is to help the teaching and learning process, and also to use new evaluation strategies. In the evaluation approach, the purpose is to provide formative and summative feedback to the students. Mainly formative than summative, but frequently both,
- The most usual application of e-portfolio is in subjects than in programmes. It is not an holistic approach, because the e-portfolio isn't applied during all the student learning process in terms of all the courses or studies he/she is doing at the university,
- In most cases, the main elements found in the e-portfolios analysed are: Curriculum Vitae (85,2 %), Rubrics (78,7 %), Follow up report (73,8 %), Public visualization (78,7 %), Competences (60,7), Feedback (52,5 %), Self-assessment (41 %),
- One of the aspects that stands out in the study is that the initiative to use e-portfolios is still coming from individuals (professors, teachers and trainers; 78,2 %) and only a few have been promoted by the institution,
- The students usually receive *training* in the goal and the use of the *e-portfolio* through

face to face and online instruction, and tutorials,

- The use of rubrics as a system for evaluate student's competences and skills is not very popular, but, in the other hand, the processes of metacognitive aspects and the presentation of evidences and *feedback* brought by the professors or trainers is used frequently,
- Finally, from the academic point of view, the appraisal of the *practitioners* has been very positive, but when we analyse the appraisal regarding the process, it drops 30% due to the difficulties of implementation, little institutional support and a lack of knowledge of good practices and mechanisms of design and techno-pedagogic implementation.

Conclusions

The data collected in the preliminary study show a real trend to implement e-portfolios as a strategy to help students during all their learning process; teaching and learning processes should be more dynamic and participative in order to reach the challenges proposed by the new European educational scenario (student centred, new evaluation strategies, follow up, to reach competences).

More emphasis in design process and the implications of the institution is needed for successful e-portfolio implementation.

After the first months of life of the NETWORK, the need to create networks of *researchers* and *practitioners* that allow us to visualise the practice of others has been made evident, whether or not those practices are good. Therefore, the lessons learned are of great utility for all the community.

Designing website that gathers together accurate information and useful resources on the subject of e-portfolios to spread awareness of its potential uses and to provide instruments for the autonomous development of e-portfolios would be a good strategy for all members, even, to share our practices with other researchers around the world, not just in Spain, in order to create a wider network.

The members of the NET have demonstrated a great interest and motivation to learn, to share and to agree on models of design and implementation of *e-portfolios* that orientate us towards the achievement of better results. Also more case studies will be collected and analysed to go further in this research. For this reason we expect to show to the audience more interesting results in a very next future.

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IF WE BUILD IT, WILL THEY COME? EMBEDDING EMPLOYABILITY THROUGH EPORTFOLIO ASSESSMENT

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Abstract: The main aim of this paper is to discuss the role of constructive alignment in helping to design ePortfolio assessment strategies which support embedding of employability within subject-based curricula. A critical consideration in this is the availability of different modes of ePortfolios (see for example Danielson & Abruytyn, 1997; Wolf & Dietz, 1998; Barrett, 2002) and their support of both formative and summative assessment objectives. A number of different scenarios for assessment will therefore be considered in this paper. Key issues that affect the quality of ePortfolio assessment and their acceptability to faculty and students will be explored further.

Keywords: employability, professional literacy, Distance learning, Higher Education, formative assessment strategies, innovation

Introduction

The use of ePortfolio assessment is a relatively new phenomenon in UK Higher Education. Although there are many examples of ePortfolio use, these are often found in vocational HE courses or in PDP courses. In courses that do not traditionally have a strong vocational flavour or that are highly subject specific, ePortfolios are rare.

Innovations may be perceived as threats to traditional practices and ePortfolios are not an exception. Adoption by institutions may depend on the success of early adopters. Early adoption has the potential for generating specific information relating to pedagogical, administrative and technical factors, as well as aspects related to student perception and engagement with ePortfolios. By showing how each of these contributes to improvements in learning and course design, evidence of their use will be favourable and more likely to be considered by other courses

The ePortfolio case study presented here, is of a course in the Open University UK. The Open University has only recently made the transition to VLE –based and ePortfolio-based teaching. As a result the case reported here should be of interest in particular to organisations at similar stages of development or with similar student and institutional profiles. What is presented here is a view of the production process involved in designing a new course at the OU, and as a result does not have any student facing evaluation data as yet. However the issues raised as a result of the production process highlight a number of key aspects that further an understanding of the role of ePortfolios in embedding employability and aligning course content with assessment.

“If we build it will they come?” asks a question, which readers may recognise as an adapted line from the 1989 film *Field of Dreams*. In other words, it is not a foregone conclusion that just because we build an ePortfolio into a course, students will want to use it, or find it beneficial in developing their learning in the ways it was designed to do. Therefore, a critical question to ask is whether the things that we put in students’ path will have the desired effects of helping them to learn and achieve both course and programme specific aims as well as their’ other, personal aims and objectives. The following account highlights some of the ways in which the process of course design and constructive alignment can help to answer such questions and thus inform the design choices made.

DSE232 course overview

DSE232 is the first course in the Faculty of Social Sciences developed with the view of capitalising on the new Moodle VLE adopted at the OU. The course counts 15 credits over a period of 12 weeks and will have an expected 350 students in its first presentation. The course will be presented twice per year.

The aims of the course are to deliver a psychology curriculum which is skills-based and uses the psychological content as a platform to teach specific skills in transactional writing. The context for this in relation to assessment is provided by requiring students to write a generic, professional report. There is a recognition that functional and transactional literacy are important areas in which students should develop, and that contextualisation of this in an applied context are ideal opportunities for engaging students with this. The course covers three main areas of applied psychology, occupational, forensic and clinical psychology, with weekly activities designed to support the material. Students are expected to keep and make use of the ePortfolio throughout most of the course, recording reflection and the work for the assignments

DSE232 makes use of the Open University's MyStuff ePortfolio. This allows course specific customisation and structuring of content. The DSE232 area of students' MyStuff is structured using multiple forms for text entry and uploads of other student-generated content. Automatic 'migration' or zipping of content from the VLE directly into the ePortfolio (e.g. recording of quiz results, forum postings) will eventually be available but for the first presentation the aim is to get students to do this manually). The capability to 'auto-construct' assignments is already available.

The assessment for DSE232 requires two submissions:

1. Formative – Students work through a traditional OU Tutor marked assessment (TMA; approximately 1500 words). This contains multiple questions following a developmental assessment format. Questions require students to engage with scenario-based material (short vignettes of real world problems for parts of this). The aim is to scaffold skills in applying knowledge to a context. Tutors provide feedback, and no summative mark is recorded although the assignment is compulsory. In this context the ePortfolio will be used as a developmental workspace including student artefacts and tutor feedback.
2. Summative, end of course assessment (ECA) – This assessment is submitted at the end of the course and constitutes 3000 words. This is segmented and includes A) A reworked aspect of the formative work. B) Reflection on feedback and evidence from other activities provided in the course. C) A 1500 word report on a longer scenario given to students in week 7. The role of the ePortfolio is to act as a developmental workspace, but also as a scaffold for constructing, presenting and submitting work.

In this sense the deployment of the MyStuff ePortfolio aims serve a variety of purposes that are consistent with Danielson & Abrutyn's (1997) and others (e.g. Barrett, 2002) distinction between different types of functions.

The VLE space used for the course is designed to give students access to the following activities:

- Conferencing and small group activities in forum based spaces,
- Individual activities that are recorded via wiki (sharing of links to resources, articles and other materials students identify),
- Knowledge-based quizzes (covering all 7 chapters of the course text),
- In-house produced AV and multimedia resources,
- Search facilities.

The learning outcomes produced for this course cover skills relating to knowledge development, conceptual and applied skills, as well as more generic key skills identified in the Open University skills framework. This includes self management, learning to learn as well as skills that have direct applicability to employment contexts (e.g. IT, communication) and corresponds broadly to those skill areas that are featured in the QA skills framework for Psychology (QAA, 2002b, p. 8). Constructive alignment has been a key aspect in designing the assessment strategy with the view of assessing these outcomes and in developing the ePortfolio deployment.

Rationale for selection of ePortfolio tool as an assessment tool

In the context of UK Government and European initiatives of life long learning (e.g. Leitch, 2006; Bologna, 2005) and other drivers of portfolio adoption (Hartnell-Young, 2006) ePortfolios have an increasingly important role to play in Higher Education. Exactly what this means for assessment at the Open University is not clear at this stage. However it is reasonable to assume that in future, programmes and courses will make increasing use of ePortfolios, and that increasingly students across HE will expect ePortfolio work to form part of their assessment. Past experiences at the Open University have highlighted particular aspects of the technical parameters that are required to ensure that ePortfolio assessments at the Open University are successful (Gray, 2006).

There are a number of potential impacts that ePortfolio implementation can have on educational institutions, not just in relation to assessment (Topp & Clark, 2006; Blocher & Sujo de Montes, 2006). Consequently, there were several strategic aims for learning and new course developments in Social Sciences and the Open University that fed into the consideration and adoption of the ePortfolio route to assessment in DSE232.

A key feature of ePortfolio-based assessment that attracted highly favourable support from the faculty was the possibility that adoption of ePortfolio based assessments in a course could lead to more flexible arrangements and conceptualisations of assessment at the Open University. One of these is that the ePortfolio assessment could lead the way in relation to facilitating collaborative online learning, involving both students and tutors as partners in a two way assessment dialogue.

Prior work by the author with paper-based portfolios in the context of VLE-intensive course delivery (Patent, 2003), also highlights the role of Portfolio-based assessment in focussing student effort, mediating student engagement, motivation and retention, supporting the development of breadth and depth in student output, and permitting the assessment of diverse learning outcomes. The work of a number of authors and good practice in ePortfolio assessment suggest that such gains could be consistently achieved (see for example Doig, Illsley, McLuckie & Parsons, 2006; Ehrman, 2006; Greenberg, 2006). Recent work on formative assessment (Knight, 2002) suggests that assessment in which the sole purpose is to collect summative information may be insufficient in promoting the type of learning students need to develop in the 21st century. In particular the idea of using assessments in a reflexive and developmentally revisionary fashion is gaining some ground, as this is considered a way for developing the thinking and learning skills required. Such approaches can however be jeopardised by low take up if they have not been linked with a compulsory assessment structure (Handley, 2007). This is the main reason for making formative assessment compulsory and ePortfolio assessment provides support for assessing in this way. Since the a record of formative work is contained in an ePortfolio repository it is available and can then be drawn into the summative part of the assessment strategy. In DSE232, the decision to use formative assessment was made prior to the decision to adopt the MyStuff ePortfolio, but on discovering that different aspects of the MyStuff system would support a formative strategy whilst overcoming some of the hurdles in formative assessment, the decision to opt for portfolio assessment recommended itself.

Additional pedagogies that shaped the development of an ePortfolio assessment strategy in DSE232 stem from recent work in writing research in HE (Ahmed & McMahon, 2006) and recognition that traditional subject-based courses could be engineered so that they become more inclusive of a broader skills framework, than that found in more traditional subjects. In particular work on the purpose and nature of the professional report submitted at the end of the course was strongly influenced by this agenda. Related to this is the concept of embedded employability. Increasingly, professional bodies (e.g. for example in health, social care and HR) rely on ePortfolio systems to engage members with continuing professional development (CPD). Building activities into a course so that the course anticipates students' future engagement with ePortfolio-based CPD was viewed as a way to ensure that students gained relevant subject knowledge, but also gained the skills and experience that should enable them to negotiate future CPD requirements effectively. A course covering Applied Psychology thus provides a natural home for ePortfolio assessment and fosters practice of technological tools that students will encounter in the shape of CPD at a future stage in their careers. From a learning design perspective, the ePortfolio approach also presents a way in which learning outcomes could be mapped onto an 'assessment space' to allow transparent and direct assessment of all learning outcomes. As a result it was expected that learning outcomes and assessment strategy could be very tightly coupled as well as being constructively aligned with the activities and types of learning expected of students on the course.

Problems and issues

Paoletti 's (2006) report on failure of a ePortfolio introduction provides a clear reminder that it is important to assess the possible reasons why an ePortfolio might fail, so that necessary risk management can be applied. This could also improve the 'stickiness' of the ePortfolio system (Jafari, 2004) and thus improve new course teams' perceptions and likelihood of adopting ePortfolio-based assessment. As a result, the DSE232 course team has been highly critical of the adoption of ePortfolio rather than simply succumbing to the seduction of the new (Rouche, Milliron & Rouche, 2003). This process has led to a number of issues being identified that required careful consideration for deployment at a course level. Since DSE232 acts as a live case for a host of course innovations, it is anticipated that our experience around managing the risks and obstacles in the DSE232 ePortfolio deployment will feed into technical development, training and assessment structures. In this way the course acts as a pathfinder for the development of portfolio based pedagogies in other areas of the faculty and the university.

Student related issues: Lack of Experience of students in negotiating the VLE and My Stuff could be problematic if insufficient time was given to develop students understanding of the tasks they are required to carry out. On a short, 12 week course (approximately 150 hours study time) this could throw up a range of problems. In other words, an ePortfolio space might be buildable within the time frame allowed for producing the new courses, but this could potentially be a risky strategy if students are not engaging with it as intended. As a result early activities in the course need to ensure that students are familiar with the tasks required for managing ePortfolio work and understand its role in assessment.

Tutor workload: The role of tutors in being able to view material that students are working on needs to be carefully evaluated since this is one of the areas where course costs could potentially expand. The ePortfolio system at the OU will eventually allow full integration with the electronic assignment submission and distribution system, which will make tutor marking in the MyStuff ePortfolio space feasible, rather than marking in a separate e-submission space (eTMA system). Additional issues relate to the training that tutors require in order to support student use of ePortfolio, and to be able to engage successfully via the ePortfolio system.

Assessment support: MyStuff supports assessment in a number of ways: automatic construction of portfolio based assignments allows students to compile their final assessment submission at the click of a few buttons and checkboxes. This is done via a course specific

workspace defined in the ePortfolio and allows the assessment process to create relatively standardised compilations of students' work. How much to allow students to select and choose all material for submission is a risk from both academic standards, and technical perspectives. This has been addressed for the first presentation by creating ready made web forms for students, rather than requiring them to construct these themselves and should thus help them manage both of their assignments. The notion of the workspace being analogous to a workbook has been used in describing our aims to developers.

Feedback on the ePortfolio: At the Open University, End of Course Assessments (ECAs) typically do not get detailed feedback as this cannot be supported easily through the existing online system. However, the ePortfolio affords the possibility that assessment feedback can be provided to students for ECAs using a tick box approach which is mapped onto the learning outcomes and which is found in the ePortfolio space. One possibility which has not been fully explored in DSE232 is to invite students to provide their own evaluations prior to receiving feedback, as this would strengthen the level of self evaluation and understanding of assessment (Rust, Price and O'Donovan, 2003). Student self evaluation could also conceivably play a role in the marking of the summative work (Boud, 1989).

Management information – Managing students over a period of time requires course level access to information on activity and engagement patterns. Although the strategy is designed to increase retention, early warning on potential problems is a desirable feature of management of any course not just those with ePortfolios. Although MI on the VLE is available, it is currently difficult to obtain for MyStuff ePortfolio, but this is an area in which DSE232 has a role as a shaper of the type of information that will be available in the future. Ideally we would like management data on levels of access in contrast with simple and perfunctory counts of the number of clicks. In particular since the ePortfolio is structured around activities we hope to be able in future to see the development of a representation of where students are, relative to the tasks that they have been set.

Social constructionist vs. traditional pedagogies – Development of assessments that maximise VLE and Web2.0 approaches can be in conflict with more traditional assessment and course production models. For DSE232 this has required substantial effort in challenging assumptions, innovating of practices and collaboration and consultation with academic, quality assurance and technical stakeholders.

Developmental Issues: Since MyStuff is an ePortfolio tool that is undergoing continued development and thus subject to the time scales imposed by developers, developing a course that uses a new ePortfolio system can be tricky. To minimise risks in facing students with under-developed functionality, in depth, three way consultation with the development team leader, other learning design professionals and academics has taken place which effectively tied the course team to adopt the functionality that is available in October 2007, with the view to the first delivery of the course in May 2008. The long production schedule for a course, has the advantage of allowing extensive usability testing and thus supports the management of the risks inherent in using new technologies.

Conclusion

Developing courses that place employability in the context of more traditional subject matters can be difficult to bring to fruition if appropriate forms of assessment and means of supporting students are not available. Once these become available course designers are in a stronger position to build a course which delivers on employability. Although DSE232 has not faced students so far, the rigours of OU production ensure that risks to the potentiality of students not engaging are reduced. Questions about the relationship between learning outcomes, individual student learning activities and forms of assessment are key to this. In particular the My Stuff ePortfolio system has the potential to make the link between outcomes, activities and

assessment highly explicit in ways that are not possible in the same way with other forms of assessment support: Students will recognise the learning outcomes because they are engaged directly with activities that are signposted as fulfilling the requirements for constructing a learning outcome. Furthermore they should be able to identify how these activities relate to their assessment but also how these activities relate to the bigger picture of their lives. Under those circumstance students will be able to direct effort to those areas in which they perceive a strong sense of relevance. As a result they will engaged and provide direct evidence of their accomplishments in the key outcomes specified in the course. If we build it they will come and use it successfully - But only if we make it clear to them why they should.

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INTRODUCING THE STUDENT COMPETENCY PORTFOLIO IN THE CASTELLDEFELS SCHOOL OF TECHNOLOGY (EPSC)

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Abstract: The Castelldefels School of Technology (EPSC) of the Technical University of Catalonia (UPC) has made significant steps toward the adaptation of their telecommunication studies and subjects to the new student-centred paradigm of learning proposed by the European Higher Education Area (EHEA). Among other initiatives, the introduction of the EPSC student competency portfolio, which in the end will adopt the appearance of a personal web page hosted by the school, represents a remarkable and worthy experience we want to report. The EPSC student competency portfolio consists in an structured collection of samples and study materials to show explicitly that our students have acquired practice during their career in the following transversal abilities: (1) working in teams; (2) working in projects; (3) oral and written effective communication; and (4) autonomous or self-directed learning. In addition, they also must show ability in: (5) scheduling and managing their studies with efficiency. Therefore, the student e-portfolio will be both, a tool which will help them to think and reflect about their own learning and how to improve it, and a tool to accredit to future employers the professional skills embedded within the degree.

Keywords: competencies, student learning portfolio, EHEA

Conception of the student competency portfolio

The Castelldefels School of Technology (EPSC) has led many initiatives toward the adaptation to the EHEA and has a reputation for excellence in teaching innovation and quality as reported in our web site [1]. One of the most challenging ideas is the implementation of the student competency portfolio from preliminary pilot experiences that are under way since 2005 [2]. We plan to introduce the portfolio in the next reform of the study plan programmed for the year 2008, as a compulsory activity that has to be accomplished by all our students before graduation. Our own judgement from the experiences and the literature review on the subject [3, 3] shows that the portfolio, and specifically, the electronic portfolio, will become a remarkable tool to express what has been learned in the career.

From the professional point of view, the portfolio will demonstrate the ability of our students to:

- Work in teams: organize and pilot meetings effectively; produce creative and feasible ideas; group conflict solving; active listening; arrange and carry out working plans for the group; assess group behaviour; establish norms; and decision making,
- Work by projects: Establish project objectives and development plans; project time management; project tracking; use project management software; assess project results; produce creative and feasible ideas; group conflict solving; and active listening,
- Communicate effectively (oral and written): Write scientific and technical texts, papers, communications, technical reports and product datasheets using a clear and effective language; make good oral presentations using the blackboard, multimedia software tools, pictures and graphics and nonverbal communication (posture, gesture, facial expression, eye contact); synthesize introductions and conclusions, ideas, and express them efficiently depending on the space and time availability,
- Learn autonomously: Determine what has to be learned and establish clear goals;

- search, classify and select relevant information in papers, books, web sites, databases, etc.; assess the weak and strong points of the own self-directed learning process; self-assess the own work and comply with deliverable deadlines while managing study time.

In addition to the four previous skills, the student must include another competency related to the way he or she is scheduling their studies and managing their study-time, involving considerations such as the number of subjects taken and passed per year:

- Ability to plan effectively their studies: Identify with precision the causes of a good or bad academic progression; select the number and type of subjects to enrol in a given semester, attending the own capabilities and personal circumstances.

Indeed, such a portfolio could not be considered in any way, if a traditional teacher- centred learning system based exclusively in lecturing were the norm in our school. If such were the case, you would be able to collect only proofs of individual technical knowledge, normally using the results of examinations. Our competency portfolio pretends to go far beyond. So, obviously, in order to facilitate the harvesting of learning evidences related to the five skills, a major change in learning methodologies has to be planned in practically every subject of the career. Such was the main aim of the pilot plan for convergence towards the EHEA: the systematic introduction and development of student-centred learning methodologies [1]. The five aptitudes to be learned are transversal to all the subjects and, therefore, are not linked to a particular matter or course. The idea of concentrating the portfolio development in a few subjects, creating for example specific courses such as: “oral and written communication techniques” is not a good proceeding. We plan, instead, to distribute for basically all the core and elective courses the transversal learning objectives that will demonstrate ability in some particular point to be collected in the future in the portfolio.

The new student-centred subject curriculum

The approach that will make possible to produce data and facts that would show student competency in some of the transversal skills, will consist in programming every core subject of the studies with some embedded transversal learning objective in addition to the more specific ones. Our idea is that the inclusion of one or several transversal objectives in a conventional subject will make room for more active and student-centred learning methodologies in the classroom, such as: cooperative learning [5], problem and project based learning (case study approach) [5], etc. We already count on the remarkable experience of a PBL-organized master of science in telecommunication engineering and management.

Our proposal is to establish per semester, and throughout each academic year, from freshmen to senior, a variety of teaching methodologies for sustaining a harvest of evidences for each one of the 5 skills to be included in the portfolio. For example, looking at the first semester (1A) of the telecommunications engineering career, some of the subjects can be structured generically as follows:

- Fundamentals of Physics: Cooperative learning. Base groups of three students to carry out the main tasks of the course instead of attending classic lecturers. Oral presentation using slides of some exercises. Write down some selected solutions using quality rubrics.

(Oral and writing skills, team work)

- Components and Circuits. Cooperative learning. Problem-based learning based on real applications. Solving problems including simulation and laboratory verification. Video recording of an oral presentation. Group portfolio to classify and present the subject learning materials and deliverables as well as reflective thinking about the course.

(Team work, oral skills, self-reflexion)

- Introduction to Computers. Case study. Puzzle for learning the basic programming theory and language. Structuring and programming a real application using commercial software.

(Self-directed learning, work by projects)

Materials (finished or unfinished samples of writing, videos, photographs, application projects and slide presentations, peer or teacher assessed deliverables, self-assessment sheets, reflective thinking, etc.) from all the three subjects can be selected at the end of semester as elements to be included in the student portfolio. Each student will be responsible for keeping their most interesting materials and rationally relate each one to any of the four professional oriented skills.

Another example of active learning can be found in [6] and [7], where the 1B-semester Digital Electronics subject is described in detail. In this course, a cooperative and problem-based learning approach is running since year 2002, and many active methodologies and techniques have been experimented: real-world oriented problems; design of a final application; puzzles to learn theory and discuss critical points; continuous formative assessment without final exams; content and language (English) integrated learning; and a group portfolio. As in other similar subjects, students collect in this course meaningful material and gain experience towards the achievement of their final competency e-portfolio.

The final fifth competency, the ability to plan effectively the career will be in charge of the students' academic advisors or tutors. They will ask the students for: group meeting and one-on-one interview records, questionnaires about academic progress and other considerations related to subjects.

The portfolio structure and assessment

The portfolio will be built throughout the studies and delivered in three revisions:

- Revision 1: After completion the selective phase or the firsts two semesters
- Revision 2: After completion of all core and obligatory subjects
- Revision 3: Before graduating after the oral presentation of the diploma thesis

The student's academic advisor will be the teacher in charge to assess each revision and suggest feedback to improve it when necessary. Students will receive free elective credits after finishing portfolio revisions. A set of guides, templates and rubrics [8] must to be prepared for developing and (self-)assessing the portfolio. The common elements for the first's two revisions will be, fundamentally:

- A two-pages length written report which will include:
 - What has been learned and in which way, with reference to the competency,
 - What has to be improved and in which way to produce better results for the next revision,
- A set of representative materials and evidences to document what has been said in the report for each one of the competencies,
- A control sheet where to annotate the major points or changes discussed with the advisor.

Electronic implementation as a web page

For the third and last revision which is the most important one, the main focus will be to generate an electronic portfolio following when possible the same structure, pedagogy and assessment as the paper portfolio [3] developed in the previous revisions. Our aim is to convert

the student “learning portfolio” into a “showcase e-portfolio”, which students can use when applying for employment. Therefore, some decisions have to be made in several directions:

- Which will be the software to produce the final version of the e-portfolio? We have to decide whether open source software is more convenient than commercial tools,
- Where will be the student e-portfolio located? School technicians and computers will support the project, but, how long our former students will need our support for hosting and updating their e-portfolio?
- Will all our students use the same template and style guide, or instead, everyone will be free to decide their own style? In which way such decision can affect the final e-portfolio assessment or for example the student’s creativity?
- By which means can we evaluate the success of the student e-portfolio once running and used by former students and their employers? Which is the way to get feedback?
- In which way can we instruct our former students to readdress their learning-oriented portfolio into a lifelong career and professional e-portfolio?

At that point, one can see the need to make further research on the subject and locate which similar initiatives are under way in other technical universities around the world. For example, we belong to the “Network on e-portfolio” led by the Universitat Oberta de Catalunya (UOC) [9] which is interested in the investigation and the practice of e-portfolios in Spain. In our university, the UPC, we pretend to develop and promote a “hot topic of interest” around the feasibility of embedding the e-portfolio into our student’s curriculum. This is the main aim of the “Student Portfolio Group (GPoE)” [10], recently funded by the Catalan Government and led by ourselves.

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EARLY LEARNER EMPOWERMENT BY MEANS OF EPORTFOLIO

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Abstract: The last years have seen an increase in interest for and application of portfolios, more precisely in ePortfolios. Despite their different functions and areas of application, ePortfolios are usually seen in and of itself as a learning method; few have considered that ePortfolios need an instructional strategy for implementation. This paper exemplarily shows for process portfolios how learning theories request instructional scaffolding for different ability levels. In order to empower learners early in their achievement of lifelong learning competences, we propose a scaffolding aid in the form of a semi-formal description structure for learning processes to be used with the method of process portfolio.

Keywords: learning theory, process portfolio, scaffolding, structured description

ePortfolio Orientation

History of (e)Portfolio

Already in 1938, Dewey stated that experience alone does not suffice learning but that reflection is an integral part of the learning process (Dewey, 1997). Paper-based portfolios have a long tradition within the field of art and architecture mainly used both for assessment during education and for presentation showing them to potential clients. For prospective artist students, portfolios by now are often requested for admission to university. In the United States, portfolios started to be used in teacher education as alternative means for assessment and examinations (Britten & Mullen, 2003).

As portfolios grow over time, their paper-based entries become difficult to manage and store. With the emerge of information technology, especially the widespread use of virtual learning management systems in educational institutions, electronic portfolios (ePortfolios) have grown in use over the last five to seven years in post-secondary education. Compared to paper-based portfolios, the benefits of ePortfolios are many and varied (Butler, 2006). The following summarise the most prominent:

- Collection of a large number of resources,
- Usage of more extensive material (especially incorporation of multimedia material),
- Easy maintenance allowing for efficient management and archiving of resources,
- Instant access and flexible management of access rights,
- Possibility of non-linear and non-hierarchical organisational structures,
- Easy distribution allowing for a large audience and quick feedback.

Nevertheless, from the time when the concept of ePortfolio took root, there are differences of views about what an ePortfolio is supposed to be (Grant, 2005). Some people regard an ePortfolio mainly as a personal digital archive to store material and pieces of work; other people, in turn, see an ePortfolio as something used to achieve specific competences and reflect on the respective learning process. When talking about ePortfolio, it is sometimes not clear whether one thinks of:

- ePortfolio *application*,
- Portfolio *method* as a – mainly constructivist – teaching/learning concept or
- ePortfolio *work* to be accomplished by learners (Grant, 2005).

There is a considerable lack of consensus regarding terminology which might be explained by the fact that the field of ePortfolio is relatively new and that time is still needed to develop a common vocabulary describing ePortfolio, its purpose and use in education (Grant, 2005).

Types of ePortfolio

In general, three main functions for ePortfolios are distinguished: the showcase or presentation function, the assessment function, and the process or development function (Aalderink, 2007).

The showcase or presentation function

The presentation portfolio is understood to be a specific view on a selection of purposeful evidence that the owner decides to publish. This type of ePortfolio is often used to put forward best assets and competences as well as information about education and prior activities to potential employers.

The assessment function

ePortfolios are sometimes seen as alternative means for assessment. Barrett (2005) distinguishes between assessment *of* learning (summative) or assessment *for* learning (formative and classroom-based) stating that:

“portfolios used for accountability are not student-centered and are mostly despised by both students and teachers [...]. However, ePortfolios used as assessment for learning, to provide the type of feedback that supports student reflection and improvement of learning, have the potential to engage students in their own self-assessment.”

The process or development function

This type of ePortfolio is meant to capture the learning process. The Consumer Guide on “Student Portfolios: Classroom Uses” (Sweet, 1993) states that research in educational sciences shows that learners “benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analyzing information, or describing their own observations.” The process portfolio aims at supporting the learner in the development of learning strategies, achievement of competences and reflection on what has been learned so far. It thus appears to provide the appropriate means for supporting learners to reflect their process of learning and enable them to make connections between the learning which occurs in different contexts (Tosh, Light, Fleming & Haywood, 2005).

In practise, however, the differentiation between the assessment and process functions is not always clear-cut. Although an important aspect, the assessment function will not be discussed in this paper. Considering ePortfolio as a pedagogical *method*, we propose in the following sections a pre-designed structure that guides students especially in early stages of learning through defined steps when reflecting their own learning process using a process portfolio.

Change of Learner Role requires Early Learner Empowerment

Due to the high prerequisites of use, as for example the competence of developing learning strategies and formulating learning outcomes, process portfolios are often reported to be used in post-secondary education settings (cp. European Schoolnet, 2007). The relatively late implementation practise can be linked to recommendations by Jonassen, Mayes & McAleese (1993), who stated that initial knowledge acquisition up to college learning should take place using classical instructional design, which mainly involves concepts of transmitting knowledge. They further state that only in the advanced stages of higher education, constructivist approaches – to which we count the process portfolio method—should be used. Gruber &

Vonèche (1977) exemplify on the basis of Piaget's theories that there are two fundamentally different approaches to education: unilateral and reciprocal. Regarding the former, perfectly designed instructional materials are given to the learners, who are then the receivers of that "adult knowledge and morality" (Gruber & Vonèche, 1977). According to Gruber & Vonèche, this approach fosters the students' obedience rather than autonomy. The unilateral perspective is in line with the processes employed in classical instructional design as proposed by Jonassen et al. (1993) for pre-college knowledge acquisition. The reciprocal approach, on the other hand, views own effort and personal experience as essential parts of learning. If the goal is to foster lifelong learning competences in students, we must implement a pedagogical approach that is oriented on reciprocity from the start.

Recent learning theories as being mainly based on the principles of constructivism and thus reciprocity induce changes in the approaches to learning. These include more learner-centred pedagogic approaches, more flexible program provisions, a greater emphasis on lifelong learning, and a move toward competence-based assessment (Attwell, 2007). The learner is increasingly expected to be the "architect" of his/her own learning process. The use of process portfolio might thus be the appropriate method to underpin this learning paradigm.

The IMS Learning Design specification (Koper, Olivier & Anderson, 2003), providing a standardised modelling language for representing learning processes, takes into account the above mentioned changes in the approaches to learning by regarding the *learning activity* rather than the learning material as its central element. Starting from a learning process description in natural language, the specification proposes a step-wise design procedure resulting in an eXtensible Markup Language (XML) document instance that can be interpreted and "played" by a learning management system. This design process envisages the use of the Unified Modelling Language (UML) as an intermediary step that helps to map the described learning process into an XML structure. Assuming that UML requires extensive technical knowledge for its setup, we developed a less rigid semiformal description structure as an in-between step between the natural language and a highly formal language such as XML for communicating learning processes (Heyer & Oberhuemer, 2007).

In this paper, we propose to extend the purpose of the described intermediary design step, originally intended to support instructional designers in the development of learning and teaching activities, to offer early students a structure to systematically describe and reflect on their own learning processes.

Learning Theory Background in Regard to Changed Learner Role

Self-Regulation and Levels of Processing

Placing students in the role of being their own learning architect demands of them a higher degree of self-regulation than a traditional teacher-centred pedagogic approach would have. Self-regulation refers to "the process whereby learners systematically direct their thoughts, feelings, and actions toward the attainment of their goals" (Schunk & Zimmerman cited in Schunk, 2000, p. 355). Learners, who act self-regulated, rehearse and use learning strategies, monitor their comprehension along with their beliefs about self-efficacy, learning outcomes, and perceived value of learning.

According to Schunk & Zimmerman, individuals go through different levels of development regarding self-regulation (Schunk, 2000). In progressing through these levels, the degree of self-influence steadily increases (cp. Table 1). While in the early stages, the focus is more on influences from the community that the learner is part of, the later stages are characterised by influences that come from the self. These levels are repeatedly visited as learners go through progressive cognitive changes.

Table 1. Social and self influences on self-regulation (Schunk & Zimmerman cited in Schunk, 2000).

Level of Development	Social Influences	Self Influences
Observational	Modelling, verbal description	
Imitative	Social guidance, feedback	
Self-controlled		Internal standards, self-reinforcement
Self-regulated		Self-regulatory processes, self-efficacy beliefs

Craik & Lockhart (cited in Schunk, 2000) propose in their Levels of Processing theory that learners process information at different levels while the greater the depth of processing during learning the more information learners will retain and remember. According to this theory, learners often perform self-regulatory processes unnoticed and unconsciously. One goal for attaining a learning process at deeper levels must thus be to make the self-regulatory functions of the learners explicit.

Vygotsky's Zone of Proximal Development and Bruner's Instructional Scaffolding

The Social Development Theory by Vygotsky emphasises the importance of social interaction in the development of individuals (Schunk, 2000). According to Vygotsky, mental functions take place on two planes. They start out on a social or interpsychological plane (through the interaction with humans) and then move to an inner or intrapsychological plane, which is personal. Vygotsky's theory resembles the levels of development according to Schunk & Zimmerman introduced in Table 1. There, too, learners are strongly focused on social influences, meaning they are in need of modelling (watching others perform tasks and actions), verbal descriptions of events and processes, social guidance and feedback in the early stages of development. However, as their development level increases, self-influences on the intrapsychological plane increase as well.

Part of Vygotsky's social development theory is the Zone of Proximal Development, which is defined as "the distance between the actual development level as determined by independent problem-solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky cited in Schunk, 2000, p. 243f). It thus relates the learner's potential development to a social aspect of learning, e.g. adult guidance. As Vygotsky states, working activities in the Zone of Proximal Development requires guided participation. Derived from this is the concept of instructional scaffolding, which was first introduced by Bruner (Schunk, 2000). Scaffolding refers to the controlling of task elements, which are beyond the learner's capabilities in order to reduce the cognitive load. Learners are thus enabled to focus on and master those features of the task they can quickly grasp (Schunk, 2000).

Summary of Requirements for Supporting Process Portfolio Implementation

From the selected learning theories we have described herein, a set of requirements can be derived that should be considered when using process portfolios for learning. These requirements are:

- helping learners to make their conducted self-regulatory processes explicit as according to Craik & Lockhart,

- providing modelling and verbal descriptions in early developmental stages of self-regulation as according to Schunk & Zimmerman as well as Vygotsky,
- providing social guidance and feedback in early developmental stages of self-regulation as according to Schunk & Zimmerman as well as Vygotsky,
- offering guided participation and adequate scaffolding while learners work in the Zone of Proximal Development as according to Vygotsky and Bruner.

The legitimacy of these theoretical requirements can be validated when looking into practise: the ePortfolio study conducted by Tosh et al. (2005) found that besides technology related problems, which represented the main barrier for students to using ePortfolios, the second greatest barrier is a general lack of adequate instruction. The survey moreover specifies that in the beginning students explicitly asked for a structured ePortfolio to support them in the reflection of the learning process.

Concern about an increased need for tutor assistance to ePortfolio students has also been expressed by Harland (cited in Healey & Jenkins, 2007), while Niles & Bruneau (1994) reported that their portfolio students were confused about their task; when asked whether more direction would have been helpful in their portfolio usage, the majority of students responded positively. These are signals that additional scaffolding and modelling are needed when implementing ePortfolio. In the following section, we will introduce an instructional aid that aims at fulfilling these requirements.

An Instructional Aid for Learning with Process Portfolios

Taking up the requirement for scaffolding, we first point out the portion of the task that our instructional aid will assist, so that learners can focus on the real task to be mastered: the reflection. Before a learning process can be reflected upon, it needs to be described. As even professional teaching practitioners lack a common language for communicating their practise (Beetham, 2004), it is hard to expect learners to readily describe their encountered learning processes. We thus propose to provide for scaffolding purposes a simple, semiformal description structure (shown in Table 2) to help learners capture their learning situations. The guided participation in this scaffolding process may then be additionally provided by the tutor, who models or supports the description of the learning situation with the help of the structure.

As we have indicated earlier, IMS Learning Design is a serious candidate for providing a modelling and description language for learning processes (McAndrew, 2004), its terminology claiming to be pedagogically neutral to describe any learning approach (Koper et al., 2003). Based on the application of IMS Learning Design, we developed a semiformal description structure for communicating learning processes (refer to Table 2). The advantage of the semiformal description is that necessary elements involved in the learning process, that might get lost in a natural language description, are explicitly captured. The further advantage in our case is to direct the learners' attention towards elements of the learning process that they might not have been noticing as relevant parts before.

Table 2. Structured Description for Learning Processes

Target Competences	<i>Describes the intended learning outcomes, which the learner establishes for him- or herself. The competence should be described using a verb for the active part and a noun for the knowledge to be acted upon. Example: Analyse ill-structured problems.</i>
Entry Competences	<i>Specifies circumstances or essentials that are present or necessary before the learning process takes place, i.e. what the learner is already able to do before the learning process. Example: Provide constructive feedback.</i>
Participating Actors in their Roles	<i>Lists the involved actors in their respective roles within the pedagogical experience. Example: Group Member.</i>
Performed Learning Activities	<i>Describes the perceived activities that the learner and other actors perform in their respective roles. For the owner of the ePortfolio, these activities may be observable or unobservable, the latter being cognitive and metacognitive activities. The activities may be referred to by number to indicate a sequence. Example: [Group Member] Think about the case study; then discuss the description of the case with my group members.</i>
Resource/s used within the activities	<i>Lists the resources that are used during the performance of the activities. These resources can be people as well as literature or tools. A number in front of the resource indicates for what activity the resource was used. Example: Case Study.</i>
Annotations	<i>Contains the actual reflection or any commentaries regarding the described learning process. In this section, the learner may, for instance, evaluate whether the activities employed were able to fulfil the stated goals, what conditions may have hindered the attainment, and whether an adjustment of activities or resources should be done next time around in a similar learning situation. Example: It was good that the mentor gave us adequate time to think our thoughts regarding the case study through. That way I did not feel rushed or unprepared.</i>

Fulfilment of requirements

We now provide reasoning how the structure is able to fulfil the requirements put forth in the previous section. The requirement of *making processes in learning explicit* can be fulfilled with this structure, since the learners' attention is drawn to the specific activities involved in learning. Learners have to explicitly think about and formulate the activities, which might have gone unnoticed before. These activities could be obvious and easily observable, or they could be cognitive and thus hidden activities, which only the learner him- or herself knows about. Also, the learning outcomes need to be made explicit which represents one part of self-regulation. It is important in this regard that during the *feedback* sessions with the tutor the learner's activity descriptions are discussed. If necessary, the learner's focus is increasingly shifted from outwardly expressive activities towards the internal processes and strategies of self-regulation within the description.

The *modelling* requirement can also be seen as fulfilled since the structure itself represents a model of how a description for learning processes may look. The modelling aspect could be enhanced even further if the tutor works collaboratively with the students to fill out the structure about a common learning experience, or provides own reflections using the structure. The *verbal description* requirement is also fulfilled since the structure including its filling out instructions comprises a verbal description. For the *scaffolding* requirement, we have pointed out earlier that the description structure in Table 2 provides the necessary elements for the description of the learning process so that learners can more readily focus on the actual task, the

reflection. For the last two requirements, *social guidance* and *feedback*, we rely on the strategies that the tutor employs when implementing the process portfolio method. These strategies need to be facilitated within the instructional setting as they are outside the realm of the semiformal description structure. Social guidance can be attained, for instance, by integrating partner and group work in the instructional setting. We have pointed out earlier, how important feedback is in applying this structure, and will provide further examples in the use case presented in the following section. Ideally, the description structure in Table 2 helps learners to pay closer attention to and then internalise the specific aspects of their own learning processes such as setting goals for activities and estimating their ability to successfully finish tasks under the given circumstances. This represents an essential brick for developing competence in lifelong learning.

Advantages of Use

One advantage that the structure offers is the overt separation of activities and resources. Having been accustomed to traditional learning environments focusing on knowledge transmission, the learners' focus may lie with the learning object¹⁵⁾ instead of the learning activity. The structure is thus an aid for reflecting the actual learning process in relation to the resources used in this process. Furthermore, the structure differentiates between the description of the learning process and the reflection thereof contained in the *Annotations* field (cp. Table 2). An advantage resulting from this is that descriptions can be shared with others (peers or tutors) or even transferred to a different type of ePortfolio without having to show the personal reflection. Without the use of the structure, the description and reflection parts are intermingled. Now, learners can make choices about what exactly to share. Last but not least, using the same structure to describe learning processes facilitates the visibility of longitudinal changes: the continuous style promotes comparisons between earlier and later descriptions. Differences and similarities are quickly identified and changes in perception regarding the engagement in learning activities as well as attainments of increasingly more sophisticated competences become apparent.

Use Case

Exemplarily taking one of the case studies presented by Healey & Jenkins (2007), we demonstrate the application of the herein described semiformal description structure as a scaffolding aid in process portfolio. In this example, the pre-service teacher students at the University at Otago, New Zealand, use ePortfolios to undertake authentic enquiry (Harland cited in Healey & Jenkins, 2007). The main focus of the ePortfolio is placed on the reflections on practise, namely the process rather than the outcome of learning. We may thus refer to this ePortfolio as a process portfolio. During the first stage of use, the ePortfolios were evaluated by the student and tutor in supervisory meetings, while the student decided what parts of the ePortfolio the tutor should actually see and comment on. During the second phase, no evaluations were made; the self-regulatory process is completely up to the learner.

As the students in the study requested more tutor assistance (Healey & Jenkins, 2007), our proposed description structure for learning processes (cp. Table 2) could have been used as an instructional aid to ease their ePortfolio use. For instance, two pre-service teachers pair up and together construct a description of a common learning process. They fill out the structure in Table 2 except for the *Annotations* field. In a second step, they individually write their thoughts and reflections about the previously described learning process.

¹⁵ The IEEE Learning Object Metadata Draft Standard (p. 6) defines a learning object as „any entity, digital or non-digital, that may be used for learning, education or training.“
http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf

In a different scenario for this use case, the tutor may choose to direct the learners' attention to a specific aspect of the structure. The tutor would thus use the setup of the language provided by the structure to shift foci in the reflection process. In a first phase, the pre-service teachers may then be directed to reflect on whether their perceived entry competences to a learning situation were adequate to successfully finish the learning tasks and achieve the learning goals, i.e. target competences. In a second phase, the pre-service teachers are then advised to specifically focus on the resources used in this learning process and whether the choice of resources was adequate for goal attainment or the preferences that each learner has.

No matter what strategy is being employed, however, the learners should always be allowed to choose whether they wish to use the structure. The structure is meant as an aid, which can be left aside or only used partially. Since the provision of scaffolding needs to be at just the right level so that learners are still challenged by the learning task, there is no use in providing excess scaffolding. The main goal is to support learners in writing a process portfolio; the level of support, however, is determined by the students.

Conclusion

In this article, we described process portfolio method in the light of several learning theories and the lifelong learning competence development. Self-regulation was pointed out as an important aspect in this regard. To promote an early adoption of process portfolio, we suggest using a semiformal description structure for learning processes as an instructional scaffolding aid. The structure serves as a modelling instrument, whereby modelling proves necessary in earlier developmental stages of self-regulation.

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A NEW LINKAGE FOR THE ASSESSMENT OF PRIOR LEARNING

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Abstract: Technology can help to develop new approaches for today's assessment practice. This contribution presents a project that concentrates on the use of electronic portfolios and Latent Semantic Analysis (LSA) to assess prior learning experiences of learners. After an introduction the assessment triangle is presented as a reference framework. The role of the electronic portfolio for prior learning assessment is identified. Latent Semantic Analysis is introduced as an innovative assessment technology. A report about a recently conducted case study at the Open University of the Netherlands follows. A problem discussion and research outlook rounds up the article.

Keywords: prior learning, assessment, latent semantic analysis, placement

Introduction

Although technology may have lead to educational innovations in some institutions most assessment practices of today are still the same as 10 years ago. Mc Donald, Boud, Francis & Gonzci (2006) argue that students can escape bad teaching but not bad assessment [1]. Assessment is always embedded into a social context and it influences behavior of students because it transports a message about what is appreciated in a given learning context and what is not. Sluijsmans, Prins & Martens (2006) point to the fact that current technology-enhanced assessment practice still focuses more on testing than assessment [2]. Additionally in most higher education institutions assessment is still done completely without the use of technology. This leads to a "bizzare practice" „where students use ICT tools such as word processors and graphic calculators as an integral part of learning, and are then restricted to paper and pencil when their "knowledge" is assessed" [3].

For the use of computers in testing and assessment different concepts like computer-assisted assessment (CAA) or eAssessment are used. Conole and Warburton (2005) present a review of computer-assisted assessment [4]. According to them computer-assisted assessment includes also optical mark reading to analyze paper-and-pencil tests and the use of portfolios to collect learning products. Computer-based assessment (CBA) is – according to them – the use of computers to "mark answers that were entered directly into a computer" and they differentiate between web-based, networked and standalone CBA. Ridway, McCuser & Peard (2006) conducted another literature review on e-assessment with a similar perspective. In conclusion they define an agenda for the future of technology-enhanced assessment that includes the assessment of metacognition, the analysis and assessment of cognitive processes and the support of reflection and critical thinking skills [3].

Apparently all of the above mentioned reviews of the field of technology-enhanced assessment do not mention several new approaches to analyze and score open responses or narrative text from learners. This paper introduces a new method and technique to assess students' prior learning through the use of electronic portfolios in combination with a content analysis technique called latent semantic analysis (LSA). In the next section we will provide context for our assessment approach and present an assessment framework. Next we introduce the electronic portfolio as an important technological advancement for assessment practice and define its role in prior learning assessment.

Third we introduce Latent Semantic Analysis as a method for prior learning assessment with (electronic) portfolios. Fourth we report about a case study we conducted in the framework of the European integrated project TENCompetence, and finally discuss preliminary results and give an outlook on future research.

New Linkages for Prior Learning Assessment

While traditional assessment is focused on the comparison of learners in competence based educational programs assessment judgements should be based on comparisons between individual performance and performance requirements set in a standard or learning target description. Competence-based assessment is not a traditional examination but a process in order to collect evidence about the performance and knowledge of a person with respect to such a competence standard. Joosten – ten Brinke et al. provide an overview about the traditional and new assessment methods and they point to the difference between performance assessment and competence assessment [5]. While performance assessment is focused only on an isolated part of a “performance” of a learner competence assessment is much broader and can include several test and assessment types like or self- assessment, peer-assessment or portfolio assessment. A competence assessment process can use several sources to judge about the competence level of learners. These sources can stem from tests, a monitoring of behaviour or documents that were written by the learner. In the literature authors often differentiate between formative and summative assessment. While formative assessment is given during learning as a kind of feedback summative assessment is more a judgment at the end of a performance mostly connected to grading. Many students think of summative assessment when it comes to assessment situations because this is the dominant practice in higher education institutions. But especially formative assessment is a powerful tool to support students to reach high-order skills [6].

No matter what kind of assessment is used every assessment situation consists of several elements. Pellegrino, Chudowski and Glaser (2001) have developed a framework for assessment called the ‘assessment triangle’. According to this framework any assessment consists of the following elements that should be made explicit.

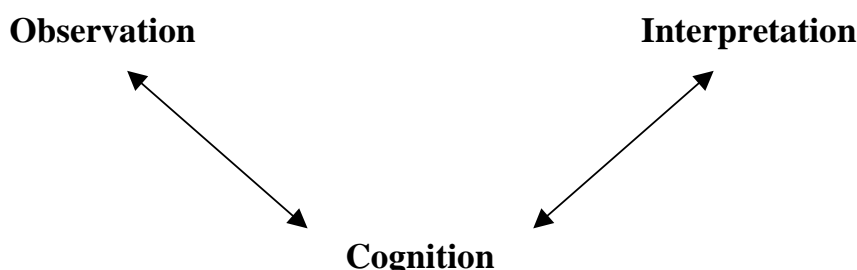


Fig. 1: The Assessment Triangle by Pellegrino, Chudowski and Glaser (2001)

Every assessment has an underlying model of cognition and cognitive growth in a domain. This model should be clear to assess and differentiate between low-level concepts and high-level concepts in a domain. The observation part consists of a “set of beliefs about the kinds of observations...that provide evidence of students’ competencies” [7]. These observations are based on tasks or a performance that demonstrates their knowledge or skills. The interpretation part is about making sense of this evidence. New assessment methods can provide new linkages between the aspects of this framework. In our project we focus on providing a new linkage from observation to interpretation for the assessment of prior learning. In some European countries and in Canada this issue is addressed by a procedure called APL/RPL (Accreditation/Recognition of Prior Learning) or PLAR (Prior Learning Assessment and

Recognition). PLAR is used in the admission phase of educational programs to assess possible prior learning experiences and to allow exemptions in the study program chosen [8]. The decisions for exemptions are based on prior output of learners. In a typical case the students send in material they have written in their former education or work context. Domain experts of the institution have to decide about possible exemptions after analyzing this material. The result of the time-and cost- intensive procedure is an individualized curriculum.

For technology-enhanced learning Nordeng, Lavik and Meloy reformulate this problem in the following way: “How can the students themselves be able to assess their position relative to a future learning environments consisting of a diverse set of learning activities from which learners somehow may take their pick? The learner’s history and goals define an entry position relative to the learning activities. A different entry position is likely to result in a different partition of the set of available activities in activities to skip and to complete” [9].

Later on we will present Latent Semantic Analysis as a new linkage for the assessment of prior learning as introduced in [10]. But first we will discuss the role of the electronic portfolio in assessment and accreditation of prior learning.

ePortfolios in APL

The implementation and use of electronic portfolios (eportfolios) has been recently discussed intensively although the targets of the electronic portfolio roadmap to equip every citizen of Europe with an ePortfolio until 2010 were too courageous. Baker (2006) states that “the word “ePortfolio” has almost become a code word for a variety of important concepts ... an ePortfolio can be one of many different things depending on audience perspective and purpose” [11]. We see electronic portfolios as digital collections of what a person has learned or produced over time. This includes the products as well as the process to these products.

Reformative educationalists like Freinet introduced the use of portfolios in his classrooms already in the 1920ies of the last century. Although the technical progress has changed tremendously since then the targets for using portfolios in education have stayed nearly the same. Documentation and self- reflection of the learning process are the main reasons to use portfolios in learning and competence development [12].

Electronic portfolios can serve several roles in competence development. Smith and Tillema [13,14] introduce different types of portfolios to clarify the many interpretations of this instrument: The dossier portfolio, the training portfolio, the reflective portfolio and the personal development portfolio. A dossier portfolio is a collection of performance proofs for entry to a profession or programme. A training portfolio is an exhibit of learning during a programme, which focuses on products or competencies build from the time the learners participate in the programme. A reflective portfolio is a composed collection of evidence of a specific competence requirement consisting of best-practices in combination with a self-appraisal. A personal development portfolio is a documentation of professional growth of an individual over a longer time that might also include discussions with peers with similar interest.

Although all types of electronic portfolios are important for the lifelong learning perspective for our focus the dossier-type electronic portfolio is the most important one. In the process of prior learning assessment the electronic portfolio is at the same time a means and an outcome of the assessment situation. Barker points to the conjunction between (electronic) portfolios and prior learning assessment. The PLAR procedure is often the starting point for an electronic portfolio. Learners pick products from their prior education and enrich them with additional more structured information. But the authors see much more potential for the use of electronic portfolios if they are used continuously: “The idea of developing an ELR in advance of choosing a training option or seeking career advancement is not unconventional, however, it is made more by the application of assessment techniques and principles inherent in good PLAR prior to choosing a training option or seeking career advancement, to help make those

decisions, rather than *after* making decisions and seeking, e.g., advanced placement in a course or program” [15].

The electronic portfolio can serve indeed as a good tool to support these advanced placements decisions. But the electronic portfolio alone is not enough because it can only help to support the observation part of the above presented framework because it offers learners a place for documentation and reflection. To provide computer-support also in the assessment linkage between observation and interpretation we introduce Latent Semantic Analysis in the next part of the paper as a method to assess the prior learning of students and to support these placement decisions.

Latent Semantic Analysis for Technology-Enhanced Assessment

Latent Semantic Analysis (LSA), in the past sometimes referred to as Latent Semantic Indexing (LSI), is a theory and method for extracting and representing the contextual-usage meaning of words by statistical computations (16). It provides a method to calculate the similarity of text or parts of textual information. The whole process of this analysis consists of several steps like the pre-processing of the text, some weighting and normalizing mechanisms, the construction of a term-document matrix and a mathematical function called singular-value decomposition (SVD), which is similar to factor-analysis. The end result of this process is a latent semantic space, in which the main concepts (or types) of the input are represented as vectors. Concepts in this space are similar if they appeared in the same context and so their vectors are close together in the space providing a measurement for the similarity of text. LSA is applied in several research fields like informatics, psychology or medicine.

For technology-enhanced learning the application of Latent Semantic Analysis can help to solve some basic problems like increased tutor load or formative feedback during learning. Since LSA is only a general “theory of meaning” as one of the inventors of the technique, Tom Landauer, stated it recently, there are several applications of LSA in technology-enhanced learning [17,18]. The most prominent example for the use of LSA in an educational environment is the assessment and feedback of free text in intelligent tutoring systems. Some examples of these applications are the Intelligent Essay Assessor (19), Summary Street (20) and Select-a-Kibitzer (21) to mention only a few. Some researchers have used LSA to provide students with text that is appropriate to their current knowledge [22,23].

Our application of LSA is similar but has a different motivation and context. In the framework of the European Integrated project TENCompetence we are currently aiming at the development of an infrastructure for lifelong competence development [24]. We are using LSA to assess prior knowledge of learners for placement or positioning decisions and finally the construction of personalized learning paths through a learning network. The result of these analyses should be taken into account for the creation of a personalized learning path. Some learning activities on the way to the target competencies a learner wants to achieve may be exempted because of the results of this prior learning analysis. In the next part of the paper we present a case study about this application of Latent Semantic Analysis.

Prior Learning Assessment Case Study

To test our model and the usefulness of LSA for prior learning we conducted a case study in an introductory psychology course at the Open University of the Netherlands. The course was an online course consisting of 18 learning activities based on a textbook. Every chapter covers a subtopic of the psychology domain. Students were asked in advance to build a dossier-type portfolio of products they produced in their past education or work context. Since we could not expect that students knew exactly which topics would be presented in the chapters they have

been asked again after every learning activity, how much of the presented material was new for them.

We used Latent Semantic Analysis to analyze the similarity between the students' documents and the content in the learning activities of the course. The basic corpus to build the semantic space consisted of other psychology books, texts from the Dutch Wikipedia and the content of the course. All student documents were "projected" into this latent semantic space and we calculated the cosine similarity measure between the student's documents and the learning activities of the course.

Depending on the policies of the current environment the learners could get exemptions for learning activities with high similarity measure. To evaluate these results we are currently conducting an expert validation. Domain experts were asked to rate the similarity of documents and to decide about exemptions based on this similarity. Another measure we are interested in is the time that experts spend to come to a decision because one of our main reasons to research technology-enhanced assessment for prior learning is the increase of the efficiency of today's assessment practice.

Preliminary results

The results of the analysis are promising. A first inspection of the results shows us that the similarity measurement that are produced by the system can differentiate between learners who sent in different material and between the learning activities and chapters. While the material of some students who sent in non-scientific psychological content produced very low values a bachelor thesis in psychology that has been collected from a colleague produced high values to the learning activities that show a topical similarity to the thesis. Table one shows a (cosine) similarity measure table between learning activities and documents in an electronic portfolio. While some documents in this portfolio show low values there are several very high results.

Table 1. Cosine similarity measure matrix as a result from LSA analysis of eportfolios/course content

Learning Activity/Student Documents	Learner Document 1	Learner Document 2	Learner Document 3	Learner Document 4	Learner Document 5	Learner Document 6
Learning Activity 1	0.34	0.38	0.44	0.51	0.78	0.73
Learning Activity 2	0.26	0.31	0.28	0.35	0.81	0.51
Learning Activity 3	0.24	0.41	0.20	0.29	0.64	0.52
Learning Activity 4	0.33	0.46	0.23	0.29	0.53	0.49
Learning Activity 5	0.94	0.90	0.24	0.39	0.62	0.89
Learning Activity 6	0.26	0.50	0.30	0.53	0.48	0.42
Learning Activity 7	0.51	0.28	0.89	0.33	0.24	0.55

In the TENCompetence project a so called "positioning service" delivers these results to a navigation service so that learning activities with a very high correlation can be exempted for the recommendation of the next best learning activity and in the future for the construction of a personalized learning path. Another possible application is the support of the traditional PLAR procedure. LSA can support the domain experts to analyze student's material. In the next part of

the paper we discuss some limitations of the presented approach and give an outlook on future research.

Discussion and Outlook

Although the results of the presented approach are encouraging we have to keep in mind that an assessment situation has more elements according to the framework presented above. While we provide here a new linkage between the observation and interpretation part the results of the analysis still need interpretation. In addition, it has to be clear which model of cognitive growth is the basis for the assessment. Especially in domains where a high level performance cannot be measured through textual expression the presented approach will not be of much help.

But there are more limitations of the presented approach. Some limitations are connected to the use of electronic portfolios in general and some limitations stem from the use of Latent Semantic Analysis to analyze prior learning.

A general problem of electronic portfolios – especially in the context of lifelong learning – is an issue like portability of the electronic portfolio as a whole and the collected artefacts [25]. Since there are several technical standards like the IMS ePortfolio standard [26] or the IMS LIP [27] we believe that this problem is merely an implementation and development issue. Every electronic portfolio system should be based on such standards to guarantee the portability. Another more general issue of the use of electronic portfolios is the validation and verification of evidence submitted. Especially in times where plagiarism in higher education is increasing the origin of artefacts is an important issue that involves also ethical implications and trust issues [28]. Is the presented work really done by the owner of the portfolio?

Other issues stem from the use of Latent Semantic Analysis. LSA results depend on several corpus factors and pre-processing procedures that cannot be described here into detail. An important issue for successful analysis is the size of the basic corpus that is used as a query basis for the Latent Semantic Space. In the future we will address this issue to collect experiences about the trade-off between the size of the corpus and the reliability of the results of LSA for prior learning assessment. Another disadvantage of using LSA for assessment is the limitation to highly textual domains. Competence assessment that takes into account a physical performance cannot be analyzed with the presented method. In addition LSA can only find a similarity when the concepts used by the learners are represented in the semantic space. But there are several special presentation types (forms, descriptions of experimental designs etc.) that show an inherent higher prior learning than the purely textual content can show. In this case domain experts can deduct this but LSA cannot. A real advantage of using LSA for prior learning assessment is that students do not have to think about the design of their portfolios because it is only based on textual information and it does not rely on the format, structure or design.

While we concentrate currently only on the exemption application of the results there are several other possibilities to make use of them. One possibility is the identification of suited peer tutors for learning activities who can help other learners with lower experiences and knowledge. Another option for using a prior learning analysis is the topic of open educational resources. The described method can be applied to identify resources which are in the ‘range of interest’ of the learner meaning that prior knowledge can be identified but not on a very high level so that there is still a probability that the learners might like the resource [29].

While we worked with dossier portfolios at this time, for lifelong learning the personal development portfolio has several implications for a prior learning assessment that does not only take into account products of prior learning but also the reflection about these products. A really continuously updated electronic portfolio could help the learner not only on a course level but for the lifelong learning perspective without the need to collect material every time when entering a new educational context again.

we are dealing in this project only with a content-based approach to analyze prior learning of learners. In the future we will address also more structured data like metadata and ontologies for prior learning assessment [30].

Acknowledgement

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MEDIATION EFFECTS OF SUBJECTIVE VARIABLES: CRITICAL ASPECTS IN AN E-PORTFOLIO IMPLEMENTATION

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Abstract: The paper describes a preliminary analysis of an e-Portfolio's implementation among a students' small target group. This e-Portfolio's System (prototype version) has been developed at Giunti Labs and customised at University of Bologna as part of a common project named Alma Two (Adaptive Learning Management Assets for Advanced Learning Methodology-driven Architecture). The theoretical framework of our analysis focused the Technology Acceptance Model (TAM), developed by Davis (1989) and extended by other researchers (Venkatesh & Davis, 2000; Venkatesh et al., 2003). The TAM postulated that the acceptance of new technology is influenced by the perceived usefulness and the perceived easy of use.

Keywords: technology acceptance, attitude toward use, perceived usefulness

Objective and hypothesis

The main goal of this study is to analyse an e-Portfolio's implementation by considering the effects of different psychosocial constructs as: perceived usefulness, perceived ease of use, attitude toward use, use behavioural intentions and actual use in the course of pre and post-implementation. In general we expected a relevant influencing role of attitude toward use and behavioural intention on actual use. We precisely expected that:

- the attitude toward use mediates the effects of perceived usefulness on behavioural intention, (Hp1),
- the attitude toward use mediates the effects of the ease of use on behavioural intention (Hp2),
- the behavioural intention of use mediates the effects of attitude on actual use (Hp3),
- the behavioural intention of use mediates the effects of perceived usefulness on actual use (Hp4),
- finally, by considering various usability problems during the starting period of implementation and the brief length of the experiment we didn't expect significant differences between T1 and T2 (Hp 5).

Method and procedure

We used a repeated measures experimental design (pre- post) within subjects. Participants received an anonymous identification code to allow their acknowledgment between T1 and T2. The implementation had a length of 36 days and in the middle of this period a meeting to check usability difficulties was organized. A self-report questionnaire was administered before (T1) and after (T2) the e-Portfolio implementation. Scales adapted from different versions of TAM (Davis, 1989; Malhotra & Galletta, 1999) were used to measure dependent variables as: perceived usefulness, defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989; p. 320); perceived ease of use, defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989; p. 320); the behavioural intention of use defined as the degree to which a person intends to perform a specific behaviour (Davis et al., 1989); the attitude toward use defined as "the degree of evaluative affect that an individual associates with using the target system in his or her job" (Ajzen & Fishbein, 1977), finally the actual use, the user's behaviour performed.

Subjects

36 students (75% females; mean age = 26) of the first year of master degree in Organizational Psychology were involved in the implementation as naïve users of the e-portfolio system. Their participation was not on a voluntary basis; in fact the students attended the Workshop about e-Portfolio, as compulsory task of their academic curricular plan.

Main results

The perceived Ease of Use scale obtained a Cronbach alpha reliability of .87 at T1 (before implementation) and .85 at T2 (after implementation). The Perceived Usefulness scale obtained a Cronbach alpha of .90 at T1 and .94 at T2. The Behavioural Intention scale obtained a Cronbach alpha of .92 at T1 and .98 at T2. The Attitude toward Use scale obtained a Cronbach alpha of .84 at T1 and .92 at T2. With reference to Actual Use scale (Cronbach alpha = .63), we had reduced to two items because the intercorrelation with the other scale's items was not good.

For the mediation analysis the role of each of the mediators were assessed independently, as well as simultaneously. The pre-implementation data didn't show mediation effects, but post-implementation results seemed most informative. With reference to Hp1 (Table 1), the first step of the regression analysis showed that perceived usefulness significantly affected on the behavioural intention of use ($\beta = .72$, $p < 0.001$). Secondly, the regression analysis showed that perceived usefulness significantly affected on the attitude toward use ($\beta = .83$, $p < 0.001$). Thirdly, the regression analysis showed that the attitude toward use mediates the effects of perceived usefulness on the behavioural intention ($\beta = .81$, $p < 0.001$). When the attitude toward use was entered as mediator between perceived usefulness and behavioural intention, the direct effect of usefulness on the behavioural intention became not-significant ($\beta = .05$, $p = .79$).

With reference to Hp2 (Table 2), we expected that the attitude toward use mediates the effects of ease of use on behavioural intention. The first step of the regression analysis showed that the perceived ease of use significantly affected on the behavioural intention of use ($\beta = .36$, $p < 0.05$). Secondly, the regression analysis showed that perceived ease of use significantly affected on the attitude toward use ($\beta = .47$, $p < 0.01$). Thirdly, the regression analysis showed that the attitude toward use mediates the effects of perceived ease of use on the behavioural intention ($\beta = .87$, $p < 0.001$). When the attitude toward use was entered as mediator between the perceived ease of use and the behavioural intention, the direct effect of ease of use on behavioural intention became not-significant ($\beta = -.04$, $p = .73$).

With reference to Hp3 (Table 3), we expected that the behavioural intention of use mediates the effects of attitude on actual use. The first step of the regression analysis showed that the attitude significantly affected on the actual use ($\beta = .33$, $p = 0.05$). Secondly, the regression analysis showed that the attitude significantly affected on the behavioural intention of use ($\beta = .85$, $p < 0.001$). Thirdly, the regression analysis showed that the behavioural intention of use mediates the effects of the attitude on the actual use ($\beta = .82$, $p < 0.01$). When the behavioural intention of use was entered as mediator between the attitude and the actual use, the direct effect of attitude on actual use became not-significant ($\beta = -.34$, $p = .22$).

With reference to Hp4 (Table 4), we expected that the behavioural intention of use mediates the effects of perceived usefulness on actual use. The first step of the regression analysis showed that the perceived usefulness significantly affected on the actual use ($\beta = .47$, $p = 0.01$). Secondly, the regression analysis showed that the perceived usefulness significantly affected on the behavioural intention of use ($\beta = .72$, $p < 0.001$). Thirdly, the regression analysis showed that the behavioural intention of use mediates the effects of the perceived usefulness on actual use ($\beta = .46$, $p < 0.05$). When the behavioural intention of use was entered as mediator between

the perceived usefulness and actual use, the direct effect of the perceived usefulness on the actual use became non-significant ($\beta = .16$, $p = .43$).

Therefore, each hypothesis shows that the mediator accounts completely a relation between the predictor and the outcome, consistent with a complete mediation model. With reference to Hp5, by considering various usability problems during the starting phase of implementation we expected not significant differences between T1 and T2. The results of an analysis of variance with repeated measures (pre and post) within subjects showed that all means of variables decreased after implementation (Table 5). Then Hp5 was not confirmed.

Discussion and Conclusion

The main goals of our study were: 1) to test mediation effects of psychosocial factors on using e-Portfolio, 2) to evaluate the differences between T1 and T2 on the level of the psychosocial dependent variables by taking into account also various usability problems during this brief period of implementation. All the specific hypothesis related to the first goal were confirmed. In particular, the mediation effects showed a critical role of attitude and behavioural intention. Then we can say that different kinds of attitudes influence the actual use of e-portfolio. But the hypothesis related to the second goal were not confirmed. In fact, while we didn't expect differences between T1 and T2, the implementation produced not only changes in attitudes but they were also in an unexpected direction. Probably the usability problems had a critical decreasing role on the technological acceptance of our students who, as naïve users, had a lot of problems in learning the basic procedures to use the e-portfolio. Moreover, the facts that the course had ePortfolios as its subject and that problems of usability have been moderated half-way, might restrict the possibilities to generalize the research results. By considering these results it is possible to conclude that the psychosocial factors play a role in activating learning. Therefore, focusing on motivational and technical training activities might represent an important pre-condition to make most effective the implementation and to overcome the usability problems of naïve users. In fact, it would be appropriate to reflect on both motivational aspects and learning time, therefore the eventual possibility to embed a period of a intensive technical training about storage and classification of contents to improve the technological acceptance of our students.

Tables

Table 1. Mediatlional analysis of the perceived usefulness effects on behavioural intention by the attitude toward use.

Variable	<u>Behavioural Intention</u>	<u>Attitude toward Use</u>	<u>Behavioural Intention</u>
Perceived Usefulness	.72***		
Perceived Usefulness		.83***	
Perceived Usefulness			.05
Attitude toward Use			.81***
	$R^2 = .51$	$R^2 = .70$	$R^2 = .72$
	$R^2 = .50$	$R^2 = .69$	$R^2 = .70$
	$F = 33.85; p < 0,001$	$F = 73.33; p < 0,001$	$F = 39.62; p < 0,001$

Table 2. Mediation analysis of the ease of use effects on behavioural intention by the attitude toward use.

Variable	<u>Behavioural Intention</u>	<u>Attitude toward Use</u>	<u>Behavioural Intention</u>
Ease of Use	.36*		
Ease of Use		.47**	
Ease of Use			-.04
Attitude toward Use			.87***
	$R^2 = .13$	$R^2 = .22$	$R^2 = .73$
	$R^2 = .10$	$R^2 = .20$	$R^2 = .71$
	$F = 4.75; p < 0.05$	$F = 73.33; p < 0.01$	$F = 41.22; p < 0.001$

Table 3. Mediation analysis of the attitude toward use effects on actual use by behavioural intention.

Variable	<u>Actual Use</u>	<u>Behavioural Intention</u>	<u>Actual Use</u>
Attitude toward Use	.33*		
Attitude toward Use		.85***	
Attitude toward Use			-.34
Behavioural Intention			.82**
	$R^2 = .11$	$R^2 = .73$	$R^2 = .32$
	$R^2 = .08$	$R^2 = .72$	$R^2 = .28$
	$F = 3.90; p < 0.05$	$F = 84.63; p < 0.001$	$F = 7.07; p < 0.01$

Table 4. Mediation analysis of the perceived usefulness effects on actual use by the behavioural intention.

Variable	<u>Actual Use</u>	<u>Behavioural Intention</u>	<u>Actual Use</u>
Perceived Usefulness	.47**		
Perceived Usefulness		.72***	
Perceived Usefulness			.16
Behavioural Intention			.46*
	$R^2 = .22$	$R^2 = .51$	$R^2 = .33$
	$R^2 = .20$	$R^2 = .50$	$R^2 = .29$
	$F = 9.06; p < 0.01$	$F = 33.85; p < 0.001$	$F = 7.62; p < 0.01$

Table 5. Analysis of variance with repeated measures (pre and apost) within subjects.

Variable	<u>Pre-Implementation (T1)</u>		<u>Post-Implementation (T2)</u>		<u>ANOVA</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>F</u> (34)	<u>2</u>
Ease of Use	4.34	1.16	4.06	1.27	1.58	.043
Perceived Usefulness	4.56	1.06	3.88	1.37	8*	.20
Behavioural Intention	5.72	1.02	4.96	1.58	9.42*	.22
Attitude toward Use	5.45	.60	4.96	.86	14***	.29

* $p < .05$. *** $p < .001$.

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THE E-PORTFOLIO IN A PROFESSIONAL TRAINING SCHEME: WHAT IS AT STAKE AND THE LIMITS OF THE SCHEME

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Abstract: On the occasion of the first international francophone conference on the e-portfolio in Quebec, (Trestini, 2006), we presented a e-portfolio which was conceived with the aim to facilitate the acquisition and the validation of skills for the C2i2e, a computer and internet certificate required for teacher trainees in all the IUFMs (French Institutes for teacher training) of France. Now that the IUFMs are going to be integrated into the university, a new national law (Dec. 28, 2006) stipulates that this program must enable the students to acquire adequate knowledge in ten professional skills areas. If one acquires the C2i2e, this in itself attests to the fact that one has gained knowledge in one of the areas (law of May 9, 2007). Our e-portfolio, which was up until now used solely for the C2i2e, could now be used to obtain the remaining nine professional skills. However, before setting out on this “adventure”, it would be wise to draw conclusions from our experiments in order to define the general conditions for using this artefact with the whole of the training program. The aim of this article is precisely to draw conclusions about the feasibility of applying this to the whole of the program.

Keywords: e-portfolio, teacher training, constructivist learning environment

1. Problematic emerging from an institutional context

In France, while the teacher training program is integrating the university because of a new law (*cahier des charges de la formation des maîtres en IUFM*: 19/12/2006) concerning professional skills, the modalities of the training program must once again be reconsidered and redone. To get training in this profession will consist in acquiring a series of “formalized skills” via the employer (In this case, the government). Now one must justify the knowledge and skills one has gained and then have these skills recognized by the state. The idea of a skill is nevertheless not new in the area of professional training, but no one can deny the fact that the contents of a course can vary from one situation to another. The radical use of the system modifies the balance of the representations of this notion and makes the people responsible for the training rethink their course plans in order to adhere to the ministerial law. The stance that is generally taken is to avoid following the laws too closely but instead to apply the notion because of its usefulness and practicality. It would be awkward and in vain to follow the laws so closely that one is stuck in a bipolar scenario which opposes modular training to a skill-based training program. Traditional modular training leads the learner to get involved in diverse activities which are usually conducive to gaining skills. Therefore, we can ask ourselves what changes can be brought to our current training programs in order to conform to the new institutional choices.

The first idea that comes to mind would be to propose activities or tasks that are regrouped in units or modules of training and which lead to the construction of a group of skills among the ones cited in the national referential. In that case, one must make sure that the whole of the activities that are offered enable the acquisition of all the required competences. This approach would also have the advantage of facilitating the evaluation and validation of competences since the approach would be based on the training program that is recommended and known.

The second idea that comes to mind would be to ask the teacher to identify in the referential the professional competences that he or she has already gained and to identify the ones that he or she needs to acquire. The teacher would then freely plan out a training scheme which aims at gaining the skills that are required. At the same time the student would look for situations in which he or she could be evaluated and prove the mastery of certain required skills. The elaboration of a personal plan, in our opinion, has at least two advantages:

Firstly, it would prevent the teachers in training from sitting through training programs that they don't need and that are not very useful to them. Why should one ask a teacher to work on getting the skills that he or she already has? In this sense, the new way of training facilitates what we call validation of skills and experience. This is allowed as long as the training program allows for the attainment of skills, evaluations and validation of skills and experience (VAE). The validation of skills is made possible when the training scheme has separate contexts for acquisition and separate contexts for evaluation.

Therefore, any competence that one judges acquired should be observed and validated by a person who is entitled to do so, in a context that is easily observable. For example, during a class animated by a teacher in training, the master trainer (titled teacher present in the class) would be allowed to attest to a skill that is observable on that specific occasion. Note that, unlike the preceding approach, this one is different from the tradition of immediately following up the training up with a test. Once again, in this particular case, the situations of training and of testing must be different.

Furthermore, this approach brings on the construction of meta-cognitive skills that all the specialists consider essential: in particular, when the teacher has a long career: realizing a need for training, the ability to analyse one's teaching, the ability to be up to date in one's training and to set up training programs throughout one's career.

We must note that according to the second approach, using a numerical portfolio would be useful: It is this hypothesis that we formulate. Firstly, it would encourage the owners of the portfolios to reflect on the links between objectives they decided on previously and the realization of these objectives. This reflection is supported when one moves on to the written phase of the telling of a personal story, revealing to the teller, his strong points and his weaknesses. Furthermore, with the complexity of the recommended path, this tool would help organize by incorporating everything into one collection of numerical information which describes and illustrates the person's learning, his experience, his failures and his successes. It enables one to better know what he has achieved and to have his knowledge recognized on an institutional or professional level. In our case:

- It gives the teacher trainee the possibility of creating a document which logs the development of his work,
- It allows the teacher trainee to analyse his/her learning, his/her strong points and weaknesses in order to confirm or correct his/her knowledge and know-how,
- It makes teacher trainee responsible and it encourages autonomy,
- It enables the teacher trainee to quickly and easily visualize his/her work,
- It allows one to assess one's achievement at will and at any time,
- It enables the teacher trainee to keep his/her work,
- It offers virtual spaces where other trainees can give input, contribute and explore other areas of competence.

Keeping in mind all this and to avoid blindly creating a training scheme, without knowing the consequences, it would be best to keep in mind past experiences. Luckily, in the past at the IUFM there *has* been training based on skills (teacher training school). In fact, in a more structured way since 2006, the teacher trainees must acquire 27 competences concerning the mastery of information technology and communication for teaching with the goal of obtaining a certificate which proves computer literacy for teachers (BO n°33 from 14 September 2006). This way of getting training (according to your needs) already exists and gives the people who are responsible for this type of training useful information. This was especially true for the IUFM (teacher training school) of Alsace which chose to start this type of training according to one's competence. The IUFM chose the second strategy that was described earlier; in other words, letting the trainees choose the courses that they felt they needed. To facilitate the

construction and the evolution of this scheme, the teacher trainee was given an e-Portfolio that was accessible via his numeric work environment (ENT).

While we carefully avoided mechanically applying the knowledge gained through the C2i2e to the larger scheme of skills, we nevertheless wanted to find indications that would help us to realize such a project. The results of our experiments, which we will give here, have no other goal than to evaluate the efficiency of the procedure that we chose and to let us know if such a procedure could be transferable to a larger project—a project that would meet our requirements.

In the next paragraph we describe the procedure that we used, then in paragraph 3 we describe the tools we used. Section 4 explores the questions that we asked ourselves and the answers that we obtained based on the experiments we conducted. To conclude, we evaluate what is at stake, the limits of the strategy we chose and the pertinence of applying it to a general training scheme.

2. Description of the approach

At the start of the academic year 2006, the institution of the C2i (a test that proves one has a minimum knowledge in computer science) brought up the question of whether the 27 required skills of the training program could be covered and validated. Normally, the training program is given to 515 teacher trainees teaching in more than 150 different junior highs and high schools. Moreover, it is also followed by hundreds of teachers and teacher trainees from elementary schools. This represents approximately 30,000 validations to deal with; a real challenge (Cf. ePortfolio Québec 2006, Trestini, 2006). Another challenge to keep in mind is the fact that we must validate experience (VAE). Actually, several teacher trainees come to the IUFM with a large number of skills that they gained in other contexts than courses for teachers. They could have gained their skills at the university, in the professional world or on a personal level. Therefore, we offered (not imposed) a list of possible contexts in which they could gain, perfect and validate their qualifications (Figure 1).

Each teacher trainee had to introduce himself/herself, identify the skills that he or she had already obtained as well as ones that they needed to acquire and finally to describe a training program that they could organise; all of this had to be included in a numeric portfolio to which they had access. A reference teacher was there to help and guide them. With him, several ways of regrouping skills were investigated and criss-crossed with the different disciplinary contents, transversal or “adisciplinary”. In this context, each teacher trainee was able to define the activities to do, the skills required and the means of evaluating them.

3. The e-portfolio

There are several types of e-portfolio (for presentations, for learning, for evaluation, etc.); each one has its own specific use which corresponds to a particular need. But the need for training is vast and it is not uncommon for several to be used simultaneously. This is exactly what we chose to do. The teacher trainee was given a presentation portfolio, a learning portfolio, and a skills validation portfolio.

CONTEXTS OF ACQUISITION																											
	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.2.1	A.2.2	A.2.3	A.3.1	A.3.2	A.3.3	A.3.4	B.1.1	B.1.2	B.1.3	B.2.1	B.2.2	B.2.3	B.2.4	B.3.1	B.3.2	B.3.3	B.3.4	B.3.5	B.4.1	B.4.2	B.4.3
Information Technologies Unit	X	X	X	X	X	X				X	X	X	X	X	X										X	X	
Preparation of training programs							X	X							X	X	X	X	X								
In-class training (Teaching a class)																				X	X	X	X	X			
Professional memoire							X																				
Core course Units						X	X	X					X	X	X	X	X	X	X	X	X	X					X
Specialty					X		X		X	X	X		X	X	X	X	X	X									
Workshops		X			X		X		X	X	X	X	X			X			X						X		

CONTEXTS OF VALIDATION																												
	A.1.1	A.1.2	A.1.3	A.1.4	A.1.5	A.2.1	A.2.2	A.2.3	A.3.1	A.3.2	A.3.3	A.3.4	B.1.1	B.1.2	B.1.3	B.2.1	B.2.2	B.2.3	B.2.4	B.3.1	B.3.2	B.3.3	B.3.4	B.3.5	B.4.1	B.4.2	B.4.3	
Information Technologies Unit	X	X	X	X		X			technological rules.				technological rules.	X	X	X												
Preparation of training programs																												
In-class training (Teaching a class)					X						X	X			X	X		X	X	X	X	X	X	X	X	X	X	X
Professional memoire					X	X	X	X			X	X			X	X		X	X	X	X							
Core course Units														X	X	X												
Specialty							X																					
Workshops																												

Diverse situations and combinations are possible and these will vary depending on which courses the students chose. The courses that are mandatory are grey..

Fig. 1 : Contextes d'acquisition et de validation proposés

3.1. Presentation portfolio

In this space the teacher trainee introduces himself, his training, what he knows, what he needs and wants and his goals. While the teacher trainee is introducing himself, he is also getting to know himself through the process of telling his story to others and hearing himself tell his story. The work of Baker (2000) shows the usefulness of asking learners to share their story, in other words, the usefulness of making and sharing a story.

3.2. Learning portfolio

The learning portfolio is incorporated into a larger digital environment; a long distance collaborative environment: Univ'-Rct (ct means collaborative training). Diverse tools are proposed to help with collaboration: an agenda, a space where one can submit documents (these can be commented on thanks to the forums that are attached), electronic mail, chats. Recording real time discussions is possible in the space called "causerie" (chatting). It enables one to receive feedback on exchanges that happen on specified dates. There are many "places" where one can "drop off" documents. These places have features (spacial metaphors) which are unique to the virtual environment. For example, the trainee has a file in his own office that only he/she

can consult. The trainee can also “drop off” documents in the “virtual seminary” to which he or she has signed up, either in the orange basket (only accessible by the trainee and the teacher-tutor), or in a red file (accessible to everyone involved in the seminary), or in the teacher’s room, etc. It is the trainee that decides who will have access to his or her work and who he or she wants to communicate with.

From a pedagogical point of view, these places are favourable to learning within the communities that the trainee chooses. By “community” we mean the whole of the trainees and /or teacher tutors that interact, that communicate and that exchange ideas either because of the training program or for personal reasons (there is also a community centre in this virtual environment). The exchanges that take place in these virtual environments contribute to the personal and professional development of the trainees.

The trainee is put in a context of collaborative learning, of mutual support, of sharing work methods and of observing in pairs. “In order to make the group progress, the learner must try the work methods that are proposed by the others or to propose methods himself”. The learner is confronted with other people’s representations (preconceived ideas) and through this confrontation can make his own ideas evolve. Not only does he become active, but he is also plays an active part in the learning process¹⁶.

3.3. Validation and evaluation portfolio

Even if the hypothesis is theoretically debatable from a pedagogical point of view, it did not seem realistic to radically separate the functions of accompaniment and of evaluating. The “reference teacher” participates in the evaluation of the teacher trainee that he is accompanying, but he is not the only person to have a say in the evaluation. We decided that it was necessary, in order to guarantee an unbiased view, to assign the job of evaluating (at least partially) to pluri-disciplinary teams supporting the reference teacher.

Validation (a stage which is different from evaluation) occurs on line, at the request of the teacher trainee on an individual basis. The request is given to a reference teacher that is responsible for a group of approximately 30 teacher trainees. This request for validation is accompanied by a rough description of the evaluation context and the name of the teacher who can attest to the attainment of the required skill(s). It is the trainee that must take the initiative to do this. The trainee must also do an “auto-evaluation”. The trainee decides freely if he has obtained the required skills and validates his skills when he considers it best. The evaluation is decided by the trainee whereas the validation of a skill is decided by the reference teacher. The reference teacher has all the necessary data to validate the skill(s) and completes the file of the trainee on line.

In order to satisfy these requirements and to facilitate the validation of 30,000 skills, without the need to meet all the teachers, we used a computer application which was integrated into the e-portfolio of the evaluation. This ensured flexibility (the evaluation was ongoing all day long), dependability and functionality: three indispensable criteria. In the following sections, we will describe how it works.

3.3.1 On the teacher trainee’s level

The teacher trainee accesses the menu through the numeric space of work (ENT) of the IUFM. The menu proposed an assessment which stated the following:

- The code and the title of each skill,
- The number of skills being acquired at the moment,
- The number of requested validations of skills,

¹⁶ Taken from the presentation of the platform Acolad which was renamed Univ’R-ct: <http://acolad.u-strasbg.fr/>

- The number of validated skills,
- The number of skills that were not validated (refusal).

For each skill that was validated or refused, the date of the validation or the refusal appears in the validation space as well as the name of the teacher that was validating.

The menu enables the trainee to ask for the validation of one or of several skills simply by clicking on a button. In this case, an email is sent to the C2i reference teachers. They receive the references of the trainee, the code and title of the skill that the trainee wants validated and a link that allows direct access to validate the skill.

3.3.2. On the IUFM teacher's level

The teacher can access an application menu by ENT. This menu shows all the requests for skills validation all the requests for trainee validations, and the C2i log of level 2 "teacher" (C2i2e) that the trainee chose, etc. The teacher can consult and validate the requests for validation or consult or validate a skill or a group of skills. Validation is given (or not) keeping in mind the comments of the teacher trainees (who justify the attainment of the skill and who put the request in context).

3.3.3. Consultation, validation or requests for validation by a user

In the first case, the teacher can get a list of all the trainees, a list of those who do not have a validation for the C2i2e, the names of the trainees that asked for a validation of one or several skills, etc. If the teacher decides to consult, validate or refuse the skills of a user, he clicks on his name and checks off the skills that he wishes to refuse or validate. An email is then sent to the trainee. The information bubble gives the title of each skill and the colour of each of them is indicated to the teacher whether this skill is still required, validated or refused. Finally, the teacher can send a request for validation of skills to another teacher. In this case, he chooses the teacher and makes the request.

3.3.4. Consultation, validation or request for validation for a group of skills

In the second case, where the teacher decides to consult or validate a request for validation of a group of skills, he must check the boxes of the skills to be considered (Cf. Figure 5).

Three lists appear after clicking on the button "process" (Cf. Figure 6). First, a list of the users that have requested a validation of required skills. Next to it, the list of users having at least one skill not validated among the required skills. Finally, in the third column there is a list made up of all the users that validated the group of required skills. The teacher can then validate the skills by selecting the users and clicking on the "validate" button.

Once again, the teacher can decide to send a trainee's request for validation of skills to another teacher. He must then select the users, click on the button "validate" to choose the teacher and click on the button "request".

4. The first results of the experiment

In June 2007, all the teacher trainees of the academy of Strasbourg were asked to fill out a survey in order to find out how they envisioned the experiment (pilot program) and how useful they found it was to use the numerical portfolio in this context. In order to avoid receiving *only* the results of the most motivated trainees, the survey was made obligatory. Three training sites were involved; Strasbourg (8 groups), Colmar (6 groups) and Guebwiller (2 groups). 452 teacher trainees answered the survey; which roughly corresponds to the number of teacher trainees in the academy. Out of 452 surveys answered, 424 could be processed correctly. Certain answers were either incoherent or "jokes" and therefore could not be counted. In order

to make the teacher trainees feel at ease, we did *not* ask for their names. Only their group and their training sites were asked for.

4.1. The contexts conducive to the acquisition and validation of skills

Among the contexts proposed, those that encountered the most enthusiasm were the following (highest to lowest):

Concerning the acquisition contexts	Concerning the validation contexts
1. Information technologies in general	1. Training in information technologies in general
2. Activities linked to professional training	2. Work done on the platform for collaborative work
3. Activities concerning the professional thesis	3. Activities linked to the professional thesis
4. Other transversal courses (besides information technologies)	4. Training in specialized subjects
5. Optional workshops	5. Activities linked to professional training
6. Activities linked to the platform for collaborative work	6. Other transversal courses besides information technologies
7. Training in specialized subjects	7. Optional workshops

Differentiating contexts seems to pay off since the contexts which were chosen for validation were not necessarily the same as those chosen to validate the acquisition of skills. Individualized learning schemes which are freely chosen, progressively replace the more traditional ones which conventionally contain an evaluation of the course itself. Furthermore, comparing the contexts which were initially proposed (Figure 1), this ranking shows their motivation to be responsible for their own learning scheme by breaking free of recommendations.

4.2. The proposed training methods : a surprise

To our great surprise, 87% of the teacher trainees would have preferred for us to organize activities (or tasks) enabling them to validate *de facto* the groups of skills rather than let them choose their own training scheme and evaluations. The question was formulated exactly in these terms. It goes without saying that the results were not what we had expected or hoped. When we compared our pre-conceived ideas about what a professional training program should be (i.e. one which trains and makes one reflect) to those of the teacher trainees, the difference was enormous. Perhaps the results show how difficult it is for the teacher trainees to break away from the traditional “tele-guided” training schemes which are firmly established in their culture (a sort of resistance to change). However, we can also suppose that this group is a manifestation of a cultural phenomenon linked to a consumer economy of “everything now” – a sort of new appetite for “ready-to-use” training schemes where personal investment and choice are minimal and where positive results are practically guaranteed. In other words (in our case), teacher trainees are looking for a training scheme which would enable them to acquire skills as rapidly as possible in order to be certified (ultimate desire). Even if the metaphor may seem unlikely, a professional training scheme would be like an object for consumption. It should work quickly and have no snags: “You must not answer to needs but to frustrations”, wrote Chetochine (2005). It is a controversial hypothesis which is debatable, but we will not exclude it, especially since the results which follow seem to confirm it.

4.3. The e-portfolio

4.3.1. Learning portfolio (personal and shared space)

25% of the teacher trainees claimed that the learning portfolio helped them to gain knowledge. The others claimed that they did not see the point in using it and they mentioned a lack of time and no immediate need to use it. They said they could use other tools to work – more precisely tools that they were familiar with (FTP, files attached to e-mails, etc.). When teacher trainees were questioned about the functions in the portfolio that they nevertheless found useful, they acknowledged its usefulness in the following order (most useful to least useful):

- To show the “validators” the work that needs to be validated,
- To use resources that are present in the documentation space,
- To communicate at a distance (asynchronous),
- To manage without the physical presence of a teacher,
- To work with others and do tasks collaboratively,
- To manage one’s time and activities in an autonomous manner,
- To communicate at a distance (synchronous).

4.3.2. Evaluation portfolio

The results obtained concerning the utility of the validation portfolio seem to confirm our last hypothesis. Indeed, 89.9% of the teacher trainees claimed the evaluation portfolio was a very useful and interesting tool! This result is diametrically opposed to the preceding one (25% for the learning portfolio). The reasons mentioned are the following (from the most useful to the least useful):

- To quickly and easily send validation requests to one’s reference teacher
- To consult one’s log (progression of skills acquired)
- To facilitate contact between the evaluator and the “validator”
- To communicate with one’s reference teacher

The reactivity which is unique to this application seems to respond perfectly to the culture of the teacher trainees of that age (23-25 years old): speed, efficiency, immediateness, feasibility, no paper.

4.3.3. Validation of acquired experience (VAE)

24% of the teacher trainees said that they had already acquired at least one of the skills of the C2i2e before taking a IUFM course. Among the 24%, the number of skills declared as acquired during this experiment were not more than 12 (of the 27 required for the training scheme) with on average, 7 skills declared as acquired and a standard deviation of 2. But what is interesting is that among the skills that were declared as acquired previously, 88% of these skills could be validated at the IUFM without any extra training. This result is rather encouraging and salutary. Indeed, the fact that we distinguish acquisition contexts from the validation of skills seems to have been favourable for the validation of experience acquired. As for the small percentage of skills acquired during the training scheme, this result is not alarming in itself. In our opinion, it simply shows the high level of expectations of the training scheme and it shows the difficulty that the IUFM and the government have on clarifying the exact meaning of these requirements. Is it a requirement that is for work or for training? It would be very useful if the IUFM and the state could reach an agreement on this point.

5. Conclusion

These results, which come from an experiment conducted among teacher trainees, do not allow us to draw any precise conclusions about these new training schemes. Let us just say that beyond the different findings that we expressed in the preceding sections, we notice that the approach to this professional and “instrumentalized” training scheme offers interesting perspectives which are promising in several respects. Nevertheless, certain results are an invitation to remain attentive to the evolution of the culture of this age group (22 – 25years old). This age group is now culturally adapted to using technologies, and this age group will continue to provide the majority of the candidates for future training schemes. Our objectives, however, are to use these technologies for more “evolved” uses; i.e. using technology to encourage reflective practices.

Conceiving a professional training scheme based on this paradigm which aims to train an autonomous and reflective practitioner, is a noble but complex task. The “scenarisation” (setting up) of a personal training scheme and the “instrumentalization” (using tools) of training is a difficult endeavour because firstly; the mediation instruments are varied (didactic, technological, pedagogical) and also because the pedagogical and institutional objectives are ambitious (professional training, training to learn how to learn--life-long-learning, *reflective training concerning one's relationship to knowledge rather than to only knowledge itself, a view of the action of the critical position*, VAE, etc.) and finally because there is so much resistance.

The fact that one considers it a “given” that such training schemes are useful in an economy of knowledge shows an honourable clear-sightedness, however this can only be developed if the goals on a higher level, that is to say those that aim at training future teachers capable of reflecting and being autonomous, are present in everyone's mind and understood by all..

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A CROSS SECTION OF E-PORTFOLIO USE IN DANISH EDUCATION FROM PRIMARY SCHOOL TO UNIVERSITY

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Abstract: In Denmark the use of e-portfolio within the educational world is emerging. On many levels of education from primary school to university level e-portfolios are being used for various purposes and with various results. At Knowledge Lab, University of Southern Denmark, and Danish E-portfolio Konsortium we are setting out to examine a cross section of these uses. We specifically want to look at various examples of use – to inductively describe how e-portfolio is used at present. The purpose of making this “stratigraphy” – a cross section of e-portfolio use in Denmark – is to focus on what the use of e-portfolio terms actually means in different contexts. What are the important terms when talking about e-portfolios in primary schools? How do you measure progression in secondary schools? How is meta-reflection detected in an e-portfolio at university level? The result will be a book, based on interviews with practitioners – with an introduction chapter which aims to give an overview of the field. At E-portfolio 2007 the presentation will address the setup of this enquiry and its preliminary results – while focusing on the use of one term, “reflection”, in different contexts.

Keywords: use cases, stratigraphy of eportfolios, Danish eportfolio use, definitions of terms

Introduction

In Denmark the use of e-portfolio within the educational world is emerging on many different levels of education. As a recent survey report from CSCS (Pellea 2004: 50-59) shows portfolios are used in education from primary school to university level in Denmark.

At the recent e-portfolio conference “Scaffolding Learning - Web 2.0 and e-portfolios”, hosted by Knowledge Lab, University of Southern Denmark, and the Danish E-portfolio Konsortium, one of the participants, a researcher in the field of learning and e-portfolios, asked the following question during a workshop: “What are we actually talking about, when we talk about e-portfolio?”. She pointed to the fact that we all seemed to agree that the subject was very important, but asked if, upon closer inspection, we actually were talking about the same thing?

The fact that the group had gathered for a workshop during the conference showed that the participants shared an interest, and that we seemed to agree on certain central terms. But as the participants of the workshop introspected none of us seemed sure that the way we practised, researched and worked with e-portfolios meant exactly the same as what the person sitting next to us understood by it.

We all agreed that it was *not* important, *nor* maybe possible to have exactly the same understanding of every term used in relation to e-portfolios, but that it *would be* interesting to examine the differences in use and in understanding.

A cross section of uses

At Knowledge Lab, University of Southern Denmark, and Danish E-portfolio Konsortium we are planning to describe a number of different ways of working with e-portfolios – thus describing the different ways terms like ‘reflecting e-portfolios’, ‘developmental e-portfolios’ or ‘presentation e-portfolios’ and ‘e-portfolio assessment’ among other terms are being used and practiced.

We could choose to do so by starting a desk research session deducing the meaning of the terms used from the relatively few books and articles published in this field in Denmark. On the other hand, this way of starting the enquiry would not take into account the various ways the terms

are already being interpreted and used in practical contexts in different levels of education around Denmark.

We want to look at various examples of use – to inductively describe how e-portfolio and a number of key terms are used at present from primary school to university level. The purpose of making this “stratigraphy” – a cross section of e-portfolio use in Denmark – is to focus on what the use of e-portfolio terms actually means in different contexts.

How is reflection described and detected in primary schools? How do you measure progression in secondary schools? What is considered the correct way to assess an e-portfolio in high school? How is reflection detected in a portfolio at university level?

A book for practitioners

The aim is to publish a book, based on interviews with practitioners – with an introductory chapter aimed at giving an overview of the field. The introductory chapter will discuss a “schematic outline” for describing e-portfolios and their use. The purpose of this is to establish a frame of reference within which the different use cases can be described and, to a certain extent, compared.

This schematic outline we understand as a type of scaffolding in the sense Erving Goffman uses it: “Scaffolds, after all, are to build other things with, and should be erected with an eye to taking them down.” (Goffman 1959: 246). Thus the outline should be understood as surrounding the understanding of the different e-portfolio use cases, in order to format a framework of questions which can be posed to the different practitioners. The rest of the book will consist of 12 interviews with practitioners of e-portfolio distributed among as many levels of the Danish educational system as possible.

During the work with the interviews and the writing of the book the schematic outline will be discussed and reviewed, as it will be challenged by what actually happens when e-portfolio is being practised in various circumstances.

The target group for the book is practitioners themselves, who are about to start working with e-portfolio. Through the book they should be able to gain knowledge about different ways of addressing the issue of planning, implementing and using e-portfolios in education by reading about the experiences others have had before them.

The book will be edited by a group of e-portfolio researchers in Denmark. Among the editors will be Hans Henrik Helms, who is director of Knowledge Lab, University of Southern Denmark.

A framework for a question guide

Lars Qvortrup (2006: 83) introduces digital portfolio in a learning environment as a “particular interface for interaction between the individual student and the teacher, among students, but also between the individual student and the education system”. The digital portfolio, or e-portfolio, is here seen as support for “communication and individual and collective learning reflections of the students”. Learning is described as “structural couplings between the students in the classroom and the communication orchestrated by the teacher” (Qvortrup 2006: 83) and understood within a constructivist paradigm of learning (Luhmann 2002).

E-portfolio is thus considered a support system for the learning context – and the purpose is to give students and teacher an extra “room” for communication and reflection. Qvortrup divides this room into first two and then three spheres.

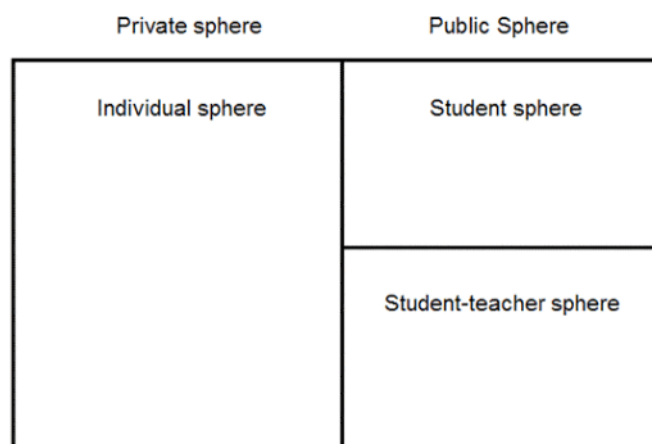


Fig. 1. (From: Qvortrup 2006, p. 95)

The illustration above shows the different spheres. This room can be (and often is) provided by the teacher or educational institution, but is owned by the pupil/student, because he or she decides whether or not she or he fills it and uses it to communicate with others. A completely private e-portfolio is not unthinkable – as it would still “constitute an interesting medium for the observation of changes of self” (Qvortrup 2006: 94). But it would only constitute what in Qvortrup's theory of learning, is considered first order or factual learning. He explains this as learning about a subject – to achieve “ready at hand skills” e.g. using a word processing program (Qvortrup 2006: 30). Even self observation can be of this nature if you do not communicate your observations to anybody.

To reach the next levels of learning – interaction with others is vital. Second and third order learning happens when the student looks on his achieved knowledge as a source of knowledge for others. This is done either in relation to the other students – thus addressing the student's sphere – or in relation to the teacher – thus addressing the student-teacher sphere.

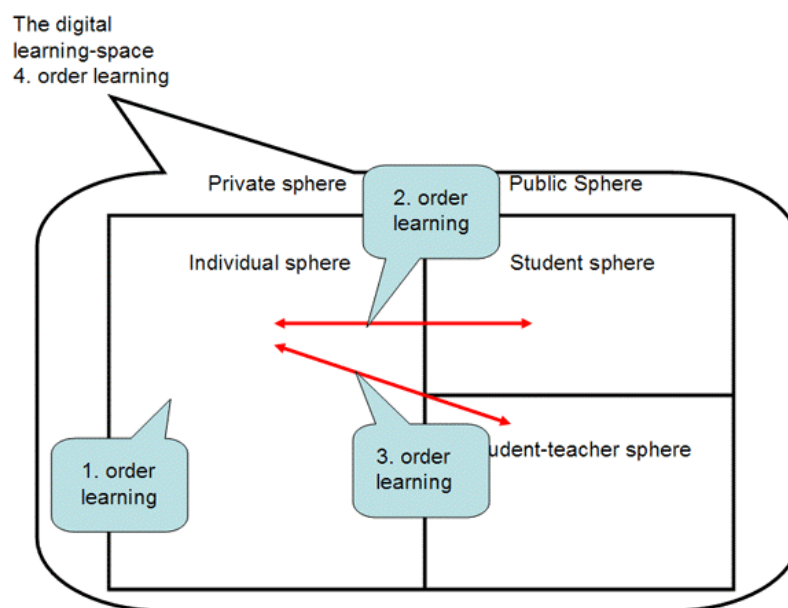


Fig. 2. (From: Qvortrup 2006, p. 95)

In the public student sphere the individual student observes and reflects on the learning of others and compares his or her own learning to that of the other students. The e-portfolio shows the reflections on this comparison and it shows the level of situative skill the student has achieved. Situative skills show “knowledge about knowledge” (Qvortrup 2006: 28) and are the ability to know what knowledge to use in a specific situation. The learning on this level is of the student seeing him/herself as a learner in a field of learners.

Third order learning occurs when the student interacts (e.g. by writing in his/her portfolio, if e.g. mandatory) with the educational system, and acknowledges it as such. The student sees the educational system and addresses it, thus achieving “creative skills”, which is the ability to see the boundaries within which you learn.

If then the student suggests changes, or reflects on the system as such, he/she is fourth order learning. He/she then not only responds to the educational system’s expectations – but also challenges and takes part in developing it. He/she is using “metaflective knowledge” (Qvortrup 2006: 92) and has the possibility to reflect on the teaching culture or organisation.

Question guide

The framework for understanding e-portfolios provided by Qvortrup could be the framework for a series of question that can be asked of e-portfolio practitioners. Firstly, a very important issue is how e-portfolio setup at the schools/colleges/universities addresses the issue of private vs. public sphere.

- Is there a specific area for private reflection – e.g. a place where personal work is selected and stored, or is room on the school server considered enough?

Within the public sphere there are several rooms – e.g. one to which students have access and one specifically for teachers.

- Which room is accessed by students individually, students collectively, teachers only or students and teachers – and for what purpose?
- Is there a specific “room” for student to student communication digitally?

The next axis of questions revolves around the issue of levels of reflection.

- Does the educational institution demand reflection (as opposed to merely asking the students to collect examples of work)?
- If so does the educational institution describe what is meant as reflection to the students?
- Of what kind is the reflective level – creating second, third or fourth order learning?
- How, if at all, is it assessed?

Asking e-portfolio practitioners these questions will allow the examination to address the setup of the “e-portfolio system” at the educational institution – and it will address the issue of whether or not reflection is pre-described by this setup.

A vital moment in the student’s work with the e-portfolio arises when the student “places him/herself in the place of the other” (Qvortrup 2006: 94) – that is, acknowledges an audience, be it fellow students, teacher or the industry. This is the moment when the student passes from first order learning to second, third and even fourth order learning. How this can be perceived by the student or instigated by the educational system is not described in detail in Qvortrup’s book.

Representation of self through performance

To focus on this issue it is beneficial to turn to Erving Goffman, who in his book *The Presentation of Self in Everyday Life* (1959) widely uses a metaphor of the theatre to describe the performance of individuals in social life. Performance “refer[s] to all the activity of an individual which occurs during a period marked by his (sic) continuous presence before a particular set of observers and which has some influence on the observers.” (Goffmann 1959: 32).

He is in fact writing in a micro sociological context about everyday interactions of groups, but his use of terms can be transferred for no other reason that this “presence before observers” could be in an e-portfolio. What is generally asked of an individual – be it a person or even an organisation – in portfolio work is that they represent themselves through their work and sometimes their reflection about it.

Front – performing for an audience

Goffman uses the theatre metaphor to describe how the individual interacts with his/her surroundings. The concept of “front” is describing the way an individual responds to standards of behaviour when acting before an audience: “Front, then is the expressive equipment of a standard kind intentionally or unwittingly employed by the individual during his performance” (Goffman 1959: 32). The front has a “setting”, some “props” and can be addressed either cynically or sincerely. The last two concepts Goffman uses to describe the individual's attitude towards his role. He/she can be “fully taken in by his own act: he can be sincerely convinced that the impression reality with which he stages is the real reality” (Goffman 1959: 28). Or he/she can lack belief in his/her own act.

The point here is that Goffman uses the theatre metaphor to underline that in human communication and interaction there is more than one reality. Representation as performing, points to the fact that in everyday life we represent many versions of ourselves. The “fronts” we perform differ with the settings. When asking students to create e-portfolios we are supplying a specific setting within which they perform.

Back

While performing on the front of the stage an individual is in Goffman's terms relying on a backstage where “stage props and items of personal front can be stored in a kind of compact collapsing of whole repertoires of actions and characters” (Goffman 1959: 114). The purpose of the backstage is to have a place where the performer can relax when not performing. During the performance the backstage is a repository for assistance, and momentary relaxation.

But more importantly – “the passage from the front region to the back region will be kept closed to members of the audience” (Goffman 1959: 115). The point of the back region is to have a place where you are not performing – but where you can store materials used in the performance. The audience is not supposed to see this because it in a sense is the opposite of the front. “A back region or backstage may be defined as a place, relative to a given performance, where the impression fostered by the performance is knowingly contradicted as a matter of course” (Goffman 1959: 114).

Goffman and e-portfolios

Goffman wasn't writing about e-portfolios – so his terms will have to be interpreted to be used in relation to this. The idea of the e-portfolio as a performance is not the invention of the present author. Helen Barrett in the online paper “White Paper: Researching Electronic

Portfolios and Learner Engagement” quotes a definition from the American “National Learning Infrastructure Initiative”: “a collection of authentic and diverse evidence, drawn from a larger archive representing what a person or organization has learned over time on which the person or organization has reflected, and designed for presentation to one or more audiences for a particular rhetorical purpose” (Barrett 2003:5).

Here the word “designed” should be accentuated, as it points to the fact that the e-portfolio is not only a collection but a manufactured collection of work for a specific audience. As such it is not unlike the definition of performance quoted from Goffman above.

Seen from the perspective of the teacher or the educational institution employing e-portfolios, the e-portfolio gives the students a stage for self presentation. The enquiry we want to make deals with asking the educational institutions or the teachers how they set this stage up.

A series of questions based on Goffman

To widen the understanding of reflection one can, following Goffman's line of thinking, ask the practitioners of e-portfolio in a learning environment a series of questions about the e-portfolios.

- Is a collection of work selected by the individual student in itself an indication of learning?
- Is the setup of the e-portfolios allowing students to actually leave the back stage?

Following Goffman one could look into, if entering the public sphere in itself is proof of reflection (or of second, third or fourth order learning) if it is not done as a performance, thus acknowledging the presence of the audience. A mere collection of work is in this sense not a reflected portfolio.

So one could ask the e-portfolio practitioners if they describe to the users of the e-portfolios what they demand of the pupils/students in relation to different audiences.

- Do they give feedback in relation to whether or not they are aware of the “stage” they are entering?
- Do they explicitly address the audience?
- Do they go ‘frontstage’?

One of Goffman’s many points is that every front has a set of “sign vehicles” (Goffman 1959:34) designed to demonstrate the front. So the leaving of the back and the entering at the front stage can be interpreted as the moment where the sign vehicles of the front are employed.

In an e-portfolio connection this means looking for specific actions that constitute the actual transcendence from one ‘sphere’ to the next. This might be uploading a specific folder on a server, writing a declaration or something similar. Finding and describing examples of these ‘sign vehicles’ could be an interesting outcome of the examination. A series of questions evolving around this issue are:

- How does the setup of the portfolio system ask the pupils/students to demonstrate that they have selected certain work and put it into the portfolio?
- What kind of ‘sign vehicles’ are used to actually allow the students to demonstrate their performance?
- Are there different ‘sign vehicles’ according to different audiences?
- Does the setup differ between audiences?
- Are the sign vehicles explicit or implicit – e.g. do you ask them to make a declaration?

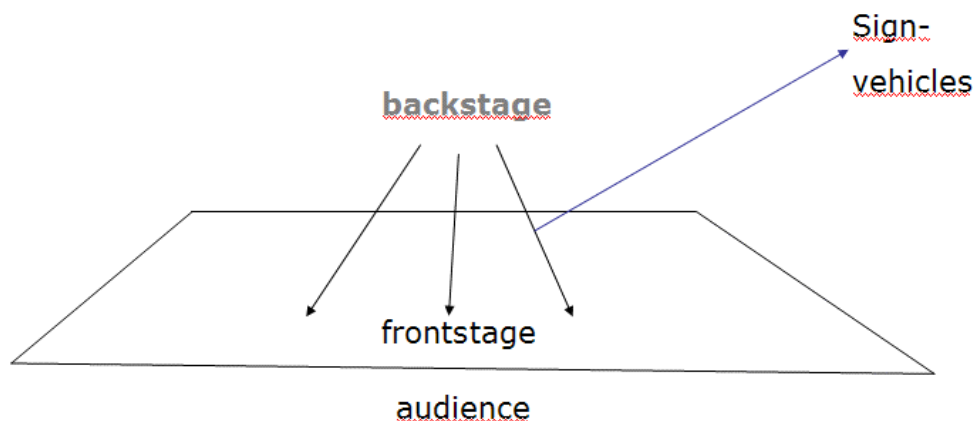


Fig. 3.

Presentation at E-portfolio 2007

At E-portfolio 2007 the presentation will not only address the setup of this enquiry. We will briefly discuss the schematic outline; but the presentation at the conference will present some preliminary results – understood as examples of use cases from the first three interviews, which will be finished by October 2007.

During the presentation we will discuss and revise the outline based on the first interviews. This will be detailed in the presentation.

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HOW CAN EPORTFOLIO MAKE SENSE FOR HIGHER EDUCATION? THE VIENNA UNIVERSITY EPORTFOLIO FRAMEWORK TAKING SHAPE

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Abstract: In this paper we consider ePortfolio from the perspective of a higher education institution and mirror the potential stakeholders' scepticism towards an implementation. We develop the argument that ePortfolio bears the potential to play a prominent role as a tool for supporting the development of specific generic competencies, which recently gain much attention in the context of the Bologna-process, as a tool for presentation, and as the means for students to receive recognition of their work in an intra-university public. Based on this view, in the context of Vienna University we position ePortfolio as part of the eLearning strategy as a tool which takes eLearning to the curricular level and offers a potential impetus towards quality development. The ePortfolio framework takes into consideration groups of stakeholders and four dimensions we see as relevant for ePortfolio in a university context: competency planning, support of the individual learning process, representation, and infrastructure. We briefly report on the first five pilot projects and consider next steps.

Keywords: ePortfolio, eLearning, Bologna-Process, generic competencies

A Role for ePortfolio in Higher Education

Who has been waiting for ePortfolio in higher education? A provocation.

While to the ePortfolio community the value of ePortfolio seems to be self-evident, the proclamation "ePortfolio for all by 2010" at the ePortfolio 2006 in Oxford is greeted with a lack of understanding on the part of many potential beneficiaries and stakeholders.

The very purpose of the higher education system is to provide formal education and certify it by awarding degrees – why then, curriculum developers may ask, "provide support for informal and non- formal learning"? [see Challenge 5 at <http://events.eife-l.org/ep2007/call/challenges>] Furthermore, in accordance with one of the major goals of the Bologna-Process, a variety of instruments is currently being introduced with the sole purpose of making students' competencies gained in Higher Education more transparent and comparable, be it by describing curricula in terms of subject specific and generic competencies to be gained and ECTS, the diploma supplement, or EUROPASS (<http://www.europass.at/>). Isn't ePortfolio doubling these efforts?

What about the assumed beneficiaries of ePortfolio, the students? We can only give anecdotal evidence from our everyday practice within the university: Many students do not react enthusiastically to the idea of an ePortfolio at all, it is seen as threatening with additional work, existing structures such as a personal webspace may be doubled, the idea of a reflection of personal learning processes by some students is even considered an undue intrusion into personal space. Teachers' reactions – again, this is only anecdotal evidence - do not differ too much - most common seems the fear of an even higher workload, but regularly there is also a strong element of scepticism against being used as an instrument for the demands of the labour market.

However, the prevalent reaction to ePortfolio is "what is an ePortfolio and what is its aim"? There is no such thing as a single notion of ePortfolio.

Even though many students work part time, it is difficult to see ePortfolio as a tool for professional development in the context of tertiary education, because the majority of academic staff has been socialised within their scientific community. Also, from the point of view of a Humboldtian university with a strong tradition of oral examination and little standardised testing, it is hard to argue that ePortfolio as a tool for the assessment of learning is adding something qualitatively new. Thus two potential purposes of ePortfolio remain: supporting the learning process and presentation of the learner's work.

Following Beetham (2004), the aim of a process portfolio is "enabling the learner to identify and reflect on their strengths and weaknesses, making use of formative feedback, and enabling professionals to support learners in ways appropriate to their achievements and preferences, by drawing on information in the profile" (Beetham, 2004, 4). Beetham sees ePortfolio in the context of pre-course diagnostics and learner-tracking, i.e. as a tool to tailor the learning experience to the learning preferences of the learner (see Beetham, 2004, 8f). This implies a tight control of the learner and implies a well defined goal of the learning process. Such ePortfolios - assuming that the work shown has been certified - can then easily be used as presentation portfolios in a transition phase or job applications.

Another view

We feel that this view of supporting the learning process is outcome oriented in a very narrow sense that does not fit with the learning processes expected of university students. We would therefore like to adopt a different perspective: Without "e", portfolio-work is not a new idea, principles and elements root in educational progressivism¹⁷. With this tradition in mind and a view to the self-understanding of the university as a place of the production of new knowledge, we adopt a view to ePortfolio mainly as *process portfolio* as an instrument to support learners in reflecting and planning their learning processes. The university curriculum is open ended in the sense that study programmes must be flexible enough to continuously integrate current developments in the respective disciplines and fields; ideally they are providing an environment where knowledge is being shared as well as produced. The ePortfolio should be a place for the learner to develop their own voice in a scientific community, where they are expected to take responsibility for their own learning processes and assume an active attitude towards learning. Therefore our position is that rather than certifying predefined goals, ePortfolio is to be implemented into our university in a way that supports active and self-directed learning on the part of the student. This approach comes with the *production* of - rather than the assessment of 'correct' reception of - knowledge.

Context: Bologna-Process

The deliberations above cannot be considered separately from the reform of the higher education system and the Bologna-process. From the very beginning, a major aim of the Bologna-process was improving transparency and enabling mobility of students and teachers (see Bologna- declaration, 1999). Expressing curricula in terms of student workload (ECTS) and learning outcomes was (and still is) a major step to take from a teacher- to a student - centred approach.

In our point of view it is the necessity of specifying learning outcomes where ePortfolio offers potential benefits in the context of the Bologna-process and reform of higher education systems. Before we develop this notion further and discuss the implications, we would like divert to a brief discussion on the concept of employability.

¹⁷ In the early 1920ies, Helen Parkhurst developed (influenced by the American progressive education) a plan that continues to be the structural foundation of the Dalton education, including amongst others the Assignment and the Laboratory in the sense of a prepared Learning Environment. The Dalton Plan as an educational concept is based on the following objectives: to adapt each student's program to her/his needs, to promote independence, to enhance the student's social skills. (Röhrs, 1991).

Generic Competencies and Employability

Specifically in the German speaking world with the dual education system and a strong tradition of apprenticeship as a central column of the education system, there is much debate about the notion of employability. Part of this discussion is rooted in a misunderstanding of the concept of a general employability as education for a defined job profile. This has caused debate whether it is the purpose of the university to educate students for specific jobs in the labour market (Kohler, 2005; Anz, 2006). An attempt to implement ePortfolio will be seen in the context.

We would like to point out that competencies relevant for employability are not a contaminant of the otherwise 'pure' academic curriculum. Their acquisition has always been supported within higher education, but neither explicitly nor in a systematic manner. It is in the universities own vital interest to attend to them in teaching and curriculum design as they are as crucial to further researchers' careers as they are to the labour market¹⁸⁾

Learning process and assessment of competencies

Learning outcomes come with the requirement of being assessable (Adam, 2004). Concerning generic competencies this results in two practical problems.

First, when taking a closer look at the generic competencies defined for the three Bologna cycles in the European Qualifications Framework (EQF Consultation document, 2005), one quickly realises that competencies like "Evaluate own learning and identify learning needs necessary to undertake further learning" or "Demonstrate transfer of theoretical and practical knowledge in creating solutions to problems" (EQF, 2005, 19) are typically not learned within a semester. However, this is the traditional unit of assessment of the Austrian university. Here ePortfolio offers a solution: it spans different contexts of learning as well as longer periods of time. As *process portfolio* spanning courses, modules, and eventually the curriculum with a special focus on generic competencies encompassing reflective skills, self-directed learning, and competency planning, ePortfolio is not only an instrument for fostering the individual development of the student, it may also give valuable feedback to the institution whether specific generic competencies have been acquired.

The second problem in the context of assessment is that some generic competencies elude formal assessment – partly because of established assessment structures which cannot be changed easily, partly in principle, we do not aim to develop ePortfolio towards formal assessment. Like Barrett (2005) we see a fundamental contradiction between the idea of ePortfolio as a tool to support the personal learning experience and individual development and assessing whether external requirements have been met. While Barrett (2005) suggests a partial integration with an institution's assessment management system, we propose that the ownership of the ePortfolio should be solely with the student. If ePortfolio work is an integral part of the curriculum and therefore part of the course work and accounted for with ECTS, it should merely be considered in terms of delivery, but not in terms of contents. First experiments with this approach have been successful (Logar et.al., 2007).

¹⁸ Learning outcomes relevant for employability, so-called *generic competencies*, encompass competencies such as will to learn and ability to learn self-directed, ability to work autonomously, ability to work in a team, reflective skills, written and oral communication skills, numeracy, etc. If one looks at the competencies named more closely, one can easily relate to the idea that they are necessary prerequisites for any professional work, be it in the labour market or in science and research (Yorke, 2004; Yorke and Knight, 2004; Kohler, 2005; Anz, 2006).

A role for ePortfolio in an intra-university community

The other purpose of ePortfolio we are interested in is that of presenting the owner's work. The opportunity to produce a specific view of the ePortfolio for a potential employer may provide a useful interface to the labour market. The main benefits we see in the context of a higher education institution is the opportunity to present one's work to an intra university public. Along side with community functionalities this limited public space provides a protected environment which has the potential to offer recognition to student work beyond the grade and the classroom. We suggest that ePortfolio is an instrument that supports valuing students not only as recipients of their teachers' knowledge, but as producers of their own works while documenting the development of their own voice in the scientific community.

From the institutional perspective this opens a role for ePortfolio as an excellent indicator for the students' general level. Thus, although ePortfolio is not seen in the context of formal assessment of the student, it may provide a valuable source of qualitative feedback which can be utilised for quality development in study programmes.

A Role for ePortfolio in Higher Education

In a nutshell, we see three potential purposes for ePortfolio for a higher education institution in the Humboldtian tradition: support of the individual learning process, especially with respect to the acquisition of generic competencies (*process*), the participation in the production of (not always new) knowledge (*presentation*) as the manifestation of the development of one's own voice within the university (*community*). We suggest a clearly defined position towards the many conceptualisations of ePortfolio as well as the aims connected with them and suggest that in higher education there definitely is a need for an instrument like portfolio-work, but not a market - yet?

ePortfolio Framework of Vienna University – a first concept

In the first part we took a view at ePortfolio from a general perspective of a higher education institution currently entering the Bologna process. In this second part we will focus on the specific organisational context of Vienna University and present a first draft of our ePortfolio framework.

Organisational Context

eLearning Strategy

When the University of Vienna began implementing its eLearning-strategy¹⁹⁾ in 2004 the necessity of an eLearning implementation on a curricular level in the context of the pending Bologna process was already anticipated. While the overall goal of the strategy – quality development in teaching – remains, and qualification and support structures are continuously adapted, much of the environment has changed. The Bologna process, introducing modularisation and the definition of learning outcomes on the different levels of the curriculum, the autonomy of the university, and the introduction of management by objectives and performance indicators have led to deep organisational changes. At the same time the rise of Web 2.0 technologies, the availability of support for high quality open source products, the university's content strategy²⁰⁾, and the adaptation of the software administering teaching²¹⁾ are

¹⁹⁾ Details on the strategy project New Media in Teaching at Vienna University - *Neue Medien in der Lehre an der Universität Wien* (2004-2006) and the supplementary project eBologna – Innovation and Cooperation through New Media at Vienna University – *eBologna – Innovation und Kooperation durch Neue Medien an der Universität Wien* (2005-2006) can be found on <http://eLearningCenter.univie.ac.at>.

²⁰⁾ Establishment of a developers group for a Digital Asset Management System based on the open source

causing technological changes and opening new opportunities. In this context we see ePortfolio as an instrument to pursue the implementation of eLearning in curricula and quality development within the larger context of the university's eLearning strategy (Roemmer-Nosseck and Zwiauer, 2006).

National context of the ePortfolio framework

This initiative is linked with the national fnm-austria²²⁾ project “*Model cases for implementation strategies for integrated ePortfolio in tertiary education*”²³⁾, which receives funding by the Ministry for Science and Research (bm_wf). From the beginning of 2007, five universities have started implementing ePortfolio pilot projects. Additionally, each institution is focussing on a different topic, namely:

- training of ePortfolio counsellors (University of Graz),
- interfaces to other areas of education (Danube University Krems),
- competency planning (University of Klagenfurt),
- course design incorporating ePortfolio (University of Salzburg),
- curricular integration of ePortfolio (University of Vienna).

Taking into account the input of the partners we will derive a more generic framework from the ePortfolio framework, describe prototypical models for ePortfolio integration on a curricular level, and develop a guideline to a curricular integration of ePortfolio.

ePortfolio framework

In accordance with the quality expectations of the development plan “*Universität Wien 2010*”²⁴⁾ and the performance indicators of the Ministry of Science and Research, the following goals for an ePortfolio implementation on a curricular level were derived:

1. *The support of critical study phases*: ePortfolio is adopted in the first semester or year of studies, the transition phase from school to university, in order support orientation and aid the student in reflecting on his/her choice for a study programme. It may also be used to counsel students' choice for specialisations and in the work on their thesis.
2. *Lowering drop-out rates*: Employing ePortfolio in study programmes with a disproportionately high number of drop-outs after the first year, support students with discontinuous learning biographies with informal acquisition of competencies.
3. *Increasing employability*, especially of the graduates of bachelor programmes: using ePortfolio as an instrument to build and reflect on generic competencies in curricula with a focus on employability.
4. *Supporting the research-teaching nexus*: Implement ePortfolio in research based²⁵⁾ study programmes with a large proportion of international students, joint degree programmes, and/or study programmes focussing on inquiry-based learning.

As with all projects, before starting the goal(s) should be made explicit and prioritised, both, concerning the possible goals of the institution and the faculty-specific ones. Given the diversity in concepts and aims present, we sought to provide orientation by representing the perspectives of stakeholders at three organisational levels: individual level, course or module level, and institutional level. For the Vienna University ePortfolio framework we consider four

software Fedora; the project is led by the University Library and implemented together with the Central Information Services, and the Centre for Teaching and Learning (http://damswiki.univie.ac.at/Main_Page).

²¹⁾ <http://studieren.univie.ac.at/?id=951>

²²⁾ Forum New Media in Teaching Austria (<http://www.fnm-austria.at>)

²³⁾ Modellfälle für Implementierungsstrategien für integrierte ePortfolios im tertiären Bildungsbereich (2007-2008); funded by bm_wf

²⁴⁾ “Universität Wien 2010” (<http://www.univie.ac.at/rektorenteam/ug2002/entwicklungsplan.html>)

²⁵⁾ Research-based is used in the sense of Healey (2005).

dimensions as relevant: competency planning, the learning process, knowledge representation, and infrastructure. Depending on their role, the stakeholders in the implementation will not consider all possible aspects of ePortfolio implementation to be relevant in their specific context (see table 1 for an overview).

The individual level concerns the learner, usually a student. Competency planning will take on different shapes in different disciplines, depending on local cultures, how hierarchical the study programme is organised, professional bodies outside the university (e.g. for law or psychology), etc. However, in all cases a personal stock taking and reflection will be a central component of portfolio work. The reflection of competencies acquired outside the university can be incorporated.

The individual learning process can be supported by fostering the student's active construction of knowledge across different modules within a semester as well as over time, using ePortfolio as a tool for individual integration, contextualisation, and "sense making". Where students are actively involved in the production of knowledge, either individually or with peers, supported by tutors or teachers, the resulting artefacts may be presented to the intra university public, thus documenting competencies acquired. Here is a natural interface to the content strategy – not only teachers and researchers, but also students' work will be offered the opportunity to license and maintain their work in the digital assets management system ("Phaidra"²⁶).

Levels ePortfolio Dimensions	Individual	Course- and Module level	Institution
Competency planning	Meta-Reflecion - individual competency planning Reflecion of extra - curricular competencies	Implementation of Meta- Reflecion processes in courses and modules as a bracket to the curriculum	Enhancing Employability
Learning Processes	Active knowledge construction, contextualisation; Production of knowledge - individually - with peers	Integration of ePortfolio with existing blended learning concepts; Cooperative knowledge production on course and module level	Curricular quality development processes
Knowledge Representation	Documentation of competencies, representation of work	Content base - - module level - - curricular level	Interface to institutional research and teaching data- base (Phaidra-project)
Infrastructure	Interaction with ePortfolio- Software	Design of ePortfolio based on teaching- and learning concepts; Interface to LMS, etc.	Providing an ePortfolio tool; Interfaces to other central services: LMS, DAMS, etc.

Table 1. ePortfolio Framework – levels and dimensions of the ePortfolio-implementation at Vienna University (description in the text.)

Stakeholders on the course- and module level are mainly the teachers, some study programmes already established module responsible in order to account for the new structural level of the

²⁶ Phaidra-project: <http://www.ub.univie.ac.at/phaidra/>

Bologna- curricula. They are the potential implementers of meta-reflection processes into courses and modules to support competency planning and the integration of knowledge as a bracket to the curriculum. This does not only suggest cooperative knowledge production on course and module level on the side of the students but also coordination and cooperation on the side of teachers. The dimension of knowledge representation becomes important in the context of curricular content bases, which are currently being pioneered by some study programmes (again an interface to the Phaidra-project). The integration of ePortfolio with existing blended learning concepts also has an obvious, but conceptually non-trivial implication concerning infrastructure: the deeper the ePortfolio-integration into the curriculum the more important the question of interface to an eLearning environment (LMS, Wikis, Weblogs, etc.) becomes.

The third, the institutional level, compiles those stakeholders, who do not work with the ePortfolio directly, but utilise the results of an implementation on a different level. They are study programme directors or others concerned with curriculum development and running study programmes, eLearning representatives, executives at department, faculty, and university level. Their interests lie in using ePortfolio for enhancing employability and curricular quality development processes. They are responsible for the infrastructure and provision of interfaces to institution-wide IT-systems.

First Steps of Framework Implementation

A Brief note on the Pilot Projects

Under supervision of the Centre for Teaching and Learning five ePortfolio pilot projects have started at Vienna University between October 2006 and March 2007. The partners, faculties or study programmes from the Centre for Translation Studies, the Centre for Sports Sciences, and the Faculty for Philosophy and Educational Sciences, have been chosen on the grounds that they have developed and implemented eLearning in the course of the implementation of the general eLearning strategy.

Table 2 gives an overview concerning subject, faculty or centre, the Bologna-cycle in which ePortfolio is used and the main goal with respect to development plan and performance indicators. The software used for portfolio work in the pilot projects ranges from word-documents over Weblogs, the community tool elgg (<http://elgg.org>), to the commercial tool factline (<http://www.factline.com>). First experience shows that a simple tool like elgg, demanding little media competencies, provides a low barrier for acceptance of a tool. If coupled with feedback and based on trust between teacher and students, acceptance of ePortfolio by the students can be very high (for details see Logar et.al., 2007).

Low complexity of the software naturally comes with the trade-off that the functionalities of simple tools are easily exploited to a point where it hinders students' creativity in designing their personal space. A more complex tool demands much higher media competence of students and teachers, resulting in slow acceptance and a much greater focus on handling the technology²⁷⁾

²⁷ A very informative study by Hornung-Prähauser et.al (2007) on different ePortfolio tools and potential curricular scenarios is available on the fnm-austria portal (<http://www.fnm-austria.at>) , parts are currently being translated into English

SUBJECT	FACULTY/CENTRE	BOLOGNA-CYCLE	GOALS
Translation Studies	Centre for Translation Studies	BA	Enhancement of employability
Translation Studies	Centre for Translation Studies	PhD	Support of critical study phases
Curriculum (working title) eTutors and Knowledge Experts Currently precursor: "Media Competencies Seminar" (Centre for Teaching and Learning)	Centre for Translation Studies, Faculty for Computer Science, Faculty for Philosophy and Educational Sciences, Faculty for Social Sciences	BA and MA	Enhancement of employability
Sports Sciences	Centre for Sports Sciences and University Sports		Forthcoming
MEi:CogSci	Faculty for Philosophy and Educational Sciences	MA	Supporting the research-teaching nexus

Table 2: Overview over first ePortfolio pilot projects.

Conclusions

In the context of a higher education institution we do see a prominent place for ePortfolio as a tool for supporting the development of specific generic competencies, as a tool for presentation, and as the means for students to receive recognition of their work in an intra-university public and the development of their own voice within a scientific community. In order to unfold this potential, we propose that portfolio-work ought to become an element of teaching and learning in regular curricula. Implicit in this view is a reluctance to automatically utilise ePortfolio as a life long portfolio. A learning space must allow for mistakes, even fallacies, and change of opinion. If students are to share the evidence of their personal growths with others, the environment – personally as well as technically – must provide a protected space. Until security and privacy issues have been clarified, we therefore object to the wide-spread opinion that a person's ePortfolio must be stored and available (to whom?) for a lifetime.

We see ePortfolio as a tool to take eLearning to the curricular level. This comes with a challenge: In order to reach beyond the small number of early adopters, integration with the universities eLearning environment is an obvious necessity. Current learning management systems (LMS) are closed systems which do not mirror the structures of the modularised Bologna curricula, should be supplemented by a

more open eLearning environment, which is scalable and integrate Web 2.0 technologies as well as ePortfolio functionalities.

From an institutional perspective we see a potentially prominent role for quality development. The implementation is still in its infancy, but first results are promising and interest in ePortfolio is growing. This is reflected by the fact that partners at the Faculties for Computer Science, Law, and Catholic Theology will begin with their ePortfolio pilots in October 2007.

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NEW VOCATIONAL PATHWAYS AND WORKFORCE DEVELOPMENT: NOTTINGHAM'S ENGAGEMENT WITH NEW EPORTFOLIO AGENDAS BRIDGING THE EDUCATION AND EMPLOYMENT SECTORS FOR REGIONAL DEVELOPMENT IN THE UK

Angela Smallwood, Sandra Kingston (University of Nottingham)

Keywords: region, vocational, school, university, employability

Introduction

Work in Nottingham has developed a strong new direction since last year's conference. From a focus on implementing interoperable ePortfolios for learner transitions between local educational institutions – schools, colleges and universities – the Nottingham consortium is now taking forward new projects spanning the two worlds of education and employment.

Government reform of 14-19 education in the UK includes the introduction of new diplomas, bridging work experience and learning, supporting new progression pathways in occupational sectors prioritised within the regional economic development strategy. Our JOSEPH project is working directly on this [1]. In addition Nottingham is also leading ePortfolio developments for the regional Lifelong Learning Network (LLN), a larger consortium, including Derbyshire, funded to help raise workforce attainment in higher skills, through developing successful new pathways into and through higher education for adult learners [2].

The 2006 Leitch review [3] identifies strategies to address serious skills shortages in the UK and highlights the role of information, advice and guidance (IAG) in empowering individuals to raise their skills levels. Nottingham's work for JOSEPH and the LLN, brings together eportfolio implementations, IAG specialists and resources, with vocational learners at different levels of education and training to engage with these key challenges for the 21st century.

ePortfolios and multi-locational learning

The trail-blazing eportfolio work taken forward in local schools in recent years, through the development of the City of Nottingham Passport, now a web-based portfolio (Passportfolio) [4], was featured at the ePortfolio conferences of 2005 and 2006. With pilot schemes for the new 14-19 diploma going ahead during 2007-08 in Nottingham, the Passportfolio's importance is stronger than ever. The challenge is to support multiple-location, vocational learning. Once the full programme has been implemented, all young people in the state system will have a statutory right to study any of the lines of learning, regardless of their location and the specialism of their home school. This will inevitably result in multi-locational learning, especially in subjects such as Engineering which require access to specialist equipment. The new Diploma also includes 10 days' work experience. The risk of fragmenting learning becomes high, especially when the learning itself is unities. Learners are likely to be moving between environments in a non-routine way, with no opportunity to settle in one environment before moving on. As the Passportfolio is hosted by an IAG provider, Connexions, rather than by a specific school, college or employer, it can be accessed from multiple locations. Use of an ePortfolio to manage, record and take ownership of their learning provides a learner-owned fixed point, offering continuity and a sense of security. Further discussion below indicates how the JOSEPH project is providing support for this.

ePortfolios for decision-making

The development of Nottingham's Passportfolio itself has now moved forward into the key territory between study and employment, where young learners research their options and reach decisions about choice of career pathways. Responsibility for the implementation of Passportfolio has been taken over by Nottingham Connexions, the region's branch of the government's support service for young people aged 13-19, providing IAG and access to personal development opportunities. Leitch stresses both raising aspirations and empowering individuals by providing full information and support: the coming together of the Passportfolio and Connexions in Nottingham makes the city an ideal testbed for this latest UK policy advance.

With no shortage of on-line information available to young learners, the challenge is to develop learners' skills to select and synthesise information about occupational sectors and learning opportunities, alongside reflective self-analysis of learning and training needs, in preparation for, and supported by, the right balance of on-line and face-to-face interaction with specialist guidance advisers – a balance which requires personalisation from learner to learner.

The University of Nottingham's JISC-funded JOSEPH project is working with Connexions and the Passportfolio to bring together IAG and ePortfolio to enrich and enhance provision of face-to-face guidance. There is much electronic and online guidance available; learners currently need to find it in the first place, work out whether it is any use/suitable, navigate their way through it and collect results to use elsewhere. We have built a unit (currently specific to Engineering, but intended to be customisable for other disciplines and subject areas) which takes learners through a decision-making process for Engineering, including identifying their relevant skills and interests, evidencing appropriate experience and achievements and researching possible career paths, progression pathways and vacancy information. The learner is guided, via a staged process, through a series of online resources selected and approved by IAG professionals. By drawing together specific learning, skills evidence and reflection, the learner is empowered to move to the next stage, whether this be application to employment, to a programme to fill an identified skills gap, or application to HE. Alternatively, the learner may be in a position to make an informed decision not to follow an Engineering pathway, but has an awareness of the processes involved in decision-making which can then be applied to another discipline or area.

Technological developments

An initial pilot/demonstrator has been developed and is being refined through consultation with IAG professionals and other practitioners. It will be tested with learners in the autumn of 2007, with a view to maintaining iterative development through the second half of the project. Early results should be available for report in our conference presentation.

As a JISC-funded project, JOSEPH is committed to contributing to the international e-Framework for Education and Research. We are therefore exploring the practicality of using a web services approach. The pilot demonstrator is a distinct system from Passportfolio, and is able to use web services to draw data dynamically from the learner's Passportfolio account to prepopulate certain fields, which the user can then edit as appropriate (and re-export to Passportfolio, also via a web services route). Learners are able to share their specific responses, thoughts and reflections achieved through the unit with IAG and support staff; they are encouraged to ask questions of specific individuals along the way.

Where external web-based resources offer APIs, we are using these to demonstrate the concept of producing and consuming web services in a flexible environment; however for more closed systems we have had to resort to offering hyperlinks and the possibilities afforded by cut and paste. At the time of writing we anticipate that pilot learners will be offered access to the

module and to Passportfolio through a Sharepoint-based local VLE designed to support vocational 14-19 pathways in the City of Nottingham; this will support single sign-on and a short-term solution to security issues.

ePortfolio futures: migrating from education institutions to employment contexts?

While Connexions are providing a learner-owned eportfolio for young learners, supporting their reflective planning and decision-making processes with recommended processes and materials, work within the University and much more broadly within the LLN, directed at older learners, is experimenting with a range of different eportfolio systems. Within the University, the CETL for Integrative Learning is trialling a number of solutions in different learning contexts, some vocational, many non-vocational. The fit to discipline ethos seems crucial. Yet, on one level, there is a danger that the attempt to identify and embed even a diversity of eportfolio systems may be misguided. For, at the same time, the University is beginning to address the enormous challenge of developing interfaces between institutional systems and the informal and social technologies which undergraduates are employing ever more freely. If we are able to harness their ability to mix and match technologies of their own choosing to the processes of personal development planning, we may be able to implement eportfolio-based learning, while seeing eportfolios themselves dissolve out of existence.

For the work-based learners of the LLN, however, the imperatives of vocational learning inscribe occupational standards, skill sets and specific requirements for whole sectors of the population. The Derbyshire-Nottinghamshire LLN will be piloting Nuventive's iWebFolio in 2007-08, to test the proposition that the development of shared templates across the education-employment divide may in itself be able to facilitate consensus development between the two sectors and at the same time point forward to the most substantive future for eportfolio technology.

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FOR AN EPORTFOLIO ENABLED ARCHITECTURE: EPORTFOLIOS, EPORTFOLIO MANAGEMENT SYSTEMS AND ORGANISERS

Serge Ravet (EIfEL)

Abstract: In its short and dynamic history, the ePortfolio has rapidly moved from the status of simple paperless portfolio to sophisticated ePortfolio Management Systems. Today, the explosion of new social practices emerging from the use of new media, such as social networks and what is commonly referred to as Web 2.0, tends to blur the frontiers of ePortfolios. This will have an impact on the technology developed by ePortfolio Management System suppliers, as well as on the standards for making them interoperable with related information systems. Is MySpace an ePortfolio? Is 43things an ePortfolio? Is Elgg really an ePortfolio? What is the relationship between an ePortfolio and an ePortfolio Management System? What standards do we need to make ePortfolios interoperable? What ePortfolio parts shouldn't be made interoperable? The objective of this position paper is to describe an ePortfolio architecture where the response to these questions will be offered, providing a pathway for innovation and standardisation, keeping the power of free personalised expression and interoperability. This will be done through the description of an ePortfolio enabled environment based on the interaction between ePortfolios, personal ePortfolio organisers and organisational ePortfolio Management Systems.

Keywords: interoperability, standards

Introduction

The ePortfolio started life as an unsophisticated object, amounting in effect to the paperless version of portfolios that had been used over decades for personal and professional development and assessment. The order of magnitude of change was mainly additive: electronic media publishing facilities allowed the creation of "enriched" multimedia portfolios, while hypertext made it easier to *connect* ideas during the reflective process. The Internet brought in a multiplicative order of magnitude, with the ability to connect everything with everything, and above all the possibility to make the content accessible to the whole world. It became an *online paperless portfolio*. Having one's ePortfolio online in turn led to change at another level of magnitude, not just additive or multiplicative, but exponential: ePortfolios can now be mined by search engines and one can use many different services available on the World Wide Web to create one's own repository, publishing and social environment.

So, if the World Wide Web allows everything to be connected to everything, the immediate question that comes to mind is: what are the limits of my ePortfolio? Are MySpace and SecondLife - two of the spaces where I create meaningful artefacts and develop social relations - part of it? Or could I decide to have my ePortfolio Island on SecondLife to create, store and share my ePortfolio? Would that mean that my ePortfolio is part of SecondLife? *Which contains the other?* It is clear that this question could not have been asked about *paper portfolios* or even *online paperless portfolios*. The nature of the new media transforms the nature of the ePortfolio and its dialectic.

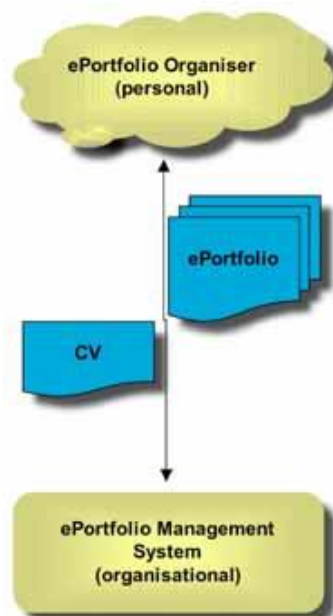
Another important aspect of the evolution of the reflection on ePortfolio is its relation to *digital identity*: *is the ePortfolio an expression of my identity through digital media, or is the ePortfolio itself a means of controlling my digital identity?* This is a serious question which requires thought, as it will have consequences for the kind of ePortfolio technology we will expect to support current and innovative practice as well as on the technical standards that will make the technology interoperable.

A further angle to explore the evolution of ePortfolio is that of ePortfolio editing tools. The most obvious gap today is the inability of ePortfolio systems to extract automatically meaningful information collected in an ePortfolio repository. What is the point of tagging all the data collected, if the system is unable to create a draft CV automatically, simply by data mining a structured collection of data? Today, the creation of a CV out of an ePortfolio repository is too often a tedious process where all the work of retrieving and publishing information is purely manual. Proper use of digital technology should allow the display of a CV (or ePortfolio) in many different formats: through a time line to reveal progression and tell a personal and/or professional story, a mind map to reveal one's vision and values, or a competency map with links to evidence and testimonials, etc.

And if this is the case for the CV, which requires an unsophisticated editing process, what about more sophisticated processes such as *reflection* and *connection*? Such processes could greatly benefit from technologies issued from semantic networks such as semantic annotation, topic maps and mind mapping. One has to recognise that current ePortfolio editing systems have not really moved much beyond the very first *paperless portfolios* in their ability to support reflective activities effectively. Some ePortfolios have little more to offer than form-filling exercises and a choice of templates with cute displays.

The last point I would like to address in this introduction is that of *complexity*. The world is complex, learning is complex, the management of learning processes is complex. Yet, most activities on learning technology, and even more on *standards*, are aiming at simplifying the world, using technology as a kind of shoehorn to force life's complexity into a series of predefined machine readable forms. Some believe that by simplifying the world's representation it will be easier to manage. For them, everything has to be expressed into XML schemas, because what we want is machine readable ePortfolios and CVs because we want machines to do the work that humans can't do (like reading thousands of applications for a job offer). The question one should ask is whether when describing individuals into a set computer readable data we are not in reality simply reifying (thingifying) human beings by computational sets and in doing so losing significant information²⁸? How can you compute empathy, generosity, non-judgemental behaviours, emotions, and the sense of aesthetics which are expressions of the right brain? While it is almost trivial to compute *skill sets*, how do you compute *mind sets*? And when you hire someone, what is most important (within limits, of course): what a computer can tell you (the obvious)? What is the most reliable indicator of future performance: a mind set or skill set? It depends, and both are surely important. The fact is that computers are good at computing skill sets and poor at computing mind sets.

Does this mean that we should not develop technical standards? Certainly not! We need them to facilitate ancillary work, not to make decisions on behalf of humans and professionals. We want servants, not masters. We need standards like HTML and HTTP that tell you how to write and transport information, not what you can write or express. We don't want standards that lead to dull form filling exercises, but standards that increase the expressive power of the left *and* right brains to convey a holistic vision of individuals.



²⁸ This may look like a paradox but the computer which is supposed to help putting things into (apparent) order (in French it is more obvious as we use word 'ordinateur' which has no equivalent in English) are insidious creators of entropy (disorder) at higher level: learninh and pedagogy!

The components of an ePortfolio enabled system

So far in this paper, I've used the terms ePortfolio, ePortfolio system, ePortfolio editing system and ePortfolio management system. They represent very diverse pieces of software, obviously interconnected, but with very different purposes. At one point, ePortfolio practitioners started to make distinctions among *learning portfolios*, *assessment portfolios*, *employment portfolios* and *presentation portfolios*. These different "types" of ePortfolios reflected the fact that ePortfolios are being produced and *consumed* (used) in many different processes, or to *manage* different processes. Nevertheless, there is also a clear distinction between the ePortfolio Management System that is used to support, let's say, the assessment process, and the *assessment portfolio* that is produced as the result of this process. They are two different objects. It is the same issue in the context of learning or employment. Therefore, if we accept that there are many different processes to be managed with the help of an ePortfolio, it might not be relevant to try to define a single set of specifications for an ePortfolio, the result of which exercise might be the lowest common denominator or useless complexity.

I believe that the lack of clarification among these different components is at the root of the inability to develop and adopt ePortfolio standards.

I intend now to explore the following components of an *ePortfolio enabled environment*:

- The ePortfolio,
- The ePortfolio Management System (organisational),
- The ePortfolio organiser (individual).

Do we need a new definition for ePortfolio?

ePortfolio: *"a collection of authentic and diverse evidence, drawn from a larger archive, that represents what a person or organization has learned over time, on which the person or organization has reflected, designed for presentation to one or more audiences for a particular rhetorical purpose."*

This is the NLII definition from 2003, which, in my view, is still largely valid. I very much liked the definition, for its inclusive approach *"on which a person or organisation has reflected"* which made an explicit link between individual and organisational learning – a key element of EifEL's vision on learning. Numerous discussions on the theme: is the ePortfolio a product or a process? Have led me to conclude that a different emphasis is needed.

If I had to change the NLII definition, therefore I would go for something like: *"a collection of authentic and diverse evidence, drawn from a larger archive, representing the capital²⁹ developed by a reflective learning individual or organisation designed to exploit/valorise their assets in a particular context."*

I certainly don't claim that my definition is better than the one offered by NLII; I just offer it as a variation on a theme, to introduce the notion of individual and social capital through the ownership of assets. In short, the *raison d'être* of an ePortfolio might simply be to valorise one's human and social capital. An ePortfolio could be to human capital what the financial portfolio is to financial capital.

It is now clear to me that an ePortfolio is not a product and a process, but is a product created as the result of a process, this process possibly being managed by digital means, for example an *ePortfolio Management System* or an *ePortfolio Organiser* – or some other tools or services.

So, if we agree to go back to the fundamentals and accept that an ePortfolio is on one level a product, static or dynamic (e.g. generated by an XML stream, like RSS), then we have to ask the question: what tools can we use to organise and author ePortfolios? Do we have to use

²⁹ Competencies, knowledge, social networks, etc.

something labelled ePortfolio Authoring System, or are we free to use whatever tool is convenient to us; and if we choose the latter, is there a risk of negative impact for interoperability, in the ability to exploit the contents of one's ePortfolio?

In order to respond to these questions, we need to ask how ePortfolios and ePortfolio Management Systems relate to each other?

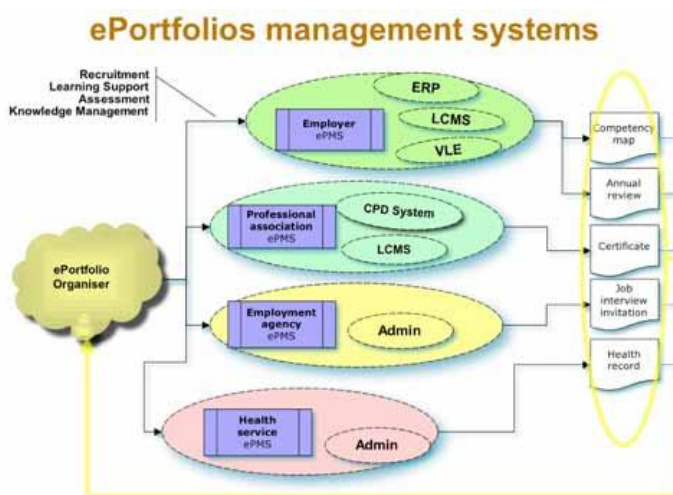
ePortfolios and ePortfolio Management Systems

What is an ePortfolio Management System (ePMS)? Is it a system to manage ePortfolios or a system to manage a process in which ePortfolios are being used, produced or consumed? And what is the difference between these activities?

The most common misconception about the relation between ePortfolios (eP) and ePortfolio Management Systems (ePMS) is that the function of an ePMS is to *host* ePortfolios. The main function of an ePMS is not to host ePortfolios but to manage a process during which an ePortfolio can be consumed or produced. Let's take an ePMS dedicated to assessment of prior experience. When registering for assessment, the candidate might submit an embryonic or a complete ePortfolio; then an assessor might plan activities to complete the ePortfolio with more evidence, collect feedback from appropriate sources, make her own observation and then judge the quality of the evidence against a set of standards of competence.

The most common misconception about the relation between ePortfolios (eP) and ePortfolio Management Systems (ePMS) is that the function of an ePMS is to *host* ePortfolios. The main function of an ePMS is not to host ePortfolios but to manage a process during which an ePortfolio can be consumed or produced. Let's take an ePMS dedicated to assessment of prior experience. When registering for assessment, the candidate might submit an embryonic or a complete ePortfolio; then an assessor might plan activities to complete the ePortfolio with more evidence, collect feedback from appropriate sources, make her own observation and then judge the quality of the evidence against a set of standards of competence. Once this judgement has been made, assessment records, Certificates where appropriate and the final ePortfolio can be returned to the candidate who will be able to use this evidence to find a job, to obtain a salary increase or register for a university course.

In the scenario described above, there is an ePortfolio at the entry of the assessment process, and then the ePortfolio is being developed (enriched), reviewed and finally exported. At the end of the assessment process, the ePortfolio has acquired its final shape and can be exported to be exploited further in another context. The ePortfolio is the evidence against which the certificate is delivered and it can then be hosted wherever the candidate wishes.



The ePMS can be seen as a tool which function is to build an ePortfolio for a specific purpose in a particular context. To provide a definition of an ePMS, we start with a variation on NLII's definition of an ePortfolio:

ePortfolio Management System: *a system used to manage (produce, consume and exploit) elements of individual ePortfolios for a specific purpose - scaffolding learning, assessment, employment, competency management, organisational learning, knowledge management, etc.*

We might even further define different types of ePMS, depending on their ability to *consume* existing ePortfolios – e.g. for recruitment – or to *produce* them from scratch – e.g. in assessment. In fact, one might avoid the generic term ePMS altogether as it misled too many in believing that they are about "managing ePortfolios" while they are in fact "managing processes *using* ePortfolios."

Here is a list of ePMS types:

- for recruitment,
- for personal development planning,
- for continuing professional development,
- for assessment of prior learning or experience for assessment,
- for initial education,
- for competency and career management.

It is clear that these ePMS differ widely in the types of functionalities they need to implement, as well as in the type of standards required to make them interoperable with their environment. While HR-XML might be critical for employability, these standards have little relevance in the context of a kindergarten! On the other hand, Liberty Alliance standards might make sense in both contexts to provide a framework for privacy, federation of identities and services.

What is also clear from the short history of ePortfolio Management Systems is that these systems are designed to fit the needs of an *organisation*. An ePMS, *nolen volens*, belongs to an organisation and represents its interests, values and philosophy. Whatever the degree of freedom offered by an ePMS, however confident an individual might be that he owns his own ePortfolio, what she/he really owns is her/his projection in the plan of the ePMS owner's values. It is her/his identity in a specific context, for a specific purpose, but this represents only a part of her/him.

So, if there are many sorts of ePMS, each with their own characteristics, and most likely their own set of relevant standards, how can we ensure that individuals will have control over their identity when it might be scattered across many ePortfolios parts that are being hosted at some point by various ePMS? How, as individual, can I use my own set of tools to manage my own archives, create and exploit my own ePortfolios, without relying solely on the provision of the organisations I am interacting with? How can I control my digital identity, i.e. the digital representation of my assets?

ePortfolios and ePortfolio organisers

If we accept the premise that an ePortfolio is some kind of product/document and recognise the fact that ePortfolio Management Systems belong to organisations and are designed to support specific processes that consume and produce ePortfolios, and if we accept the idea that an ePMS can grow into an organisational ePortfolio, then there is a gap that need to be filled: where is the individual ePortfolio Management system?

Where is the system that allows our own collections and connections, protects the privacy of our own reflections and social networks? How can I protect my personal assets, manage my intellectual property rights, or even control the exploitation of personal data by third parties?

multiple services.

So, back to one of my earlier questions: where do MySpace and SecondLife stand in relation to ePortfolio organisers? My claim is that they are part of the ePortfolio organiser as they hold some of the assets of an individual. This goes equally for Elgg and other social networks as well as all services contributing to the construction and expression of one's digital identity.

The conversational ePortfolio framework: a regional ePortfolio system

ePortfolios (documents) are the result of a conversation: with oneself, peers, tutors, clients, managers, assessors, friends, etc. This conversation can take many different forms, for example a personal reflection, an external feedback, an assessment of a simple dialogue. But there is another conversation that is going on: the conversation between the person and institutions and between institutions; it can occur within a personal space (ePO) or an institutional space (ePMS) and across individuals and institutions. For example, a regional authority might be interested in drawing a map of the competencies of a territory. Therefore:

- Anonymous data from individual ePOs and ePMSs are collected, which contain a description of the competencies, within the regional territory,
- Then data are analysed: trends, strengths and weaknesses are elicited and the results of the analysis are published,
- Policy makers engage into a dialogue with employers, educational and training institutions, NGOs and citizens to reflect on what needs to be done to improve employability and employment, innovation and research, etc. – benchmark with other territories,
- Individuals could place themselves on the competency map and reflect on their professional development to keep-up with trends. Some could ask to have their prior learning and experiences accredited being unaware of their value on the labour market,
- Education and training providers could adjust their provision to bridge the gap, and market their offer to target populations identified in a kind of skill gap analysis.

Another conversation could be triggered during a recruitment process:

- An employer publishes a vacant position on a series of job boards or public employment services – regional and international,
- Pools of ePortfolios / CVs are analysed to identify possible good matches. They are notified and invited to respond to the opening,
- Prospective candidates analyse the job offer against their competencies and compile an ad-hoc CV and motivation letter that provide links to relevant ePortfolio parts,
- The employer receives a long list of candidates (50) from which a shortlist (10) is extracted. The selection is made online against a series of criteria. Each of the candidates receives feedback containing:
 - The number of candidates who responded and the number short-listed,
 - The criteria that were used for screening and their own score,
 - The place of the candidate in relation to others – on a multidimensional map,
- Short-listed candidates receive a screening questionnaire to provide additional evidence of skills, competencies and abilities,
- Less fortunate candidates receive notification of their rejection and are invited to reflect further on the points that were noted as 'weak' during the review process. Based on the collection of feedback received from other prospective employers, patterns

emerge (or not) that provide a foundation for further action,

- Public employment services receive anonymised copies of review outcomes that are analysed to elicit possible patterns and actions – e.g. increase the counselling provision, develop special workshops or training programmes with education and training partners,
- Long-listed and short-listed rejected candidates readjust their CV/job search portfolio to improve the odds of being short-listed/selected.

Looking for a job is a learning experience that is rich with reflection opportunities. It is an opportunity to better understand what employers really want, as well as one's own strengths and weaknesses. Keeping a reflective journal of one's job quest – that could be private, public or restricted to a group of trusted people – is a means to construct some meaning from a series of events and data that might be interpreted as un- or over-informative ("*nobody likes me!*").

We could describe many more 'conversations' across organisations and institutions during which ePortfolio parts are being consumed and produced.

ePortfolio standards

While existing standards, such as IMS ePortfolio, make sense for a paperless portfolio, it is clear that these specifications are not adequate for a globally ePortfolio enabled system where ePortfolios, ePortfolio organisers and ePortfolio Management Systems interact mutually and with other systems as well. Today's ePortfolio standards development is in a state similar to that of world in which HTML, the structure of a document, would have been defined without the HTTP protocol, i.e. the ability to access and deliver contents³⁰.

More generally, one should ask whether it makes sense to have standards specific to ePortfolios or if we would be better off re-using existing standards, even ones defined outside the field of education and human resource management.

The most obvious set of standards relevant to ePortfolios is the one supported by Liberty Alliance related to federation of identities and services, and more recently to people services - they take into account social networks. Microsoft has its own set of standards such as WS* and Card Space, but other specifications such as Open ID are possible alternatives or complements.

Liberty Alliance should also be studied as an example of a group of organisations that have joined together to create and implement successfully a set of standards limited in their scope, but fundamental to providing a relevant answer to a critical problem. In contrast to IMS Global, which has attempted to define the HTML (XML) of ePortfolios without defining the protocol for accessing ePortfolios, nor ePortfolio architecture, Liberty Alliance has worked on the 3 fronts simultaneously, providing an infrastructure that is vital for most business processes.

The ePortfolio community should be inspired by the example of Liberty Alliance and see in it a way of dealing with important issues with a limited set of specifications, protocols and architecture. One possible domain is the CV. Of course, a CV is not an ePortfolio, but it is and will be for a long time a type of information that can be extracted from an ePortfolio to be presented to an employer or even a university to register for a course. If we are able to make the information contained in a CV easily readable by machines, while keeping the expressive power an individual can use by enriching the xmlised information with powerful editors, this would be a major step for ePortfolios.

³⁰ EIFEL is currently working with Liberty Alliance and HR-XML to design a HR-XML webservice using Liberty Alliance framework as transport protocol – an ID-SIS in LA's terminology – so we would have the HTML and HTTP of the ePortfolio...

We need to get away from the initial misconception that ePMS would have to import and export whole ePortfolios, e.g. when moving from school to higher education, then employment. Such a vision would probably lead to a set of specifications that would rigidify the whole system and kill innovation. There is clearly no need to import a complete ePortfolio when moving from one institution to another and for the most obvious reason: we lead parallel lives, and we belong simultaneously to different groups and institutions, each with their own characteristics. We have to accept that we will have different parts of our ePortfolio organiser distributed over a series of information systems that do not have to talk to each other directly, or if they do, it must be under our control, i.e. the control of our ePO, which will act as kind of digital safe. In an ePortfolio-enabled architecture, we need:

- ePO to manage the various parts of our ePortfolio repository that is distributed – aggregate repositories and publish multiple ePortfolios,
- ePMS to export data when the link with a group or institution is terminated – e.g. export an assessment portfolio after accreditation of prior learning with an awarding body. The (initial) set of standards required is minimum, like IEEE RCD, and, for Europe, CEDEFOP's Certificate/Diploma supplement.

Conversely, there is a whole domain where it is not (yet?) relevant to attempt to develop standards. Personal development planning and continuing professional development (CPD) are processes that are peculiar to individual communities and there is clearly no need (yet?) to abstract those processes into technical standards. There is no need to have a set of standards that will cover the needs of CPD for mechanics, waiters or doctors. Each community can develop their own tools, based on their own specifications, as most of transactions will be within their own system. What will be important is their ability to export information in a format useful, not for another PDP or CDP system, but for a potential employer or for a training organisation in a format already covered by HR-XML specifications. Similarly, when an employee leaves a company, it should be mandatory for the company to provide, not just a certificate, but a portfolio presenting the career of the employee. This can be done using HR-XML standards, and customising to the needs of communities through the process known as *Application profiling*.

Other groups of specifications that are fully relevant to ePortfolios are those related to archives, such as OAI-PMH (<http://www.openarchives.org/>) for the exploitation of meta data; workflow standards, such as BPML (<http://www.ebpml.org/>) for managing processes such as ePortfolio review and assessment, and peer to peer such as JXTA (<http://www.jxta.org/>) for sharing resources across ePortfolio organisers. It is critical before attempting to develop any new standards to establish a proper inventory of all standards relevant to ePortfolios. It is only when we have agreed on such a list (or established different lists, based on different values and approaches) that we might want to reflect on whether we should develop another set of specifications, and if the response is yes, we should further ask ourselves: *are the issues addressed by these new specifications specific to the world of education and training or are they more general problems that should be addressed with other communities?*

It is likely that there are issues that are critical in the context of education and less critical in other contexts; hence the need to develop new specifications. The Schools Interoperability Framework (SIF) is a good example of a series of specifications relevant solely to the world of initial education³¹. It is also possible that the education community come up with a specification that is relevant to a larger community. IMS Content Packaging provides a general solution to transfer contents over the Internet as easily as transferring CD-ROMs, something useful to the publishing industry in general, not just the education and training communities. But there is also the danger that the education community come up with impoverished specifications or implementation of general specifications. For example, while Shibboleth is the academic

³¹ Although one should wonder whether those specs are not in the process of being made obsolete with more general frameworks such as Liberty Alliance

implementation of the same standards on which Liberty Alliance is based (SAML), the two implementations might only become compatible with the next version of SAML, and Shibboleth does not provide the same level of services as Liberty Alliance³².

ePortfolio developments

The underlying technology of ePortfolios is transforming the architecture of existing information systems (IS). We are moving from organisation-centred IS, where individuals were offered a space, to people-centred IS, where the organisation's IS behaves as an *aggregator* of individual or departmental IS. We are moving from top- down to bottom-up flows of information and control – there will be still a strong control at the organisational level, but the diverse entities will be much less tightly coupled, leading to a more *agile* architecture.

While, until now, ePortfolio organisers owned by the individual and ePortfolio Management Systems owned by the organisation, were indistinct entities, in the near future, each of those components will affirm its autonomy, with ePMS evolving towards Organisational ePortfolios Systems. This tendency is already at work with publishers of ePortfolios systems like Nuventive which, in conjunction with an ePMS (iWebFolio) is providing TracDat, a quality management system, which is in fact an organisational ePortfolio. In the UK, the Centre for British Teachers (CfBT) also has an ePortfolio for the continuing professional development of teachers, as well as Stratis, a tool similar to Tracdat, i.e. an organisational ePortfolio for managing quality assurance. It is the ability of ePortfolio suppliers to adapt their provision to the unique needs and business processes of their organisational clients that will make the difference. And this is a very different business from providing ePortfolio organiser services.

On the ePortfolio organiser front, i.e. the system owned and controlled by the individuals, the critical aspect will be the issue of digital identity control, from the *trivial* requirements for single sign on to control of who has access to what and when (including the ability to erase personal information from the Web). Another key aspect will be the ability to exploit one's personal assets, which will be distributed over a series of information systems like 43things, MySpace or SecondLife, as well as education and employment systems or one's computer. Data mining, aggregation, spatial representation are some of the key services required to help individuals to manage and exploit their assets.

Conclusion

While we are still in the infancy of ePortfolio history, its emergence has already had a major impact on current learning technologies development, as well as on our reflection on information systems and architectures. Beyond learning, employability and social inclusion, the ePortfolio elicits the critical issue of privacy and control: who owns and can exploit our personal data, the digital representation of ourselves. Perhaps the issue of ePortfolio can be subsumed to that of *digital identity*, i.e. the extension of our physical identity, an ePortfolio being the mere projection of one's identity?

This is why I believe that terms such as *ePortfolio organiser* and *ePortfolio Management System* might soon be replaced by other ones such as *Assets and Identities Management systems* (AIMS) with their personal and organisational versions, the latter being some kind of reengineered version of the current ERP (Enterprise Resources Planning). It is that understanding that has driven EIFEL to encourage the cooperation between communities working in the field of digital identity and human capital management. Thanks to EIFEL's

³² Shibboleth which was initially designed to respond to the needs of libraries and the publishing industry focused on Single Sign On (SSO) across institutions, not on sharing profile data and federation of services, something that on the other hand has been extensively developed by the Liberty Alliance consortium.

efforts, two of those communities, Liberty Alliance and HR-XML, are now talking together, connecting people, ideas and projects.

It is important at this stage that the ePortfolio standardisation community move beyond the discussion on whether 43things is an ePortfolio or not³³, and beyond a fixation with semantics. It is time to join communities like the Oasis Group, Liberty Alliance and HR-XML, which are now working on the definition and implementation of standards that are pivotal to the future of ePortfolios. We need to be in a position to influence future standards and developments designed by those who have demonstrated their capacity for successful industry adoption. We should learn from the successes of Liberty Alliance and HR-XML, as well as from our inability as ePortfolio community, to make any serious progress on standards design and implementation.

We have to face the uncomfortable truth that the standards most relevant to ePortfolios are being currently developed outside the mainstream ePortfolio community. This has to be changed, and this is what EIFEL is aiming at.

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³³ I've always been rather irritated by the fact that while most will agree that we have been able to create ePortfolios with simple word processors or presentation tools, although they might not provide all the services one would expect from a modern ePortfolio platform, often the same people will wonder whether social networking tools, that have a much more powerful expressive power than mere word processor, could be used to create ePortfolios. In separating clearly *ePortfolio organisers* from *ePortfolio management systems*, then one could say that you can chose the tools you want as ones' personal ePortfolio 'organiser' (from Facebook to plain web publishing tools), this is completely different for ePortfolio Management Systems. Of course, it is perfectly legitimate to look at 43Things is *a kind of* ePMS which is relevant to a series of communities within a specific context (sharing goals and reciprocal learning), but this is not an environment that is relevant to institutions: institutions need their own kind of ePMS, such as those provided by commercial vendors and open source platforms. And they will differ in a school, a university a professional body a learning society, a company, an awarding body or a local community: they manage different processes. ePortfolio organisers could be seen as the digital image of the individual while the ePortfolio management systems would be the digital clone of the institution and its processes.

MOSEP- MORE SELF ESTEEM WITH MY E-PORTFOLIO SUPPORTING NEW COMPETENCIES FOR E-PORTFOLIO TUTORS

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Abstract: In this article, we want to show that the implementation of e-portfolios as a method in an educational institution is neither a matter of tools (which is already known and accepted by the community), nor is the sole introduction of a new method (accompanied with e.g. guiding material and explanatory media) sufficient to implement e-portfolio as a sustainable measure to enhance the self-directed learning. In the article, we want to outline new competencies of teachers and tutors needed in order to support learners in their individual learning process. In order to support the teachers and tutors, a new training concept has been developed.

Keywords: e-portfolio, self-esteem, competencies

Introduction: e-portfolio is not a question of tools.

In recent times „e-portfolio“ has become the buzz word for individual, self-directed and lifelong learning. The e-portfolio hype is unbroken and many educational institutions are addressing the question on how to implement the concept of e-portfolios in their curriculum. In this discussion, many other questions arise too: How can an institution integrate the e-portfolio in their current educational programme? How can the e-portfolio software interact with an existing learning management system? What does the interaction between tutors and learners look like? How can the portfolios be assessed? How can the portfolios be maintained? Who owns the data? What is the technical solution for the interoperability?

All these questions are important and (with many others more) need to be addressed when implementing e-portfolios in an institution and into a curriculum. But from our point of view „the“ crucial question is: How can teachers be trained to being able to support learners in their e-portfolio process? What kind of competencies do teachers need in order to guide learners through their individual competence development?

In this article we want to show what kind of competencies are required by teachers to guide learners through their portfolio development process and furthermore, we want to demonstrate a course design, addressing these questions.

New competencies needed by teachers

That teachers and trainers have a key role in the implementation of e-portfolios is clear, at least it has been since the case studies of the MOSEP project. Teachers, trainers or counsellors have to support the young learners with the development of their e-portfolio. And „learning“ in this way means a constructive approach on learning. Learning with an e-portfolio has to be active, constructivistic and has to be monitored by the teacher or trainer who follows the rules of enabling didactics. With an e-portfolio the result of learning isn't unimportant, but the focus is on the learning process itself.

According to Graham Attwell (1997) and in respect to the implementation of e-portfolios the new teacher has to be able to:

- provide technical support,
- organize the contexts and communities of learning,

- formulate organisational objectives,
- facilitate the structure of portfolio contents,
- facilitate reflection,
- guide and monitor the students advancement through the integral cycle of investigative learning,
- help evidencing competences,
- support planning,
- interact and conduct conversation with the students,
- plan and assess the overall process“ (Attwell, 1997).

Out of this vision of a „perfect teacher“ we can deduce that working and learning with e-portfolios requires a set of competencies. Now, one question seems to be obvious: How can we ensure that a teacher gets most of these competencies? One way is maybe to have teachers to develop their own e- portfolios, too. In that way it is possible to ensure that teachers are working actively and builds up experiences. This may help them later to identify and solve problems of their students. In addition to that, an own e-portfolio may give a trainer the possibility to own those „skills of participation“, which Henry Jenkins (2006) mentioned.

- Play – the capacity to experiment with one’s surroundings as a form of problem-solving,
- Performance – the ability to adopt alternative identities for the purpose of improvisation and discovery,
- Simulation – the ability to interpret and construct dynamic models of real-world processes,
- Appropriation – the ability to meaningfully sample and remix media content,
- Multitasking – the ability to scan one’s environment and shift focus as needed to salient details,
- Distributed Cognition – the ability to interact meaningfully with tools that expand mental capacities,
- Collective Intelligence – the ability to pool knowledge and compare notes with others toward a common goal,
- Judgement – the ability to evaluate the reliability and credibility of different information sources,
- Transmedia Navigation – the ability to follow the flow of stories and information across multiple modalities,
- Networking – the ability to search for, synthesize, and disseminate information,
- Negotiation – the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms” (Jenkins, H., 2006, p.4).

These skills and the experiences gained by working with one’s own e-portfolio, might be very useful to understand the new role of a teacher and use this knowledge in practice. Furthermore, a teacher or trainer will be able to foresee and understand problems which may appear while working. These difficulties may be caused by problems of understanding or be of technical origin. But if the teacher has solved those problems once by himself, it may be more probable that he/she can guide his/her students through the same or similar problems much better than without.

But who trains the teachers? This question leads us to a challenge which has been approached by the MOSEP-Project, too. To present possible solutions on the above mentioned issues, we have to have a look on another bundle of proficiencies a user of an e-portfolio should have.

“ICT literacy” is a term, which consists of a set of competencies and knowledge, figured out by the ICT Literacy Panel in 2002.

Components of ICT Literacy*

Proficiency	Definition
Define	Using ICT tools to identify and appropriately represent an information need
Access	Collecting and/or retrieving information in digital environments
Manage	Using ICT tools to apply an existing organizational or classification scheme for information
Integrate	Interpreting and representing information, such as by using ICT tools to synthesize, summarize, compare and contrast information from multiple sources
Evaluate	Judging the degree to which information satisfies the needs of the task in ICT environments, including determining authority, bias and timeliness of materials
Create	Adapting, applying, designing or inventing information in ICT environments
Communicate	Communicating information properly in its context (audience, media) in ICT environments

Fig. 1. ETS 2007

A team of experts tries to work out a solution, which probably has the best chance to ensure that e- portfolios can be accepted and introduced. A set of self-explaining tutorials, supported by multimedia contents ought to help teachers to handle the problems. The tutorials consist of a number of sessions enabling teachers to work through all aspects step by step, in groups or alone (and) in a linear or non- linear way.

But apart from all the opportunities, we would like to reflect on the topic critically. At first, we assume that not all teachers are familiar with these skills and competencies, required for a successful portfolio implementation. Secondly, even if teachers start to work with e-portfolios and try to own most of these competencies, we have to anticipate that especially the older ones might not be able to cope because the young learners are digital natives and would handle an e-portfolio faster than most of the adults.

But that is exactly the point, why a teacher has to see themselves not longer as a teacher in the “old” way and needs to anticipate the new role.

Another point is that learners in general have explicit expectations what teaching and learning should be like. A new learning method like e-portfolio might be confronted with some difficulties.

The last point we would like to mention is that competencies can only build up individually. So expansive learning is a precondition for owning the proficiencies we described. The problem which may appear is that imposing e-portfolios on students might prevent expansive learning e-portfolio avoids expansive learning (Engeström, 1987).

The MOSEP project

MOSEP means “More self-esteem with my e-portfolio” and is a European project, funded by the European commission – Leonardo da Vinci. It has 9 partners from 6 European countries, including Austria, Germany, UK, France, Poland, Lithuania and Bulgaria.

The main objective of the project is (besides a basic study) to design a course concept for the use of freely available materials for teachers and vocational counsellors. The course concept addresses the question which competencies of teachers are needed to support learners in the portfolio process.

All materials in the course are self-explanatory and can be (freely) downloaded and used by institutions without a „guiding“ expert. This will be realised by the use of multimedia material, videos and screencasts which can be freely accessed and used by the course participants via the project website.

The course will be tested and evaluated in 6 different countries, in order to prove the didactical concept and the developed course materials.

- The media didactical concept is based on the assumption, that the course should be
 - suitable for different target groups (teachers, trainers, tutors, vocational counsellors),
 - usable by the teachers, without external guidance,
 - adaptable according to the institutional needs,
 - freely accessible and available,
 - software independent.

Furthermore, the content of the course should be „modularisable“, which means that the topics and the assignments (if they are not appropriate for the institutional context) shall be combinable. This means that the content of the course shall be divided in small „bits and pieces“, which can easily be re-used and (if necessary) shuffled with other activities.

To fulfil those pretensions, a “course philosophy” was created, which brings up the fundamentals of the whole MOSEP tutorial:

Due to the wiki-structure of the course, the participants should be able to fit it into a form adequate to their individual needs, so different target groups can use it. Nowadays, nearly everyone knows how to work with a wiki (or at least knows how to read one), which makes it easy for those different groups to use the course without any external help or guidance. Again, e-portfolio is not a question of tools and it would be inconsistent to use a specific tool or any kind of Learning Management System.

To keep a clear view and to ensure the combinability and re-usability, a “Story-Line” structures the course and its modules (its detailed description can be found below).

The course only suggests timings for single activities or face-to-face situations, which allows the tutor and his/her students to determine the whole course timing freely on themselves. So it can take whole days, may be split up into half-days or after school sessions or even, thanks to the online option, can be accomplished at home, independent of time.

Different kinds of multimedia shall be used, like video-sequences for different purposes, audio podcasts or screencasts.

The content of the modules is derived from the main findings of the basic study which has been implemented by the project consortium at the beginning of the project. The topics of the modules are based on a „classical“ e-portfolio approach, which can be often found in the e-portfolio literature:

planning – selection/connection – reflection – presentation – assessment.

The theoretical background of this process can be derived from David Kolb and combines his learning cycle (Kolb, 1984) with the classical e-portfolio approach:

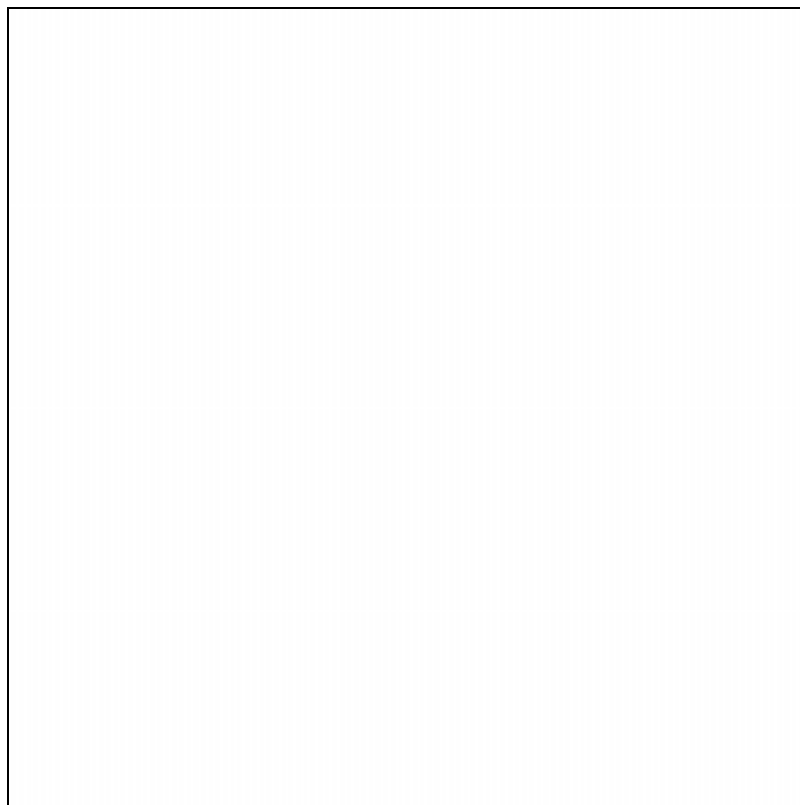


Fig. 2. Pallister 2007

Each module is divided into different sessions, each session consists of information material, resources, web links and multimedia artefacts. Furthermore, practical assignments shall activate the course participants to work on their individual competence development by using the portfolio method themselves. The course is divided in a foundation module and 4 additional modules.

The themes of the modules are not only described, but also formulated as questions. Participants can easily investigate the purpose of the topics. For example, the “Foundation module” is structured as follows:

Foundation module: What is an e-Portfolio and what are its opportunities? How to plan and implement an e-Portfolio?

To start working with e-Portfolios, you'll have to know, what exactly e-Portfolio-work means and how you can plan/implement/use it. Those questions will be answered in the “Foundation module”, which is an introduction into the whole topic and which also should be the first module to read.

- Introduction | Why e-Portfolio?
- Working with young learners | How can I support young learners?
- Digital Technology in the construction of identity | Why might learners need it?

- Integration of e-Portfolio process with young learners | e-Portfolio and curriculum – which barriers, which strategies?
- Planning and implementing an e-Portfolio | How to plan and implement an e-Portfolio?
- Validation.

The complete course covers the following topics:

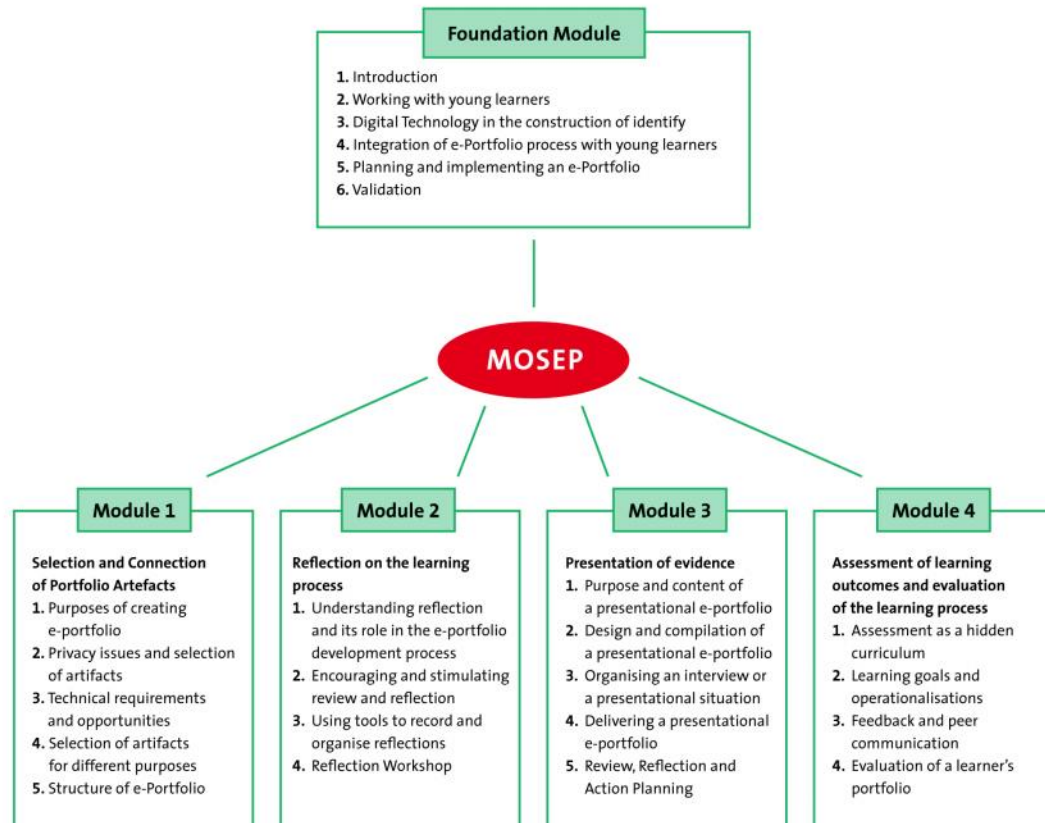


Fig. 3. Ulrich 2007

Technical approach or „Which e-portfolio software shall I use?

As it is impossible to name a prototypical e-portfolio software tool which is appropriate for a generic e-portfolio usage, the MOSEP philosophy tries to develop the course as platform independent as possible. In order to fulfil this requirement, none of the practical assignments require a certain functionality, as long as the basic e-portfolio functionalities are available.

For the concise usage of the MOSEP course and the practical implementation in an institution, the course provides guidelines and tutorials for the usage of two different open source e-portfolio tools: Mahara (<http://www.mahara.org/>) & Elgg (<http://elgg.net/>). Both are available as open source products and cover the main requirements for a basic e-portfolio process.

Conclusion and Outlook

As shown in the introduction, the implementation of e-portfolios is neither a question of using a specific tool nor of a specific method. New competencies of the tutors are needed in order to support learners in their individual portfolio development. The MOSEP project provides a set of materials, methods and assignments (as well as multimedia resources and generic e-portfolio tools) to support teachers, tutors and vocational counsellors in their ambition to use e-portfolios as a method for self-directed and (in the end) lifelong learning.

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Figure 3:

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IMPLEMENTATION OF AN EDOSSIER FOR THE EUROPEAN LANGUAGE PORTFOLIO

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Abstract: The educational reform in Europe fosters the use of the new Information and Communication Technologies for formal learning in the classroom and for informal learning outside the educational centre, according to the initial policies for lifelong learning (European Union, 2002) and the Program of Lifelong Learning 2007-2013 (European Union, 2006). With regard to the learning of languages, the European Community promoted an eLearning program that considers language learning a preparation for the active use of language for communication, as social interaction. One of the first actions in this field was undertaken by the Council of Europe with the design of the European Language Portfolio (ELP, 2000), developed from the Common European Framework of Reference for Languages (CEFR, 2001). This is the compendium of the components and competences that intervene in the learning of modern languages. The ELP has become common use with the application of new technologies to its implementation, with the Europass initiative. We want to contribute by completing the process of a digital Portfolio with the implementation of an eDossier that digitally enables the original idea of being a collection of evidence. This is done by using the ELP official templates in our Web2.0-based learning environment generator called AIOLE, An Interactive Online Learning Environment.

Keywords: ePortfolio, eDossier, Language Learning, Personal Learning Environments

ePortfolios

Portfolios are a collection of evidence which shows the experience, abilities, competence and knowledge of its owner. The origins of portfolios were in the field of art and architecture. They were used as samples for the evaluation of artists' and architects' work. They aim to show evidence of the quality of their work to potential customers. They were finally used in education to assess the learner's achievements and competence. Some outstanding developers of this new trend highlight the aspect of learning tools to the main feature of elements for demonstrating the abilities, experience and knowledge of portfolio users: Cambridge (2001) establishes them as contextual, developmental tools for learning through a selection of experiences and self-assessment. Portfolios measure learning and development over time (Barrett, 2000). Their features can be summarised as follows: they are user-centered, customizable, flexible, reflective, easy to use, goal-oriented, career-centered (McCloud, 2004). Some (Barret et al, 2004; Hiebert, 2006) point out four main processes in the use of a Portfolio: Reflecting, Collecting, Connecting, Publishing. Others establish similar activities in the process of creation of a Portfolio: Selecting, Presenting, Sharing, Collaborating, and more. And the main action to focus here is the customizable, flexible, reflective, easy-to-use edition itself. To achieve this, the best way is by using the technology currently available, this is, the Web technology. This is the basis for ePortfolios.

The European Language Portfolio

EPortfolios seem ideal for "deep learning, which involves reflection, is developmental, is integrative, is self-directive, and is lifelong" (Cambridge, 2004). This is also presented in the original Principles and Guidelines for the European Language Portfolio (2004), which reads: the ELP "concerns with the development of plurilingualism as a lifelong process, the development of the language learner, and the development of the capacity for independent

language learning”. Here the ELP presents itself as a developmental portfolio focussing on lifelong learning for language learning as a personal learning tool, promoting the learner’s autonomy, owned by the learner. It has a pedagogic function and a reporting function. It is based on the Common European Framework of Reference for Languages (CEFR, 2001) and focuses on reflection as ‘awareness’ of their development. The CEFR is the compendium of the components and competences that intervene in the learning of modern languages. It aims to be a reference for the design of activities and tasks to the development of the communicative skills of a language: speaking, listening, reading and writing. It is useful for the educational authorities, for course designers, for the teacher and for the learner, since they all take part in the process of learning at different levels. The ELP works as a standard with coherent transparency, offering “common features which make it recognisable and comprehensible across Europe”. The three basic components of the ELP are the template documents for the Europass, the Linguistic Biography and the Dossier. Although initially limited to language learning, its success has made it extensible to the Europass CV, which comprehends a wider scope of abilities and work experience.

AIOLE

This paper proposes the implementation of such an electronic Portfolio from the validated ELP template documents of the Europass official site, using them with AIOLE, a system for online community and personal learning environments.

Personal learning is a great endeavour, very difficult to achieve. However, the shift in the new Web (the so-called Read/Write Web or Web2.0) to provide more pedagogically designed learning opportunities on the Web has produced a new focus on learning design, and tools for personal learning are beginning to appear. For this, some structuring or patterning is required and some Web developers (Johnson et al., 2006) have established new reference models as technological frameworks based on Web tools following certain patterns for services: network patterns with RSS feeds for offering access to content and learning resources, temporal patterns to manage agendas, conversation patterns to establish coherent communication, workflow and resources patterns to upload and download files, images and materials, language tools and activities and the integration of a most effective tool for personal learning in a social pattern, the use of portfolios (Fig. 1).

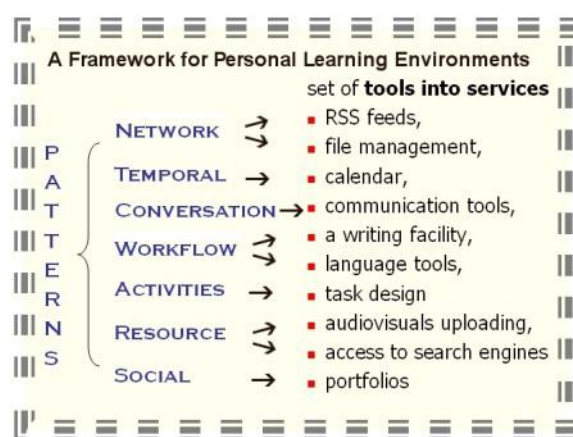


Fig. 1. A Reference Model for Personal Learning (Johnson et al., 2006)

AIOLE (An Interactive Online Learning Environment), with its capacity to write on the Web, tries to integrate all these services and makes the personalized edition of the above mentioned documents possible. These documents facilitate the selection of evidence and self-assessment

(with the Europass) and reflection (in the Linguistic Biography) from the descriptors analysis of the four communicative language skills established by the CEFR. The most important innovation of AIOLE is the production, not only of the Europass and of the Linguistic Biography in a stable, and simultaneously flexible and adaptative form as a service, but also the edition of an eDossier as an electronic dossier, where to include (creating, connecting and uploading on the Web) the whole evidence that demonstrates the linguistic experiences of the user by means of multimedia facilities, such as scanned certificates, scanned or digitized photos taken with digital cameras and mobile phones, documents written on the Web, sound and visual documents of all kinds. And all this is done easily by the user from anywhere at any time with the use of the AIOLE system.

The initial work of some teachers of languages offering web pages with content has led them to use the Learning Management Systems, for the creation and dissemination of courses online. However, due to the limitations to distributing contents (some of them are digitally translated from textbooks and have their own copyright), the difficulty of their use and the additional training needed they are not sufficiently used in language learning where the learner must actively take part in communicative activities. As an improved evolution, Online Learning Environments provide learning contexts with more interactive resources and services, since they offer the distribution of contents, together with interaction of learning tools arranged in online services where learning design works as the key factor to reach the ultimate objective of Lifelong Learning. The integration of all these tools into services provides the main feature of Personal Learning Environments (PLE; Johnson et al, 2006; Sanchez-Villalon et al, 2007a; Fig. 1) where the learner can take control and responsibility of their own learning. These learning environments have a series of characteristics that we want to point out:

- They are easy to use for teachers and learners who are not expert users in programming or in computer science,
- They are accessible at any time and from anywhere (this means they offer ubiquitous access to contents and resources),
- They make it possible to follow-up, control and guide the learning,
- They allow collaboration (collaborative character in the synchronous and asynchronous communication) in certain necessary communicative tasks.

Thus, AIOLE is “an online learning environment generator where the learning design of any activity can be easily described and later the learning experience reported as evidence in an ePortfolio by directly writing on the Web.” (Sanchez-Villalon et al, 2007b). With the AIOLE system the teacher can design activities for learning a language, selecting contents on the Web or developing some on their own, classifying them as automatically as possible and putting them at the disposal of their learners, guiding them as their learning process advances. Simultaneously the system can offer all the functionalities to the learner, who, after being initially guided by the teacher, can acquire a series of skills in the use of ICT as the agent of their own learning, designing their tasks, controlling their process and ultimately realizing the self-assessment of their own learning process. These are services which make use of a set of learning tools (Sanchez-Villalon et al, 2007c) such as the AWLA writing learning appliance and the WebWriter2.0 tool for the task editor and the test editor (Fig. 2).

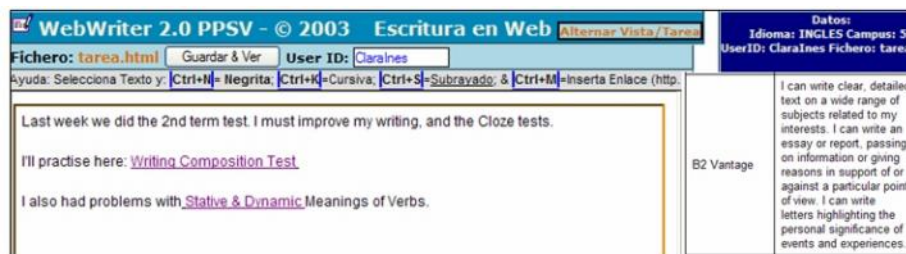


Fig. 2. WebWriter 2.0 to edit learning plans and write tasks and activities.

The AIOLE eDossier

This integration in AIOLE includes the ELP services based on the learning design standardized by the descriptors and levels developed by the linguistic authority of the CEFR (2001). It can be of help simultaneously for the learner, used as evidence in the academic area, for the teacher, to follow-up the language learning process, and in the labour world for the manager of human resources to ultimately value the suitability of a user for a working position that needs certain levels of knowledge and abilities in foreign languages. The integration with AIOLE tools provides the ePortfolio with the following features:

- The learners can *collect* the elements developed throughout their language learning process with AIOLE, mainly the texts written with AWLA writing learning appliance, and the tests done with the WriteOnLines facility, which respectively show the writing and assessment experience in the target foreign language. They can copy them as links on the Web to later paste them in their eDossier.
- They can *upload* any other multimedia element with the file manager facilities. They can copy their URL address to later paste them in their eDossier as a visual reference or as a link.
- The Task edition facility with WebWriter 2.0 allows both the tutor and the learner to design the learning with lesson *plans* and learning *objectives* (Fig. 2). A permanent access to the CEFR institutionally-based set of the descriptors and levels of their learning achievements helps them together with the tutor's task-based learning design. It also provides them with the control of the learning. The tutor can have control in the first stages of the learning and of the use of the AIOLE environment, as an intermediate solution leading to the definite learner's autonomy.
- The Europass (Fig. 3) and the Linguistic Biography help the learner keep reflecting on the evolution of their learning and the ability to edit them gives them control over the report of their learning.
- WebWriter 2.0 allows the permanently flexible, updatable *edition* of the Europass (Fig. 3) and the eDossier (Fig. 4) from the ELP Europass and Dossier Template documents and the *publication* of the learners' achievements on the Web.

All this provides an always available, lifelong updatable version of the learners' ePortfolio, following the European Language Portfolio standards in a transparent, coherent, easy-to-use, HTML/RTF-based interoperable version of the report of their learning.

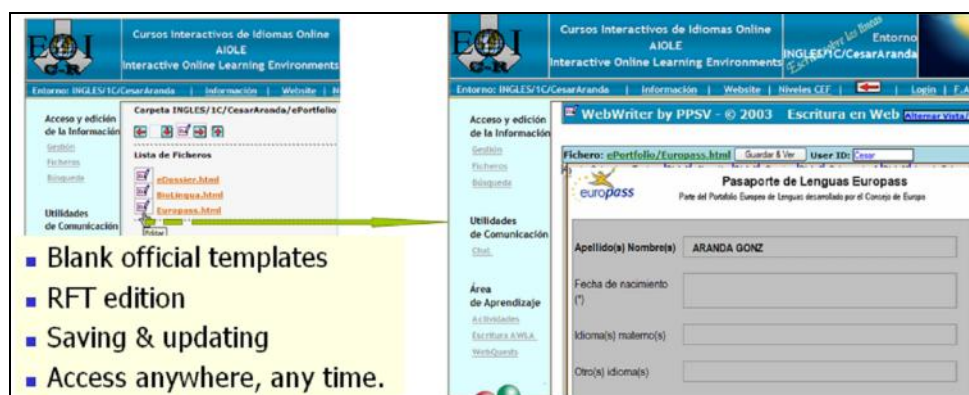


Fig. 3. WebWriter 2.0 to edit and update the Europass (with features).

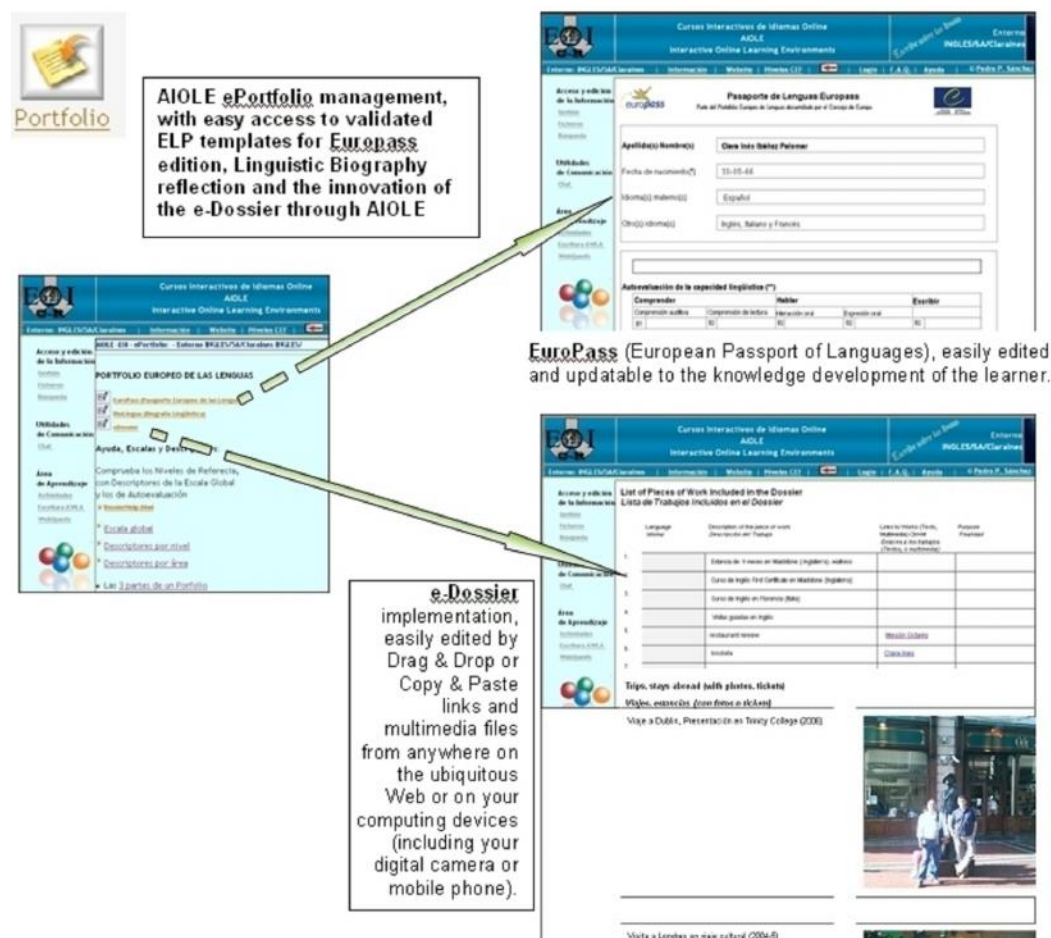


Fig. 4. ePortfolio in AIOLE with access to the Europass and eDossier

The eDossier has been used since February 2007 by 10 students at the Basic Level and 5 students at the Proficiency Level. Some have made use of visual files, consisting of images of scanned documents and photographs. However, most of them mainly used only textual descriptions and links to access the original files published on the Web. By reporting their URL address they can easily show their achievements in the learning and use of a foreign language, following the standards and requirements of the European Language Portfolio.

Conclusion

eLearning has shifted from the distributions of learning contents mainly achieved by using LMS systems towards the use of online learning environments, where the provision of learning resources and communicative, interactive services is crucial. In language learning, these resources are mainly concerned with the development of the communicative skills. Writing is one of these and one of the new facilities the Web 2.0 offers. With AIOLE, supported with the appropriate frameworks (such as PLE, CEFR and ELP), both tutors and learners can design learning plans, tasks and activities, and organise them in standardised electronic portfolios. The aim of this paper has been to report the experience of extending the ePortfolio into the edition of an online eDossier, with multimedia and hypertextual information as evidence of their learning, easily reportable as a URL address.

Further use and analysis will be undertaken in the near future. Additional facilities for other Europass documents, such as the Europass CV, and the Europass Diploma Supplement, will be implemented in AIOLE.

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OUR JOURNEY TOWARD A NEXT-GENERATION DIGITAL PORTFOLIO PRODUCT

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Abstract: Are assessment-, development- and showcase Portfolios really that different, or can a system be created that integrates these functions for the benefit of all stakeholders?

Keywords: Winvision product software Web 2.0

Introduction

When an educational organization wants to implement an ePortfolio, a large number of complex choices need to be made. For example: will students be free to design their own portfolio from scratch, or will the system provide a structure to fill in? When associating competences with a piece of evidence, do they enter these themselves or do they need to be selected from a database of standard competences? Will the assessor provide a direct assessment on competences, or will assessment be done on criteria with the system computing the resulting competence status?

Also, when an organization is already working with paper-based portfolios, a lot of work has often gone into the design of the system, and it is desirable if the way of working can be preserved in the new digital system. Clearly, this demands great flexibility on the part of the digital system.

This paper looks at the development of a next-generation ePortfolio system called the Winvision Digital Portfolio 3.0. Rather than being a fixed application, it allows extensive customization of the portfolio, its contents and the processes in it, so that an organization can have the best of both 'build' and 'buy' options: low cost, low risk, a short deployment time and a good match between the software and the people and processes of the organization. Obviously, this has not been an easy task, and it is hoped that sharing some of the challenges that were encountered will aid in understanding what it takes to implement an ePortfolio solution.

What is Microsoft SharePoint?

Now in its third version, SharePoint 2007 is Microsoft's solution for building portals, intranets, learning environments and websites. It is not just a program you can run (on a server) but also a platform on top of which custom software can be built.

One feature which was pioneered in the '2003' edition is the 'webpart': a small program that lives in its own rectangle on a webpage, and which can be drag-and-dropped there by the end-user. In this way, lecturers, students and other users can design their own websites (including features like blogs and wikis) without having to learn HTML or programming.

There are two main versions of SharePoint: the basic collaboration features come in Windows SharePoint Services (WSS) which is free with Windows Server 2003, and Microsoft Office SharePoint Server (MOSS). The latter offers extra functions such as enterprise search, advanced content management, portal management, etc but requires a license fee. The Winvision Digital Portfolio 3.0 is built on WSS.

The start of our journey

Winvision has been a supplier of Digital Portfolio software since 2004, when a portfolio was implemented for Hogeschool INHOLLAND in the Netherlands. This portfolio, and its successors 'DPF 2.0, 2.1, 2.2 and 2.3', were based on the Microsoft SharePoint 2003 platform, a powerful system for creating websites and portals for collaboration in larger organizations (for more information on SharePoint, see the sidebar or the Microsoft SharePoint website [1, Microsoft, 2007]).

In 2006, it became clear that not only the Portfolio concept had evolved significantly, the next version of the SharePoint system was also around the corner. This prompted Winvision to take a fresh look at the market, the technology and the educational research, gathering the knowledge that would form the basis for version 3.0.

What is an ePortfolio?

When taking our fresh look, we encountered a great number of different ways of looking at portfolio-learning, its goals and benefits. A number of these are illustrated in the diagram below.



Let's examine these different ways of looking at ePortfolios.

A way to present yourself, telling your own story

One of the leading thinkers on ePortfolios, Dr. Helen Barrett, sees a strong relation between Digital Storytelling and ePortfolios [2, H. Barrett 2006]. The premise is that when a learner tells the story of a learning experience, or of his or her life, 'deep' learning takes place, and video, blogs, wikis and websites are considered to be powerful ways to facilitate this.

A tool for assessment of student competences

ePortfolios are also seen as a way to assess the attainment of standards. After the student submits evidence in a certain form, the assessor can determine and store a certain competence-level. Sometimes this can be judged based on the materials alone, sometimes the assessor also has observed the behavior of the student first-hand.

A tool and file-format to help transitions to other institutes

An ePortfolio can also be seen as primarily a structured (XML) file that contains all information that is needed for the easy transition of a student or worker from one organization to another. In other words, an “ultra-CV”. In the software industry, the IMS consortium (and related, regional organizations) plays a major role in this by creating the ePortfolio XML specification. In their Best Practice guide [3, IMS Global Learning Consortium ePortfolio Best Practice guide], IMS recognizes these types of portfolios: Assessment ePortfolios, Presentation ePortfolios, Learning ePortfolios, Personal Development ePortfolios, Multiple Owner ePortfolios and Working ePortfolios. We were happy to see that a) others also recognized that the term ePortfolio has so many meanings and b) all of these meanings were considered in the drafting of the standard.

A way to facilitate coaching by providing insight into the learner

When an ePortfolio contains a set of personal information such as interests, work experience, affiliations, qualifications, etcetera, along with the student’s the Personal Development Plan, current competency status, and all the learning products that have been created up to a certain point, there is no doubt that this is a valuable resource for a coach. In such an ePortfolio, the coach can access this information in real-time, and quickly form a picture of areas in which the student could use guidance.

Helping personal development

An ePortfolio can also be seen as a tool that facilitates personal development. Almost every book on ‘success’ emphasizes the need to be clear about your values, goals, talents and weaknesses. And not just know them, but write them down and regularly reflect on them: are you achieving your goals or are you missing the mark? And if the latter, what’s missing?

Just as an example: who hasn’t at one point eaten a good meal at a fine restaurant, only to remember (just after deserts) that you are, in fact, on a diet?

An ePortfolio can not only provide a place to store these goals and reflections on them, it can also make them available to your coach and to others in the community of the student. The premise (and paradox) is that personal growth is easier done together with others.

A tool for networking and collaborative learning

Using an ePortfolio, a student can easily put her learning results on-line for others to review and give feedback on. This facilitates collaborative learning and the formation of social networks of people with similar skills, experiences and interests.

A note of concern

When there is such a diverse set of goals and stakeholders, complexity will arise, and there is bound to be some confusion. The following paragraphs from the site of Dr. Barrett struck a chord [4, H. Barrett, 2004].

Barton and Collins (1993) stated, “*the first and most significant act of portfolio preparation is the decision of the purposes for the portfolio*” (p. 203). What are your purposes in creating an electronic portfolio? To support ongoing learning/professional development? To support formative and summative assessment? To support marketing and employment? These are three major purposes for electronic portfolios... and they are all different and require different types of technology tools. A learning portfolio can be supported very nicely with a web log environment ("blogs"), whereas an assessment portfolio that ties artifacts to a set of standards, with feedback or validation, is best implemented through a relational database structure. A marketing or employment portfolio only needs an authoring environment that supports formatting and hyperlinking on a web-based server.

And

I am concerned that in the name of assessment, we are losing a powerful tool to support deep learning. I am concerned that that we are losing the "stories" in ePortfolios in favor of the skills checklists. Portfolios should support an environment of reflection and collaboration. It is a rare system that supports those multiple needs.

At the same time, a system that supports those multiple needs is exactly what we wanted to create, because in our view, only then the full benefits of ePortfolios will become available to all stakeholders. It is desirable if students only have to learn one user-interface to work with different aspects of their portfolio, coaches should not have to browse three systems to learn more about a certain student, and nobody should have to manually copy data between them.

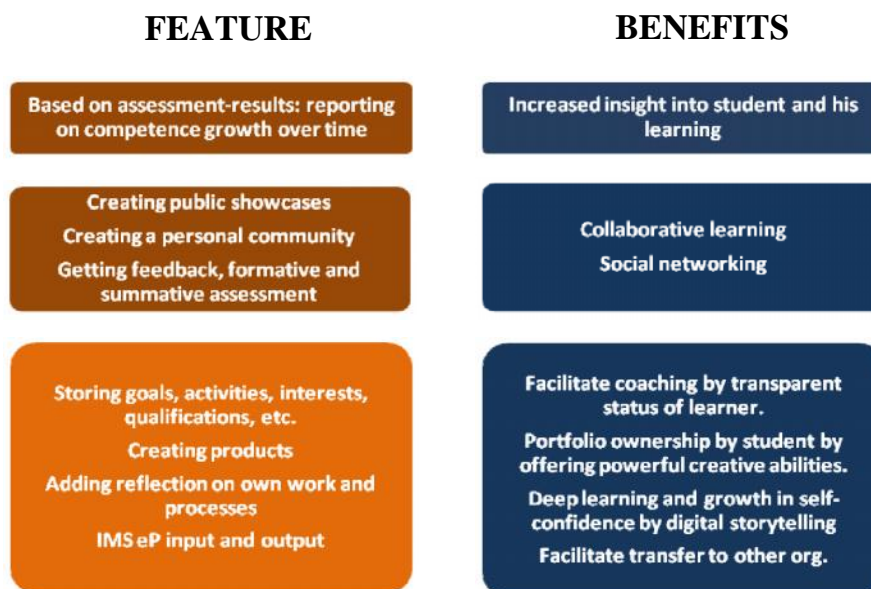
From vision to design

There are many different perspectives and stakeholders around an ePortfolio: coaches, lecturers, students, assessors and school-administrators all have something to gain. For a successful design and implementation, it is imperative that the correct perspective is chosen as primary.

For the development of our next-generation ePortfolio, we chose the student's perspective as primary. It has to be our goal to facilitate the educational and personal development of the student first, before we do anything else. Why? Because if the student isn't helped, or empowered, or made enthusiastic about the system, she isn't going to use it, and the other benefits cannot be achieved.

A student today has a busy schedule, with many conflicting interests and duties: classes to attend, friends to see, exams to prepare for, social and familial issues to solve. If a system does not provide real value in his perception, it will be regarded as (at best) a distraction.

So we have to make the system attractive, valuable and interesting in the eye of the student. We want to do this, first and foremost, by empowering the student to create good looking content and achieve personal growth. In our view, this is where it starts. In other words, there is a structure to the benefits we want to achieve: some cannot be achieved before some others have been. This is illustrated in the following diagram.



The left stack shows how each higher feature builds on the ones below, on the right are some of the benefits that can be achieved.

In this paper we will highlight some interesting design considerations that went into the system, starting with the following sections in which we highlight an aspect of each block.

Level 1: content creation and basic publishing

Obviously it is impossible to prove you are a competent singer by writing an essay on it. In the same way, you cannot prove you are a great writer by showing pictures. In other words: for different competences and skills, some media are better suited than others. Depending on the specific needs and goals of the students, it is important that one or more of these types of content can be created:



Documents

It should be possible to present basic documents such as essays, spreadsheets, letters, analysis results, etcetera as evidence. But Photoshop- and CAD-drawings, molecular modeling files, and other non-text-based content need to be supported as well.



Photo report

The Photo report makes it easy to upload a set of photos, add commentary, titles and tags to them, and to present them on a webpage where they can be viewed and zoomed in on.





Video / Audio report

The Video / audio report is especially suited for proving competences like oral presentation, sports, dance, music, theatrical arts, journalism, and etcetera.



Blog

Originally used as an online diary, the blog (short for web-log) is a good medium to use when the student will present a sequence of notes or short essays, for example in case of updates on an internship. Of course, it can also be used for creative writing, political science and many other courses.



Wiki

Students can use Wikis to present evidence on a subject in many different ways, some of these are:

- to show knowledge of a subject as a network of pages (as opposed to a linear narrative in the conventional 'essay' format),
- as an easy way to create a website on a subject,
- as the result of a collaborative effort in a group project.



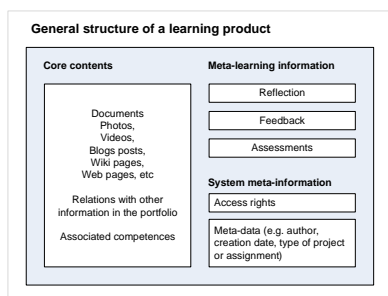
Website

The 'website' learning product type is the most general way to collect and present evidence. The student herself creates the pages that contain the necessary information, and fills them with webparts (see the sidebar on SharePoint) and content. The navigational menu to access these pages is generated automatically.

Structure of a learning product

In our system, a learning product always consists of different parts: the content itself, and meta-information that is related to the learning experience itself. These consist of feedback, reflections and assessments, and other system-level properties.

In the screenshot below, it can be seen that the core contents are accessed from the menu on the left, while the meta-learning information is accessed from the tab-bar.



Level 2: facilitating interaction and showcases



When the student can create content that he or she is proud of, it makes sense to add the next level of functionality.

Using a system based on requests, the student can now ask other students, lecturers and other people to give feedback on the learning product. This can then be given in the form of 'rich text' so that the reviewer can include some markup in the response, and with the possibility of attaching one or more files (for example including corrections to documents in the learning product).

Using another form of request, the student can request an assessment of the content and (optionally) the competences that others around her have observed. This assessment can then be given by her teammates, lecturer, coaches, company mentor or others.

For a complete picture during evaluation, she can also enter a self-assessment.

Formative assessment is intended to give feedback on the student on her level of competence at a given time, as the basis for further improvement in the future. For large projects (for example a graduation) it is therefore desirable if such an assessment can also be received during the course of it, not just at the end. Recognizing the desirability to request and receive a non-final assessment this has also been made possible in our product.

Level 3: tracking progress

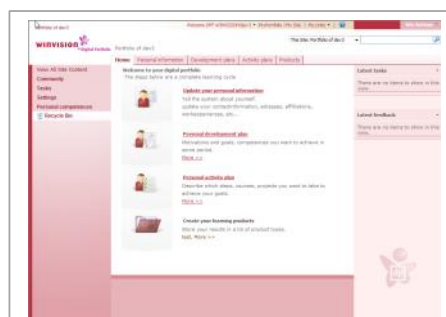
Building on the assessment-results from the previous level, it becomes possible to track growth in competences in time. At the same time, it has also been found that ways of assessment and the reporting desired varies greatly.

To illustrate this: with our customers and prospects, we have seen a simple textual assessment of a learning product at one end of the scale, and the very sophisticated Protocol Portfolio Scoring model [5, Straetmans 2004] at the other. In the latter, competence-level-evaluations are not entered directly by the lecturer or coach, but computed by the system based on indicators, a threshold-value per indicator, the number of works (which need to have a mandated variety) and several other factors.

Recognizing this variety, it is our recommendation to anyone implementing a digital portfolio that the assessment-scoring and -reporting model is made as open and flexible as possible.

Customization

One of the big differences we encountered in existing portfolio systems of our customers (paper-based or electronic) was the level of pre-formatting of the content. For formative assessment and the development portfolio, a free-



The default start-page of DPF 3.0



The same start-page in Edit mode, the 'latest tasks' webpart is being dragged to another location

form structure was preferred. For summative assessment, the contents of the portfolio were prescribed.

We wanted to support both ways of working, since the information and artifacts collected are equally valuable for future viewers of the portfolio (such as employment intermediates). Also, it would lower the cost, and increase the likelihood of a successful adoption because of the single user-interface.

So for content where the focus is on assessment, the institute will carefully craft all content (be it a PDP or the starting point for a certain product), resulting in portfolio-contents which the student only has to fill in. And for content where the focus is on development or presentation, the content of the portfolio would be designed by the students themselves.

Luckily, the SharePoint platform has provided us with very good capabilities to create a system that supports both ways of working.

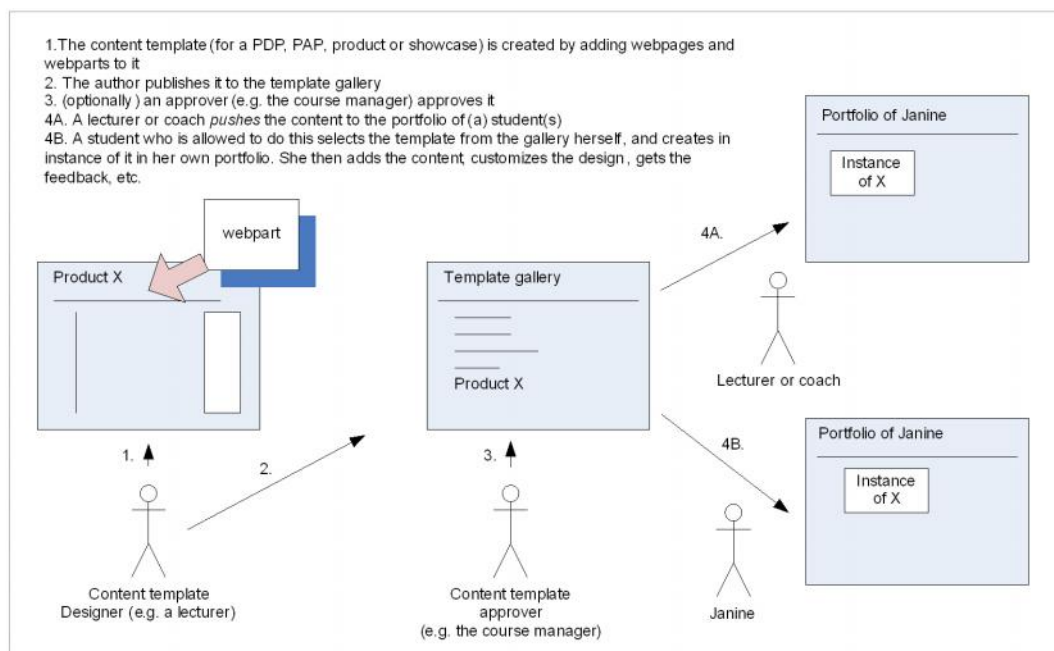
For example, we have seen paper-based portfolios where the PDP was implemented as a complete step-by-step guide towards self-discovery, with extensive questions about experiences, motivations, goals, people that are admired, and etcetera. Such a template would be filled with *online forms*, *form documents*, *instructions* to perform certain exercises, *on-line surveys*, and perhaps *custom-built webparts* as well.

And we've seen PDP's that just have a single webpart that shows a list of *single-line goal-statements*, that too can be created.

Interestingly, this distinction that we found 'in the field', corresponds exactly to the observation Dr. Barrett made in her presentation "Using Wikis for Classroom-Based Assessment and Interactive Student ePortfolios" [6, H. Barrett, 2007] when comparing between using portfolios in 'assessment FOR learning' vs 'assessment OF learning', as shown in the table below.

Assessment FOR learning	Assessment OF learning
Purpose prescribed	Purpose negotiated
Artifacts mandated - scoring for external use	Artifacts chosen - feedback to learner
Organized by teacher	Organized by learner
Summative (Past to present)	Formative (Present to future)
Institution-centered	Student-centered

In other words, as opposed to more fixed variations, in our system the portfolio 'production pipeline' doesn't start with the student, but with the person who designs the templates upon which the portfolio will be built, as illustrated below.



If one were to ask the question ‘who is in control of this ePortfolio’, using this system, the answer is: ‘you decide’. It can be the institute, the student, and both.

Conclusion

By putting the creative process of the student first, and by choosing the powerful platform that is Microsoft SharePoint 2007, we have found that it is indeed possible to build a ‘unified’ portfolio system that enables development-, assessment- and presentation portfolios, as well as the ‘ePortfolio 2.0’ (social) concept.

More information on the Winvision Digital Portfolio 3.0, and its on-line Community of Practice, can be found at the Winvision website [7, Winvision, 2007].

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BEYOND THE BLOG: GETTING THE RIGHT LEVEL OF STRUCTURE IN AN EPORTFOLIO TO SUPPORT LEARNING

Simon Cotterill, Paul Horner, Sue Gill, Tony McDonald, Paul Drummond, David Teasdale, Anne Whitworth, Geoff Hammond (University of Newcastle upon Tyne)

Abstract: There has been rapid growth of freely available blogging and social networking sites on the Internet (as part of the 'Web 2.0' phenomena) and there are indications that these technologies can have benefits for supporting learning [1, 2]. This raises an important question for the ePortfolio community: does the availability of free blogs and social networking sites mean that specialist ePortfolio applications are now redundant? The question touches on challenges around the diverse definitions of what exactly constitutes an ePortfolio, the tensions between positivist and constructionist philosophies [3], and the related question about how much structure should there be in an ePortfolio. This position paper puts forward the argument that there is still a need for some level of structure in most learning contexts and that there is still a requirement for specialist ePortfolio software. This is argued from a Higher Education perspective. The paper also aims to document developments with ePET [4] which aim to integrate blogs and community publishing into the ePortfolio. This has been done with the aim of further supporting customisation to the right level of structure depending on the specific learning context and pedagogic requirements.

Keywords: ePortfolio, blog, community publishing

The ePortfolio is dead...Long live the ePortfolio

The process of producing a portfolio and developing 'portfolio thinking' (reflection, evidencing, PDP etc.) may have strong educational and life-long learning benefits but do we actually need dedicated ePortfolio software to help achieve this if we choose to take an online approach? Clearly not. For example, 'portfolios' can be created with 'simple tools' (word processors, presentation software etc.) and then simply uploaded and published on a Website. Moreover, the huge growth of freely available 'Web 2.0' social publishing sites (blogs, wikis, etc.) might be considered to remove any need for specialist portfolio software altogether.

The ePortfolio is dead...Long live the ePortfolio

There are many varied definitions and typologies of portfolio and ePortfolio, in part reflecting the wide range of purposes for which they are used (reflection, presentation, assessment, sharing and communication etc.). We consider that a level of structure, relating to purpose(s), differentiates ePortfolio from other applications such as blogs and wikis (that is not to say that 'portfolio learning' can't be achieved with unstructured tools). Intrinsic structure in an ePortfolio may be useful to provide 'scaffolding' to support learning pedagogy or meet requirements for assessment. Skill sets, objectives, outcomes and competencies are by definition structured and can be explicitly supported in ePortfolio. Structure is also important in the transfer of portfolio data using recognised interoperability standards (such as IMS LIP, IMS ePortfolio, Europass-CV & HR-XML). These standards, which support structured data, are becoming increasingly important for job/course applications and supporting continuity in life-long learning. Standards commonly used with blogs (especially RSS) are very important for communicating current information but we consider them to be of less relevance in supporting life-long learning.

The required level of structure in an ePortfolio is complex. For example, learner-specified objectives might be recorded into a structured framework to support reflective evidencing [5]. On the other hand, programme-specified objectives and pedagogy can be supported in an unstructured blog where there is a high level of structure extrinsic to the application (e.g. external guidelines for assessed assignments or a tutor's direction for video storytelling). Moreover, the question of structure is deeply embroiled with tensions in the community

regarding constructionist and positivist paradigms for learning. There are policy drivers for greater personalisation and choice for learners [6] which may imply less structure. Ironically though, the move towards more personalised learning pathways [7] and greater employment mobility may actually increase the need to support the flow of more structured qualification and skills information between organisations. One thing is clear though; the level of structure required is very much dependent on the learning context, pedagogic requirements and the individual learner needs. Based on this, this paper illustrates the way in which we are trying to address these requirements for varying levels of structure in one particular ePortfolio application.

ePET Portfolio

We developed the ePET portfolio to be highly customisable on an institution and programme basis so that it could be configured to support a diverse range of pedagogic requirements [8,9,10]. Access to information is learner-centred but the structure of the portfolio (portfolio tools, terminology, and skill sets) are determined at the programme level. Compared to other ePortfolios, ePET was at the more structured end of the spectrum. However, we have now introduced the option for greater personalisation and unstructured blogs and community spaces *within* the ePortfolio framework and content management system. The blog was first introduced to support learners in Speech & Language Sciences in 2005 [11], where some pre-specified blog categories (inter-professional learning and dysphagia) were included to support curricula requirements. Since then the blog has been significantly extended as described below.

An integrated Blog for Learning

We have designed a blog and community spaces with explicit support for learning and CPD which is integrated into the ePortfolio. In addition to the standard features available in most generic blogs and social networking sites the following have been developed:

- Blog integration with course/CPD skill sets and learning context,
- Blog integration with ePortfolio for reflective evidencing of skills/learning outcomes,
- Pre-specified blog categories (in addition to personal ones) to help ‘scaffold’ learning for specific student programmes & CPD schemes,
- Support for both assigned and user-initiated learning communities,
- Support for both ‘open’ and ‘closed’ learning communities,
- User control of access to their blog entries at private, community, institution and public levels,
- Integration with ePortfolio tools for assessment (where appropriate).

Integrating skills and learning outcomes

The blog is integrated with the ePET portfolio and draws on skill sets and terminology that can be customised at the programme level. This aims to ensure that the blog can be more readily embedded within the learner’s context. For example, depending on the context a programme (or CPD scheme) skills might be labelled as ‘learning outcomes’, ‘objectives’, ‘competencies’ etc. After creating a blog entry the learner has the option of linking it with one or more skills (Figure 1.). This has been designed so that blogged achievements can be linked with particular skill(s) in the learner’s ePortfolio and can also maintain the learner’s awareness and focus on the learning outcomes / skills. For example, programme leaders might design skill sets around transferable skills linked to ‘employability’ in a less-vocational programme or professional

skills/outcomes in a more vocational one. It is also intended to support user-specified learning outcomes within this framework in the near future.

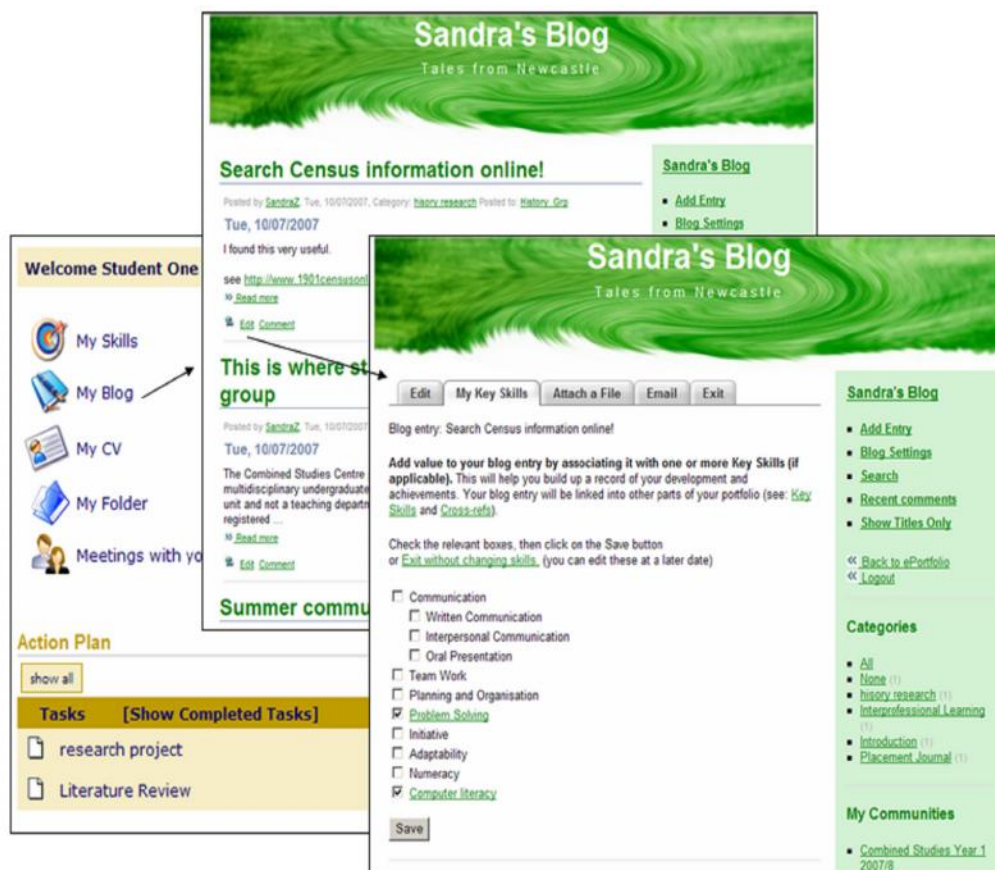


Fig. 1. Integration of skill sets in the blog

Integrating blog entries with ePortfolio

When a learner links a blog entry with a skill (Figure 1) this automatically generates a cross-reference with the skill so that the record will be included in the evidence section of the 'My Skills' tool³⁴ in the portfolio. Clicking on the skill will take the learner to the appropriate section of 'My Skills' (Figure 2). The cross-reference can be enriched by the learner who can specify how the achievement described in the blog entry relates to the particular skill with the aim of encouraging and demonstrating 'meta cognition'

³⁴ Tool names are configurable at the programme level to fit in with the learning context. e.g. it might be called 'My Skills', 'My Learning Outcomes', 'My Objectives', 'My Evidence' or any other label.

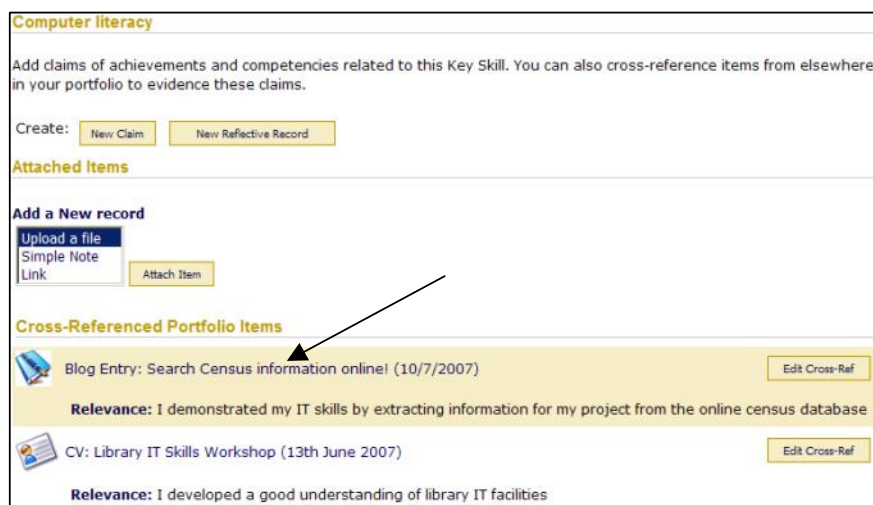


Fig. 2. A blog entry is automatically cross-referenced with a skill

Pre-specifying blog categories

In common with most other blogging software, learners can create their own categories against which they can classify blog entries. However, we have added the facility for programme leaders to pre-specify categories which are of significance to learners studying specific curricula (Figure 3).



Fig. 3. Both learner and programme-specified blog categories are supported

In addition, when learning communities are created, the initiator (student or staff) can pre-specify categories for members posting blog entries to that community. The facility to pre-specify programme and community-specific categories is intended to provide some minimal 'scaffolding' in an otherwise unstructured environment. It does not diminish from the learners capacity to generate their own personal categories but will hopefully prompt recording and reflecting on achievements related to important learning objectives or community goals.

Programme-specific categories in the blog may also have significance in assessment. For example, blog entries for a specific category can automatically be viewed in an assessed section of the portfolio (unless access is set to private). The assessed section may include extended guidance of what is required for the assessment in relation to the category and space to summarise personal development in this area and upload other pertinent information.

Community Publishing

Support for both assigned and user-initiated learning communities has been included in attempt to harness the ‘power’ of social networking *for learning* and other community objectives. Typically a student’s primary community would be one which related to their programme, stage and the academic year. In addition there may be communities relating to modules, seminar groups etc. The aim here is to promote ‘safe’ environments in which learners can interact with others at the same level of development and with similar learning objectives – without the potential for external ‘spamming’ or exposure to the blogs from the previous academic year (unless educationally desirable).

As well as communities to which learners are assigned there is also the facility for user-initiated communities which cross traditional boundaries of course/discipline, year-group, student/ staff roles and organisation. The communities may be ‘open’ (to students and/or staff to join) or ‘closed’ (limited to a managed and defined membership e.g. communities of practice which are commercially /managerially sensitive).



Users control access to their blog entries; with publishing at private, community, institution and public levels. By default blog entries will be included in a user’s primary community and only accessed by members of that community. There may be situations where public blogging with open access on the Internet is problematic e.g. inappropriate or defamatory blogs about organisations by students on placements or researchers inadvertently blogging sensitive information which compromises IPR of the University or their sponsoring organisation. These may be training issues and may still occur on external public blogs. However, these problems are probably less likely to occur if by default access to blog entries is limited to a defined community.

Conclusions

In this short paper we stating the position that varying levels of structure in ePortfolios can support learning and it is this structure (according to purpose(s) and context) that in part differentiates ePortfolio from ‘generic’ Web 2.0 tools. In arguing this case we are presenting our ‘work in progress’, illustrating how we have further extended customisation of ePET to support a range of structured and unstructured portfolio tools with *integrated* blogging and community publishing tools explicitly designed to support learning.

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A MULTI-AGENCY APPROACH TO DEVELOPING THE NORTHERN IRELAND TEACHER E-PORTFOLIO

Victor McNair (*University of Ulster*)

Introduction

In spring 2006, the Department of Education for Northern Ireland, the University Council for the Education of Teachers in Northern Ireland (UCETNI), the Regional Training Unit (RTU) and the General Teaching Council for Northern Ireland (GTCNI) established Working Group to develop the underpinning principles, specification and concepts of a career-long and career-wide teacher e-portfolio (NITe-P). The Working Group, comprised of representatives of all the partners in teacher education, based its work on the Northern Ireland Teaching Competences and the regional version of the National Standards for Headship (leadership development being viewed as an essential part of teacher lifelong learning). This paper reports on these developments and will show how NITe-P-based learning is creating new opportunities for greater coherence, depth and consistency in the way teachers select, reflect and present their professional development. It will also outline the challenges in acceptance, assessment and unity among all the agencies responsible for professional support and learning. Drawing on an evaluation of the University of Ulster open source Professional Development System (PDSys) and its use among PGCE student teachers, the paper will show how these students have attempted to match their professional development needs with their classroom and professional practice. At this early point in the cultural acceptance of e-portfolios as a professional tool, the ambiguities surrounding e-portfolio-based reflective practice will be highlighted. The implications for teacher learning and for those organisations responsible for teacher development will be outlined.

The NITe-P is part of an overall Information and Communications Technology (ICT) strategy, entitled ‘*emPowering Schools*’ (<http://www.empoweringschools.com/>) and elsewhere, the author has explained how this strategy has begun to facilitate and drive teacher professional development and lifelong learning (McNair and Marshall, 2006). As part of its vision for ‘*system-wide embedding of ICT into practice*’ (Anderson and Stewart, 2005) the long-term goal of the project will be to embed NITe-P within the Northern Ireland Managed Service for ICT through its management organisation ‘Classroom 2000’ (C2k).

Teacher Education in Northern Ireland

Figure one illustrates the relationship between the phases of teacher lifelong learning, the key assessment activities undertaken and the support agencies primarily responsible at each phase. For the purposes of this paper, teachers’ previous, extra-curricular and non-career-based learning are not included, although it is acknowledged that they are important factors in all lifelong learning. Four agencies are responsible for professional development, each with differing roles. For example, Higher Education Institutions (HEIs) and RTU tend to have an accrediting role while schools and Curriculum Advisory and Support Services (CASS) almost exclusively provide support that arises out of individuals’ and schools’ needs. All, however, use a range of assessment instruments including portfolio, action research, practical tasks and essay-based assignments, usually within a culture of reflective practice.

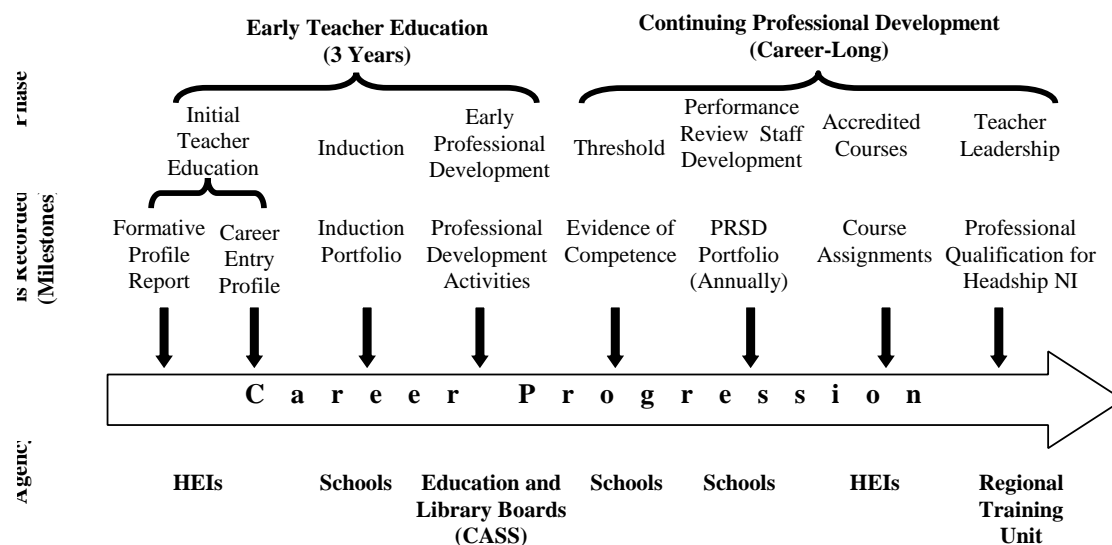


Fig. 1. Northern Ireland's Multi-Agency Career Progression

Furthermore, there are five main HEI providers and five Education and Library Board CASS³⁵ providers although all teacher education is overseen by the Education and Training Inspectorate (ETI) on behalf of the Department of Education. Currently, Northern Ireland faces several challenges raised by this diversity of support. Moor *et al.*, (2006) suggest that such diversity can lead to discontinuity of practice and Moran *et al.*, (1999) highlight the plight of beginning teachers because of this discontinuity. The Department of Education have also argued for greater coherence between the phases and support providers (DE, 2004:48). The term 'Lead Agency' (Figure one) describes how that agency's primary responsibility in partnership with the other providers.

However, in the example of Initial Teacher Education (ITE) while all HEIs use Formative and Career Entry Profiling, as summative statements of the their assessment of student teachers based on each student's reflections on practice, there is little common agreement among the partners about how the documents are best developed and used to support beginning teachers in the transition from ITE to Induction. This divergence in practice is highlighted by Moran *et al.* (*ibid.*) as a contributing factor to Induction difficulties among beginning teachers. While support in Early Professional Development (EPD) is shared between schools and CASS, weak links in support provision have been identified by ETI that can reduce "*continuity and progression in professional development*" (DE 2005: 34). The major challenge for the NITe-P therefore is to create common e-portfolio processes around each professional development activity, preferably within one hosted area. Such commonality would allow organisations to maintain their disparate practice while making it possible, for example, for the outcomes of one phase to initiate the activities of another. The common processes would also lead to standardisation of support materials and the merging of practice in the development of support services, particularly in using similar forms of multimedia evidence in similar ways.

A brief outline of the NITe-P development process

The first major task of the Working Group was to agree a set of common principles for development. These agreed principles are:

³⁵ Education and Library Boards and Regional Training Unit will merge under the Education and Skills Authority, proposed for April 2008.

1. The NITe-P will be based on the GTCNI teaching competences and when appropriate, the National Standards for Headship for Northern Ireland (NSHNI);
2. The type of evidence and the use to which it can be put will to be agreed across the whole profession.
3. Ownership of all e-portfolio content resides with the individual user throughout his/her career.
4. Each organisation will ensure that its e-portfolio software solution will conform to the NITe-P specification.
5. The implementation of the process is based on partnerships among all stakeholders so that professional development is a commonly understood activity.

The next major task was to design a format that would not significantly change the existing professional development milestones while allowing organisations to procure their own software solution if they so wish. Figure two illustrates how the milestones have been linked to sections of the NITe-P.

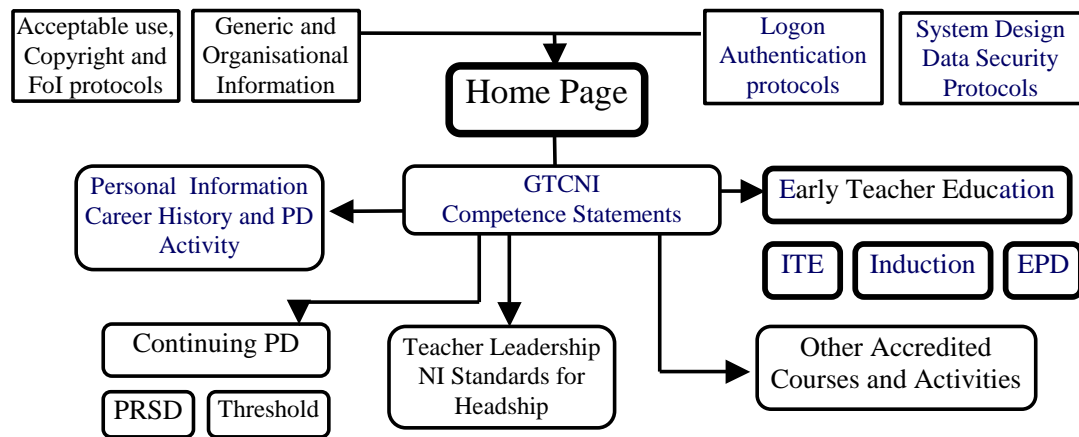


Fig. 2. Schematic Layout of the NITe-P

The rationale for this design is twofold. It was not within the brief of the working group to change the milestones and it was (and still is) believed that as the NITe-P changes the way teachers collect, reflect, select and present the outcomes of their existing activities, such changes constituted a major cultural step forward for all teachers. For example, the NITe-P will contain the professional and technical information owners will need to compile evidence of their learning and hence, providers will be able to see this information also. Therefore, progression from one stage to another should be more readily addressed both by the owner and by the viewer of the presented work. Figure three illustrates how the NITe-P can also allow these milestones to be approached in a range of ways. Its accommodation of multimedia-rich content has created a corresponding need for all support personnel (teachers, CASS staff, HEI and RTU tutors) to accept e-portfolios as a new form of evidence of professional learning. The NITe-P has started a process of merging content, unifying data gathering processes and the corresponding support procedures of all the agencies involved. Looking to the future, the specification will need to be as interoperable as possible, given increased movement of the teaching workforce between sections of the UK and Europe. The NITe-P does, however, conform to Jones' (2007) outline of Becta's four modes of e-portfolio usage (assessment, presentation, learning and transition), and provides a means of presenting student teacher

assessments while the multi-agency approach supports transition across all phases of teacher education. However, interoperability with systems outside NI remains a challenge. Figure three illustrates how teachers, when using the NITe-P for their professional development, can *collect* and accumulate a range of data about their teaching, can then *reflect* on its relevance to the professional milestone appropriate to their situation, *select* and *present* that data as evidence of their teaching competence and allow the others access to view the presentation.

Piloting the NITe-P process: student and tutor views

At the time of writing, the NITe-P is being developed by converting University of Ulster PDSystem open source software (<http://foss.ulster.ac.uk/>) and trials have been planned across

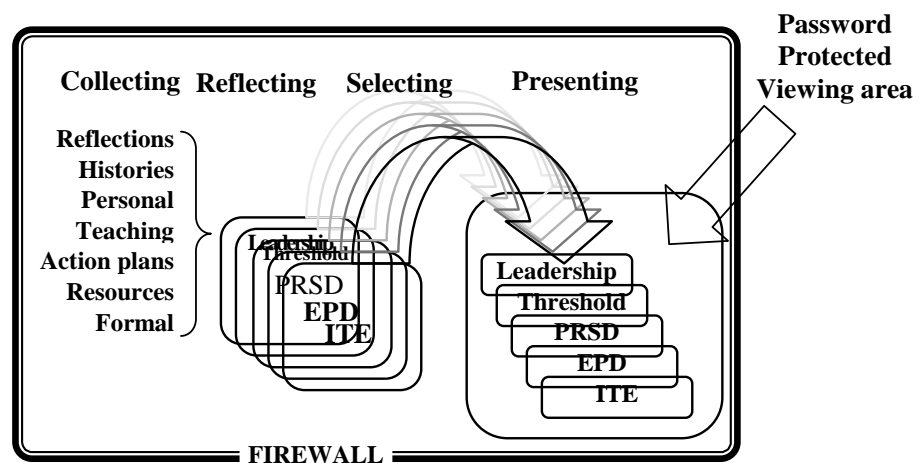


Fig. 3. An Illustration of the multipl 1

the majority of teacher education phases for September 2007. A pilot study, undertaken between September 2006 and June 2007 has established the appropriateness of NITe-P-based professional development as a catalyst for deeper analysis of teacher learning through the presentation of multimedia evidence, enhanced professional dialogue and deeper reflection. Thirty students (24 Physical Education and six technology and design) were trained in the application and use of the system and were instructed about how to adopt it for presentation of their formative profile report (FPR) at the mid stage in their PGCE year. The smaller technology and design cohort were then asked to use the system to present their Career Entry Profile (CEP) at the end of the PGCE year (the larger group no longer being accessible to the author). Three principal methods were employed to gather data: firstly, questionnaires with both quantitative and qualitative (free text) response opportunities. These were analysed and general themes drawn from the data, which were in turn used to identify issues for the second phase of the evaluation, focus group interviews. Student samples for these focus groups were selected by each tutor and the emerging data enabled the researcher to add deeper meaning to the questionnaire responses. Finally, an analysis of the content of student presentations was undertaken to evaluate the validity of the claims made by students and also to determine the professional relevance of the range and nature of the student presentations. Anonymity was guaranteed on all data.

While the findings convey a mixed response, 77% of students reported that the activity involved strong evaluation, and that it allowed them to focus on teacher competences with benefits to their future development (50%). Although the majority of students (64%) used the PDS to present evaluations of teaching they had previously completed, only 23% viewed this as a distraction to their teaching. The data also show that major challenges remain. Students'

questioned its usefulness and purpose and commented on the time needed to complete the FPR, in some cases, given that there was an existing paper-based format. Other comments included issues such as; “[The] *difficult interface meant it was sometimes fiddly and time consuming*” and the infrequent use led to problems; “*Not using it regularly enough to build up a good e-portfolio*”. Positive comments included the potential to; “*Set goals for future development...as your career develops*” and to “*...have all the relevant information remaining to your career in the same place*”. One student recognised the long-term benefit; “[the e-portfolio is] *accessible from anywhere format common and recognisable for all teachers*” while another stated those long-term benefits more personally; “[it allows me to] *refer back to it and see if my professional development is progressing*”. Tutors reported generally positive views on the proposals for the NITe-P. For example, when asked about its design and potential benefits, responses included;

“Organising/ structuring /building a continuous /joined up profile”.

“Reflection on practice”

“Could have great potential for encouraging increasing high quality reflective work. Also, a wonderful way to store quality work (evidence) of competence”.

Tutors were also mindful of the dangers of the process of completing the NITe-P being time consuming, complex and duplicating in its use and scope, as one tutor suggested, the implementation needs to be characterised by; “*careful and enthusiastic delivery with supportive technology to ensure value (+purpose)(sic) is clear and apparent to students*”.

Discussion

Among the many challenges facing all e-portfolio promoters, two are raised in this paper, namely, how multi-agency professional development needs to change, and the practical concerns of users (time, relevance and complexity have been highlighted above). In relation to the multi-agency policy agenda, there are many versions of the nature and purpose of e-portfolios making communication of the nature and purpose of the NITe-P open to confusion. The Working Group has purposely narrowed the NITe-P focus to address teachers’ professional development concerns although it is acknowledged that users may want to broaden its purpose. The rationale for the narrow focus is to enculturate e-portfolio use in teacher education and while the ubiquitous use of social networking software may support this enculturation, one step at a time seems wise. Another policy issue is that of the process by which students and teachers engage in reflection within a multi-media forum. It will be important for all teachers to agree on how the range of media are used for evaluation of learning and for assessment. It will also be important to avoid the ‘warehouse’ effect, where owners simply fill their presented work with a wide range of files on the assumption that the viewer will sift through the information to glean evidence of professional learning. Proper collection, selection, reflection and presentation of information *must* be a professional expectation and therefore needs to be taught. In relation to the practical considerations of users, the PDSsystem changed the process by which the students involved recorded and reported their professional development. For example, For FPR and CEP reporting, students used a range of multi-media formats including video, graphic, scanned and Word files, as well as links to other sources. This available range of evidence formats raises the issue of the asynchronous nature of evidence. Whereas, with the paper-based versions of the FPR and CEP, students tended to reflect at the time of writing the paper-based documents, in contrast, the expectation created by the availability of other forms of evidence in the NITe-P means that students need to think of these assessment points in advance, and consider the breadth of evidence they provide. It is crucial that all opportunities are taken to avoid the dangers that Spendlove and Hopper (2006: 188) warn against, that of e-portfolios becoming “*as contrived and fabricated as standard portfolios*”. The opportunity exists in Northern Ireland, as it does in many other countries, to ensure that this does not happen.

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PREPARING ARTS LEADERS IN 21ST CENTURY SKILLS: A CASE STUDY FOR THE EPORTFOLIO PROJECT IN THE ARTS AND ADMINISTRATION PROGRAM AT THE UNIVERSITY OF OREGON

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Abstract: The ePortfolio project at the University of Oregon began in the Arts and Administration Program in the School of Architecture and Allied Arts in 2005. The Arts Management (Cultural Management) field is experiencing a generational shift, which will have significant repercussions for the future of the nonprofit arts sector in the United States (Dewey, 2004). Founders will be retiring in startling numbers over the next decade, making the preparation of the next generation of arts managers critical (Saunders, 2006). In recognition of the need to prepare arts leaders to bring the nonprofit arts sector in line with technological advances, the ePortfolio project in the Arts and Administration Program represents the only professional preparation program for arts managers in the United States with a focus on technological preparation. This paper describes the process and content of the ePortfolio project, the goals and challenges that are shaping it, and the vision for its unique contribution to not only the arts management field, but ePortfolios for professional schools.

Keywords: professional eportfolios, career preparation, eportfolio functionality, 21stcentury skills, arts managers

Goals

The mission of the ePortfolio project at the University of Oregon states that ePortfolios enhances linkages between professional preparation, academic coursework, and technological applications by supporting students, courses, and project advancement through tutoring, project evaluation, and inter-departmental collaboration.

ePortfolios is a three-year initiative supported through a grant by the University of Oregon Education Technology Committee. Directed by Dr. Lori Hager, professor in the Arts and Administration, ePortfolios connects the professional development graduate curriculum with the Information Design and Multimedia course series. Under the guidance of Eric Schiff, arts management graduate students create and post their ePortfolios at the end of their first year, which they manage throughout their graduate studies.

This initiative supports ePortfolios to expand throughout AAA, offering workshops and tutors to undergraduate and graduate students to design, develop, and publish their ePortfolios in support of internships, research, and career advancement. The purposes of the three year ePortfolio pilot project are:

- Research, design, and plan pilot and model from existing models and in application to the UO environment,
- Provide training to support staff, students, and faculty in eportfolio development,
- Document and evaluate the first term implementation for the purposes of program improvement,
- Pilot an eportfolio site for undergraduate and graduate students in eportfolio development.

Additionally, Year Two and Year Three goals include:

- Mentor additional faculty in the development and use of ePortfolios,
- Continue workshops and trainings in design and applications specific to ePortfolios,
- Expand ePortfolios applications throughout AAA,
- Explore feasibility of expanding ePortfolios to include undergraduate fine and performing arts students and faculty,

Focus: Platform for ePortfolio (web development); Organizational system (PODS);

Interdisciplinarity (ad-hoc group)

Vision: ePortfolios enhances connections with the professional communities, alumni and families through a fully public site that demonstrates the best student work.

Structure

ePortfolios focuses on tools development for students in the professional arts fields in recognition that artists entering the workforce must be conversant in digital technologies and medias, and that universities have a responsibility to prepare artists as entrepreneurs with the ability to communicate, network, and promote their work electronically.

Throughout the year ePortfolio tutors provide support to students during regular lab hours in software, web development, and digital media. In addition to providing one-on-tutoring in design software and web development, ePortfolios works with the new AAA career services center, PODS (Professional Outreach and Development for Students) to offer workshops in designing and developing ePortfolios as part of the Career Intensives Workshops. Student are offered the opportunity to post their ePortfolio on the dedicated server, and access to one-on-one sessions with the ePortfolio tutors for development and maintenance.

The focus on ePortfolios in the Arts and Administration Program is on developing student skill sets in technological application to ensure employability in a tight arts market, and to increase the technological capacity of the arts sector generally. University of Oregon Arts and Administration graduate students are uniquely positioned to be leaders in the arts management field, and are competitively advantaged when seeking employment post graduation in large part because they are required to take a series of “core technology” courses. Adjunct Instructor Eric Schiff leads students through the Information Design and Presentation and Multimedia/Internet media courses, where students are exposed to and develop skill sets in graphic and visual design theory, best practices and application of technology tools and resources, and delivery systems centric to branding and marketing for both non-profit and for-profit arts organizations.

The two Information Design and Presentation courses focus on understanding and applying concepts in organization identity, brand development, and systems for the design and presentation of information across a variety of both print and visual mediums. Students work with industry standard software programs and digital tools to complete projects and outcomes that include creating an organization brand/logo, collateral materials, and a comprehensive set of graphic standards. Designing and producing media for both small and large format advertising is covered with field trips to local print shops and service bureaus as part of the “real world” experience. Learning valuable project organization and management skills are a natural outgrowth of the course requirements and subsequent activities that include developing and applying metrics and standards for review and evaluation.

In the Advanced Information Design and Presentation course, concepts of information architecture and associated design and development processes and issues are introduced and applied through a series of lectures and projects that include creating online multimedia presentations. Project requirements and outcomes include learning best practices and tools for developing and mapping content information hierarchy and navigation, developing systems for

collecting, naming, and culling necessary content assets, story boarding and prototyping presentation design, layout, and formatting.

Provided with a strong foundation of theory, methodology, skill development, and practical application through the two Information Design and Presentation courses, students take the third in the series of “technology core” courses, Multimedia/Internet media. The primary outcome of this course is an ePortfolio, an exit strategy and marketing tool for students post graduation. Students are introduced to ePortfolio theory, concepts, issues, methods, and technologies. They use industry standard software and digital tools to create their portfolios, which are then housed on the University of Oregon servers.

As a result of the ePortfolio initiative, 12 out of 15 AAD graduate students completed their eportfolios during the first year of the project - a 70% improvement over eportfolio completion rate of students the previous year. At the end of the second year, 100% of the students completed and posted their ePortfolios.

Staffing

We selected a very qualified team from a highly skilled pool of applicants. ePortfolio tutors are upper-level Digital Arts students, and have advanced skills in digital editing, design, and website development, (as well as the patience required to teach the tools). The graduate assistant is a second-year master’s student, with experience in project development and graphic and design. Weekly meetings provided opportunities to assess tutor comfort level, skill level, and to address any issues that may have arisen. At the end of each year, the program evaluation report was created, distributed, and posted on the website. These evaluation documents assist in continual program improvement.

Faculty from other programs, including Architecture and Digital Arts were brought in to consult on integrating eportfolios into courses and student academic requirements. During Year One, Digital Arts faculty conducted a daylong intensive as part of a web development courses, and students were required to submit and post their eportfolios. During Year Two, Architecture faculty worked to develop a course gallery site so that students in her studio course could post their project, work collaboratively, and so that projects could be shared with faculty and students. This project gallery function will be included in Year Three pilot web development process.

Web Development

The original ePortfolio website was developed on Word Press, a blog software program, in order to allow a single individual to add content and maintain the website. It also has the capacity for social and professional networking via the blogs, which was an important component. We wanted a means of communicating between courses, and of soliciting evaluative comments from colleagues at peer institutions.

During Year Two, the project conducted an extensive research and development for a comprehensive website and database that would utilize best practices in the ePortfolio fields and extend applications specific to the professional arts. As a result, the new website will function in three ways: full public student professional ePortfolios for career development and professional networking, hybrid public/private space that is course-based where students and faculty post and archive course projects, is searchable, and which has project collaboration functions allowing faculty and students from different departments and disciplines to navigate interdisciplinary virtual environments; and a fully private site to track student learning throughout their academic career for the purposes of assessment, advising, and archiving.

Through the ePortfolio initiative the scope of the project has broadened to include piloting a data driven ePortfolio website and web server using Plone, an open source technology. The intent is to provide a comprehensive network of ePortfolio resources for students, faculty, alumni, community, and professionals to use for their specific need and purpose.

Evaluation

A rigorous program evaluation and documentation plan has been implemented since the project began in September 2005. Each time students access the tutors, students log in, designate the length of the session, what they hope to accomplish, and then at the end of the session, they fill out an evaluation of the session. At the end of the week, each tutor fills out a weekly assessment of their sessions. The evaluations and assessments have given us useful information for setting lab hours and assessing what students are utilizing the tutors to assist with, as well as providing assessments on work stations, tutor expertise, and convenience of lab hours. As a result, we are adapting our training and expectations, and constantly monitoring lab time usage so as to make the most effective use of the tutor and student's time.

During the first term implementation in 2005-2006, we directly assisted 45 students to create and post their ePortfolios on ePortfolio.uoregon.edu. ePortfolio tutors assisted students in 144 tutoring sessions, averaging 2 hours duration, in Dreamweaver, Illustrator, InDesign, Acrobat, FTP, graphic design and digital editing. We began with one faculty and one support staff from Media Services, and expanded to include 2 undergraduate students, 1 graduate student, 1 adjunct instructor, 2 additional AAA faculty, the career services director, as well as faculty and administration across campus. We successfully deployed the project website in 2005 at ePortfolio.uoregon.edu.

Through the ePortfolio process, students develop a strong foundation in design, design tools, and web hierarchy and information architecture. Students used 7 lab hours in web hierarchy and architecture; 21 lab hours in design; 25 lab hours in learning design tools such as Illustrator, InDesign, and Photoshop; and 31.75 lab hours creating, uploading, and updating their ePortfolios. However, students used the majority of the lab tutor sessions to learn and practice web development software tools such as Macromedia Dreamweaver and Fireworks.

Student testimonials

Q: How do you think that having an ePortfolio will help academically and professionally?

“Hopefully, it will enable to get a sneak preview of my work and make them excited enough to call me in for an interview. It might also expose me to people that I am not even aware are looking for someone with my skills and training.”

“Having an e-portfolio helps refine what I want others to see as a part of my portfolio. Academically I have little use for the e-portfolio, other than the learning process of putting one up. But professionally I believe it will help in letting prospective employers have easier access to my portfolio that can be viewed at any time as long as there's an internet connection.”

“Having access to my portfolio via the web is not only a great way to teach web design but also a business tool. At this point, I am newly entering the job market and providing potential employers, schools and friends with an easy way to see my work and progress is vital. The ePortfolio class has been an incredible help and has served as a much needed jumpstart to my portfolio development process.”

Summary

ePortfolios provide students with an artifact storage system for project portfolios, which in the arts will often include visuals, anecdotes, video, and written materials generated from multiple community projects. The eportfolios allow students to manage, represent, and archive multidimensional learning in the arts. We envision incorporating digital storytelling (Barrett) as well as digital performance archive and evaluate multidimensional experience of live community arts events and projects, as well as visual arts events, classes, and arts project development.

We will enrich the ways in which students will be able to access the ePortfolio experience through pre-assessments that identify students for the appropriate “ePortfolio track.” Students will undergo a preliminary assessment relative to technological and design skills. Based on their score, they will be directed through the ePortfolio process in one of three ePortfolio tracks:

- Track 1 - Minimal to no skills – directed to take a tools course, either through Digital Media Tools, a quarter-long digital arts courses, or other,
- Track 2 - Intermediate Skills – ePortfolio workshop,
- Track 3 - Advanced skills – one-on one sessions with the ePortfolio tutors.

The final result of participation is a successful ePortfolio posted and maintained on the new website.

We envision the website as a community bulletin board, a communication hub between pre-professional arts students and the professional community through student eportfolios, internships, and job opportunities, peer networking and peer review; an interdisciplinary communication hub between students and faculty on campus through a project gallery and virtual gallery space where students’ best course work and projects are exhibited and can be searched and archived; as a professional and social network for students post-graduation through enhanced connections with alumni relations and the Career Center.

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A PORTFOLIO FOR A PROJECT-BASED LEARNING TELECOMMUNICATIONS ENGINEERING COURSE: A CASE STUDY

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Abstract: The professional environment of a Telecommunications Engineer requires being a technical contributor in building large and complex systems designed in large teams. This involves fluent capabilities in many general competences such as team work and project execution. This paper presents a curriculum design using project-based learning methodology as a case study for the use of a portfolio. In concrete it motivates the need of a semi-structured reflective portfolio.

Keywords: portfolio, project-based learning, team-work, competences, engineering, ICT, blended learning

Introduction

The work developed by telecommunications engineers has evolved to very complex systems involving many expertise and people to produce a final complex outcome. This work and relations environment is typically organized in projects of multidisciplinary nature. This results in a professional environment where engineers need strong higher-order thinking abilities (analyze, represent, partition, isolate and solve systems and problems) as well as strong interpersonal and communication skills to work effectively in large teams. The importance of these skills were formalized by the industry sector in [1] where a competences framework for ICT curriculum design was proposed. These guidelines were used to build the curriculum design of the Telecommunications Engineering Degree at Universitat Pompeu Fabra (starting the academic year 2004-05) using the project-based learning (PBL) methodology. The PBL methodology centers the learning experience on a project assignment. The students are required to develop a solution for a real project scenario. This imposes them learning the technical competences well enough to apply them in a real environment. When the project is multidisciplinary the student must relate many concepts of different areas to apply them towards a single solution. Multidisciplinary projects are typically large and need to be worked out in teams. Hence the project is an environment to put in practice the technical and general competences integrated together in a real environment where students must take charge of a large task to be accomplished together. Hence it is an excellent framework for a student centric learning experience to acquire the required competences of the Telecommunications Engineering profession. As the project was the tool to articulate the curriculum design of the competences, we are seeing the need of using a portfolio as the tool to provide guidance on the learning process.

The paper presents the curriculum design of one module (unit of courses) as a case study [2]. It describes the important highlights of the implementation and the refinement of the technical competences in this module's framework. Over the last three years, a set of evidences have been consolidated to drive the learning and feedback of the technical competences. More difficult has been to consolidate approaches on the general competences. We are currently initiating the definition of a development portfolio to articulate the development and feedback of these competences. The paper presents first the module's definition and structure and a description of the curriculum framework. Next the design and refinement instruments are discussed along with some environment considerations.

Finally, it summarizes the motivation to build a portfolio and the considerations for choosing a semi-structured development portfolio for each individual module and the current work in progress of the portfolio design to be introduced this incoming year.

Module's Definition and Structure

The telecommunications Engineering degree is a two years degree taken after the three year technical engineering diploma. UPF operates in quarter basis. Each quarter lasts ten weeks of classes and two weeks of exams and evaluation. The first academic year of 60 ECTS is structured in three quarters with two modules of 10 ECTS running in parallel each quarter. The modules are designed as the integration of two traditional courses to address multidisciplinary projects of significant size to be worked out by a team of 5 students. The technical content of the modules are divided in 5-7 different topics (e.g. multidisciplinary chapters) each taught by a different lecturer expert in the topic. The extension of each technical topic varies. Students are assigned a project to be worked out in teams of 4-6 students. Project teams are assigned by the faculty and the same team of students is used for the modules of the same quarter. Hence, the same team members work together solving two projects at the same time. About 50 students course the degree turning into 10 teams all working the *same* project assignment. A team project has a tutor in each module. The role of the tutor is to give feedback on the project progress and team issues. Biweekly tutor sessions (5 per module) are scheduled in the official module's class calendar. The total number of class hours accounts for 30% of the student dedication time being the remaining 70% of the time independent study. The project is the tool to structure most of this independent learning dedication. Classes are divided as plenary (with all students) or seminars (classes with 16-25 students).

Given this general structure each module defines the internal operational rules to implement the assigned technical and general competences as in any course definition. The technical disciplines have reached some consolidation after three years of refinement. However, articulating the learning process of the general competences is still in an inception phase. One of the reasons is the little faculty experience in these subjects as these competences require many new abilities to the faculty. This cultural shift is difficult to take and requires faculty training. This work in progress is part of the process of building this experience tuned to our educational model.

General Competences

The first quarter, as the entrance quarter to the degree, initiates the development of the general competences around five major competences:

1. **Information management.** A good engineer cannot rely only on library and published knowledge in books and scientific publications as the Telecommunications sector evolves at much faster speed than editorial publications. Making available information over the internet is becoming very normal practice. However, the amount of new information on-line is huge and mixed with much irrelevant information from unreliable and not trusted sources. Hence it is of great importance to be able to navigate in this sea of information to find the necessary information in any topic when needed within a reasonable amount of time. How to effectively manage the search and organization of information towards a particular goal is the objective of this competence.
2. **Capacity of analysis and synthesis.** Working towards the solution of a project, students must use many sources and build a coherent solution including many issues addressed correctly. Between so many materials, it is important to understand that is quality that matters and not quantity. This competence focuses on training students to

identify the essence of a topic or situation, and know how to translate this essence in a well structure set of ideas in a concise form.

3. **Decision-making.** Students are not used and try to avoid making decisions. This is particularly true when these decisions have a direct impact in their progress or evaluation. However, the ability of taking the right decisions in critical aspects determines the opportunities of a professional in the work environment. We build a working framework where students need to continuously make decisions. The objective of this competence is to train students in taking right decisions at the right time, make them aware that decisions are everywhere and in everything, and learn the impact and importance of taking decisions as one decision takes the other and a cascaded effect is produced.
4. **Working in a team.** Working well and effectively in a team is an important but complex competence that many people develop with many years of experience. This framework intends to provide a guided environment to initiate the students in this direction.
5. **Ethical commitment.** Ethical principals appear in many of the organizational and professional decisions. The technology sector is a relatively new discipline and many of the references of use and behaviours are still to be defined. This competence intends to introduce general practices in this direction. For example, an important aspect is the appropriate use of information and learning the difference between copying and plagiarizing. The easy availability of the cut-and-paste facilities of information from different sources breaks some of these references. Also, in our framework, the materials involved in the solution of the project are very diverse and can even include project solutions from previous module's editions or even the current work in progress of other teams in the same class. We promote collaboration and the use of reliable sources but the limits of this use must be clearly understood. Furthermore, working in a team requires building a strong sense of commitment towards the team mates in order to contribute in the team progress effectively. Another aspect is the professional commitment when providing cross-evaluations and self-evaluations. All of these situations are normal in the professional environment and they appear in our learning model so students get the experience and correct behavioural habits.

Defining the framework, mechanisms and materials to develop these competences is a refining process that in our case is still evolving. Next we describe our evolution in this direction discussing the important factors and defining the steps planned for the future.

Instruments to Develop the Competences

The curriculum design introduces several instruments to develop these competences but the design is still evolving every year. Initially, the only tool used to drive the **project learning process** and the **team work** were the biweekly tutor sessions designed to emulate real team project meetings. As such, attendance to the meetings were compulsory by all team members and they were required to submit a team project progress report to use as point of discussion in the project meeting (similar to the ones presented in [3]). The project report included the typical information to manage a project: identification of objectives and tasks, temporal planning, assignment of responsibilities and tasks to team members, status report and results of each task in the past period (previous two weeks), and assignment of tasks for the next period and others. Since the project is an umbrella that covers all technical content and involves effective application of general competences, a progress report template that asks reflections at all levels of the execution seemed initially enough to guide the learning process at all levels. However, students take it as a merely assignment to be submitted before going to a special

purpose class as opposed to a practical working document to transfer information and stimulate discussion and suggestions across the team members and with the tutor. Inspiring reflection at this level requires a different thinking and interaction framework. We need a more individual reflective framework to work out these competences. This framework should adjust to the natural way of working of the student so that it does not impose a particular way of working but instead it adds or improves these competences of his work style.

The one-hour tutor session every two weeks is not enough to cover too many issues and the methodological aspects of the learning process is almost always left aside by tutors as priority is given to guide and advance the project progress. Then, it was evident that we had to introduce a complementary framework (as in [4][5]) to emphasize the guidance and training in the working methodology. Our goal is to articulate a reflective and development portfolio supervised by portfolio tutors dedicated to the general competences.

The **information management capabilities** were initially supervised in two main directions. First the tutor had to verify and discuss with students the references included of every single technical report submitted during the quarter. We relied on the content of the project progress reports to guide this process. However, the project reports almost never included information on this respect such as discussion of what sources were used to look for references to solve the assignments, how much dedication was put in the information search, what references were consulted, which ones were neglected and which ones were selected and why. The other way to guide this process was with the revision and subsequent acceptance or rejection of the submissions. Tutors were not supposed to accept deliverables with no references, with incorrect citing editorial format or with only references from non verified-quality sources. The second year a seminar dedicated to information management was introduced and the professor teaching the seminar did review all reports to validate the criteria in the submitted reports. This provided an explicit framework and more visibility to this competence in the entire learning process and the students paid more attention to it. However, it is still evident that several feedback iterations are needed in order for the students to consolidate and mature this ability as a usual professional habit. This information is only available in the elaboration process of the report and only some part can be seen in the final outcome. Hence, we need a tool to guide the process to provide continuous feedback on this competence. The portfolio is an instrument that will help us making explicit a framework for the competences to monitor and to provide continuous feedback on these general competences.

Similar considerations were evident for the **decision-making** and **capacity of analysis and synthesis** competences. Again our initial framework for these competences was the project reports and the intermediate technical submissions. The limited content in the progress reports introduced the same lack of information for guiding the process and development of these competences. In addition, the framework of intermediate technical reports also limits the amount of reasoning one can put if this is supposed to be a well written document. In addition there is an important temporal factor, taking decisions of complex systems involves many interrelation decisions and a decision may impose some constraints for the following ones. Hence, monitoring and guiding the direction of this cascade of decisions can only be done by monitoring the process and hence with a dedicated continuous evaluation of the learning process. Furthermore, the organization decisions are also crucial in the performance of the team and the final quality of the outcome. Again, monitoring in time how decisions are made provide a real learning experience in managing projects. We plan to introduce a reflective section dedicated on analysis, synthesis and taking decisions to monitor these competences. This section will be initially free style as each student may think differently. But the important thing is that we plan to dedicate faculty resources in guiding these areas by explicitly asking the portfolio tutors to dedicate time on these areas. This guidance should result in a better elaboration of the technical outcomes and hence in *better* assimilating *more* technical knowledge.

The **ethical behaviour and commitment** in this open and team-based educational framework is also different. Students must collaborate in teams and the team role is promoted at the same time the individual role is also emphasised. Getting the right balance of these roles is important for the professional maturity. The students promoting too much one or the other can be a problem for a team limiting the team progress. Most of our grades are team based. Hence, even though the competences are not acquired, and in fact are limiting the team performance, these students may be getting the same credit as the others in the team. We do not have enough mechanisms yet to detect and punish undesirable behaviours including lack of participation, respect and commitment to the team. The objective is not to build the mechanisms to detect and punish it but to build the mechanisms to guide and put the pressure to disincentive it to the level of correcting and avoiding it. We are refining the individual evaluation of the team work within the context of the reflective portfolio, considering similar techniques as the ones presented in [6] [7] [8] [9], as an improved tool to monitor the individual student participation and behaviour in the team.

In general, there is still much work to be done in polishing the design instruments of the general competences. So far much more attention was put to the technical competences, and most decisions were taken to build an excellent technical framework. It turns out that some of these decisions complicate enormously the organization, guidance, improvement and evaluation of the general competences. The major important factors are described in the next section. This work intends to refine the framework to maintain the technical quality while acquiring excellent abilities in the described general competences.

Environment Considerations

Faculty profile

The module involves many multidisciplinary topics, and the faculty has been selected as expert of the topic taught. In addition, the project-based methodology requires faculty profiles with project management experience. This results in 5-8 faculty involved in the module combining academia professors and industry professionals. In order to guarantee the integration of the lectures and project definition and execution, all lecturers were also tutors of at least one team project. This translated to 5-8 opinions of very different profiles by nature in the supervision of the same deliverables, processes and competences. Coordinating these opinions towards a common learning (and evaluation) framework is a very difficult coordination task and conceptual challenge. Different profiles and ways of working is an asset to provide different views to students, but there has to be a common guidance framework for students to take as reference in selecting and building their own approach. We are still refining the appropriate roles and responsibility assignments to faculty in this framework. The portfolio is expected to provide a framework for the reflection and development of these important considerations of the educational model.

Technology platform

The use of new technologies in this discipline is normal and both faculty and students would like to have more suitable platforms to have a truly blended learning environment. Right now there is no such platform available. In one site, there are the professional project management tools that are suitable tools to manage real projects. These platforms are not equipped with the appropriate feedback and evaluation channels required for the learning process of an educational project-based learning model. On the other hand, the educational platforms provide a virtual framework to build a class-community and an individual student-professor interrelation. But these do not provide the capabilities to manage, guide and evaluate teams and projects. Moodle is the current platform in use after trying several platforms. However,

moodle still has many shortcomings to support well a project-based and cooperative learning methodology. Added functionality in the electronic platform would highly improve the learning experience and it would permit to concentrate the student-professor face-to-face interaction to more critical higher order thinking skills making more efficient the faculty resources.

Portfolio Design

Our first experience with reflective assignments was initiated last year with a free-style personal journal guided with a set of general questions. It gave useful insight but a more formal framework and faculty resources and attention was needed to better motivate the students to develop it.

The intention is to structure and formalize all materials and evidences in a common portfolio framework to present it to the students in a more formalized way and giving to the reflective sections a privilege position within the portfolio structure even if they remain optional. The real success would be that students participate in these sections because they notice a real improvement in their performance. So our goal is keeping the competences optional instead of making them compulsory. The compulsory sections would remain largely the same to the current module deliverables (with some additional team-work and self- and cross- evaluations). These sections would be the structured part of the initial portfolio design. The introduction of the portfolio provides also a framework to redirect faculty resources for the monitoring and guidance of these student materials. The unstructured part would correspond to the reflective section that will be free-style to keep the freedom of thinking, selecting and organizing ideas and hence promoting creativity, initiative and active learning.

The exact portfolio design is under development. The short-term goal is the portfolio design of the undergraduate PBL modules coordinated by the author. But there is an intention to formally study this topic to define a training framework for a complete project-based learning telecommunications engineering curriculum starting at the undergraduate level but progressively moving to the master and PhD supervising levels.

Conclusions

A curriculum design of the telecommunications engineering based on project-based learning (PBL) is introduced. This methodology encompasses a particular learning framework that becomes an interesting case study to implement the portfolio to guide independent learning. The structure and implementation issues of a particular module (as a group of courses) have been presented to motivate and introduce the need of a semi-structured development portfolio per module. The portfolio is work in progress with a long term objective to define a general training framework to progressively evolve these competences from the undergraduate to master and PhD Telecommunications engineering degrees.

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SINK, SWIM OR DIVE IN? THE EXPERIENCE OF PILOTING AN EPORTFOLIO TOOL IN EMPLOYABILITY AND LIFELONG LEARNING CONTEXTS

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Abstract: In 2006-07, the University of Salford initiated an ePortfolio pilot project that represented an institutional response to strategic objectives as identified in the Learning Technologies and Employability Strategies, both key components of the University's overarching Learning and Teaching Strategy (2005). There was growing interest from academic staff to explore technologies that have potential to support (and consolidate) strategic approaches to lifelong and work-based learning. This interest emerged from their engagement with institutionally led projects and in response to national policy. The case study will explore opportunities, tensions and challenges arising from the project and will make a series of recommendations based on this experience. It will also outline the lessons learned so far and the key issues for Salford as the University moves into the next phase of development.

Keywords: implementation, strategy, ownership

Introduction

Adopting a practitioner perspective, this case study explores the opportunities and challenges arising from piloting an ePortfolio tool at the University of Salford, within three different lifelong learning and employability contexts in higher education. The case study describes the lessons learned so far and identifies some of the key issues to be addressed in the next phase of the project. The case study will:

- describe the impact of national UK higher education policy on strategic approaches to the student experience, lifelong learning and employability at the University of Salford,
- contextualise the subsequent development of our ePortfolio pilot project within this overarching framework by examining the ways in which ePortfolio technologies are implemented in three different discipline and vocational contexts,
- share the experience of selecting and implementing an ePortfolio tool,
- summarise recommendations for those considering introducing specific software to build and publish ePortfolios.

National Context

The National Committee of Inquiry in Higher Education (NCIHE 1997) sought to formulate a strategy for higher education that would contribute to the 'development of a learning society' (NCIHE 1997) and that:

...in the future, competitive advantage for advanced economies will lie in the quality, effectiveness and relevance of their provision for education and training, and the extent of their shared commitment to learning for life. (NCIHE, 1997, para.27)

The term 'knowledge-economy' is used to describe the competitive advantage that can be gained by the effective utilisation of intangible assets such as knowledge, skills and innovative potential (Brinkley 2006). The NCIHE proposed that higher education needed to ensure learners were better equipped to contribute to and benefit from these changes through:

- Provision of higher level work-based learning qualifications,
- Providing opportunities for learners to develop key skills,
- Ensuring learners have experience of the work-place,
- Providing opportunities to develop lifelong learning skills and attitudes.

Nearly ten years on from the NCIHE, The Leitch review (2006) raised concerns that although progress had been made, the UK population was not sufficiently skilled to ensure the future prosperity of the country. The review proposed that skills development should be demand-led, economically valuable and responsive to a changing environment but that responsibility for investment and delivery should be shared between employers and higher education.

Employability and Lifelong Learning at Salford

The University of Salford's response to the changing environment of higher education can be seen through the progress of initiatives designed to embed key skills, implement personal development planning and engage with employers.

The Salford Key Skills Project (1998-2000) established ten discipline based key skills projects. The project initiated wide-ranging practice, such as:

- Introduction of self-assessment tools, such as the key skills self-assessment tool and record,
- Development of new modules such as the Independent Learning module linking experience of a volunteering placement to inform knowledge and understanding of sociological theory and reflective practice,
- Involvement of employers in programme design and assessment.

The subsequent Key Skills Implementation Strategy ensured that key skills would be embedded in the curriculum through a process of curriculum mapping and review at module and programme level. This is a requirement of the Programme Approvals process at Salford.

Since 2001, the Personal Development Planning (PDP) element of the Progress File has provided the driver for many HEI's to implement electronic portfolio systems. The QAA guidelines (2001), which provided the national policy context for these developments, define personal development planning as:

a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development (QAA, 2001, para. 27).

At an institutional level, the Progress Files Implementation Project at Salford (2003 – 2006) established a network of staff and Careers Advisers responsible for implementing processes of PDP. This led to new activities such as:

- the Personal Development Week in the School of Media, Music and Performance which includes workshops from Equity and performer agents,
- development of new modules, such as the Applied Study Skills module in the School of English, Sociology, Politics and Contemporary History,
- Introduction of assessed reflective writing assignments,
- Consolidated models of personal tutoring, supported by planning and recording materials.

Subsequently, the Employability Strategy (2005-2008) continued to support and develop previous work in Key Skills and PDP as well as consolidate work-based learning and work placements. To date, outcomes include:

- The Code of Practice for Work Placements,
- Introduction of a fee-free work placement year,
- Embedding Employability Skills in the Curriculum staff development pack.

In 2007, University was selected by HEFCE to undertake the Employer Engagement project. The project aims to develop a better understanding of what employers want and expect of higher education and to identify processes required for HE to deliver a Workplace Learning strategy. All of these developments are identified and supported within the University's Teaching and Learning Strategy.

Processes of Personal Development Planning (PDP) underpin and support the development of learner employability in each of these contexts but the experience of implementing PDP at Salford is similar to that described in the Universities UK (2003) report on PDP implementation. There are differences in conceptualisation, approach and understanding about whether PDP is seen as a 'holistic/reflective' activity or an activity intended to support particular aspects of learning within modules. Representative Faculty PDP Co-ordinators reported that a lack of clarity about what PDP was in practice, was negatively affecting engagement with PDP in some contexts. The aim of the pilot ePortfolio project, therefore, is to identify whether ePortfolio technologies improve learner engagement with processes of personal development planning.

The University had been engaged in exploratory work into electronic systems to support PDP as early as 2002. Work in this area developed out of the Department for Education and Skills (DfES) funded Salford Key Skills Project and the subsequent Salford Key Skills Implementation Strategy and focussed on key skills profiling and development tools. The Information Systems Institute³⁶ selected a tool developed by another UK Higher Education Institution (HEI) and the School of Leisure, Hospitality and Food Management, developed a personal profiling tool 'in-house'. The School of Nursing was also involved in a national Fund for the Development of Teaching and Learning (FDTL) collaboration, to develop a key skills assessment tool. Sustainability of all of these initiatives presented some obstacles to maintaining student engagement and further development of the initiative.

In 2004, the University expressed a wish for a single, cross – institutional solution with a preference for third-party software and services selected through a tendering process. A proposal and budget was prepared but the project could not proceed because there were lots of competing priorities for funding within the University at that time. The project emerged from separate bids submitted by the Faculty of Health and Social Care and the Faculty of Business, Law and the Built Environment under a recent e-learning project call, and subsequent agreement to adopt a coherent, cross-school University approach which, subsequent to evaluation and review, could form the basis for a University wide model. Therefore, the Salford e-portfolio pilot is co-ordinated at an institutional level by members of staff within the Education Development Unit, and supported by our Information Services Division.

The Pilot Contexts: Contextualising the Development of ePortfolio Pilot Projects

The ePortfolio tool is being trialled in three contexts:

- A group of 50 students in the level 1 Business Skills Module,
- Supporting work placements on three programmes,
- A group of 250 Pre-Registration Diploma Nursing students.

The Business Skills Module was developed through the Key Skills Project. It involves students working in small groups of six or seven. They are given the task of researching one company from a given industrial sector and they are required to keep a paper-based personal

³⁶ The Information Systems Institute was subsumed into Salford Business School in 2005

development Journal (PDJ) and assessment is via a reflective assignment and presentation. The presentation is both peer assessed and assessed by a panel which includes employers.

Salford Business School work-placement students are assessed via a learning log and are expected to write an entry at regular intervals. At the end of the placement they receive an appraisal from their work-place employer.

The School of Nursing has had a paper-based portfolio for a number of years. Maintenance of the portfolio, as evidence of continuing professional development, is mandatory and necessary for periodic nurse registration every three years. The School modified its approach to the portfolio in response to the introduction of PDP in higher education to include personal and educational aspects of a student's development.

In each of these contexts, PDP practice was well established but assessment practices reflect the difficulty described earlier in this case study regarding whether PDP is treated as a 'holistic' activity or embedded within modules. In the Business Skills module students are expected to complete the PDJ but are not penalised if they fail to complete it. They are encouraged to continue with it beyond the level 1 module but very few do. Business work placement students are only expected to use the log in support of their placement year. The Nursing Personal Development Record is a 'requirement' of the programme but it is not subject to assessment.

It was hoped that the introduction of an ePortfolio could improve learner engagement with PDP, in the following ways:

- ePortfolios could provide a more engaging, interactive environment for learners,
- Learner engagement could be monitored by tutors. One tutor commented that this was not a cynical view of monitoring but was intended to provide support for learners,
- A single and common institutionally 'branded' virtual space might help learners (and tutors) to *make sense* of PDP (and related) activities.

The Experience of Selecting and Implementing an ePortfolio Tool

In moving forward on e-portfolios, the University undertook an evaluation and tendering process³⁷. for ePortfolio software and a product called iWebfolio was selected for the pilot. The product is supplied by Nuventive (a Sungard partner) who are providing a hosted service during the pilot. Further to this, the University has been invited to submit a bid to HEFCE, following approval of an expression of interest, to conduct a feasibility study for shared services with the selected software provider.

Requirements included:

- the ability to limit and restrict the functionality of the tool,
- the ability to allow learners full-access to the functionality of the tool, once they were confident in its use,
- a hosted service so that the University would not need to make an investment in hardware and technical support for the pilot phase,
- the opportunity for learners to continue using the tool, beyond the institutional context,
- the ability to download ePortfolios into a simple format, if the pilot did not continue.

To date, the ePortfolio templates for each area of activity have been defined. Business Work Placement students have begun to develop ePortfolios and staff and students in the School of Nursing are receiving training.

³⁷ See Appendix 1 for Product Requirements

Recommendations

As a result of the experience of the pilot project to date, the case study makes the following observations and recommendations.

Developments should be aligned with institutional strategies

The exploration of ePortfolio technologies is identified as a strategic objective within the University's Learning Technologies and Employability Strategies, both of which are key components of the University's overarching Learning and Teaching Strategy (2005). This brings advantages such as participation in key University Groups and Committees and the opportunity to highlight the work with senior colleagues.

Draw on the expertise of existing networks (or communities of practice), who have a history of engagement with related initiatives, for support and participation

The pilot project has been led by staff that are responsible for, and have an interest in, the development of these areas of work. In the Salford Business School, two staff were Key Skills Co-ordinators from 2002 – 2004 and one member of staff is the Faculty PDP Co-ordinator. In the School of Nursing, the project leader has been involved in two ePortfolio projects previously.

Raise awareness of the project amongst all staff as their contribution will inform future developments or implementation

Identify what it is you are aiming to do and how the ePortfolio tool can help you to do it (and keep it simple!)

Some staff expressed concerns about ePortfolio technologies providing a 'one-size fits all' approach to PDP whilst others have expressed the view that an ePortfolio tool can 'stand-in' for structured and supported processes of PDP. For this reason, the authors make a deliberate distinction between:

- the ePortfolio tool
 - The software or environment that enables the creation of ePortfolios
- an ePortfolio template
 - Framework or structure to guide the learner in their reflective and/or portfolio building
- ePortfolio tool functionality
 - What the ePortfolio tool allows the user to do, and how the resulting eportfolio is shared with, and commented on by others
- The ePortfolio produced by the learner

The project has introduced the tool into an existing programme context, directly transferring existing paper-based support materials and frameworks in order to address the core issue of whether or not ePortfolio technologies improve engagement with PDP.

Collaboration and networking are central to development and sustainability

Staff in the Education Development Unit provided expertise in curriculum development and pedagogy. Colleagues in the Information Services Division brought experience of software selection, guidance in learning technologies and ICT training. Project leaders brought the knowledge and experience of their students and previous experience of ePortfolio technologies. Employers have not had a direct involvement in the design and development of the project to

date but this is an aspect of the work that will be considered for the future. PDP Co-ordinators (members of staff in each school who together provide a forum to support implementation of PDP) have provided invaluable opinion and ideas that have informed the development of the project.

When selecting a product for a project with small numbers of students participating, identify how the product or project can be scaled up to meet the needs of the organisation

The selection process aimed to identify a product that could be adapted to a range of different contexts. The approach to ePortfolio templates that iWebfolio adopts allows this but is sufficiently flexible to allow students to create their own using the full functionality of the tool. One of the recommendations arising from this project is to explicitly work with champions as this has helped the implementation process but this creates a tension when considering ‘scaling-up’ the project. Therefore, an issue for the Salford, as we give consideration to the consequences of a roll-out is how to identify new ePortfolio contexts.

Don’t assume that all learners (or tutors) will automatically engage with the environment you provide

Previous experiences with ePortfolio technologies in the School of Nursing, concluded that of the seven factors negatively affecting implementation, four focussed on the lack of support and guidance for tutors and students. Training and support has been an important priority. ICT trainers have worked with Nuventive to adapt user support guides and have designed and delivered training sessions for students and staff.

Key Issues for the Next Stage

Reflecting on the above, key issues for us as we move into the implementation phase therefore include:

- How do we successfully integrate the use of ePortfolios with existing practices? e.g. within the curriculum and/or frameworks of student support and development or with personal tutoring (or both). Should their use be linked to assessment frameworks?
- Integration with related institutional developments to enhance student employability which are beyond the ‘formal curriculum’ and to new initiatives such as employer engagement and delivery of education and training,
- How can we engage students?
- How can we engage staff?
- How can we ensure sustainability over time and identify appropriate levels of investment to extend the project beyond the pilot phase?
- How we maintain and strengthen partnerships both within the University and with external collaborators such as Nuventive?

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Appendix 1: Product Selection Requirements

MR1	The portfolio owner should be able to manipulate and edit text within the ePortfolio, including sifting, selecting or connecting by copying or pasting selected items.
MR2	The product should provide a facility for gathering and storing a range of data types, e.g. text, still images, video clips and audio. Vendors should describe how large artefacts are managed and any effect on storage space.
MR3	The product should enable tutors or Careers Advisers to develop text-based curriculum vitae (CV) templates for a range of purposes and audiences.
MR4	The product should allow programme team members to customise written guidance about PDP that appears within the ePortfolio.
MR5	Portfolio owners should be able to create folders to organise their artefacts and the artefacts should be able to be moved easily from folder to folder.
MR6	Portfolio owners should be able to import, export or reference by hyperlink to other information as evidence, e.g. reflective statements, images etc.
MR7	Portfolio owners should be able to define their own goals, standards, competencies or objectives.
MR8	Tutors should be able to define goals, standards, competencies or objectives for the course of study through the provision of templates or organisational structures.
MR9	The product should be able to switch between locally held data and hosted data as although the data will be vendor hosted initially, we may wish to transfer the data to local servers in a full rollout.
MR10	The portfolio product should support the uploading of portfolios to a website. It should also offer the facility of viewing the portfolio as a website.
MR11	The portfolio owner should be able to create unlimited multiple portfolios for different purposes.
MR12	The portfolio owner should be able to archive portfolios that are no longer needed.
MR13	The portfolio owner should be able to export artefacts or portfolios to a standard format (such as PDF).
MR14	Vendors should provide information about if and how artefacts within the ePortfolio may be authenticated by the product.
MR15	Vendors should describe the types and nature of roles within the product, (e.g. administrator or portfolio owner) and specify if each role is licensed separately.
MR16	The portfolio owner should be able to define which aspects of a portfolio a reviewer can see, e.g. reflections, self-assessments etc.
MR17	The portfolio owner should be able to control who views their portfolio or aspects of their portfolio.
MR18	The portfolio owner should be able to make their portfolio available to reviewers both inside and outside the University with the same degree of functionality.
MR19	Portfolio owners should be able to make their portfolio (or aspects of their portfolio) available to multiple audiences at the same time, e.g. personal tutors, clinical mentors and potential employers.

MR20	Portfolio reviewers should be able to provide feedback on the portfolio.
MR21	The portfolio owner should be able to define the level of access to the portfolio or aspects of the portfolio, e.g. read only, view selected segments etc.
MR22	The portfolio owner should be able to define the time period in which reviewers can view their portfolio or aspects of their portfolio.
MR23	Portfolio feedback by reviewers should be date stamped.
MR24	Portfolio feedback should show the identity of the reviewer.
MR25	The ePortfolio application must be customisable to reflect the University's Corporate Identity
MR26	Individual Portfolios must be customisable by users.
MR27	Vendors should describe the extent to which the product meets web accessibility guidelines
MR28	The ePortfolio records would be hosted by the provider[
MR29	Vendors should describe the minimum and maximum amount of storage space available per licence.
MR30	Vendors should provide detail regarding maximum hosted space available with the specified licence and whether storage is scalable beyond this, detailing how and any costs incurred.
MR31	The product should use Salford's existing LDAP compliant Novell directory for authentication, allowing students to use their existing network accounts.
MR32	The ePortfolio should display the University's data protection and policy statement, when launched.
MR33	Vendors are required to provide detail regarding data storage and security as the Nursing students participating in the pilot phase may wish to store confidential information arising from clinical placements.
MR34	The solution and the information processed must comply with the principles and other requirements of the Data Protection Act 1998
MR35	Vendors should describe how they specify who is entitled to use the software, e.g. everyone (staff and students) with a User Account or a specific subset of all staff and students participating in the pilot.
MR36	The solution must be able to be managed and administered via a web-based interface. It must as a minimum support Microsoft Internet Explorer. The version of Windows Explorer required to run the application and any browser dependencies must be specified.
MR37	The solution must be able to be managed and administered via a web-based interface, The solution must be accessible using the standard browsers supported by the University.
MR38	The proposed solution must be designed to be highly available, especially during peak times, with target availability in excess of 99.999%.
MR39	A detailed breakdown of hardware and software requirements or dependencies must be provided as part of the complete Tender. This should include anticipated Server requirements if the solution was to be hosted by Salford in the future.

MR40	Initially the product must support 500 individual learner accounts and 50 tutor/reviewer accounts. Subject to continuation beyond the pilot phase, this should be scalable up to at least 19000 learner accounts and 3000 tutor/reviewer accounts.
MR41	The response time for end user and administrative actions must typically be less than five seconds.
MR42	Training must be provided in the use of the proposed solution and any associated products or services in a 'training the trainers' model, working with ICT skills trainers at the University.
MR43	The supplier must give an indication (using comparable contexts) of training needs for new users, and the subsequent costs of adopting a 'training the trainers' model at the University. This should be broken down according to the variants of user account types (e.g. Administrator, Staff, Student, etc.)
MR44	The supplier must provide information regarding the nature of the on-going support and help available to individual users, including face-to-face support and provision of supporting materials, e.g. online tutorials, in system help etc.
MR45	Vendors should provide information regarding the frequency of software updates and how and when these are applied.
MR46	Vendors should describe short, medium and long-term plans for the development of the product.
DR1	The product should include an interactive tool that automatically constructs a curriculum vitae (CV) from evidence selected by the portfolio owner.
DR2	Portfolio owners should be able to control whether groups of reviewers are able to see each others feedback.
DR3	The portfolio owner should be able to export the contents of the ePortfolio to other ePortfolio products, i.e the portfolio should be 'portable'. Details of the standards used to develop the product should be provided.
DR4	The portfolio owner should be able to export the contents of the ePortfolio to other ePortfolio products, i.e the portfolio should be 'portable'. Details of the standards used to develop the product should be provided.
DR5	The product should manage pre-entry access for new students, e.g. following offer confirmation and results but pre-University registration. This is something we may wish to develop in the future and so vendors should give an indication of experience with other partners and any potential licensing implications arising from this.
DR6	If applicable, provide details of how the product links to Salford's Student Information System or other Salford applications and what additional functionality this brings to the ePortfolio system.

THE IMPACT OF E-PORTFOLIO DEVELOPMENT ON THE EMPLOYABILITY OF ADULTS AGED 45 AND OVER

Hilary Stevens (SWOOP Project, University of Exeter)

Abstract: The South West Opportunities for Older People (SWOOP) EQUAL Development Partnership has tested the effectiveness of an electronic portfolio (e-Portfolio) in supporting the job search and personal development of older people. Representing part of a wider package of support that aims improve the employment prospects of older people, e-Portfolio has introduced a technology-based approach to helping adults record, store and reflect upon their skills and personal achievements and market these assets to others. This paper describes how the technology was introduced to this non-traditional e-portfolio audience, what its effects were and what aspects of the programme were considered most beneficial by participants. It concludes with recommendations for the design and delivery of e-portfolio programmes for this audience in future.

Keywords: older people, impact, evaluation, outcomes, e-portfolio, employment, employability

Background

Across the European Union, changing demographics have prompted member states to revisit their policies on the employment of older people. Within the United Kingdom, successive government papers have stressed the importance of extending working lives in meeting the challenges of an ageing society (Department for Work and Pensions, 2002; HM Government, 2005). However, the employment rate of men and women declines as they enter their 50s and only just over one-in-ten are working beyond state-pension age. Older people are more likely to leave full time employment than younger people (Lissenburgh & Smeaton, 2003) and once unemployed, older people are less likely to find work. The barriers older people face in finding work are well documented but include ill-health, lack of formal qualifications and lack of confidence, in particular in their ability to find work (National Audit Office, 2004).

In response to this challenge, an innovation programme was established in the South West of England, with funding from the South West Regional Development Agency and the European Social Fund 'EQUAL' programme to research new approaches to enhancing the employability of older people (that is those aged 45 and over). As part of this work and in recognition of the increasing profile for personalised learning in UK and European policy³⁸ the project funded an evaluative case study of the use of an e-portfolio for employment purposes with a an older (non-standard) audience.

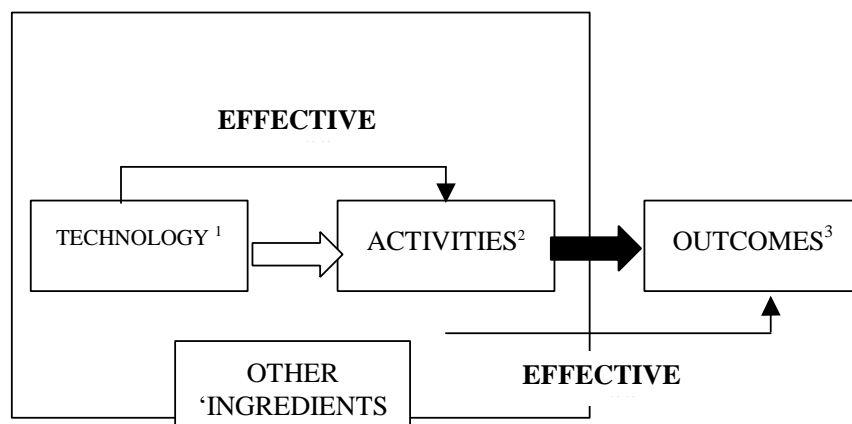
An e-portfolio product was embedded within a mentor-supported programme ("SWOOP Forward") consisting of three, three-hour group sessions. A group interview was carried out at the end of each session to gather feedback on the programme and to explore clients' progress. Three SWOOP Forward programmes were delivered in the South West of England between March and July 2007.

³⁸ For example, the European Institute for e-Learning (EiFEL) is actively campaigning for 'e-Portfolio for every citizen by 2010' and 'one e-Portfolio for life'.

Conceptual framework

The evaluation of SWOOP Forward was informed by the conceptual model or ‘theory of action’, illustrated in Figure 1. The model is an adaptation of the evaluation model proposed by Steve Ehrmann (1998).

Fig. 1: A Conceptual Framework for Evaluating e-Portfolio [Source: *Adaptation of Ehrmann 1998*]



¹ This includes not just computers but the venue and the way the technology is delivered, that is the ‘hardware, software and social technology of the situation’.

² What people chose to do with the technology (e.g. reflection, complete quizzes etc.)

³ The outcomes of what they did (e.g.

Ehrmann uses the model to identify five sets of questions that need to be answered in order to isolate the effects of the technology from that of the activities it supports. These are:

- Questions about the technology, *per se* (e.g., Did users have access to it? How good was the training? Were some users more skilled using it than others?)
- Questions about the practice or behaviour, *per se* (e.g., What activities did the technology support?)
- Questions about the outcome, *per se* (e.g., What changes are there in terms of the employability of users.
- Questions about the technology’s use for the practice (e.g. Was e-Portfolio any good for producing CVs?)
- Questions about the practice’s fostering of the outcomes (e.g. Did the quizzes give users and better sense of their achievements?)

The programme’s theory of action is also informed by theories of adult learning and andragogy in particular (Brown, 2002) that seek to explain how programme activities, for example, reflection on prior experience, transforms an individuals’ understanding about one’s own abilities, and in turn generates programme outcomes. As SWOOP is an employment-orientated project, these intended outcomes were conceptualised in terms of enhanced employability as defined by Hillage & Pollard (1998). Thus, the impact of the programme was explored within the following framework of employability:

- an individuals’ assets in terms of the knowledge, skills and attitudes they possess,
- the way they use and deploy those assets (e.g. career management skills, job search

skills and their strategic approach³⁹ to job search),

- the way they present them to employers (e.g. presentation of CVs, qualifications, references, interview technique and work experience).
- the context within which they seek work including an individuals' personal circumstances (e.g. caring responsibilities or disability) and/or external factors such as the pattern and level of job openings, labour market regulation and benefits rules and employer recruitment and selection behaviour.

SWOOP Forward

The SWOOP Forward programme was launched in March 2007 and was specifically marketed at people aged 45 who were looking to make changes to their working lives. The programme aimed to help people reflect on their skills, abilities and experiences, plan their next step, develop a CV and present themselves in a more positive way for job interviews and in application forms. The programme consisted of three, three-hour group sessions, held over a period of three to four weeks. Groups were small - between 5 to 7 people - and were led by a professionally trained mentor. The programme ran three times: once in Exeter and twice in Truro, attracting seventeen participants in total. The term 'e-Portfolio' was not mentioned in marketing literature but would-be participants were informed that the sessions would use an interactive computer programme and as it was a pilot programme, would be asked to provide feedback about their experience.

The programme used the 'vanilla' version of a commercial system called [Vitaality](http://www.arcsoftwareconsultancy.com/Vitaality)TM, developed by Arc Software Consultancy. The system was selected following a formal tender process whereby several software houses were invited to tender for a fully specified e-Portfolio product. In terms of Barrett's (2001) typology of e-portfolio use, the product was used for formative (i.e. to support reflection and learning) and 'marketing' purposes. It did this by supporting three activities: introspection, action and reflection, self-assessment, and the creation of a record of achievement. The latter was compiled through⁴⁰ the use of workbooks and other interactive tools resulting in a flexible personalised repository based around a digital progress file whereby achievement and qualification records, presentation documents (such as a CV) and personal profiles could be stored.

The first session in the programme introduced the software and how it could be used to support self and career development. Clients were shown how to log in and navigate the system and given time to complete on-line exercises and quizzes that were designed to help them identify their interests, key skills, personal qualities, achievements, work-life balance preferences and learning and working styles. The second session invited clients to reflect upon what the quizzes had revealed about themselves and use the software to build a body of evidence supporting the statements made. They were also given time to input details of their education and employment history. The final session used the work of the previous session to individually prepare a CV or supporting statement. Clients were encouraged to bring details of a real job specification to help them match their skills to the requirements of a role. In each session, 'hands on' computer time was complemented by mentor-presentations on topics such as the application of e-portfolio in other contexts, the value of reflection and job search skills. A follow-up (forth) session was held in Truro.

³⁹ Being adaptable to labour market developments and realistic about labour market opportunities, including the willingness to be occupationally and locationally mobile.

⁴⁰ Vitaality. Retrieved 14 January 2007. [Available from: <http://www.arcsoftwareconsultancy.com/Vitaality/WhatIsAPortfolio.htm>].

Programme participants

Seventeen people attended SWOOP Forward workshops following advertisements in the local press. The programme was run three times: once in Exeter, Devon and twice in Truro, Cornwall. The Exeter and first Truro group was attended by five clients, whilst seven people attended the second Truro group. Five of the second Truro group also attended a fourth 'follow-up' session. This was also open to the first Truro group but no one from this group attended.

In terms of eligibility, the project was specially aimed at people aged 45 and over although two people who were slightly below this threshold were accepted onto the programme. The average (mean) age of participants was 54 with the youngest being 41 years and 64 the oldest. Participants were required to have had some experience of using a computer although this requirement was relaxed for one client. Participants' demographic and socio-economic profile was as follows:

- most participants (fourteen) were women,
- almost all described themselves as 'white' (with one describing their ethnic group as 'mixed'),
- two had a long-term disability, health problem or disability,
- seven were working, either as an employee or were self-employed, six were unemployed and three were economically inactive,
- time since last worked ranged from just under 6 months to almost 7 years,
- most (nine) were qualified to at least NVQ level 3 (or equivalent). This included four who held a post-graduate qualification,
- Most (ten) participants were looking to change or get a job, four indicated that they were looking to explore their options and one was looking to start a course.

Evaluation Methodology

Purpose, scope and focus

This paper reports solely on questions about the outcomes clients derived from the programme. More specifically the evaluation questions explored in this paper are:

Has the programme helped beneficiaries to better understand and represent their skills, attitudes and attributes? What other effects has it had?

What was it about the programme that gave it 'value'?

Data collection and analysis

Four primary sources of data were used: a registration form, a usability observation form, interviews with study participants and a reflective journal maintained by the mentor. The mentor's journal contained her thoughts on what had worked well and not so well and suggestions for improvements. The registration form collected routine monitoring information such as their contact details, demographic information and details about their economic status and future intentions, highest qualification and computer use. The usability form was intended for use by the tutor to record observations that arose during the session. This contained sections for 'getting started', 'look and feel', 'getting around', 'system failures' and 'other comments and observations'. Whilst the form was used in early sessions it was later replaced by an approved system of note taking by programme participants⁴¹.

⁴¹ At the start of the programme all participants were given a 'goody bag' containing SWOOP branded materials. This included a notebook and pen which participants were encouraged to use to record any problems or observations as arose through using the software.

Participants were given an information sheet and consent form at the start of the programme. The information sheet described the background to the project, and explained why the research was taking place and how the results would be used. Assurances of anonymity and the ability to withdraw from the interview (without compromising their participation in the programme) were made clear. A group interview (“debrief”) was held after each session. The session was recorded using a digital voice recorder and the feedback was transcribed verbatim. The four transcripts were then read thoroughly, recurring themes and ideas noted and a thematic framework developed. The data was then labelled using the classification and sorted into a thematic chart (using one row for each participant). The results were then written up grouping similar themes.

Impact of SWOOP Forward

SWOOP Forward clients reflected on their progress at the end of each session. Their responses have been grouped into the following broad outcomes:

Greater understanding of personal skills and attributes

A key aim of the e-portfolio pilots was to help clients better understand their skills, attitudes and attributes. There is evidence that using the e-portfolio software either confirmed individuals self-knowledge by for example, confirming preferred learning styles, or more commonly, challenged existing notions about what they could or couldn't do. As one Exeter participant reported, *“It is making me think a lot of what I can do. Whereas I always think in my head I can't do it. But I can. There are lots of things I can do”*. Her comments were echoed by another who reflected, *“[using the software] made me think about what I can do, what I am good at and so, I think most people did that. You don't think about what you can do or what your skills are”*.

Improved self-confidence

The process of skill identification and evidence building provided a confidence boost to several clients. One client in the first Truro group reported, *“feel[ing] a bit better about myself”* and another, reflecting back at the end of the programme claimed she, *“look at myself in a [more confident] way.”* Increased self-confidence gave one client the courage to change the direction of her working life:

“...to look at something different is bit scary and you think ‘well hang on, am I making an idiot of myself sticking my head above the parapet and saying I'd like to do this’. I think I have learned that actually ‘no, go for it. Let them shoot me down!’”

Motivation and outlook

This growing appreciation of their employability led some clients to conclude that they could apply for a greater variety of jobs than they originally thought and two participants from the second Truro group said that felt more positive about their employment prospects. There is also evidence that the programme helped clients overcome feelings of disillusionment with one Truro client reporting that the programme had helped her, *‘see through the fog’* following her redundancy. She described how what it was like for her to lose her job and how she viewed her prospects at the start of the programme:

“When you are made redundant your future is behind you. Everything you'd wanted, everything you've worked for, everything you've learned, it suddenly stops dead. Who you are, what you are, where you are, where you're going. Well, I'm not going anywhere, nobody wants me at my age.”

Attitudes about age and employment

Whilst unfavourable employer attitudes to older job candidates was highlighted as a barrier to finding work, one client felt that the programme had encouraged her not to focus on age too much:

“One tends to use [age] as a bit of an excuse if you haven’t got a job and you are applying for a job. You think, ‘well they are not going to hire me because of my age’ and, ‘Oh I can’t do this because of my age’ or ‘you know, there’s no point in me even applying because of my age’. Whereas this shows you that you’ve got a lot of skills. You have a lot to offer. You know you have the qualifications to back it up. You have the examples of the experience to back it up so age doesn’t matter any more. You can do it.”

The realisation that age ‘should not mean shortcoming’ was one of the most powerful lessons that one participant of the second Truro group took from the project and others claimed feeling, “better” about their ability to compete against younger candidates for work. As one participant in the first Truro group described, the programme had, “reiterated that I am just as worthy an employee as you know as a 23 year old”.

Better understanding skills and competencies valued by employers

There is evidence that participants’ understanding of the skills and competencies valued by employers increased as a result of the programme. For one Exeter client this process started with a better appreciation of, “what the word ‘skills’ means”. It was not obvious to some clients that they needed to be explicit in marketing skills that they took for granted (for example, listening, organisational and communication skills). As one Truro client described, “you perform [the skills] daily don’t you and you just do it automatically and you don’t think anything of it really or think it’s anything special.”

All groups reflected positively on the fact that employers were just as - if not more - interested in their personality and experience as their qualifications, and that evidence of experience could be drawn from unrelated jobs in the past or from domestic or social settings. One Exeter participant who did not hold formal qualifications reported, “it’s just realising that my wealth of experience and things that I’ve done in the past are just as valuable [as qualifications] so that for me, that’s been really, very, really helpful, very valuable”. A fellow Exeter participant also observed, “you don’t think that [an employer] will want to know what kind of person you are.” This was particularly encouraging news for those that had not worked for some time.

Evidence-building and recording

Once clients had completed to quizzes and diagnostic tools they were guided through a process of evidence building. This involved typing in details of their work experience and educational achievements, and providing examples of how and when they demonstrated the skills and attributes they claimed to possess. This had a similar effect to the quizzes in terms of confidence building. As one participant in the first Truro group described, “once you have put all this information down you realise that hey I’m not too bad after all”. He goes on, “it does bring back memory actually seeing it down on the computer what you’ve got and what you can actually offer to a prospective employer.”

A very tangible and practical outcome of the programme was a growing body of evidence that clients could draw upon when applying for jobs. As one Exeter-based client reported, “I’ve a lot more information in the programme than I would have had in my other CV”. Another commented that the “electronic CV and backing information” and in particular, having “everything in the same place” would be “very useful in whatever I wanted to do”.

Improved self-marketing through CVs, supporting statement and interviews

Participants had varied experience of producing a CV. Whilst none of the clients had finished a 'polished' CV at the end of the three sessions many indicated that they had made sufficient progress in order to complete the process at home. One Exeter client who reflected on what she had learnt realised that, *"I have been doing my letters of application all wrong. It's sort of like, love me in spite of myself"*. Several clients said that they felt more knowledgeable about producing a CV and were confident about tailoring a CV for a specific job. This general feeling is illustrated by the Truro2 client whom at the end of the project volunteered that, *"I feel confident that I can go away now and, with quite a lot of work put together a really good CV. I know where I'm going and I've got the tools available and yes it has changed my view definitely on how I should present myself"*.

Taking part in SWOOP Forward had helped many clients become more confident about interviews and two had used what they had learnt about themselves to prepare for interviews that had gained whilst on the programme. One participant in the first Truro group felt that taking part had, *"made her think more about answering employers' questions and needing to have the evidence"* and one in the second group felt that attending the first session had *"probably"* helped her in preparing for a job interview.

Another client in the second Truro group reflecting on two recent interviews during the follow-up session described how the project had helped her better articulate her talents.

Employment outcomes

Four of the nine unemployed or economically inactive programme participants are known to have found employment since completing the project. Positions were secured as a Ward Clerk, a sales assistant at Marks & Spencer's, an adult basic skills tutor and a paid fundraiser for a local charity.

The client who had found work as an adult basic skills tutor had done so after taking her CV to the local college. She claimed the reason she went was because, *"I was more confident as a result of coming here"*. This confidence had not only enabled her to approach the college speculatively but had also empowered her to negotiate the hours and days she wanted to work, *"[that] came directly from 'don't take what you don't want'"*. The client who found work as a fundraiser reported that she was able, 'approach' the role 'directly as a result of [SWOOP Forward]'. It was her ambition to find paid work in a local charity but, *"never thought I would be able to"*. She felt the programme had given her the, *"confidence to think actually yeah you can do that. It is not out of your reach. Give it a go"*.

What worked?

As SWOOP Forward was an experimental project it was important to identify exactly what it was about the programme that had helped clients. The discussion identified four broad features that had contributed to the programme's success: the e-portfolio software, the process of reflection and evidence building, and mentor and group support. SWOOP Forward clients were satisfied with what they could do with the e-portfolio software and liked the idea of storing their information in one place. One client in the second Truro commended the functionality of the software, *"it has everything on there. It is the package. So it's got personal statements. It has got the skills. It has got the CV. It has got the tutorial guides which have got quite a lot of information on. So it's the whole thing about job hunting and evaluating and reassessing yourself"*. Another client in the same group liked that fact that it was about, *"not just your working life, but you as a person"*. A number of clients were pragmatic about the limitations of the software, with one reflecting that, *"computer programmes, they are never always exactly*

right". There was some interest in a 'presentation' portfolio that clients could show potential employers.

The quizzes and diagnostic tools used to identify skills and support the process of reflection and evidence building were universally popular with clients. As one Exeter client observed, "*at the beginning it sort of says well no talk about yourself, you know. So it's a motivational thing to do*". The discipline of evidence building was seen to be a major benefit of the system and some clients had already articulated what they had learned about themselves at job interviews. A participant in the second Truro group acknowledged, "*it was good on the e-portfolio having that category so you have to state your skills and then you have to state your evidence. That was good, making you have to do that.*" She added it, "*helps you focus your mind and it makes you look at it slightly more intense than normal*".

All three groups agreed that the mentor was crucial in introducing the software and supports its use. For example, one Exeter client feared users would, "*flit about from section to section without actually starting and getting anything done*" if it was not introduced in a systematic and supported way and another admitted that she would have, 'given up very, very quickly' without any support. A client in the second Truro group reasoned, "*You are promoting this to older people with change. You have to introduce that personally. I don't think a screen would do that*". Clients were overwhelmingly supportive of the programme being delivered as a small group. One client from the first Truro group reflected the feeling expressed in all three groups, "*It's nice to bounce ideas off people and it helps me to think of things in a different way and it also sort of sparks off new ideas for me as well.*" Another client, this time from the second Truro group claimed she, "*got lots out of hearing what other people have said*".

Conclusion

The evaluation has shown that the SWOOP Forward programme enhanced individual's employability. Using the conceptualisation of employability outlined earlier in this report it is clear that programme supported clients in identifying their own 'assets'. The quizzes and diagnostic tools reminded clients of their knowledge, skills and attitudes although, as these were not assessment tools the evidence generated was not objective.

Notwithstanding this the identification of, and reflection upon personal competencies, skills and achievements was an empowering process for many, boosting their self-confidence not only in terms of what they had to offer employers but also in their ability to find and secure work. The mentor facilitation and group environment were instrumental to this process. As empowerment is one of the leading principles of EQUAL, SWOOP Forward has provided an excellent example of how technology can facilitate this process.

The programme also helped clients to improve the way they used and deployed their assets in managing their career and searching for jobs. In particular, it gave them an opportunity to reflect on their experiences and achievements and use this information to make decisions about what they wanted to do next. The support of the mentor was particularly important in this respect. Clients also left the programme feeling more confident about how they presented themselves to employers both in terms of the presentation of their CVs and their interview technique. Whilst the e-portfolio programme provided portability and a useful framework for the self-reflection and evidence-building and presentation, it is unlikely that users would have completed the process without the support of a mentor. Clients appreciated the assistance of the mentor in using the software but also in supporting and encouraging them in their reflection and job search.

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POLE: PERSONAL & ORGANISATIONAL LEARNING ENVIRONMENT

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Abstract: Whilst there is an extensive reflection on the role of ePortfolios in the field of education, and to a lesser extent in the world of work, the general focus has been on the *learning individual*. What about *learning organisations*, learning communities or even learning regions or cities)? Does it make sense to discuss an organisational or community portfolio? If yes, what would it look like? What is the relation between individual and organisational portfolios? This work in progress is the result of a conversation between the authors on the link between individual and organisational learning and the need to define a common framework to design a continuous learning space or *learning landscape*, hence the acronym of POLE (Personal *and* Organisational Learning Environment) and the idea that the ePortfolio might be the DNA of this living and developing organism.

Keywords: personal learning environment, PLE, organisational learning

Introduction

While the ideas leading to personal learning environments (PLE) emerged in 2000 [see: http://en.wikipedia.org/wiki/History_of_personal_learning_environments] the term was first coined by Scott Wilson in 2005. The concept was further explored through a series of projects, some of them funded by JISC, and a number of tools were developed as the result of the reflection on the type of services one would expect from such environment.

The concept of PLE is often presented as the mirror of learning management systems centred on organisations. As the article on Wikipedia states: "*This alternative approach developed in parallel to that of Learning Management Systems, which unlike the PLE take an institution-centric (or course-centric) view of learning.*" However, this statement can be misleading. While the PLE shifts the locale of control from the institution to the individual there is not an ontological opposition between 'individual centric' and 'organisation centric' learning.

What we want to explore in this paper is a learning landscape where individual centric (PLE) and organisational centric (OLE) environments, coexist and are mutually nurtured by each other in what we will call a *conversational framework*. In this context, an OLE (Organisational Learning Environment) is radically different from a LMS (Learning Management System) or a VLE (Virtual Learning Environment): it refers to a system supporting the organisation *as a learning entity*, a point of reference for constant transformation; it is about capturing, selecting and connecting knowledge and creating new knowledge through reflection, as support for further organisational transformation.

A PLE is not a complement to a VLE, nor the opposite of a LMS. Both are two concepts belonging to a completely different plane — the later are primarily *teaching* and *training* aids, supporting the *extrinsic* motivation to learn, whereas PLEs are about scaffolding learning and nurturing the intrinsic natural desire to learn.

The concept of PLE was needed in order to solve a problem: how to move the individual away from the periphery of automated learning management systems towards determining own learning path, resources and context.

We believe that the concept of POLE is just as necessary in order to develop a holistic approach to learning and to recognise that individual *and* organisational learning, while of different nature, develop in close interaction providing each a certain degree of autonomy.

What is an OLE?

Like individuals, organisations have an identity – legal, physical and, increasingly digital – constructed through an interaction with a series of networks within a sector, a branch, a supply chain, a group of clients, or an innovation and knowledge network or a geographical space. The ability to achieve internal transformation whilst preserving identity and culture is one of the main aims of organisational learning. And organisations, like individuals, learn through reflection on their own practice, collaborative research and knowledge networks.

Organisational learning needs support. Of course it often already happens without the support of a system that could be defined as an OLE, just as people have been able to learn without, and too often despite, dedicated technologies. Learning organisations can live using paperboards and email, just like students could learn with paper portfolios and books.

How could this concept of an OLE be *reified*⁴² into a piece of software? What existing systems could be considered as the components of an OLE? We will start with the easiest part: elimination. The vast majority⁴³ of learning management systems – open source or proprietary – have nothing to do with OLEs. They are about distributing contents designed for memorisation and multiple choice testing. Most LMS do not encourage, nor enable the creation of new knowledge. Nevertheless, they have their usefulness, just like the reptilian brain does for the human. And OLEs aim to be to LMS what the neo-cortex is to the reptilian brain, what high order thinking is to reflexes.

After eliminating LMSs – and VLEs – what are we left with? There are knowledge management systems (KM), enterprise resource planning systems (ERP), customer relationship management systems (CRM), HR information systems (HRIS), and supply chain management systems. Are they part of the solution or the source of a new problem that need to be solved?

While it is not within the scope of this paper to enter into a detailed analysis of these different potential contributors to an OLE, we can say at this stage that an OLE will be at the same time similar and completely different from some of the tools that already exist – just like ePortfolios are similar to paper-based portfolios, while being radically different (they are not simply *paperless portfolios*!).

The main difference between OLEs and existing systems will be their relationship: while old organisational information systems were based on the idea of *integration*, OLEs are based on *aggregation* of loosely coupled parts. And this is this idea of *aggregation* that renders now possible a new type of relationship between PLEs and OLEs: in the old systems, individuals were known under their employee number by the HR system, and their telephone number in the company directory; in the new system, people will be known by their portfolios (by their ideas, by what they do) and directories will be the aggregation of the relevant information extracted from individual ePortfolios – a company directory can be created through the aggregation of RSS information coming from the employee's personally managed data.

This approach could greatly improve organisations' efficiency. For example, many knowledge management initiatives failed because employees were being asked to disown their knowledge, by placing it in an organisational repository, while through aggregation, it would be possible to build a system of recognition, relying more on the intrinsic motivation to learn and share than the extrinsic motivation of command and control.

⁴² There is nothing wrong with the idea reifying a concept into a piece of software. This is precisely what computers are good at. What is more of a problem is when technology is being used to reify individuals, transforming individuals as some kind of terminals of a software chain, a dis-ease easily spread through LMS and a certain vision of learning/instructional design, systems where learners are not valued as knowledge producers, but mere consumers of pre-digested contents.

⁴³ There are few LMS that are not only designed for distributing contents and collecting test results, but to create a conversation with users in order to invite them to produce new knowledge that is collected and shared within an organisation.

So, an OLE could be described as a system that values all its assets at organisational level, including the identity of individuals, while preserving its own identity. And just like PLEs, OLEs "can cross institutional boundaries"⁴⁴.

It is time now to attempt a first definition of an Organisational Learning Environments (OLE). Starting from that of a PLE, one could say that:

An Organisational Learning Environment (OLE) is a space where individual personal learning environments are connected and aggregated with other organisational information systems into a single space, contributing to the identity of the organisation and its ability to work across institutional boundaries through the use of networking protocols to connect a range of resources and systems within an organisationally managed space.

In fact, an OLE cannot exist independently from PLEs, while the reverse is not necessarily true: PLEs can live on their own, without the need for any kind of OLE. This is why we feel that in order to reflect the relationship between OLEs and PLEs, an OLE is in reality a POLE: no real organisation learning is possible without individual learning.

ePortfolios, PLEs, OLEs and POLEs

So far we have discussed PLEs, OLEs and POLEs and the ePortfolio was mentioned several times. What is the relation between individual ePortfolios and PLEs and that of organisational ePortfolios and POLES?

PLEs and POLEs are about learning and learning itself is about constructing meaning and identity through interactions – with other individuals, networks and organisations. ePortfolios have also been described as supporting the construction of identity [Grant 2006]. Are they different names to describe the same objects?

First of all, ePortfolios are not just objects – they are also processes, but that is not the point. They are part of a learning ecology where individuals *organise*⁴⁵ their ePortfolio while organisations *manage* a series of ePortfolios. In a recent paper [Ravet 2007] an ePortfolio system was described with 3 different entities:

- **The ePortfolio** – a document constructed for a specific purpose / audience,
- **The ePortfolio Management System** (organisational) – consuming and producing ePortfolio parts to support / as result of different processes – planning learning, managing competencies, accreditation of prior learning, etc. It is an aggregation of individual ePortfolios,
- **The ePortfolio Organiser** (individual) – also consuming and producing ePortfolio parts to support / as result of different processes – planning learning, managing competencies, accreditation of prior learning, etc. It is an aggregation of distributed heterogeneous data.

While the definitions of an ePortfolio Management System and that of an ePortfolio Organiser look remarkably similar, they are two completely different (assembly of) tools. For example, both need identity management, but the solutions, although complimentary, are not the same⁴⁶:

- **OpenID** is well suited for individuals who want to federate different accounts and

⁴⁴ "PLEs include the integration of both formal and informal learning episodes into a single experience, the use of social networks that can cross institutional boundaries, and the use of networking protocols (Peer-to-Peer, web services, syndication) to connect a range of resources and systems within a personally-managed space." (ibid note).

⁴⁵ collect, select, connect, reflect, get feedback, publish, plan future learning, etc.

⁴⁶ NB: both approaches offer the same type of services (or will soon do so), and have libraries which make the implementation of digital identity management an easy task; the major difference is policies: any organisation can decide to implement OpenID, and in doing so will allow a person to federate his/her identities, while the implementation of Liberty Alliance requires policy agreement with the organisations that are member of a circle of trust.

identities as well as controlling the sharing of personal attributes with others. This might be well suited for *ePortfolio organisers*.

- **Liberty Alliance** is well suited for organisations that want to create circle of trusts across organisations, so a person can federate several identities/accounts and federate services to control the sharing of personal attributes with other members of a *circle of trust*. This might be well suited for *ePortfolio management systems*.

And PLEs like POLEs also require identity management to allow a person to move seamlessly across their various components. Like ePortfolios they also need to provide facilities to collect, select, reflect, connect, share, get and provide feedback. So what is the difference? Why do we feel the need to use different concepts?

To use a biological metaphor, one could say that the ePortfolio is the DNA of the PLE: it is what makes the PLE what it is. Without an ePortfolio a PLE is nothing more than a glorified LMS or VLE. The *raison d'être* of a PLE (POLE) is to create the learning space/landscape where the person (organisation) will construct his/her (its) identity, the ePortfolio being the synthesised representation of this identity leading to further learning and transformation. The ePortfolio is a DNA in constant mutation, reflecting the constant transformation that learning carries.

Conclusion

ePortfolios and PLEs are two different but complementary things. POLEs are the enablers of the expression / construction / transformation of one's ePortfolio and identity. ePortfolios are the mirror that helps individuals and organisations to reflect on their learning, which has been enabled by POLEs.

Notes

Introduce EPSS as organisational learning: first order: online help; second order: capture experience to transform it into knowledge.

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REFLECTIVE E-PORTFOLIOS FOR CONTINUING PROFESSIONAL DEVELOPMENT AND ORGANISATIONAL CHANGE

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Abstract: The process of introducing a reflective e-portfolio to a UK call centre sub-contracted by a major learning and careers services company to deliver telephone career guidance provides the focus for this paper. The aim of the e-portfolio was to support the continuing professional development of career coaches providing a service to a wide diversity of callers with a range of needs. The ultimate aim of the e-portfolio was, therefore, to improve services to customers. Whilst both the employing organisation and contracting organisation were initially able to provide a clear specification to inform its design, different priorities emerged from a process of consultation with a group of managers and end users over a ten month period. Characteristics of the organisational cultural of the employer had to be navigated carefully. It became apparent that this particular process of technological implementation was being mediated by different interpretations and understandings of technology and its uses. Both the technology and the resulting technological change were the outcomes of a series of complex social interactions. This paper will examine the way in which the technology was built, implemented, applied and interpreted, and how precursor technologies as well as human actors, played a central role.

Keywords: organisational change, continuous professional development

Introduction

There is an increasing consumption of information communication technologies (ICTs) in the workplace, both in the public and private spheres. ICTs have become a pervasive feature of contemporary work processes, affecting every part of everyday work. Their introduction has revolutionised the workplace, enabling new and innovative ways of communicating, storing, processing, sharing and presenting information. This revolution in information management has undoubtedly prompted shifts in workplace organisation. However, whilst on the one hand, transformations in organisational cultures, structures and forms have been influenced by the implementation and application of ICTs, on the other hand, they are mediated through these organisational elements. These shifts and changes have stimulated much literature on the efficiency, innovation and applications of ICTs, but social and cultural issues have been largely neglected. This paper focuses, therefore, on the relationship between technology and culture in one private sector organisation, sub-contracted by another to deliver a telephone helpline service.

Background

The largest telephone helpline service in the world for delivering career guidance is currently known as the 'Learndirect' helpline and was launched in the UK in February, 1998 (Watts & Dent, 2002). Its genesis can be traced to the policy interest in educational guidance for adults in the early 1990s and the introduction of a guidance helpline in Scotland in 1997. A national helpline, called Learning Direct, was set up in 1998 in a single call-centre, operated by Broadcasting Support Services (BSS), based in Manchester, England. At this time, the policy intention was for the helpline to become the information and advice service for the University for Industry (Ufi), when established. Accordingly, the sub-contract held by BSS was transferred to Ufi in June, 1999. BSS is also responsible for a service to Northern Ireland, with services for Wales and Scotland managed separately.

Demand for this free service grew quickly, stimulated by the deployment of a substantial marketing budget. The initial target for calls in the first year of operation was 250,000, with plans for the rapid expansion of capacity to handle four million calls annually. To accommodate this level of expansion, the capacity of BSS was expanded with the opening of a second call centre in Leicestershire (Watts and Dent, 2002). Significant productivity gains to the operation of this call centre service have been attributed to a combination of: financial incentives built into the BSS contract; strict monitoring of staff performance; and innovative working practices (Watts & Dent, 2006). It is employees at these two call centres, Manchester and Leicester, who were involved in the pilot of the e-portfolio development. Within the two call centres, there are three levels of staffing, each dealing with calls from customers of increasing complexity. This differentiation reflects the different levels of qualification and/or expertise of employees, as well as job function. It was the highest staffing level (that is, the lifelong learning advisers, subsequently re-named careers coaches), offering 'in-depth' career guidance to customers, who were the target for this e-portfolio development.

Personalised Learning Environments in the workplace

Socio-cultural theories of knowledge acquisition stress the meaning of collaborative learning and 'learning communities' (Hung, 2002), while the 'Zone of Proximal Development' emphasizes the importance of collaboration with advanced learners and experts to enhance individual knowledge and skills (Vygotsky, 1978). Agostini *et al.* (2003) complain about the lack of support offered by many virtual learning environments (VLEs) for emerging communities of interest and the need to link them together with the official organizational structure within individuals are working. Ideally VLEs should link together knowledge assets with people, communities and informal knowledge (Agostini *et al.*, 2003) and support the development of social networks for learning (Fischer and Sugimoto, 2006). The idea of a personal learning space is taken further by Razavi and Iverson (2006) who want to integrate weblogs, e-Portfolios, and social networking functionality in this environment for enhanced e-learning and knowledge management in order to develop communities of practice.

Based on these ideas of collaborative learning and social networks within communities of practice the notion of PLEs in the workplace has been put forward as a new approach to the development of e-learning tools (Attwell, 2007; Wilson 2006) that are no longer focused on integrated learning platforms such as VLEs. In contrast, PLEs are made up of a collection of loosely coupled tools, including Web 2.0 technologies, used for working, learning, reflection and collaboration with others. A PLE should use social software in the workplace for informal learning which is learner driven, problem-based and motivated by interest and considers learning not as a process triggered by a single learning provider but as a continuing activity. Another development route is constituted by embedded or work-integrated learning support based on the pioneering ideas in the Learning in Process project (Schmidt, 2005) and the APOSDLE project (Lindstaedt & Mayer, 2006) where learning opportunities (learning objects, documents, checklists, but also colleagues) are recommended based on a virtual understanding of the learner's context. While these development activities acknowledge the importance of collaboration and community engagement and of embedding learning into working processes, they have not so far addressed the linkage of individual learning processes and the further development of both individual and collective understanding as knowledge and learning processes mature. In order to achieve that transition (to what we term a 'community of innovation') then processes of reflection and formative assessment have a critical role to play.

Traditional conceptions of human resource development (as well as organisational development and innovation management) are supposed to support continuing professional development. Problems associated with training away from the workplace and the challenge of transfer of learning between contexts has led to the development of a number of approaches to the development of e-learning, e-assessment and knowledge management that offer solutions for specific learning needs that can be accessed independent of time and place, including if

necessary just-in-time direct from the workplace. However, these approaches have often created a fragmented learning landscape that could either be mainly driven by a technological and/or organisational perspective on the one hand, or else a largely individualist learner-oriented perspective on the other that does not necessarily link to what is happening in the workplace or the learning of others. The idea that individual, collective and organisational development processes could be linked is therefore attractive: the difficulty, however, is finding contexts where actors at all these levels are motivated to engage in such developments. The key requirement is perhaps that the learning activities of practitioners must be conceived (and technically supported) as embedded into, interwoven with, everyday work processes (Schmidt, 2006), which are themselves about the creation, transformation, and communication of knowledge about improving practice. Individual learning activities are not isolated, but rather have to be seen as interlinked. The development of new forms of reliable knowledge and practice with impact (e.g., in the form of widespread use as new or improved services or processes) is not constructed by a single practitioner, but rather evolves in collaboration with other members of a community. One method of embedding all of these processes, which sits within the workplace PLE is an e-portfolio.

E-portfolios

Portfolios have been a feature of vocational and professional programmes for a number of years, and have accumulated a range of meanings (Ward & Richardson, 2005). Their use has ranged from simply providing a record of progress; collating evidence for assessment of outcomes; and encouraging reflection on the process of learning and development to more complex tasks (Beetham, 2005). Typically, they have been used within the context of particular learning programmes for the collation and assessment of evidence. Increasingly, however, they are being used to collate evidence from across different learning programmes to provide an overview of learners' progression and achievements to date, together with opportunities for reflection and personal development planning. In the UK, examples of such schemes include DfES Progress Files (14-19), Records of Achievement (HE) and Individual Learning Plans (FE and Adult/Lifelong Learning) (Beetham, 2005). Professional bodies and large employers are also beginning to encourage the use of portfolios (e.g. the NHS, the Teacher Training Agency, the Armed Forces, the Royal Institute of British Architects).

The term 'e-portfolio' (that is, electronic portfolio) simply indicates that some (or all) of the evidence is collected in digital form (Beetham, 2005; Lorenzo & Ittelson, 2005). The various definitions of 'e-portfolio' tend to relate to a collection of digital resources that: provide evidence of an individual's progress and achievements; are drawn from both formal and informal learning activities; are personally managed and owned by the learner; can be used for review, reflection and personal development planning; and can be selectively accessed by other interested parties (e.g. peers, assessors, awarding bodies, prospective employers). They can also be used for different purposes. So for example, e-portfolios can be used to support: individuals in taking responsibility for their own personal and professional development; summative assessment; formative assessment; learning and learning to learn; presentation of best or most relevant achievements; and personal and professional development planning. Because e-portfolios commonly need to support transition between different learning providers, and between learning and work, information needs to be presented according to common standards and terminology.

E-portfolios for learndirect *Advice* (IdA) and Broadcasting Support Services (BSS)

E-portfolios represented a potentially powerful tool for developing reflective practice amongst IdA/BSS practitioners, thereby improving their job performance. It has been estimated that people are now averaging fifteen hours a week on informal learning activities, yet very little of

this informal learning is supported by e-learning (Roberts *et al.*, 2005). So in this particular organisational context, e-portfolios also offered a method of recording both formal and informal workplace learning, as part of a broader personalised learning environment. Additionally, they offered a potential framework for gaining formal accreditation of workplace learning. At the level of the individual user, minimum requirements can be identified for e-portfolio systems. These include the ability to upload files; enter reflective statements; and display materials (Roberts *et al.*, 2005). Ideally, these systems should offer users flexibility to input materials; the facilities for on-going editing, updating and review; and the ability to organise and retrieve objects/artefacts. There are, however, more complex requirements if the e-portfolio system is to inter-operate with other systems (such as learner records, virtual learning environments or assessment systems) and if it is to allow learner data to be shared with other organisations (e.g. for accreditation).

In considering the development and implementation of an e-portfolio system in any organisation, there are a number of important considerations. Those particularly pertinent to IdA/BSS included: general issues of data ownership and confidentiality; maintenance; relationship with management structures; regulatory and policy issues; and support for individuals engaged in portfolio development in terms of training, dedicated time and recognition/accreditation of informal learning. One low cost option for IdA/BSS to consider was to introduce a standard product. However, the process of examining the organisation's needs and designing a bespoke e-portfolio had the potential to add considerable value to its implementation, since the emphasis would be on the *process* of ensuring that the e-portfolio accommodated the particular needs of the organisation and its employees, rather than the needs of the organisation having to be fitted into an existing e-portfolio *product*. The process of working with the organisations (IdA/BSS) therefore included a number of stages, as follows:

Research phase:

This involved a study of possible options in the context of IdA requirements.

Awareness-raising phase:

Involving four separate presentations to possible target groups and stakeholders, to outline the possible benefits of portfolios and introducing the concept of reflective learning. This was an essential stage of the process to secure 'buy in' and ownership of the e-portfolio by potential users. Since the benefits of reflections lay at the centre of e-portfolios, it was crucial to allow time for the potential audience/users to reflect on what was being offered and become familiar with the concept of 'reflective practice'.

Consultation phase:

Although the development team had a vivid sense of what an e-portfolio system might comprise for IdA/BSS and how to design and implement it, experience suggested that it is best to involve the users early and intimately, finding out what features they really wanted. Consequently, the team proceeded in frequent small steps, co-designing closely with the user community, delivering real functionality at each step, constantly testing 'real-world' situations and rapidly adapting to the problems and opportunities identified by users.

Design phase:

An appropriate technical framework for the construction of an e-portfolio involved one which gave the user a strong sense of ownership of their skills; of the process of planning and development; a sense of connection with peers; and a sense of being valued by the institution. Four core functionalities were identified: a reflective diary space; a personal 'dashboard' (for organising and presenting user input); features for user-to-user community building; and spaces for collecting, organising and sharing resources. Three overarching functionalities, weaving

throughout the above, would be: 1) very strong discussion features for ad-hoc and more goal-directed discussions; 2) the ability to load documents containing specialist information; and 3) close integration with the day-to-day working practices of the users and with institutional credit-acknowledgement.

Piloting and refinement phase:

Although the entire development of the e-portfolio was in close co-operation with users, piloting the emergent e-portfolio system with a small user group was an important part of its overall development.

Implementation phase:

Details of the implementation phase were negotiated with IdA/BSS and involved: discussion with personnel responsible for staff training to establish what was feasible and possible; preparation and briefing of user group(s); and user support (e.g. on-line support for users, at a distance).

Discussion

This iterative process of development and implementation highlighted the extent to which the technologies utilised to construct an e-portfolio ‘fit for purpose’ were mediated by different interpretations and understandings of technology and its uses. For example, early on in the developmental process, both employers and employees agreed about the desirability of a facility to enable employees to record ‘case studies’ of interesting and/or difficult customers with whom they were dealing, so that these could be discussed and shared selectively with colleagues. However, once the technology was developed to specifications which met all requirements for recording the required information, employers were confronted with various issues related to client confidentiality that needed to be addressed before the technology was fully implemented. A second example of how different interpretations and understandings of technology mediated use relates to levels of access afforded to various parts of the e-portfolios. Again, in early discussions with mixed groups of practitioners and their managers, consensus emerged regarding the need for practitioners to have some degree of control regarding who would have access to ‘their’ material. However, employers developed firm views during the process of technological development about the areas and materials to which they needed access. This appeared to be non-negotiable. A final example related to the practitioners’ use of images in their e-portfolios. It has been argued that digital technologies are enabling many to become more visually literate and because of this there is case for broadening existing definitions of literacy (Davies, 2006). Visual images can help individuals to learn from one another and, in collaboration, create new meanings. Despite initial agreement that e-portfolios could be developed into a personalised learning space, when the technology interpreted this as meaning that users could, for example, load a photograph of themselves, the employers identified a major problem. Company policy prevented the uploading of any files, including images to their system. As a work-around, employees were permitted to load photographs of themselves from their home computers, as the e-portfolio was on-line. Nevertheless, the two key concepts of ‘personalisation’ and ‘control’ were challenged in a fundamental way by existing company policy.

The extent to which the company chooses to harness the technology to encourage change in the future is currently unknown. It is likely that the introduction of the e-portfolios will alter and, in some way, interrupt the flow of information and communication through and within the organisation. An organisational culture may become ‘technologised’, whereby cultural elements are mediated by the integration of the e-portfolio in work processes. The organisational culture was, indeed, characterised by two different ethoses that represent both positive and negative (or sceptical) attitudes towards technologies within the organisation. Symon (2000) argues that the implementation and application of information and

communication technologies goes through a filtering process of social norms, attitudes and values. Cultural elements influence the implementation of technology, but do not necessarily create a network-structured organisation. However, the organisational culture will incorporate individuals who hold positive and/or sceptical assumptions about ICTs, but which may hinder the effective application of technology in the workplace (Barnes, 2003). These positive and sceptical ideas and attitudes towards ICTs are embedded in the organisational cultures and are likely to have significant effects for training, communication and information flows and work productivity.

Another important issue is how the implementation, integration and application of ICTs do not have uniform consequences or outcomes. Creating a cohesive setting is dependent on the context in which the technology is implemented and used. As this case study shows, individuals from different occupational groupings and various hierarchical levels do not have the same reactions to technology implementation and application, even in similar contexts. Overall, a more negative response to technology may be found in a training setting compared to the work setting, even though the two settings are part of the same organisation (Barnes, 2003)

Conclusions

The implementation of technology operates not only as a catalyst for change but may also be used to encourage change. It is too early to assess the extent, or the manner in which the introduction of an e-portfolio into the call centre has affected employees at different levels of the organisation, or to discuss their influences on the organisational culture, organisational structures and social relations. Certainly, the introduction of e-portfolios has the potential to impact on all of these variables. One other issue currently being worked through are the patterns and forms of access to, and participation in, the new e-portfolio technology. Additionally, the benefits and problems arising from the introduction of this technology into the work setting for training purposes are not yet apparent. It is unlikely that technology will prove to be an independent force in organisational transformations, but is likely to play a significant role in any changes that occur.

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THE IMPORTANCE OF ACKNOWLEDGING LEARNING PROCESSES IN ASSESSING THE IMPACT OF EPORTFOLIOS

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Abstract: A team of researchers from the Learning Sciences Research Institute at The University of Nottingham conducted a project commissioned by the British Educational Communications & Technology Agency (Becta) in 2006 to identify the impact of eportfolios on learning. The aim was to identify common themes across a range of eportfolio projects, and to establish dimensions and baselines that could be used for future planning and implementation. The research team chose to focus on selected learning processes related to eportfolio work, particularly recording and storing evidence, planning and organising, reflecting, giving and receiving feedback, collaborating, and presenting and publishing. The results of this study suggested that eportfolios benefit learning most effectively when considered as part of a loosely-coupled set of tools and spaces that support a connected teaching and learning approach, rather than as a discrete entity. This should include online repositories, planning and communication tools, and opportunities for both students and teachers to draw out and present eportfolios at particular times and for particular purposes. The study indicated that, from both the institutional and the user's point of view, eportfolio development can be undertaken from the starting point of one or more of the learning processes, rather than taking on all processes at once. As a result of the study, an eportfolio maturity model was developed to enable individuals and institutions to identify their progress.

Keywords: formal education, learning processes, fieldwork

Introduction

In 2006 the British Educational Communications & Technology Agency (Becta), which provides policy advice to the Government, commissioned research to identify the impact of eportfolios on learning across all sectors of formal education. The aim of the project was to establish dimensions and baselines that could be used for future planning and implementation. Specifically, it aimed to provide advice on the potential of eportfolios for learning; which aspects of existing projects had an impact on learning; and whether these were transferable. A team of researchers from the Learning Sciences Research Institute at The University of Nottingham conducted the project over a period of six months. At the outset it became evident that while the use of the term eportfolio was not widespread, individuals and institutions used learning platforms and online spaces to support the processes that were the focus of the study.

Research Methods

The research used mixed methods including document analysis, surveys, site visits and interviews to achieve its aims. Eight case studies had been suggested by Becta, including primary and secondary schools, Further Education (FE) and Higher Education (HE) institutions, and junior doctors in the National Health Service (NHS). Each researcher took responsibility for researching and documenting at least one case. An online survey was developed for students and teachers, to gather use data and responses to a set of statements on a 4 point Likert scale. These statements are found in the appendix to the full report (1). Several open-ended questions were also included, and 172 responses were received. The data from each case study, and the survey responses, were coded and analysed to identify material relating to the broad themes of the research, and other emerging themes. The report aimed to provide sufficient descriptive data to make judgements possible by policy-makers and other

audiences, but argued that examples of good practice should be documented even if they existed in small pockets, to identify 'what could be', in addition to 'what is' (2).

In addition, the research team set out to develop a draft eportfolio maturity model, based on work done by Underwood and Dillon (3). A maturity model is a profile based on a set of text descriptors that can be used to provide a snapshot of an organisation's progress. The descriptor set is generally developed in three stages, but given the time constraints, the team worked on the first stage only. The researchers drew upon a bank of 67 descriptor sets for reporting on a wide set of policy and user issues relating to the use of ICT in educational settings (3). Although most of the items in the existing set were not included for the eportfolio model, since they related to contextual and background factors, a few were retained.

At two half-day workshop meetings, research team members and project consultants worked together discussing relevant thematic areas, and these discussions produced a number of draft descriptors. At two subsequent workshop meetings involving research team members, these descriptors were revised and new ones formulated to take account of emerging findings from two other sources: the project team's case study data, and the data from the online survey of eportfolio users (and some non-users). Finally, the seventeen sets of descriptors that emerged from these rounds of development were shared with Becta colleagues, and went through a final round of revisions to increase clarity, sharpness of focus and comprehensiveness in relation to the project's research goals. The model is found in the final report (1).

Findings

The results are presented under the process headings used by the research team to analyse the data for the final reports (1, 4).

Engagement and motivation

Engagement can include physical attendance, social interactions with teachers and other learners, and involvement in activities. It can be measured by observation, usage statistics and reports from participants. In the case of eportfolio development, both engagement and motivation can be affected by access to suitable technology. According to many teachers, the motivation to use the eportfolio systems provided in each case was closely related with motivation to use ICT in general. There was a range of engagement within each project, with school students appearing engaged in several dimensions. Most institutions did not analyse the usage statistics to identify trends, and their responses were generally in terms of perceived usage, attention to the task and interaction with other people through the software.

In one FE college, a teacher reported that the visual aspects of working with ICT, as well as the reassurance of a safe environment for eportfolio development, assisted some students to become engaged in their work and motivated to produce new material. In contrast, doctors engaged with the eportfolio process as it was a requirement of their programme: '...so it simply has to be done.'

Primary students were very enthusiastic about using the school website for storing, collaborating on and presenting their work. Generally, they found it 'fun', and agreed that they became more interested in their work. Among FE and secondary students, the survey results from students who 'have created an eportfolio' (n = 66) were intriguing. Although fewer than half found it fun, or that it made them more interested in their work, more than half indicated that they would like to use an eportfolio in future. (Note that the use of the word 'fun' in the question is likely to appeal more to primary students.) A small number of teachers, on the other hand, generally felt that working with eportfolios had been fun for their students, as well as making students more interested, with 77 % agreeing or strongly agreeing with these statements.

In general, then, it seems that teachers believed the students were enjoying this use of ICT, while students were less enthusiastic. However, many students were quite pragmatic, realising that they should use such tools for planning, storing and reflecting on their work. Where students see a connection with their current and future lives, motivation will be relatively high. Where the activity is mandatory and high-stakes, as in the case of the junior doctors, it is likely that it will be taken up anyway.

Goal-setting and reflection

Goal-setting and reflection are intertwined processes that support learning, and were clearly part of the purpose of the eportfolio work in several secondary and FE settings. Setting goals requires self-knowledge as well as knowledge about the possibilities ahead, whether pertaining to curriculum, employment or personal growth. It also requires personal organisation to achieve the goals. The software tools provided in some cases, such as calendar, archiving and blog-type tools, facilitated this process.

A FE tutor explained:

‘We give students a model to reflect: to look at what happened to them, why did it happen, what could they do in the future. We encourage them to upload an action plan, to continually look at their development... maybe what they’ve already achieved, or by going on a course. Some students commented in the survey that they learnt how to set targets and keep track of their work, adding, however, that it took ‘ages’ to do. In another college, a reflective student saw the potential as a long-term tool and suggested ‘it would be good to look at your grandmother’s portfolio’.

According to one assistant head teacher the digital repository particularly assisted ‘fragile learners’ (such as disorganised or borderline students) to organise themselves, and to avoid losing the evidence of work they’ve done. Here too, support was provided for reflection, especially within the Certificate of Personal Effectiveness, which encouraged students to practise the skills associated with reflection. Tutors in the NHS project stressed that reflection is central to a doctor’s culture and that it should not be something that needs strong cultivation: it arises out of what they routinely do. However the NHS eportfolio project was relatively new, and a manager suggested that there had not been enough time to integrate a culture of recording reflection: ‘The doctors themselves are interested in ticking the competency boxes and when they are in the middle of the range they are not yet asking how they might progress.’

Survey data showed that eportfolios helped students think more about their own learning to a greater extent than using an online space only, although the distinction between the two terms was somewhat blurred. In spite of the large number of students using an integrated planning system, slightly less than half of all FE and secondary students valued the planning functions, perhaps hoping for more long-term planning help. As one student wrote:

‘I would like more help on how to be able to make plans on the website, to help with organising myself a little better with my work. I would also like more guidance in what I would like to do when I am older and what I want to achieve.’

All the teachers in the survey claimed that eportfolios helped them think more ‘about learning in general’, while most teachers claimed it helped their students be better organised.

Feedback and collaboration

One of the claims made for virtual learning environments and learning platforms is the capacity for both collaboration in social learning and feedback, an evaluative activity that can support assessment for learning. This can involve students, teachers, parents and experts within and across institutions. In many schools, pupils, teachers and experts used the forum capability of the learning platform. One teacher said: ‘The forum is good for assessing what the children

know everybody discusses as well, even the quiet ones.’ Another went further, describing how students worked with people outside the school through the learning platform, as a means of stimulating topics in the curriculum as well as being reflective of class activities.

An ICT co-ordinator saw the value in crossing boundaries between home and school:

‘It’s a great way for children to share work and collaborate with children in other schools. The children are able to continue their learning and share work with their parents. It helps the parents to understand better what the children are doing in school and works to build greater home-school links. The children become more interested in the world around them and enjoy having a platform to share their work and show what they can do.’

Out of school, primary and secondary students collaborated with friends and others in and outside their schools using more open software such as instant messaging, social networking sites or email. Some FE students felt that blogs were easier to use than their institution’s software, but that they were social software and therefore not suitable for formal contexts. They had used these intermittently and were not regular users. They commented:

‘MySpace is more for your personal enjoyment than for professional use as an eportfolio would be. An eportfolio is more for applying for universities. A blog or MySpace is more for your friends to look at, where you put your photographs of your holiday and that sort of thing.’

The FE students generally did not collaborate in their institutional online spaces, whereas school students tended to work together on projects.

The survey data revealed some very positive responses in areas related to feedback and collaboration, with slightly more positive responses from students working in school and college websites (62% positive compared with 50 % using eportfolios), indicating perhaps that eportfolios are often seen and used as individual spaces. Students tended not to see eportfolios, individual learning plans or progress files as ways to see what their friends were learning. This might also point to concerns about privacy and ownership, which are important issues in this area. Students would have to trust others with personal information, especially when they might be competing with their fellow students for jobs or university places.

The potential for eportfolios to support feedback is very high. Furthermore, the potential for collaboration between teachers and their students, between students and their peers and between parents and experts is provided through linked virtual learning environments, with the proviso that it should always be the learner who decides who may see particular material, sometimes in negotiation with teachers. What eportfolios add is a repository where the knowledge created through collaborations can be stored for later referral.

Storing and presenting evidence

Many of the purposes of eportfolios involve presentation of evidence to an audience, whether for celebration or assessment, or for applications to institutions and employers. The study found that the content of the web spaces, in most cases, was course or curriculum-related, although evidence of outside activities was clearly encouraged in some instances. In the primary settings, teachers tended to collect a great deal of visual evidence by using digital cameras. One teacher held conversations with individual 3-5-year-olds about the contents of their repositories, leading to diagnosis of strengths and weaknesses. Many students used personal equipment in addition to, or instead of, the school resources and, in some cases, have more experience than their teachers. One said:

‘I’ve got records of achievement, certificates and that for GCSEs and stuff, but my house was trashed and I lost all my certificates so I had to go back to AQA to get them. If the eportfolio is accessible and has the certificates, and this is accepted by universities, then brilliant! I don’t need to keep the proof.’

Eportfolios for presentation and publication can provide teachers with valuable information about their incoming students, as a means of supporting personalisation, among other things. A primary school teacher suggested:

‘We’ve used presentation software, and they will upload these eportfolios onto the school website, so hopefully for the transition from Year 6 to secondary, they will be able to show just what they can actually do. We find with any sort of changes within the key stages there tends to be a drop to begin with, because of the under-estimation of what they can do.’

This drop in achievement and engagement in connection with transition points has been noted previously, but might be overcome with increased communication between phases.

However, many students did not think of eportfolios in terms of presenting and displaying work to an audience, perhaps due to the specific purposes of the cases studied. Eportfolio audiences include current teachers, parents, future teachers, admissions officers and employers. Even where the notion of presenting to an audience was acknowledged, there was little discussion of who the eportfolio audiences might be outside the current institution, or the possibility that there might be several different audiences with different interests.

Attainment

All institutions had been making efforts to improve the attainment levels of their students, but as one secondary teacher said: ‘How do you know which factor did that?’ A secondary college suggested that the eportfolio system assists attainment because it ‘removes some of the barriers to learning’, specifically some individual students’ inability to manage learning resources in hard copy form, or set and meet deadlines.

A sixth-former reported that since using the learning platform she had raised her grades in textiles significantly, while a Year 4 student claimed that using the school space had helped him to move from one of the bottom groups in Year 1 to one of the top groups in Year 4. For the doctors at the other end of the spectrum, the eportfolio was also used to formalise evidence of achievement, principally for their tutors, and in this regard was seen as a valuable device to meet their assessment requirements.

While the capacity was not yet exploited, some eportfolio software tools can be linked with student management systems to log and store numerical and other attainment data that would assist students and teachers to track their progress.

Although one FE student commented in the survey: ‘To be honest I haven’t learnt anything from using the eportfolio that I didn’t already know’, the survey results tended towards a positive response to using eportfolios to assist learning.

The potential for eportfolios to support attainment is linked to the learning processes discussed above. It is also likely to be influenced by the connection of eportfolios to other ICT supports for learning. It seems that eportfolios make the evidence of attainment more obvious, in a range of media formats, to both teachers and students. This transparency can have the effect of giving the learner more control over their learning, and planning for future growth. A further benefit of eportfolio systems, little used in the cases studied, is in tracking attainment measures for the purpose of individual planning, and, for institutions, in addressing curriculum and pastoral issues among cohorts of learners.

Progression and retention

Progression and retention are key aims of the Widening Participation agenda in the UK (5), which seeks to increase the involvement of a wider range of students in Higher Education. Most of the cases reported here had been using eportfolio systems for a short time and did not provide data on progress and retention, and most tutors were reluctant to suggest that eportfolios alone were the cause of any improvement: However, in one local authority in the

study, the overall pattern of participation in post-16 education was already beginning to show significant improvement, with participation in full-time courses rising from 69 % to 77 %, higher than the national increase. Within a lifelong learning framework, data from the earliest years would be useful in tracking progress, so the work being done in primary schools links with high-stakes work done in later years. A loosely-coupled system that includes planning and guidance tools, repositories of evidence and space for creativity is likely to be more successful in addressing a range of learning processes.

Self-esteem

The positive effect of eportfolios on the confidence and self-esteem of learners is often claimed, and students and teachers in this study reported instances of increased confidence in using the technology and in approaching their learning. Some FE students said: 'It is nice to have an area you can put stuff that you can be proud of, like in MySpace'; 'It makes me feel proud that I took my time to do that bit of work and now people can see what I can actually do'; and 'I have learnt that everything is possible, all that's needed is a little patience and some work.'

However, most secondary and FE students did not regard online spaces and eportfolios as areas for creativity. Furthermore, although students tended to 'understand their work better' and were 'pleased with' their progress, for students other than those in primary schools, using eportfolios and online spaces did not, in the main, help them to be more confident. This could be due to the extent of feedback and reflection that they have engaged in: more constructive feedback and reflection is more likely to enhance confidence. This points to an important role for teachers and tutors in promoting the social, as well as the instrumental, outcomes of learning activity.

Conclusions

In terms of the impact on learning outcomes, the study found that eportfolio processes supported both pastoral or social needs and curriculum outcomes. In light of assessment for learning (formative assessment) eportfolios made progress and attainment more obvious to both teachers and students, because viewing and revisiting the repository of work revealed development, achievements, strengths and weaknesses. There was a tension between facilitating creativity and designing supportive structures for students to enter information.

The researchers concluded that the individual and group processes of capturing and storing evidence, reflecting and planning that many institutions currently encourage—even where they do not use the term eportfolio—have great potential to support future individual or group eportfolio development. There were some learners in all age ranges who found that software that includes structured processes and organisational tools (such as templates for planning, calendars and goal-setting exercises) scaffolded their learning until they were confident enough to progress to working independently. Some valued seeing e-portfolio exemplars before embarking on their own.

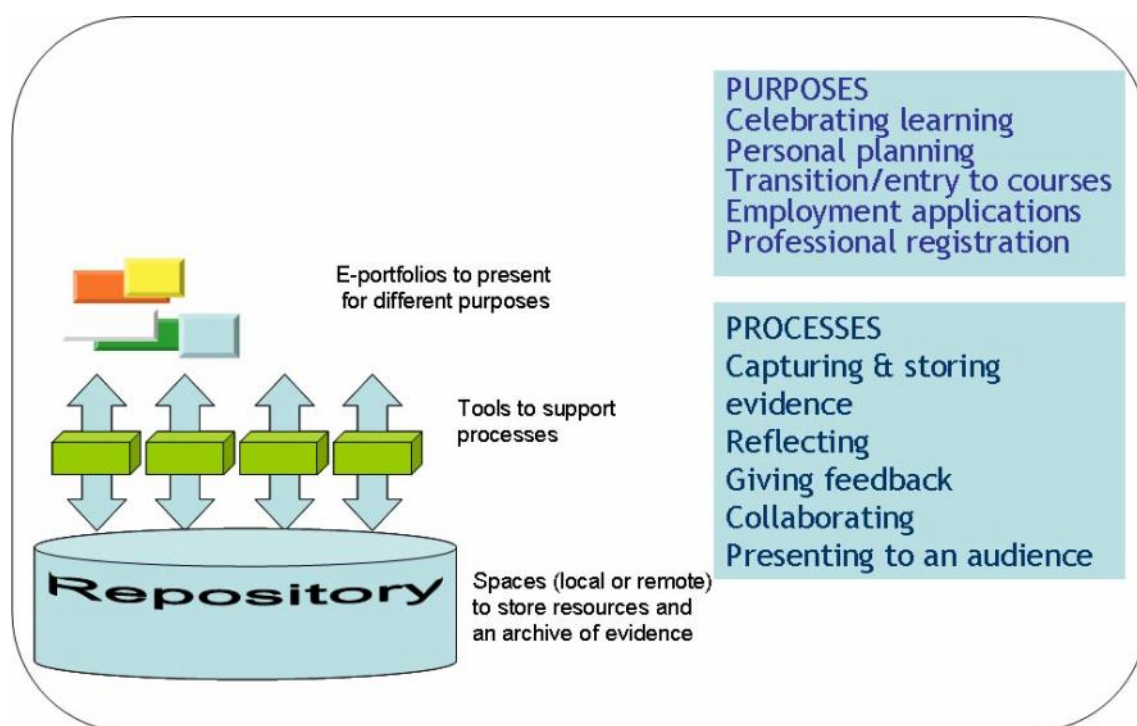


Fig. 1. Components of an eportfolio system

While the study found software products that addressed various eportfolio processes, the team concluded that an eportfolio system should be a flexible arrangement, made up of related, but loosely-coupled components that serve the objectives of the learners at a particular time. Figure 1 illustrates the components of a system that includes the repository function, tools that support the processes outlined above, and the capacity to present customised eportfolios to various audiences. The repository for an individual could be distributed across several locations, linked by aggregating tools as required (6). Tools could be freely available, open source, institutional or otherwise, but must support learners' needs to engage in various processes that support learning at different times. Further, the study concluded that learners could start eportfolio development through embarking on any of the processes, depending on their current needs and purposes, gradually adding to their experiences. The impact on learning is likely to flow from the extent of engagement in these processes, making simple statements about the 'impact of eportfolios on learning' too superficial to be helpful.

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BREAKING OUT OF THE BOX: DEMAND LED E-PORTFOLIO FOR EMPLOYABILITY

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Keywords: employability, ePortfolio

1. The limitations of current ePortfolios

The commercial world is ahead of education in moving beyond closed systems containing services ("Web 1.0") toward a more open landscape: "Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences"⁴⁷.

If we accept this proposition a paper-based Portfolio cannot deliver the transformative benefits that Web 2.0 enables. ePortfolios working at the page metaphor level are severely constrained. The ePortfolio within a closed learning environment within a single organisation cannot deliver the same benefits as an open system using the network as platform. Why then are so many ePortfolios designed for closed virtual learning environments? Colleagues in the UK, the Netherlands, Belgium and Germany have been working together to exploit the opportunities that the open web provides.

2. A shared Problem

Although unemployment is low, the workforce in England has significantly fewer skills than other comparable European states. Before taking office the new British Prime Minister commissioned a strategic report which recommends major initiatives to improve the skills of existing workers and the next generation of workers currently studying in school, college and university. One of the *Market Failures in skills* identified by the Leitch Report⁴⁸ is *Information Failure*: "This occurs when the information available to individuals or firms is incomplete or imperfect, or when some have more or different information to others. This might be awareness of the benefits of skills improvements, or information about the quality and content of particular courses and particular institutions". This is a shared European problem.

⁴⁷ Tim O'Reilly [Available from: http://radar.oreilly.com/archives/2005/10/web_20_compact_definition.html accessed: 10.10.2005].

⁴⁸ For the Report of the Leitch Review of Skills in the UK. [Available from: http://www.hm-treasury.gov.uk/independent_reviews/leitch_review/review_leitch_index.cfm].

3. A Solution?

Although the UK has made a significant investment in ePortfolios for Personal Development the priority for vocational reform may be more specific: to support learners integrate and apply the skills they are learning in employment and education. The *employability e-Portfolios* that colleagues in Belgium and Holland have implemented in traditional industries and SMEs are directly relevant to the UK⁴⁹. These ePortfolios are owned by the individual to help the individual develop the skills a rapidly changing labour market requires and can be dynamically linked to major HR systems, such as SAP and to education/training providers. *ICT services* help the individual to compare his or her skills profile against current career opportunities and identify the education and training providers who can enhance the individual's skills profile to meet employers' needs⁵⁰. Further ICT services support employers and education/training providers plan for skills development within competency frameworks.

The UK is learning from this Dutch and Belgian work on skills and competency frameworks linking employers and education / training providers. Can we adapt these services for the similar but distinct needs of an under performing area in England, the East Midlands? How can we make available the services we are developing for use in the Netherlands and elsewhere in Europe?

JISC⁵¹ plays a leading role in the e-Framework⁵² a strategic initiative involving SURF⁵³ and the ministries of Education in Australia and New Zealand which defines different versions ("*service expressions*") of the same generic service ("*service genre*") which can be shared and adapted for use in different contexts.

Following the development of a Reference Model for ePortfolio Learning funded by JISC⁵⁴ the Centre for International ePortfolio Development in the University of Nottingham are adapting the services which were developed to profile applicants for use within a regional partnership to provide e-Portfolios linking education and employment. Not only has this the potential to reduce costs but because the services are versions of the same thing the resulting services will be easier to interoperate, especially if tools which allow for the auditing of schemas, such as Schema Prof⁵⁵, are used.

4. The European Context

UK offers an example of an economy that has moved from manufacturing to a service based economy and has developed *services* for profiling people and providing information that may be relevant to the Netherlands. Where the UK is looking at the new project based economy from the perspective of the Ministries of education and skills, the Netherlands is looking at the same problem from the perspective of the Ministry of labour. These approaches fit well together but there is also a fundamental need shared by both countries and the rest of Europe: In the old economy people used the same skills in the same job for a long time. In the new economy people must continually develop new skills as they move from one project to another within a company and as they often move between employers. People are learning new skills throughout their lives and will often need to share their personal information between the

⁴⁹ See http://www.eife-l.org/publications/eportfolio/proceedings/ep06/ep2006_papers/vervenne/

⁵⁰ For an overview of this work <http://www.hr-xml.org/hr-xml/wms/customers/pdf/Competencies.pdf>

⁵¹ The body responsible for the strategic support of ICT in Higher Education in the UK. See: <http://www.jisc.ac.uk/>

⁵² See <http://www.e-framework.org/>

⁵³ JISC's Dutch sister <http://www.surf.nl/en/oversurf/Pages/Introductie.aspx>

⁵⁴ <http://www.nottingham.ac.uk/epreferencemodel/index.htm>

⁵⁵ <http://iwm.uni-koblenz.de/schemaprof/>

education/training providers in a secure, trusted way not just in their home country but anywhere within a single dynamic European economy.

5. An Opportunity and a Risk

The opportunity is to draw on the work of colleagues in Belgium and Holland who have implemented large scale *employability e-Portfolios* in both large industries and in consortia of SMEs. These e-Portfolios are owned by the individual to help the individual develop the skills a rapidly changing labour market requires but are also dynamically linked to the major HR systems, such as SAP, and to education/training providers. *Services* help the individual to compare his or her skills profile against current career opportunities and identify the education and training providers who can enhance the individual's skills profile to meet employers' needs⁵⁶. Further ICT services support employers and education/training providers plan for skills development within competency frameworks.

The risk is that appropriate standards will not be available. It is important that the UK contributes to the development of the standards required to support these developments. There were significant problems with the UKLeaP specification, which was based on IMS LIP and remains a draft British Standard in development. There were significant issues with the IMS ePortfolio specification⁵⁷. There is an urgent need for a reliable standard for learner information and within the Human Resources community significant take up of HR-XML, for example by a Recruitment Clearing House with 7% of the UK market⁵⁸ and this has prompted the development of a new specification with which UK HR ICT specialists working with Sector Skills Councils are already engaged. The link between education and employment is of strategic importance and the new version of HR-XML is a significant opportunity for developing a solution to specific problems.

However, specifications are of secondary importance. The ePortfolio Reference Model⁵⁹ funded by JISC proposed a "thin" model of ePortfolio in which the *services* consuming and producing data were separated from the *repositories* holding the data, which were also separated from the ePortfolio *application* managing the data flow. The Reference Model confirmed that the use of the eFramework reduced the complex problem of ePortfolio to simpler terms in which it could be implemented: this work is currently being developed for trials. However it did not address the use of repositories for learner information. This key issue is being addressed by Prof Ingo Dahn as part of the TAS3 project and the subject of a separate paper⁶⁰. This proposes a specification neutral approach to learner information which will be trialled and implemented in UK and the Netherlands from 2009⁶¹.

⁵⁶ For an overview of this work <http://www.hr-xml.org/hr-xml/wms/customers/pdf/Competencies.pdf>

⁵⁷ Doris Kezler in a presentation to the Institut für Wissenmedien at the University of Koblenz-Landau in December 2006 reviewed the work of the Nedcar project noting that although, the IMS ePortfolio specification offered an appropriate framework it rapidly turned out that adaptations of the specification were required. This is probably the largest implementation of this IMS specification and stimulated the development of a new version of HR-XML.

⁵⁸ Alex Charles of SkillsMarket is pioneering use of HR-XML for ePortfolios for recruitment, a process which bears significant similarities to recent JISC work.

⁵⁹ For the ePortfolio Reference Model see: <http://www.nottingham.ac.uk/epreferencemodel/outputs.htm>

⁶⁰ *Specification Neutral ePortfolios and their implementation with a Fedora Database* to be presented by Prof. Ingo Dahn of the University Koblenz-Landau to ePortfolio 2007 at Maastricht.

⁶¹ For the press release announcing the formation of the HR-XML Europe consortium in 2004 see http://www.sourcewire.com/releases/rel_display.php?relid=18976&hilite

6. Demand Led e-Portfolio for employability

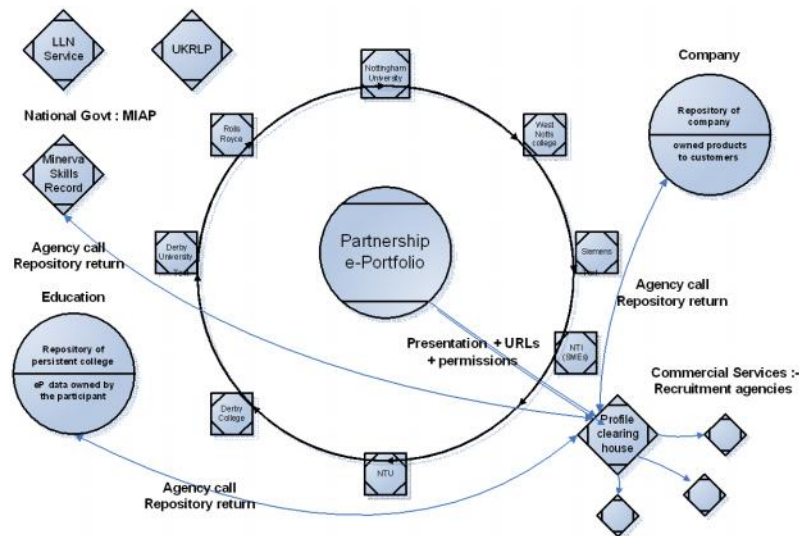


Diagram 1

Diagram 1 shows how an employee who is improving her skills within an LLN can draw together what she is learning at college or university (information held in the ePortfolio) recover information from her old college records (the repository of old college data) and examples of her current work (the repository of company owned products). This information is integrated within an ePortfolio provided by a clearing house supporting recruitment agencies.

This learner may not be motivated by the concept of Personal Development but a strong wish to get a better job and this is what a demand-led ePortfolio for employability focuses on. The diagram shows a use case in which:

- a Partnership ePortfolio is at the centre of a circle linking the educators and employers making up an LLN (in the case of the Derbyshire / Nottinghamshire LLN NuVentive's i-webfolio which has strong access and security features),
- The ePortfolio provides the Recruitment Profile Clearing House with a view onto information that the applicant has assembled in several presentational portfolios for different types of employer PLUS links to resources such as a formal skills record provided by the Minerva service,
- In addition the Partnership ePortfolio provides a link to a repository containing information preserved from an old college PassPortfolio, say a piece of evidence of a skill (bottom left of the diagram),
- In addition the e-Portfolio provides a link to an employer's system showing the deployment of the same skill in a set of technical drawings for a customer (top right),
- The clearing house authenticates and assesses these materials and identifies recruiting agencies / employers with a likely interest in this individual.

While the functions of the Recruitment Clearing House are not identical to UCAS⁶² the processes involved bear marked similarities.

Diagram 1 covers a number of possible scenarios:

- a college learner in an LLN who decides to apply for a job rather than university,
- a college learner who applies simultaneously for employment and university,
- someone in employment who decides to begin part-time HE study,
- someone made redundant (or returning to work when children begin school) who wants to re-engage with education and training in order to get a good job.

The original version of this scenario adapted an existing HR pattern widely used in universities for the UCAS process but did not take account of the specific needs of potential applicants who are not in education or not interested in academic routes. Many useful current PDP processes are perceived by many learners to be supply-led. The explicit intention of these scenarios is to illustrate the re-use of current HR patterns in order to develop a demand-led approach to deliver the Leitch agenda. Further scenarios are required for people disengaged from learning and employment.

7. Integrative Learning

Simultaneous learning within employment and education

Increasingly regional partnerships are being formed as a result of JISC activities and other initiatives, such as Lifelong Learning Networks (LLNs). Advice and Guidance is playing an increasing role in this work, for example the Nottinghamshire PassPortfolio in which Connexions are taking a leading role.

Up to this point, the collaborative Nottingham work on e-Portfolios has concentrated on encouraging and supporting transitions, but the development of 14-19 Specialised Diplomas is stimulating a growing emphasis on “*Lifewide Learning*” in different contexts, often including employment contexts and the involvement of employers in the development of curricula. There is a parallel, increasing demand from full-time undergraduates for various forms of work experience/placements which can complement and be integrated with their academic learning.

In a *lifewide learning* scenario the learners must integrate the skills s/he is learning, for example through a college course, with the learning from practical experience being gained at the same time in employment. S/he must learn how to express themselves in the different terms required in these different contexts. Here information does not pass from a college to an employer in a single, once-and-for-all transfer, but constantly passes backwards and forwards.

⁶² Full time students in the UK normally apply to University through UCAS.

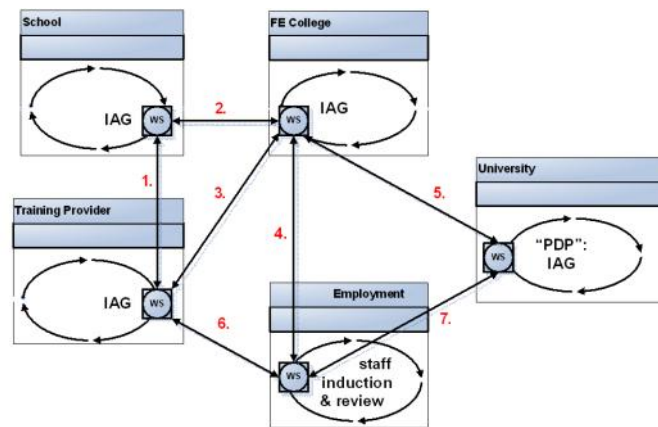


Fig. 1.

In this illustration a learner may be employed but also attending college to re-take the GCSE English s/he failed at age 15 (4) and developing specific skills through a training provider (6) while the university student is undertaking a work placement as part of a degree programme (7). The primary question is the nature of the Advice and Guidance (sources and processes) that learners' require to integrate what they are learning simultaneously in education and employment.

The second question is the nature of the ICT required to support the provision of that *Advice and Guidance Service*. While two separate systems in two separate organizations could hold different perspectives on the learner's progress, the point is for the learner, and the advisors in education and employment to develop an integrated overview of what is being achieved and what needs to be achieved next. Institution-specific, system-bound approaches present significant problems here, which the more open architectures being opened out by *Web 2.0* address.

8. Scenario Re-engaging an employee with learning

How does a 26 year old disengaged from learning for 10 years recover their profile from ICT resources in order to re-engage and progress? This draft scenario represents the first phase of an individual's engagement with a LLN, a regional partnership funded to increase participation in Higher Education and focused on vocational reform. The focus is on the relationship of informal social software for the initialization of a new ePortfolio which also draws on national databases and repositories of preserved data.

a) Scenario Background

A 26year old who left college early now lacks the prospects of friends who stayed on and went to university. He is in a steady job and now wants to catch up. The Amicus Rep has told him about the Lifelong Learning Network and he uses meet-O-matic to arrange a time to talk with an advisor face to face.

b) What the participant tells the advisor face to face:

Then

At the end of my first year in college my cousin said he'd pay for me to go to the Isle of Man if I tuned up his bike for the TT. I missed some of the exams and never quite made it back to college but in October my uncle got me a good job that could lead on to chartered engineer. That meant bits of college / Learn Direct work.

But I was still mainly into bikes and that was a good way to get on with the guys at work: I added a bulletin board about the bikes in addition to the group of friends I moderated. They are all old AEU types and I went to AMICUS meetings because that was expected. So I did stuff in college for work and stuff with Parity through the union, quite a lot of it on-line.

Now

I use MySpace because anyone can see your stuff. I started with the bikes: videos, technical stuff, chatting on IM and advice (from my uncle!). There's also an activist's feed from the union: work's much more traditional even though I do CAD stuff. I've got a mortgage, I'm nearly 27 and the people who stayed at college and went to uni have prospects I don't. More important: I'm still doing pretty much what I did 10 years ago. I got in touch with friends who went to uni (I had to sign up to FaceBook) but the links they gave me were for 19 year olds and the formal engineering web sites just gave me information, not people like me who I could talk to.

Next

I want to stand back, try out new stuff to find out what I really want from life: I need a different view. And of course that includes more money and a career as well! A qualification in IT? Something with an HE badge on it certainly. A degree would be best, but that would have to fit into work, or get me into a new job.

c) What the Advisor suggests

The learner seemed to me to be a non-conformist with an excellent set of traditional and 21st century skills including communication, creativity, collaboration and leadership while achieving below less able students in educational settings⁶³. I suggest s/he recovers information about their past achievement (which I expect will be better than s/he expects) and use this as the basis for an initial assessment of how their profile matches different educational opportunities and their linked career opportunities. S/he can then develop more detailed profiles and identify how they can be enhanced to meet goals.

Commentary

The Cmap attached in the Annex is an instantiation of Hilda Kruger's core iterative process around Learner Contexts for Learning⁶⁴ for the scenario numbered steps 1-4. JISC has begun work on the recovery of data from MIAP / QCA databases. SAP and Oracle are commissioned to develop interoperability with employment ePortfolios for their HR offerings for pilot from 2009 through the TAS3 project funded by the European Commission.

⁶³ This categorisation is taken from Creating & Connecting Research and Guidelines on Online Social and educational networking published by the National School Boards Association.

⁶⁴ This Cmap builds on the work of Hilda Kruger (the link to which is broken) and Nigel Ecclesfield (unpublished)

Technical services could categorise these personal data according to source (step 2) but this is insufficient to integrate data to link different terms meaning similar things in the education and employment worlds in order to assist learners produce information and knowledge (step 3). However the TAS3 consortium has commissioned the University of Koblenz-Landau to develop services to recover personal information on the recovery of data and information from federated repositories for pilot implementation by the University of Nottingham.

Ontology services could then assist learners in integrating data and information to produce knowledge. However, an assessment of the TAS work by Star Lab, leading European experts in the semantic web, concludes that it is impractical to develop such services before 2012, although the UK and NL demonstrators should gather the data required to further their long-term development.

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DEVELOPING W-PORTFOLIO CULTURE IN COMPUTER EDUCATION FOR TEACHER EDUCATION

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Abstract: As an attempt to develop an ICT culture in teacher education programme, the use of web portfolio (w-portfolio) in a computer education is being explored. A collaborative action research and multiple case studies are employed to study the development and implementation of the w-portfolio culture. The “learning about computer with computer” is the framework for this research and the main approach of learning how to learn about computer in order to prepare student teachers for their life-long learning and employability. The Yahoo website is used as a platform for the w-portfolio because with one Yahoo ID they can get more facilities such as Mail, Groups and Geocities. As part of the content of the websites, students have to submit their assignments by creating hyperlink to the word processor, multimedia presentation and spreadsheet documents without converting them into HTML format. Yahoo! Groups is used where students have upload their assignments from time to time as part of their learning process. The course tutor is a member all the groups to monitor and assess students’ learning process. Other students have to be members of the groups for peer assessment purposes. Students use blog as a platform for meta-cognitive reflection for each assignment.

Keywords: web-portfolio, computer education, teacher education

Introduction

The use of portfolios for learning and assessment is gaining attention from educators and employers. According to Stefani, Mason and Pegler (2007), one of the best ways of ensuring that students develop a portfolio is to integrate it into a course. Therefore, portfolio can be used to support the learning and teaching process. It aims to help students develop and further their learning. A particular student’s learning needs and the development of his or her motivation and confidence are paramount (Klenowski, 2002). Taking into account these important features of portfolio, the Faculty of Education, Universiti Kebangsaan Malaysia has taken the initiative to inculcate w-portfolio in computer education for teacher education by employing the “learning about computer with computer” framework. Thus, students learn about computer application software including web development at basic and intermediate levels. They have to upload their assignments from time to time as part of their learning process in Yahoo! Groups and Yahoo website where both are used as a platform for the w-portfolio. The use of w-portfolio is a part of learning which is linked to integration of classroom activities and not for assessment purposes only.

Computer Education Course

Computer education framework:

- Learning about computer (Literacy computer) skills (learning about computer),
- Computer / ICT culture in daily life including for teaching and learning (for educational purposes) (learning with computer),
- Create or develop computer product (learning about advanced computer).

The course being studied is Computer in Education. It is offered every semester in the teacher education programme at first degree level. The aim of the course is to enhance the students’ computer skills by applying the skills in educational context. ICT/computer skills and intrinsic motivation are essential elements to the success of developing an ICT culture. Therefore, both elements are being cultivated within the “learning about computer with computer” framework.

This framework is also the major approach employed for teaching and learning in this research. It emphasizes on learning about computer at basic and intermediate skills as well as learning how to learn about computer to support life-long learning. Students need to complete the projects or assignments that are related to their daily life as students and also their future career for the employability purposes.

Formative Assessment of W- Portfolio

Students' work may be assessed through either a standardized measure that is summative assessment or a criteria-based measure that is formative assessment. The later is an alternative assessment; Portfolio is one of them. A major claim made in current literature is that formative assessment of portfolios can enable productive forms of learning to take place (Johnston, 2004). There are more general learning support aims in formative assessment of w-portfolio such as providing feedback on student learning, motivating students to learn, consolidating the learning that is occurring, enabling students to apply abstract concepts to practical problems, providing feedback for academic staff on the effectiveness of their teaching and providing information for quality assurance purposes (Stefani et.al, 2007:78). The assessment of the portfolio is designed formatively so that there are more opportunities for students to receive feedback (Klenowski, 2002).

In this study, the Computer in Education course is assessed formatively, 50% of the total mark based on projects or assignment for the whole semester. Students sit for the final examination at the end of the semester. This examination contributed 50% to the final grade. Regarding the portfolio as formative assessment, the use of web based portfolio or w-portfolio using Yahoo platform is being explored. It is used as a platform for the w-portfolio because with one Yahoo ID they can get more facilities such as Mail, Groups and Geocities (including blog). This platform is being exploited to support teaching and learning of the computer course. The reasons for the usage are: 1) it is free, no extra cost for the hardware and software; 2) Yahoo platform can be used later after graduation for employment and life-long learning; 3) does not require the course tutors to maintain the server.

Life-Long Learning and Employability

The use of a portfolio is an educational process in itself. This is because the development of the portfolio of work to be assessed and the submission of this work is a phase of ongoing learning. The evidence in the form of the product of the portfolio is a demonstration of learning and at the same time requires the student to develop important insights, skills, strategies, dispositions and understandings for continuing learning (Klenowski, 2002). This continuing learning is important for students today for there is a need to continue learning beyond school and to develop means that will enable them to achieve success, fully and freely, through the realization of their self-initiated ends (Klenowski, 2002).

Furthermore, in terms of employability, students are not assessed solely on their academic achievements. For instance, according to Cox and King (2006), today's employers seek for two skills in their potential employees: transferable skills and specific subject skills. Meanwhile, the Malaysian Employers Federation (2002) added among others, two skills that are looked for in graduates in order to be employed; namely ICT skills and planning and organizing skills. These skills may be acquired through the process of developing a portfolio as described earlier.

Problem Statement

Often, the problems faced related to the assessment of students' projects are: students have difficulty to submit their assignments on time; students' project are infected by the computer virus; fear of the lost and damage of storage devices such as hard disk and students' flash

drives; and difficulty in storing students' printed work and compact disks (CDs) for a long time systematically and in accessing it manually. For these reasons, the use of w-portfolio needs to be explored. Thus, the focus of the first phase of this research is how w-portfolio may be developed and used as a tool for formative assessment for the computer education course.

Methodology

The application of ICT requires the computer/teacher educator to explore new approaches to teaching and learning. In this research, it involves a process of developing and trialing the use of w-portfolio followed by a period of reflection upon practice. Collaborative action research and multiple case studies are employed to explore the development and implementation process of w-portfolio culture.

The computer education course is offered every semester. The students are put into groups of 15 to 20 per computer class. The authors of this paper are the course tutors of this course. Each semester can be considered as a cycle in this action research approach. It gives the researchers opportunities to reflect on the strengths and weaknesses of the implementation process of w-portfolio culture in every semester. The multiple cases that consist of individual w-portfolio for each student are studied. The weakness or weaknesses of a particular stage are then, the focus for improvement in the following cycle of the action research.

Findings

After registering the Yahoo ID, students use the email facility to send messages and attachment files for submitting their assignments to the course tutors. This approach is used to master the skills of using attachment and creating a specific folder for the assignment in the Yahoo! Mail, as well as saving their emails for future references. Email is also used to send and reply messages from the group email. Related to Yahoo! Groups, students have to create groups and be the moderator. Other students then become members of the groups for peer assessment. The course tutor is a member of all the groups to monitor student progress in accomplishing the assignment and assess students' learning process formatively. Students then have to upload their assignments from time to time as part of their learning process in the *Files* allocation (the size up to 100MB) as show in Figure 1.

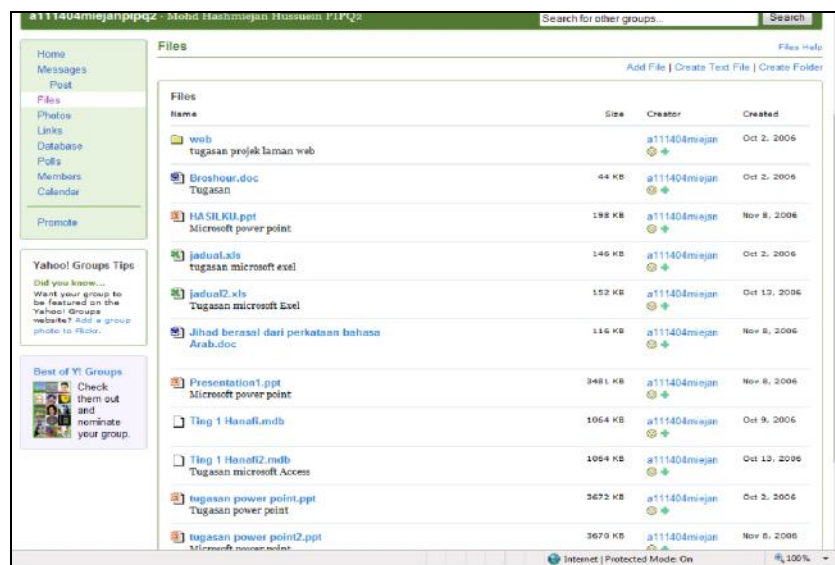


Fig. 1. Student uploads the assignments from time to time

Yahoo! Geocities provides two applications. 'Blog' is used for meta-cognitive reflection for each project or assignment. The development of a portfolio of work requires important cognitive and meta-cognitive skills such as monitoring, planning, reflecting and self-evaluation. In this way the portfolio cannot be separated from the processes involved in this development (Klenowski, 2002). After being familiar with 'Blog', students then learn how to develop websites using FrontPage and launch their website at Geocities. The content of the website includes any topic and hyperlinks that are related to their specialization as well as the hyperlinks to their projects or assignments. The students have to submit their final projects or assignments by creating a hyperlink to the word processor, multimedia presentation and spreadsheet documents without converting them into HTML format. Figure 2 is one of the w-portfolio examples where the students have to create and launch w-portfolio at Geocities.



Fig. 2. Student's W-Portfolio at Geocities

By experiencing the use of w-portfolio to support learning about computer skills and its application, it has given some advantages and disadvantages to both students and course tutors. According to students and based on observations of the students' involvement, the e-learning and e-portfolio/w-portfolio approaches being imposed to them have given a kind of 'culture shock'. However, students are familiar with portfolio for certain subjects during school days, but not in the electronic or digital forms. In addition, the use of portfolio is not yet to be cultured as one of the formative assessments in schools for every subject. Students are used to examinations or standardized assessments.

Based on the reflection by the course tutors, developing a w-portfolio culture among students demand time and good ICT infrastructure. A good computer network at high speed access of uploading and downloading the projects is vital. This research experienced obstacles or difficulties caused by the unstable computer network. This may result in students not being fully responsible for their w-portfolios. The students need to be motivated and reminded all the time by the course tutors to upload their projects and to manage the portfolio.

Conclusion

The use of w-portfolio, although still in its infancy, has the power and potential to transform. However, in the promotion of the portfolio for assessment and learning purposes, there is the possibility that too much will be promised and in practice a lot less will be accomplished. Yet it is vital that alternative methods are explored fully in the search for improved methods for learning and assessment that empower students to learn, help them manage their learning and develop vital skills for success in the twenty first century (Klenowski, 2002). To culture the use of w-portfolio in teaching and learning of computer course needs to be enhanced in other courses within the teacher education programme. After exploring the implementation process of w-portfolio, the next phase of the research will be to examine the impact of w-portfolio in students achievement, employability and life-long learning.

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A FEASIBILITY STUDY ON PERSONAL DEVELOPMENT PLANNING PROCESS EMBEDDED AT THE ‘SPECIAL’ EPORTFOLIO FOR GENERIC COMPETENCIES DEVELOPMENT

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Abstract: University education does not only provide students with the opportunities to acquire subject knowledge, but life skills for effective learning and to become successful practitioners in their fields of study. Student Affairs Office of The Hong Kong Polytechnic University supports the university’s mission of developing students’ generic competencies by creating the SPECIAL ePortfolio. The concept of personal development planning is built into the system as to improve the capacity of students to understand what and how they are learning, and to review, plan and take responsibility for their own learning. The ePortfolio serves the purposes of personal and career development. A feasibility study was conducted at the planning stage by inviting students for focus groups. The results showed that students did not quite appreciate the value of managing their own learning through personal development planning, but they realized the importance of developing generic competencies. They usually join extra- curricular activities, gain job experience, participate at exchange programmes and collaborate with peers at academic work. If students were asked to use the ePortfolio, they tended to look for resources that assist them to plan and prepare for career.

Keywords: generic competence, life skill, personal development planning, ePortfolio, student development

Introduction

People often perceive education as a process where students engage in programmes which are meant to deliver specific subject domain outcomes. Increasingly we are becoming aware that effective university teaching and learning extends beyond the development of skills and knowledge in specific subject domains. There are other forms of skills that are often common to all courses, regardless of their subject domain and are often referred to as key skills or generic competencies. In a knowledge society, this extended set of outcomes in curriculum and teaching are gaining prominence in all sectors of education, including the higher education in Hong Kong.

The Hong Kong Polytechnic University adopts two approaches of developing students’ generic competencies, particularly in the areas of global outlook, critical and creative thinking, social and national responsibility, cultural appreciation, life-long learning, biliteracy and trilingualism, entrepreneurship and leadership as stipulated at the University’s strategic objective one. The first approach is by means of introducing specific and separate mandatory subjects into the curriculum, such as language subject and general education. The other approach is to embed the development of students’ generic competencies integrally into the subjects of the mainstream disciplinary curriculum by introducing new curricular emphases, teaching methods and educational technologies. Faculty members also collaborate with Student Affairs Office (SAO) in organizing co-curricular programmes that foster students’ development of generic competencies.

SAO has been active in providing a comprehensive range of co-curricular and extra curricular programmes and conducting research studies on students’ developmental needs. In view of the institutional concern on developing students’ generic competencies, SAO initiated a gigantic project entitled “SPECIAL ePortfolio for all round development” where opportunities for assessing and developing generic competencies are grounded. This paper examines the personal

development planning (PDP) process underpinning the development of the SPECIAL ePortfolio and describes a feasibility study exploring students' reaction towards PDP and their interests on this e-learning tool.

Personal development planning and instructional guidance

Personal development planning is “a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/ or achievement and to plan for their personal, educational and career development” (Quality Assurance Agency, 2000). The concept of personal development planning (PDP) is embedded at the SPECIAL ePortfolio as illustrated at Figure 1. Students are able to *understand* their strengths and weaknesses by completing assessment on generic competencies, physical fitness and psychological health available at ePortfolio. They are provided with guidelines on how to *set meaningful yet realistic goals and action items*. After taking up their planned actions, they can *document their experience* and to *reflect* on their own learning, performance or achievement at the ePortfolio. The primary objective of personal development planning is to improve the capacity of students to understand what and how they are learning, and to review, plan and take responsibility for their own learning (Cottrell, 2003).



Fig. 1. The concept of personal development planning underpinning the SPECIAL ePortfolio

There is a close relationship between personal development planning and career development. Effective engagement with the personal development planning process can provide students with both the evidence and the language to convey their achievements to employers. In addition, reflecting on development and identifying strengths and weaknesses can help the individual develop as a learner and understand how their learning relates to a wider context (The Higher Education Academy, 2005).

Personal development planning can be facilitated or self directed (Gough et al, 2003). Not all students are capable of going through this process by themselves, but a self directed learner is able to benefit most out of it. What if students lack independence, confidence or resources when going through the personal development planning cycle? Students need instructional guidance from instructor or mentor to support them through the process. Effective PDP practice needs the integration with mainstream academic pursuits, links to the learning objectives and outcomes of programmes and to be supported by lecturing staff, underpinned by support from the institution. (The Higher Education Academy, 2005).

Categorization of generic competencies into SPECIAL domain

It has always been the mission of SAO in developing students' generic competencies for effective learning and career. Other than the generic competencies listed in the University's strategic objective, SAO has been keen and effective in developing students' generic competencies in other areas such as psychological wellness, interpersonal skills, etc. All these generic competencies were categorized in the following seven SPECIAL domains. This categorization gave students the full picture of all kinds of generic competencies. They were not required to develop all competencies during their university life, but those relevant to their professional and personal needs.

SAO's SPECIAL Domain	Generic Competencies	Description
<i>S - Social development</i>	Leadership*	Leadership refers to the ability to build up a common vision; infuse team members with energy and confidence; encourage people to persist in their efforts; explore new ways to improve; and implement strategies that enhance the overall performance of the team.
	Teamwork	Teamwork refers to the willingness to support team decisions; the ability to exchange information about work in a timely manner; maintain openness to information, ideas, and feelings of others; create and maintain an atmosphere that fosters open communication; and effectively manage and resolve conflicts.
	Interpersonal Effectiveness	Interpersonal effectiveness refers to the mastery of essential social skills to perform effectively in major interpersonal task domains and the ability to engage others in social discourses.
	Communication*	It refers to the ability to apply oral and writing skills to communicate clearly concisely, and effectively with others.
P - Psychological development	Emotional Quotient & Psychological Wellness	It is the ability to perceive and express emotions, to understand and to manage them for fostering personal growth.
P - Physical development	Healthy Lifestyle	The way people live and develop habits in fostering good health.
E - Ethics	Social and National Responsibility*	Social and national responsibility is based on a belief in the dignity, rights, and equality of all individuals; and a deep concern over moral and social problems in our city, our country, and our world. In practice, it means

		how ready are we to help others even when there is no personal gain; and to perform our civic duty as a citizen.
C - Career development	Entrepreneurship*	Entrepreneurship refers to the major behavioural characteristics of entrepreneurs: (1) proactively scan business environments in search of new opportunities; (2) generate innovative solutions to problems; (3) take initiatives in identifying and organizing resources to convert opportunities into marketable goods or services; and (4) create own business organizations.
I - Intellectual development	Critical Thinking*	It refers to the ability to identify and interpret problems, to state strong reasons/evidences to support a given argument, to analyze arguments, to make conclusions, and to identify illogical reasoning in similar situations.
	Creative Thinking*	It refers to the ability to use one's imagination freely to generate new ideas. It is the ability to discover and apply new and useful angles, ideas, and methods to understand and manage routine matters.
	Problem Solving	It refers to the ability to identify problems, set goals, plan and find strategies to solve them successfully and effectively.
A - Aesthetics	Cultural Appreciation*	It refers to the behavioral involvement in, attitudes and understandings of various artistic and cultural forms. The degree of interest in and the ability to appreciate and understand the beauty of arts, ethnic heritage and natural environment are examined.
L - Learning	Life-long Learning*	Lifelong learning refers to ongoing acquisition of knowledge, skills and competencies pursued throughout life. Therefore, it involves one's ability to cultivate an aspiration towards the mastery of new knowledge and skills, to take initiative to formulate one's own plan and direct one's learning activities by managing well the available learning resources.
	Global Outlook*	Global outlook refers to an understanding of the interdependency of nations and peoples, and the political, economic, ecological, and social concepts and values that affect lives within and across national boundaries. Having a general knowledge of history and world events and the ability to accept and cope with the existence of different cultural values and attitudes, it allows for the exploration of multiple perspectives on events and issues.

Methodology

In the initial stage of planning the SPECIAL ePortfolio project during Spring 2007, a feasibility study was carried out by conducting focus groups. The main purpose of this focus group study was to solicit in-depth and detailed comments from undergraduates on development of generic competencies in university life, categorization of generic competencies into SPECIAL domains, personal development planning and expectations on features available at ePortfolio.

The ultimate objective of building the ePortfolio is to foster students' all-round development. The research team would like to know if there were different opinions between students who are socially active and those who are not. A socially active group of eleven students and a socially inactive group of nine students participated separately at two focus groups. At the beginning of the discussion, the moderator briefed students about the purpose of the study, anonymity, confidential treatment of data, and freedom of expressing opinions. Following the discussion guide, the moderator also used projective techniques to facilitate the discussion. Qualitative data of the focus group transcriptions was coded and being identified into broad themes for analysis.

Discussion

Students were facilitated to discuss a number of important issues related to skills development and university life. The following topics were included, but discussion was not limited by them.

- Students' expectation on outcomes of university education,
- Employers' preferences on graduate attributes,
- Introduction of SPECIAL categorization and personal development planning,
- Introduction of ePortfolio.

Students' perception on employer's expectation on graduate

The two groups of students had similar views about employers' expectations on university graduates. A graduate should possess good language skills in English, Chinese and Mandarin, good at teamwork, stress management, interpersonal skills, analytical ability and be able to solve problems. In terms of working attitude, a graduate should be a responsible person, being confident and have interests in job.

Skills development in higher education

The socially active group mentioned overseas experience as a good way to learn to become more well-rounded.

“Leave HK. This is true. You better join exchange programmes. It is the most efficient way. I took an intern in US last summer and participated at an exchange programme in German.” (Third year Accounting and Finance student, socially active group)

Both groups mentioned participating or organizing extra curricular activities (e.g. voluntary service, outward bound, etc.), taking part-time job or internship as ways to improve teamwork and to build up network with different people. The socially inactive group realized that doing group project and assignment also improve teamwork.

Students from the socially active groups understood that they need the experiential learning context to learn and develop generic competencies.

“Generic competencies are not learnt through attending seminar. The most effective way is to provide students' opportunities to practise these skills. E.g. through intern & exchange...” (Third year Hotel and Tourism Management student, socially active group)

“If you ask me to join few days of training camp on these generic skills, it wouldn't work on me. I think overseas exposure is better. For example, culture is not learnt through

training, but interacting with people from other countries.” (First year Engineering student, socially active group)

SPECIAL categorization

The two groups of students in general found the categorization of generic competencies into the seven SPECIAL domains systematic. Still they were unable to comprehend all seven SPECIAL domains because they thought it was too detailed and academic. Dimensions such as “aesthetic” was not related to their major and it would be difficult for them to develop “entrepreneurship” skills. The SPECIAL categorization was too comprehensive, they would like to focus on important domains such as “intellectual development”, “learning” and “psychological development” and eliminate the less important domains such as “aesthetic” and “ethnics”.

“I think these terms are too academic. For example, those whom are not Business major would not know the meaning of entrepreneurship.”

(Third year Logistic students, socially active group)

“Too many categories... I have no patience to read through.”

(First year Textile and Clothing student, socially inactive group)

“I think the framework shall include the core competencies only. It shall focus on those that many students are weak of, but needs improvement...”

(Second year Computing student, socially active group)

Personal development planning (PDP)

The process of personal development planning was introduced by the moderator. Students' comments were mostly negative. Both groups found it troublesome to engage in PDP because of the heavy administrative workload of documenting their goals, plans and reflection. They were not motivated to take up PDP because employers did not recognize it and they did not see any value of self-monitoring.

“I think that if you ask students to document these things, it is quite troublesome”

(Third year Design student, socially active group)

“PDP is not a new thing to me. Many of us were asked to set our plan in primary or secondary school. How many of us would do so? Even if students set their plan, they might have forgotten that they had any plans at all.”

(First year Applied Biology and Chemical Technology student, socially active group)

“I wonder if employers are interested to read your PDP plan. No use. What is the use if I set plan and goal where I am the only one to read?”

(Third year Accounting and Finance student, socially active group)

“I do not think the PDP tool can help me, I know all these stuff (i.e. to plan, to implement and to evaluate) already.”

(Second year Nursing student, socially inactive group)

The moderator further explained PDP where instructional assistance could be provided by an advisor or a mentor during the PDP process. Most students still have reservation in taking up PDP, except a few from the socially inactive group. If they were asked to engage in PDP, students wished to receive individual tailored guidance from mentor whom is very experienced with the skills development, familiar with their own personality and personal growth. They would stop consulting the mentor if they found the guidance rather general.

“The person who guides me has to understand my personality very well in order to provide useful and tailored guidance.”

(Third year Logistic student, socially active group)

“I expect there will be a good mentor with relevant experience and with certain

qualifications in guiding me to develop the interests and abilities that I am having. In this case, I am willing to spare my time to join this activity as I regard it as beneficial to my future life.”

(First year Engineering student, socially inactive group)

Students' concern on ePortfolio purposes, features and system usability

Instead of mastering separate systems available at the university, students expected an integration of different systems, including ePortfolio. They were mainly concerned of easy navigation, being able to access ePortfolio after graduation, being able to share the ePortfolio with others and employer's recognition on the use of ePortfolio in job application. Students did not want to produce a long piece of writing at the ePortfolio. They preferred the flexibility of writing down their daily life experience, not learning experience in particular. If they were asked to use ePortfolio, they were mostly concerned of its career development purpose.

“If ePortfolio can further integrate all the existing things like WebMail, WebCT into one place, I think most students will favour and are willing to use.”

(Second year Textile and Clothing student, socially inactive group)

“It can somehow suit my needs in pursuing my career. If there is more career related information, such as cover letter sample, it would be better.”

(Third year Accounting and Finance student, socially active group)

“I don't want to make a long writing at ePortfolio by answering the pre-set question such as ‘What were the kind of generic skills developed throughout your activity?’. It is OK for me to jot down something related to my daily life. Something that is more interesting.”

(First year Engineering student, socially active group)

Conclusion

Students understood the importance of developing generic competencies as these are life skills for career and effective learning. They tended to take part in co-curricular and extra-curricular activities, getting work experience, participating at exchange programme or collaborate with peers at academic work as to widen their horizon and to become well-rounded. Students in general appreciate ePortfolio for its easy accessibility to SAO programmes and resources. Both groups of students share similar views on personal development planning (PDP), SPECIAL categorization and purpose for using ePortfolio. They seemed less keen in using ePortfolio for personal development, but more interested at career planning and development. Perhaps they could not see the value of self-monitoring one's growth through PDP. Another reason could be the fact that students failed to imagine the full features and resources available at ePortfolio and the possible instructional support behind it. Instead of marketing and introducing PDP directly to students, it is recommended to embed it into personal development programmes organized by SAO. Instructors of related programmes are suggested to review the course curricular and to plan if PDP fit into the learning context. Instructional support shall be provided to help students to set meaningful goals and to monitor their personal development progress. Instructors shall recognize and reward students when they have met their learning objectives. A year-long Good Starter Programme is planned with the aim to help freshman for university adjustment and adaptation. Instructors will walk through the process of goal setting and planning for university life by using the SPECIAL ePortfolio. Personal advisors will meet students regularly and to provide instructional support for students' personal development planning.

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II. DIGITAL IDENTITY AND PRIVACY

Digital Identity and Privacy (DIP) Conference
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BALANCING PRIVACY AND INFORMATION UTILITY IN DATA ANONYMISATION

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Abstract: In order to protect the privacy of individuals in sensitive data that has been released for analysis, it is not sufficient to de-identify the data by removing explicit identifiers, such as names and addresses. The data must also be anonymised, so as to prevent compromising the privacy of individuals through the manipulation of the data and / or by matching it with other sources of data. Anonymised data must satisfy two conflicting goals: privacy and information utility (e.g. the precision and completeness of the data). When data is anonymised, ideally both privacy and information utility levels should be maximised. However, it is difficult to determine the optimal levels of privacy and information utility when anonymising data, since the higher the required level of privacy, the lower the utility value of the anonymised data. To date, we have not found a model that has been proposed in the literature that could be used to guide the selection of an optimal balance between privacy and information utility. This paper describes current research work undertaken to address this challenge; a data anonymisation model will be developed during the course of the research work to guide the process of microdata anonymisation.

Keywords: security, privacy, microdata, information utility, association rules

1. Introduction

Statistical data often serves as the basis for creating knowledge that is used by different organisations to assist in their planning and decision-making activities. When confidential statistical data is released for use, it needs to satisfy different requirements with regards to protection of privacy of the individuals whose data is released. Furthermore, the released data should be such that it is useful and usable to the users of the data.

It is clear that a conflict arises in this case since protection of privacy implies hiding and obscuring data, while making data usable and useful implies providing data that is accurate, complete and precise. Ideally, both privacy and information utility levels should be maximised. However, the higher the required level of privacy, the lower the utility value of the released data. Without guidelines to guide the selection of optimal levels of privacy and information utility (taking into account the purpose for which the released data will be used and in which type of environment), it is difficult to find a good balance between the two goals.

In this paper, we describe current research work undertaken to address the challenge of anonymising microdata such that it possesses an optimal balance between privacy and information utility. This paper is organized as follows: In Section 2, we describe the main research aim of the undertaken work by discussing the need to guide the anonymisation of microdata to balance the needs of privacy and information utility. To address this need, we propose a model to guide the anonymisation of microdata. We discuss this model in Section 3 and conclude the paper in Section 4.

2. Guiding the anonymisation of microdata

Statistical data can be released either in the form of tables or as microdata files. Data released in the form of tables is usually summarised and aggregated (e.g. in the form of averages, means, frequency counts, etc.). Microdata files, on the other hand, contain records of non-aggregated data and each record contains a set of attribute values that are associated with a single individual or other entity [9].

If the data is released in the form of microdata rather than in the form of tables, it may be of greater value to users of the data since the users are offered greater flexibility with regards to what the data can be used for. For example, users can compute specific statistics that are of interest to them, rather than being restricted to using pre-computed aggregated statistics.

Due to the need to protect individuals' privacy, confidential statistical data should be anonymised in addition to being de-identified. The process of microdata de-identification, which involves the removal of explicit identifiers (e.g. names and addresses) does not necessarily produce anonymous microdata. That is, the microdata can be manipulated or matched with other sources of data to compromise the privacy of an individual. This can occur through different forms of disclosure [2]: identity disclosure, which occurs when the identity of an individual is revealed from the released microdata; attribute disclosure, which occurs when sensitive information about an individual is obtained from the released microdata; and inferential disclosure, which occurs when the value of a particular characteristic of an individual can be determined, from the microdata, more accurately than it would otherwise have been possible.

The concept of k -anonymity has been proposed by Samarati and Sweeney [6, 7, 8] to anonymise microdata through the use of data generalization and suppression. In order for a microdata set to satisfy the requirement of k -anonymity, every record in the microdata must be related to at least k other records. Different algorithms [1, 3, 6, 7] may be used to anonymise microdata such that it satisfies the requirement of k -anonymity.

The privacy level of anonymised microdata is affected by the value chosen for k . The higher the value for k , the greater the privacy level of the anonymised microdata. However, choosing a high value for k requires that data is anonymised to a high degree, which reduces the accuracy and completeness of the data. Therefore, the higher the value chosen for k , the lower the information utility level of the anonymised microdata.

Although k -anonymity is able to protect against identity disclosure, it does not prevent attribute disclosure. This limitation has been addressed in [5] by introducing the concept of l -diversity, which requires that a microdata set is such that, for every block of tuples that have the same value for the quasi-identifier, there are at least l "well-represented" values for the sensitive attribute. However, l -diversity is also insufficient to prevent attribute disclosure, as has been discussed in [4] where the authors present the concept of t -closeness to address this limitation.

Before microdata is anonymised, the required levels of privacy and information utility should be determined. Ideally, the microdata should be anonymised such that it will provide a level of privacy that is sufficient to prevent disclosure, while also providing an acceptable level of information utility. However, since privacy and information utility are two conflicting requirements, it is difficult to determine what should be the optimal value for k when microdata is anonymised for different uses such that it satisfies k -anonymity. Similarly, it is also difficult to determine the optimal values for l when satisfying l -diversity, or the value for t when satisfying t -closeness.

To date, we have not found a method proposed in the literature that could be used for the purpose of guiding the selection of an optimal balance between privacy and information utility when anonymising microdata for different uses, and which would be sufficiently formal and yet simple enough to use. Without such guidelines, it is difficult to select the optimal levels of privacy and information utility when microdata is anonymised for different uses in different environments.

The study discussed in this paper aims to address the above problem by answering the following research question: "How can the processes of microdata anonymisation be guided such that there will exist an optimal balance between privacy and information utility in the anonymised microdata?".

The research question will be addressed by developing an anonymisation model. This model, called the ANOPI Model, or the **AN**onymisation with **O**ptimal **P**rivacy and **I**nformation utility Model, will ensure that the anonymised microdata possesses an optimal balance between privacy and information utility, based on the content of the microdata, the purpose for which the microdata will be used, as well as the environment in which the microdata will be used. The model will be the main result of this study and it is briefly discussed in the next section.

3. The ANOPI model

The ANOPI Model, or the **AN**onymisation with **O**ptimal **P**rivacy and **I**nformation utility Model, will be developed during the course of this research. The purpose of this model is to guide the anonymisation of microdata such that the microdata will possess an optimal balance between privacy and information utility. The level of privacy and information utility will be based on the content of the microdata, the purpose for which the microdata will be used, as well as the environment in which the microdata will be used. The model anonymises microdata when it is given, as inputs, a non-anonymised microdata set as well as the minimum support and confidence values of sensitive association rules that can be mined from the microdata. During the course of this research, the ANOPI model will be implemented in a prototype data anonymisation system. The model is shown in Figure 1.

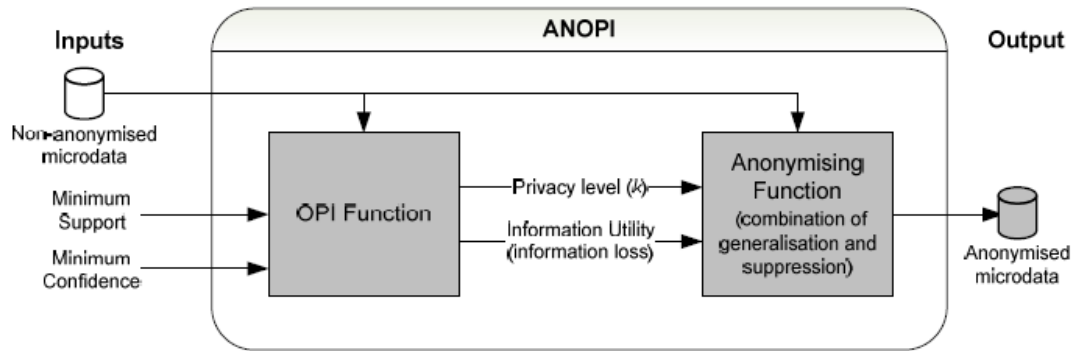


Fig. 1. The ANOPI model, shown with its inputs, its two functions and its output

The ANOPI model is composed of two functions: the first function determines the optimal balance between privacy and information utility, and the second function anonymises microdata such that it possesses this optimal balance.

The OPI function, or the **O**ptimal **P**rivacy and **I**nformation utility function is used to determine the optimal balance between privacy and information utility. The function produces two values as outputs: privacy and information utility. The value for privacy is represented in terms of the value for k used for subsequent k -anonymisation, while the value for information utility is represented in terms of information loss. The operation of the OPI function is based on the fact that different association relationships exist among attribute values and individual records in the microdata. These relationships are represented as association rules that have certain support and confidence values.

The OPI function works as follows. When a non-anonymised microdata set is given as input, all sensitive association rules, that can be mined from the non-anonymised microdata set, are found. The association rules are known as *sensitive* association rules because they can be used to disclose confidential information. The association rules must have certain minimum support and confidence values, which are provided as inputs to the function. Based on these rules and

their support and confidence values, the optimal values for k (privacy level) and information loss (information utility) are determined and provided as outputs of the function. These values for k and information loss, together with the non-anonymised microdata, are then used as inputs for the anonymising function.

The anonymising function is the second function of the model and its purpose is to perform the actual anonymisation of the microdata. To anonymise the microdata, a combination of generalisation and suppression is applied on the non-anonymised microdata such that it satisfies k -anonymity and possesses the identified level of information utility.

4. Conclusion

In this paper, we presented current research work that has been undertaken to address the challenge of finding an optimal balance between privacy and information utility when anonymising microdata. The aim of this research is to develop a model that can be used to guide the process of anonymising microdata. To date, we have not found a model that has been proposed in the literature and which could be used to guide the selection of an optimal balance between privacy and information utility. Therefore, it can be quite difficult to determine the optimal way in which to release microdata such that it possesses an optimal balance between privacy and information utility. We believe that, by undertaking this study, the process of releasing microdata (with respect to resulting levels of privacy and information utility) can be significantly improved through the use of a formal model to guide the anonymisation of microdata.

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OVERCOMING THE LIMITATIONS OF K-ANONYMITY THROUGH ASSOCIATION RULE HIDING

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Abstract: The concept of k -anonymity has been proposed as an effective way to anonymise microdata, where every record in the anonymised microdata must be related to at least k other records or individuals. However, it is possible to infer sensitive information from microdata that satisfies k -anonymity in situations where the values of the sensitive attributes are not diverse. In this paper, we discuss this limitation of k -anonymity and propose an anonymisation approach to overcome this limitation by combining k -anonymisation with association rule hiding. The proposed anonymisation approach not only ensures that we cannot infer sensitive data when there is lack of diversity in sensitive values, but it also provides the additional advantage of enhanced privacy, by hiding sensitive association rules.

Keywords: privacy, k -anonymity, association rule hiding

1. Introduction

Statistical data can be released either in the form of tables or as microdata files. Tables usually contain data that is summarised and aggregated, for example in the form of averages, means, and frequency counts. Microdata files, on the other hand, consist of records that contain "raw" or non-aggregated data, where each record contains a set of attribute values that are associated with a single individual or other entity [13]. Some users of statistical data may require the ability to compute their own statistics, rather than being restricted to using pre-computed statistics. Therefore, when statistical data is released for analysis, it is more beneficial to those users if microdata is released, rather than specific statistics in the form of tables, as it offers greater flexibility with regards to what the data can be used for.

To protect the privacy of individuals whose data is contained in the microdata, it is not sufficient to de-identify the microdata by, for example, removing explicit identifiers, such as names and addresses. That is, it may still be possible to manipulate the de-identified data, or match it with other sources of data, in order to compromise the privacy of individuals. Therefore, in addition to being de-identified, the microdata must also be anonymised.

The concept of k -anonymity has been proposed by Samarati and Sweeney [10, 11, 12] to anonymise microdata such that the correctness of the released (anonymised) data can be preserved. In order for microdata to meet the requirement of k -anonymity, every record in the microdata must be related to at least k other records or individuals. However, k -anonymity cannot always guarantee to protect privacy. As we will show in the next section, it is possible to infer sensitive data from microdata that satisfies k -anonymity, in circumstances where the values of sensitive attributes are not diverse. In this paper, we will address this limitation by proposing an anonymisation approach that combines k -anonymisation with association rule hiding.

The rest of this paper is organised as follows. In Section 2, we briefly discuss the concept of k -anonymity and present its limitations. In Section 3, we provide background knowledge to association rule hiding, which will be necessary to understand the proposed solution. In Section 4, we present a solution to the described limitation of k -anonymity, by proposing to combine

k -anonymisation and association rule hiding into one anonymisation approach. We discuss related work in Section 5 and conclude the paper in Section 6.

2. k -anonymity

Before we define the concept of k -anonymity, let us first define the concept of a quasi-identifier. A quasi-identifier is the set of attributes that include explicit identifiers (e.g. names and telephone numbers) and those attributes that, when combined, can be used to uniquely identify an individual (e.g. birth date, race, sex) [4, 12]. A data release satisfies the requirement of k -anonymity if “each release of data is such that every combination of values of quasi-identifiers can be indistinctly matched to at least k individuals” [10].

Samarati and Sweeney [10, 11, 12] have discussed how microdata can meet the requirement of k -anonymity by undergoing a combination of generalisation and suppression. During the process of generalising and suppressing data, it is important to ensure that the data is not distorted more than what is necessary to satisfy k -anonymity. That is, the released data should be generalised (and suppressed where required) only up to the point where k -anonymity is achieved. This view has led to defining the concept of k -minimal generalisation, which requires that the least amount of generalisation and suppression is enforced to achieve k -anonymity. Different algorithms may be used to compute a k -minimal generalisation, such as those presented in [4, 8, 10, 11].

To illustrate the concept of k -anonymity, consider the microdata shown in Table 1, which may represent data on patients admitted to a hospital. This table has already been de-identified, as it does not contain any explicit identifiers. We anonymise the table such that it satisfies k -anonymity with $k = 3$. To do this, we must ensure that any combination of the values in the quasi-identifier (namely: Date of birth, Race, Sex, and Zipcode) can indistinctly match at least 3 tuples (representing individuals). To achieve this, we have generalised the values for Date of Birth, by removing the month and day and keeping only the year of a person’s date of birth. The resulting microdata is shown in Table 2.

Table 1. Table showing de-identified but non-anonymised microdata

	Date of birth	Race	Sex	Zipcode	Disease
1	1967/01/01	Black	Male	40121	Cancer
2	1967/02/02	Black	Male	40121	Hypertension
3	1967/03/03	Black	Male	40121	Cancer
4	1968/04/04	White	Male	40242	Heart disease
5	1968/05/05	White	Male	40242	Heart disease
6	1968/06/06	White	Male	40242	Heart disease
7	1969/07/07	Black	Female	40373	Cancer
8	1969/08/08	Black	Female	40373	Hypertension
9	1969/09/09	Black	Female	40373	Hypertension
10	1970/10/10	White	Female	40404	Heart disease
11	1970/11/11	White	Female	40404	Cancer
12	1970/12/12	White	Female	40404	Hypertension

Table 2. Table showing k -anonymised microdata, with $k = 3$

	Date of birth	Race	Sex	Zipcode	Disease
1	1967	Black	Male	40121	Cancer
2	1967	Black	Male	40121	Hypertension
3	1967	Black	Male	40121	Cancer
4	1968	White	Male	40242	Heart disease
5	1968	White	Male	40242	Heart disease
6	1968	White	Male	40242	Heart disease
7	1969	Black	Female	40373	Cancer
8	1969	Black	Female	40373	Hypertension
9	1969	Black	Female	40373	Hypertension
10	1970	White	Female	40404	Heart disease
11	1970	White	Female	40404	Cancer
12	1970	White	Female	40404	Hypertension

Table 2 satisfies k -anonymity with $k = 3$, since every combination of values of quasi-identifiers (Date of Birth, Race, Sex, Zipcode) can be indistinctly matched to at least 3 individuals. Since Table 2 satisfies k -anonymity, we would assume that it also protects the privacy of those individuals whose data is reflected in the table. However, this table does not protect the privacy of all individuals. By examining records 4, 5 and 6, we can see that every white male (admitted to the hospital), who was born in 1968 and who is living in the area with Zipcode 40242, has heart disease. Therefore, we are able to infer sensitive data (i.e. the type of disease) using supposedly anonymised data. For example, suppose we know that our white male colleague has been admitted to hospital recently. Since he is our colleague, we also know that he was born in 1968 and lives in the area with Zipcode 40242. Based on this non-sensitive information, we can use Table 2 to infer sensitive information about him, namely that he suffers from heart disease.

Although the example presented in this section is trivial, it does illustrate the limitation of k -anonymity in situations where the values of sensitive attributes are not diverse. We propose to overcome this limitation by combining k -anonymity with association rule hiding, and hence we provide background knowledge to association rule hiding in the next section.

3. Association Rule Hiding

The concept of mining association rules was initially discussed in [1] and then further formalized in [2]. An association rule is a rule of the form $X \Rightarrow Y$, where both X and Y are sets of items of a transaction in a database and where $X \cap Y = \emptyset$ [7]. A rule $X \Rightarrow Y$ is said to hold in the set of transactions of the database with support s , where s is the percentage of transactions in the database that contain both X and Y . A rule $X \Rightarrow Y$ is said to have confidence c in the set of transactions of the database, where c is the percentage of transactions in the database containing X that also contain Y .

Both the support and confidence of an association rule $X \Rightarrow Y$ can be represented as percentages and are calculated as follows:

$$Supp(X \Rightarrow Y) = \frac{\text{Number of Tuples containing both } X \text{ and } Y}{\text{Total Number of Tuples}} \times 100$$

$$Conf(X \Rightarrow Y) = \frac{\text{Number of Tuples containing both } X \text{ and } Y}{\text{Total Number of Tuples containing } X} \times 100$$

Association rules are mined in two steps [7]. First, all those items that occur at least as frequently as the pre-determined minimum support value are found. Thereafter, those rules that satisfy the minimum support and minimum confidence values are generated.

To find association rules, the database is examined for candidate rules; the support and confidence of those candidate rules are calculated to determine if they are considered as significant or not. A rule is considered as significant if the values for its support and confidence are greater than the minimum values specified by the user. This process ensures that not all derivable association rules are found, but only those rules that satisfy the minimum support and confidence values specified by the user.

The problem of association rule hiding has been defined as transforming a database D into a database D' such that all (or the maximum number of) significant association rules that can be mined from D can still be mined from D' except for those rules that are considered as sensitive [3]. Therefore, this problem aims to reduce the support of sensitive association rules below a given threshold. This aims to prevent the discovery of sensitive association rules, which will prevent the use of those rules to infer sensitive information.

Given an association rule of the form $X \Rightarrow Y$, we can write its confidence in terms of its support as follows [6]:

$$Conf(X \Rightarrow Y) = \frac{Supp(X \cup Y)}{Supp(X)}$$

where $Supp(X)$ is defined in a similar manner as $Supp(X \Rightarrow Y)$ above.

A number of strategies have been proposed in [6] to hide association rules, based on either decreasing the confidence or the support of a rule. To decrease the confidence of a rule, we can either increase the support of the rule antecedent X , or we can decrease the support of the rule consequent Y . To decrease the support of the rule, we decrease either the support of the rule antecedent X or the rule consequent Y . Algorithms have been proposed in [6] for the different strategies. The support of an itemset is decreased by removing it from a transaction that supports the itemset. Similarly, the support

of an itemset is increased by inserting the itemset into transactions such that those transactions will support the itemset. We have selected the strategy of decreasing the support of the consequent of a rule for the anonymisation approach which we propose in the next section.

4. An anonymisation approach based on k -anonymity and association rule hiding

In Section 2 we illustrated that we were able to infer sensitive information from a table that satisfied k -anonymity, but where the values of sensitive attributes were not diverse. To overcome this limitation of k -anonymity, we propose an anonymisation approach that combines k -anonymisation and association rule hiding. By k -anonymising the table, we ensure that every combination of values of quasi-identifiers can be indistinctly matched to at least k individuals. By performing association rule hiding, we ensure that sensitive association rules cannot be inferred from the anonymised table.

4.1 Description of the proposed anonymisation approach

The anonymisation approach is a process consisting of three steps:

1. A de-identified microdata table is k -anonymised; the value for k is provided as an input to the anonymisation process. Thereafter, the k -anonymised table is used as an input to the process of association rule hiding.
2. Sensitive association rules with a confidence value above a minimum threshold value c are found. The value for c is provided as an input by the user. The specific value for c is best left to be determined by the user of this anonymisation approach, who is able to assess the sensitivity as well as the disclosure risk of the microdata.
3. The sensitive association rules found in step 2 are "hidden" by decreasing the support of the rule's consequent.

In this work, we consider a sensitive association rule to be a rule of the form $X \Rightarrow Y$ where X is one or more attribute of the quasi-identifier and Y is one or more attribute that is considered to contain sensitive data.

To ensure that we do not affect the k -anonymisation that has been performed prior to association rule hiding, we should not change the values of the quasi-identifiers. That is, we should not increase or decrease the support of the antecedent X of an association rule. This implies that we need to change the values of the consequent Y of the rule, namely the sensitive values related to a quasi-identifier X .

We achieve this by suppressing the values of the sensitive cells of those tuples that support both the antecedent and the consequent of the rule. This suppression reduces the support of the consequent of an association rule. Sensitive cells of those tuples are suppressed, one tuple at a time, until the confidence of the rule is below the value c , which has been provided by the user in Step 2.

If the confidence value of a rule is high, but the actual number of tuples that contribute to this value is low (i.e. the actual number of tuples that contain both the antecedent and the consequent of a rule is low), then the confidence value can be reduced significantly by suppressing the sensitive cells of only a relatively small number of such tuples. In such cases, a user of the data may easily deduce that the values of the suppressed sensitive cells are the same as the non-suppressed sensitive cells of tuples that also support the same rule. This is further illustrated in the example below. To prevent such deduction, we propose that in such cases we determine the actual number of tuples that should contain both the antecedent and the consequent of a rule in addition to the determining the confidence value of a rule. We suggest that the specific value for what is considered a "low" number of tuples is best left to be determined by the user of the anonymisation process, who can determine the sensitivity of the microdata and its disclosure risk. Therefore, in cases where there is a low number of tuples (as specified by the user) that contribute to high confidence value of a rule, we suppress sensitive cells of those tuples, one tuple at a time, until the confidence of the rule is below the value c and the number of tuples suppressed is at least as great as that specified by the user.

4.2 Example of using the proposed anonymisation approach

Recall the example we presented in Section 2. By using the same data, let us illustrate how Table 1 would be anonymised using the described approach to protect the privacy of the individuals.

First, we must k -anonymise the table. Let us choose $k = 3$. Table 1 undergoes k -anonymisation, as has been described in Section 2, to create Table 2, which is used for subsequent association rule hiding. Let us choose (for this example) that we want to hide all sensitive association rules that have a confidence value above 70%. Therefore, we will first find all association rules with a confidence value above 70%. We will then decrease the confidence value of those rules that are considered as sensitive, by decreasing the support of the consequent of the rule, until the confidence value is below 70%.

There is only one sensitive association rule in Table 2 with a confidence value above 70%, namely the rule {Date of Birth = 1968 & Race = White & Sex = Male & Zipcode = 40242} \Rightarrow {Disease = Heart disease}. This rule has a confidence of 100% (calculated by using the equation defined in Section 3).

In order to reduce the confidence of this rule to below 70%, we suppress the values of the sensitive cell (i.e. Disease) of those tuples that support both the antecedent and the consequent of the rule, i.e. tuples 4, 5, and 6. We first suppress the sensitive cell of tuple 4. This suppression caused the reduction of the confidence of this rule to 67%, which is below our minimum threshold value. The resulting microdata is shown in Table 3.

Table 3. Table showing k -anonymised microdata (with $k = 3$) in which sensitive association rules have been hidden.

	Date of birth	Race	Sex	Zipcode	Disease
1	1967	Black	Male	40121	Cancer
2	1967	Black	Male	40121	Hypertension
3	1967	Black	Male	40121	Cancer
4	1968	White	Male	40242	*
5	1968	White	Male	40242	Heart disease
6	1968	White	Male	40242	Heart disease
7	1969	Black	Female	40373	Cancer
8	1969	Black	Female	40373	Hypertension
9	1969	Black	Female	40373	Hypertension
10	1970	White	Female	40404	Heart disease
11	1970	White	Female	40404	Cancer
12	1970	White	Female	40404	Hypertension

We also notice that in this case the confidence value of the rule is high (100%), but only three tuples contribute to this high value. This is also the reason why the confidence value has been reduced so significantly by suppressing the sensitive cell of only one tuple. For a user of this data, it may be quite evident that the sensitive value has been suppressed in order to achieve diversity. A user of this data may easily deduce that the sensitive value suppressed is the same value as that of the other tuples in the group with the same quasi-identifier, namely the tuples 4, 5 and 6.

Therefore, we should also determine the actual number of tuples that should contribute to the confidence of the rule, together with the value for the confidence of the rule. (That is, we should determine both the actual number and the percentage of all tuples that contain the antecedent and the consequent of the rule). For this example, let us choose that in this situation we require that the sensitive value of at least two tuples should be suppressed to reduce the risk of disclosure. Therefore we also suppress the value for Disease of Tuple 5.

Since there are no more sensitive association rules with a confidence value above 70%, the process of association rule hiding is complete. The resulting microdata is shown in Table 4.

Table 4. Table showing k -anonymised microdata (with $k = 3$) in which sensitive association rules have been hidden and where the sensitive value of two tuples was suppressed

	Date of birth	Race	Sex	Zipcode	Disease
1	1967	Black	Male	40121	Cancer
2	1967	Black	Male	40121	Hypertension
3	1967	Black	Male	40121	Cancer
4	1968	White	Male	40242	*
5	1968	White	Male	40242	*
6	1968	White	Male	40242	Heart disease
7	1969	Black	Female	40373	Cancer
8	1969	Black	Female	40373	Hypertension
9	1969	Black	Female	40373	Hypertension
10	1970	White	Female	40404	Heart disease
11	1970	White	Female	40404	Cancer
12	1970	White	Female	40404	Hypertension

Since Table 4 has been k -anonymised and since we have not changed the number of records or the values of the quasi-identifiers in the process of association rule hiding, Table 4 still provides at least the same amount of privacy as Table 2. Moreover, Table 4 provides a greater level of privacy than Table 2 since we cannot make the same inference about our white male colleague as we have done in Section 2. Although we can see that it is certainly possible for our white male colleague to have heart disease, we cannot infer this with complete certainty as there is also a possibility that he has another disease, which has been suppressed in the microdata in Table 4.

5. Related Work

The limitation of k -anonymity presented in this paper has also been discussed in [9], where the authors propose the concept of l -diversity to overcome this limitation. A table is said to be l -diverse if, for every block of tuples that have the same value for the quasi-identifier, there are at least l “well-represented” values for the sensitive attribute. An algorithm for l -diversity can be created by modifying any algorithm for k -anonymity such that every time a table is checked for k -anonymity, it is checked for l -diversity instead.

In this paper, we provided an alternative solution to l -diversity to overcome the described limitation of k -anonymity by making use of association rule hiding. Our solution not only ensures that we cannot infer sensitive data when there is lack of diversity in sensitive values, but it also provides an additional advantage over l -diversity. This advantage is the enhanced privacy that results from the fact that we also ensure that any sensitive association rules will be hidden (based on the minimum confidence value provided by the user).

To illustrate this advantage, consider the following example, which uses the microdata shown in Table 4. This table satisfies the distinct 2-diverse property, since there are at least 2 distinct values for the sensitive attribute in each equivalence class. By examining tuple 1, 2 and 3, we can see that there is a 67% probability that a black male born in 1967, who lives in the area with Zipcode 40121, was admitted to the hospital with cancer as the disease. If this information is considered as sensitive, the table can undergo the anonymisation approach described in Section 4, where we will hide all sensitive association rules with a confidence value of 67% and above. To hide such rules, we would suppress the value for Disease of tuple 1. The

resulting probability that a black male born in 1967, who lives in the area with Zipcode 40121, was admitted to the hospital with cancer as the disease is reduced to 33%. This enhances the privacy of the resulting microdata, although at a cost to information utility, since some of the data was suppressed. To complete the discussion of this example, we would also suppress the value for Disease of tuple 8, since there is also a sensitive association rule with a confidence value of 67%, namely $\{\text{Date of Birth} = 1969 \ \& \ \text{Race} = \text{Black} \ \& \ \text{Sex} = \text{Female} \ \& \ \text{Zipcode} = 40373\} \Rightarrow \{\text{Disease} = \text{Hypertension}\}$.

6. Conclusion

In this paper, we have shown that k -anonymity does not necessarily protect privacy. That is, it is possible to infer sensitive information from a k -anonymised table in situations where the values of the sensitive attributes are not diverse. We have also shown how this limitation can be overcome by proposing an anonymisation approach that combines k -anonymisation with association rule hiding. Once a table has been k -anonymised, association rule hiding is used to suppress the values of certain sensitive cells, thereby ensuring that sensitive data cannot be inferred when there is lack of diversity in sensitive values.

A number of questions remain unanswered. For example, how to determine what is the "best" value for the confidence of an association rule that should be used in the proposed anonymisation approach; or how to determine what is the "best" value for the actual number of records that should support both the antecedent and the consequent of a rule. Currently, we assume that the user of the proposed anonymisation approach will have the necessary skills to be able to assess the sensitivity of the microdata, as well as its disclosure risk, to make the appropriate selection for these values.

Choosing a low value for c in Step 2 of the proposed anonymisation approach will result in a microdata set that provides a high degree of privacy, but with lower degree of information utility. That is, the probability of inferring a sensitive value is reduced, but then many more sensitive cells will be suppressed, which reduces the information utility value of the microdata. This gives rise to the question of how to ensure that microdata is anonymised such that privacy will be protected while the data is useful and usable for its users. The work described in this paper is part of a larger research project that concentrates on finding techniques for balancing the needs of privacy and information utility when anonymising microdata.

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INCREASING USER VALUE THROUGH PROFESSIONAL IDENTITY PROFILES, PROFILE-BASED CONNECTION AGENTS AND GAMES

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Abstract: Encouraging users of online communities to complete, maintain and improve their electronic profiles is a challenging task. Only if users see real value for themselves will they invest their time and energy in this activity, and become active contributing members of the online community. In this article we present some improvements to profiles and knowledge management systems specialized in lifelong learning and career development that we believe are necessary in order to increase user value and motivation. First, we reflect on the relevant information that should be provided in a “professional identity” profile in order to increase user value in the area of career development. We show that social interaction, in addition to solitary introspection, is necessary to provide users with the knowledge they need to make a career change. We then report on our exploration of agents and games that use profiles as a basis for connecting people. Profile-based connection agents and games can help individuals get valuable feedback about their profiles, critically re-assess and redefine their lifelong learning and career development objectives and plans, and identify relevant users to connect with in order to exchange knowledge.

Keywords: online communities

Introduction

Electronic profiles are essential for online user communities engaged in exchanging knowledge related to lifelong learning and career development. It is there for instance that individuals can explicitly map their experiences as well as their ambitions, providing a basis for matching, as well as information and inspiration for other users. However, encouraging users to complete, maintain and improve their profiles is a challenging task. Users may dislike updating their competences after each and every course they have taken, or they may forget to add new contacts. Only if users see real value for themselves will they invest their time and energy in this activity, and become active contributing members of the online community.

What improvements to profiles and knowledge management systems are needed in order to increase user value and motivation?

First of all, it is important that the user believes that the information required for the user profile is pertinent. The profile should be clear, well-structured, and the information requested should clearly relate to the reason the user has visited the community. In addition, the user should be able to control which parts of the profile remain private, and which can be made public (Hansen, 2006). Hence, when visiting a website specializing in lifelong learning and career development, the user should be convinced of the relevancy of the information demanded for these purposes.

Second, the social nature of knowledge exchange networks and communities should be taken into consideration in system design (Cheak et al, 2006; Brown and Duguid, 2000; Cross et al, 2001; Wenger et al, 2002; McAfee, 2006; O'Reilly, 2005). A user who is actively engaging with other users is more likely to extract value from the system and to contribute to the community by pro-actively sharing knowledge. Thus traditional knowledge management systems, which historically treated users as passive recipients of data and information, are increasingly being improved with new functionalities, such as connection agents and games, aimed at engaging users in a rich set of social interactions (e.g. learning by doing, educational games, discussions, joint initiatives, etc).

Consequently, in this paper, we first reflect on the relevant information that should be provided in a “professional identity” profile in order to increase user value in the area of career development. We then report on our exploration of agents and games that use profiles as a basis for connecting people.

This research is being carried out within the context of the Integrated Project TenCompetence (Koper and Specht, 2006). The aim of the TenCompetence project is to build a European Network for Lifelong Competence Development. The TenCompetence system is based around the needs of the person who wants to develop their competences, rather than on the needs of an educational, government or industrial institution. In such a system, users are able to access information related not only to traditional courses, workshops, and reference material, but also ‘live’ resources, such as communities of practice developed around a given competence, experts and peer groups. Thus the TenCompetence project provides an ideal context for research and experimentation related to increasing user value via the enhancement of the social dimension of knowledge exchange networks.

Professional Identity Profiles

Individuals visiting the TENCompetence website in order to reflect on their current competences, to learn which functions or jobs are within their reach, or to explore the possibility of learning new skills or working in a new field will be doing so in the context of managing their own career development.

We may need to explore alternative careers at many different stages of our lives. When we are young and need to choose our first career, when we have experienced a career crisis beyond our control like losing our job due to down-sizing or de-localization, when we want to re-enter the work-force after raising children, or simply because we start to question, at any age, if we are really doing what we want with our life.

Interestingly, Ibarra (2003) has found that in the context of re-inventing ourselves, the people who know us best are the ones most likely to hinder rather than help us. In addition, it is nearly impossible to change careers without altering our professional and social circles. This means that we need to shift connections, i.e. look for new peer groups, guiding figures and communities of practice. We need to find people who can help us see and grow into our new selves, find new role models and people we can relate to, and find new communities that offer inclusion, a safe base and replace the community that is being lost. Online lifelong learning and career development communities are a perfect place for users to meet new unbiased people and shift connections.

Ibarra’s research on career transition also revealed two essential ideas that go against conventional wisdom. Firstly, we are not one self but many possible selves. Deep within our hearts and minds, we contain a whole cast of characters made up of the selves we might become, the selves we would like to become, and the selves we fear becoming in the future. Possible future selves are not just any set of imagined roles; they represent an individual’s persistent hopes, fears and fantasies and indicate what could be possible given appropriate social conditions. (Markus and Nurius, 1986). For example, I am now a researcher, but I could become a teacher, a musician, a counselor, an athlete, or a dog trainer. I fear becoming unemployed or working at McDonalds. To suggest that there is one perfect career out there for our one true self is to deny the rich network of potential within ourselves. There may be several possible careers in which we could be happy expressing one of our different selves. Secondly, a successful career change requires a multi-step process of envisioning and testing possible futures. The linear reflect, plan, implement model used by career counselors is flawed. Not only does it assume that we can identify our one true self at the beginning of the process through various tests, but it also fails to recognize that the interactions between a person and her environment can produce possibilities that were unknown at the beginning of the process.

However, it is difficult to narrow down the choice of possible careers unless we first understand ourselves, and it is difficult to give up a career in which we have invested years of our lives unless we have a good idea of the alternatives. Ibarra's research also highlights the need for individuals to be more aware of the basic assumptions they use to evaluate career possibilities. Figure 1 shows three levels of career decision criteria adapted from Ibarra (2003). It helps to think of these as parts of an iceberg. The tip of the iceberg is our job - Level 1. This is what is visible to the outside world. Just above and below the surface are the competences, motives and work-related values that hold constant from job to job - Level 2. Schein (1993) refers to these as "career anchors"; for example, the need for autonomy, security, entrepreneurial creativity, pure challenge or lifestyle. Career anchors are what we would be unwilling to give up if forced to make a choice. Deep below the surface in Level 3 we find our basic assumptions about how the world works. These are usually rooted in our infancy, early family life, and cultural and social context; for example, our preconceived notions of acceptable male and female roles. Although we may not be aware of these basic assumptions, they also determine how we manage our careers.

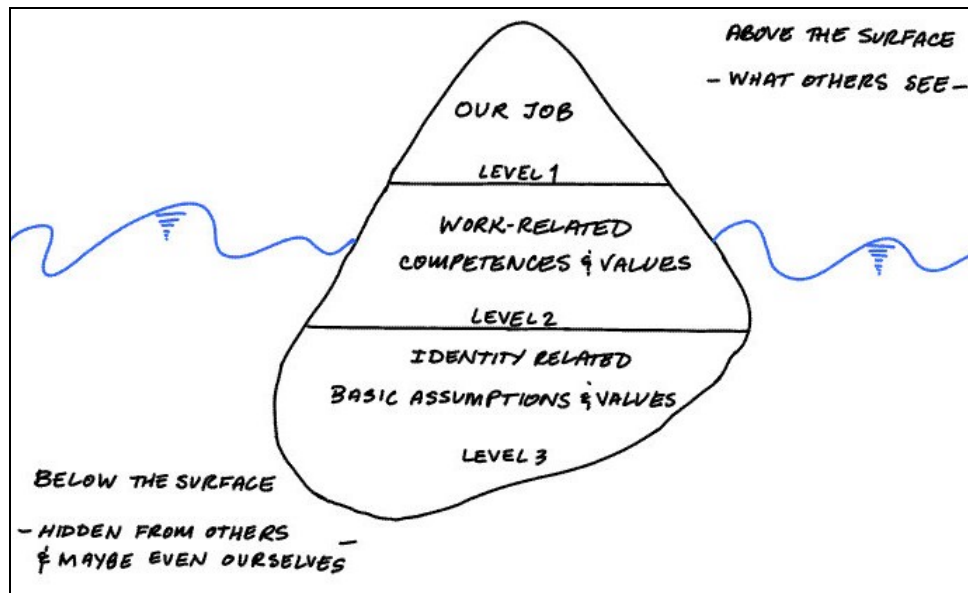


Fig. 1. Three Levels of Career Decision Criteria

For the purposes of identifying relevant career possibilities, it is therefore important to help users identify their basic and work-related values through an on-line personality test (level 3) and career anchor survey (level 2), and then to help them connecting to other users with similar values.

A first step consists hence in extending profiles with "Professional Identity" information including:

- A personality test which measures basic but implicit assumptions about what is desirable and possible in our lives and in the world,
- A "career anchor" survey to determine the competencies, preferences and work-related values that we would be unwilling to give up,
- A "life experience" survey to provide details about the jobs we have already tried, and what we liked and disliked about each of them

to add value to users by helping them learn more about themselves, as well as learn which jobs people similar to themselves (i.e. with their basic and work-related values) have or have not

found satisfying and why. This should provide users with relevant ideas about alternative careers. Users can then add the list of possible careers they are interested in exploring to their professional identity profiles.

In addition, one of the central identity problems that needs to be resolved during a career transition is the selection of the story that links what we have been with what we want to become. Until we get this story right, others will view us as unfocused and be less willing to help. Thus it is important to get feedback on trial narratives from others in order to find out what is believable and what makes us a more compelling job candidate. For this reason, users also need to be able to create a different public professional identity profile with a targeted curriculum vitae, story line and alias for each alternative career they wish to explore.

Table 1 gives an initial description of the kind of information we will be requesting from our users. The personal nature of the information listed in a professional identity profile makes its handling crucial. One may not want to have fields such as alternative careers or reasons why a job is disliked available to a future employer. As one of the goals of this profile is to help users formalize what they want for their future and express different facets of their personality, mechanisms must be devised to ensure that he or she reveals only the information that needs to be revealed for each specific purpose.

Table 1. Fields needed in a Professional 1

Field/Slot Name	Variable Type	Description
Basic info like sex, age, country, language, ...		
Network		Lists of friends, colleagues, and acquaintances. Connections can be suggested by agents, but they are ultimately approved by the user who decides to instantiate them or dismiss them.
Personality Test Result	MBPT Type	Myers-Briggs Personality Type (16 possible)
Career Anchor 1	CA	Most important Schein career anchor (8 ⁶⁵ possible)
Career Anchor 2	CA	2 nd most important career anchor
Liked Job 1	Job	Most favorite job
Liked Job 2,3, ...	Job	2 nd most favorite job, etc.
Disliked Job 1	Job	Worst job
Disliked Job 2	Job	2 nd worst job
Why Liked Job 1	String	Reason liked Job 1
Why Liked Job 2,3, ...	String	Reason liked Job 2, 3, ...
Why Disliked Job 1	String	Reason disliked Job 1
Why Disliked Job 2, 3, ...	String	Reason disliked Job 2, 3 ...
Alternative Career 1	CareerName	1 st Possible career to explore
Public Alias 1	NickName	Alias for alternative career 1
Story 1	String	Story for alternative career 1
CV 1	CV	CV for alternative career 1
Alternative Career 2, 3, ...	CareerName	2 nd Possible career to explore
Public Alias 2, 3, ...	NickName	Alias for alternative career 2, 3, ...
Story 2, 3, ...	String	Story for alternative career 2, 3, ...
CV 2, 3, ...	CV	CV for alternative career 2, 3, ...

⁶⁵ Technical/Functional Competence, General Management Competence, Autonomy/Independence, Security/Stability, Entrepreneurial Creativity, Service/Dedication to a Cause, Pure Challenge, Lifestyle

Connection Agents

The additional information we are requesting for such professional identity profiles will have to be specified by the users, and could be perceived by them as yet another additional cost of their time. This cost will therefore have to be counter-balanced by generating extra user value from these profiles. Thus in addition to the value these profiles provide to users by helping them learn more about themselves and alternative careers, connection agents will also use these profiles to help users browse the network, reduce its complexity, and get to meet and know each other.

Connection agents provide the system with embedded dynamics and bring life to it. They can be perceived by users as virtual characters inhabiting the network and responsible for enhancing the users' experience, for instance (i) by regularly recommending, or suggesting, new or relevant learning opportunities, (ii) by pointing to interesting trends and events, or (iii) by initiating connections between users who have similar profiles. Agents will therefore leverage the extra information brought by richer professional identity profiles and bring value to the users by recommending them new "connections" (Resnick and Varian, 1997).

Agents will also bring value by learning from their 'mistakes', or more precisely, by integrating the feedback given by users to tweak their suggestions (or courses for action). For example, a user may not be interested in engaging in a particular kind of game, or may not want to grow her network but only to strengthen her existing network. Positive or negative feedback will be associated with each suggestion pushed forward by the agents, who will then use it to rank the alternatives and propose the ones it believes best represent the user's intentions at the top of the list.

Connection agents can therefore be considered as the entities responsible for promoting a continuous state of activity in the community via dynamically-generated suggestions, prompting users to not only develop new relationships or maintaining and fostering existing ones (for instance via connection games, as we will see in the next section), but also to exchange information, experiences, and assets within and across their communities.

Profile-based connection agents

In this section we present five profile-based connection agents we aim to develop and test within the TenCompetence framework. These connection agents help people to connect to themselves, to other users, to knowledge assets and to the system. The main connection agent is the "Personal Coach Agent". This agent acts as a personal coach to help people with their personal and professional development (Roda et al, 2003; Cross and Parker, 2004). In a career development context, one of the goals of this agent is to help users better understand themselves and their needs by helping them complete their professional identity profile as well as reflect on their career history and future objectives. Such an agent suggests alternative careers, provides users with initial tentative connections to other users who have a similar personality and career anchor profile, as well as integrates the suggestions brought forward by the other dedicated agents detailed in Table 2. This agent is also responsible for obtaining feedback from users (*'this suggestion is relevant to me'* or *'this is not relevant to me'*) and for ranking the alternatives it receives from the People, Asset and Concierge connection agents accordingly.

Table 2: Summary of Profile-based Connec

Connection Agent Name	Summary of Functionalities	Connection Targets Achieved
Personal Coach agent	This ‘overall’ agent is responsible for ensuring that users learn about themselves by identifying and suggesting connections to other users that are strongly related to them. It gathers the suggestions forwarded by the other agents and ranks them according to user preferences and feedback. It also incorporates the feedback.	help users better understand themselves and their needs by helping them complete their professional identity profile as well as reflect on their career history and future objectives
User Profile agent	Aims at increasing consistency across the system by recommending existing alternative careers already present in the repository, for instance (Table 1). This agent is also responsible for measuring the ‘connectedness potential’ between two user profiles: to do this, it uses a combination of string matching operations (comparing career alternatives amongst users, for instance) and of network distance (users who can be ‘reached’ via a peer or a chain of peers will be given a higher ‘connectedness score’ than users which cannot be reached.	(1) identifies fields values (career alternatives, ...) which are already present in the repository in a slightly different form, and suggests them as replacements, in order to diminish redundancy as much as possible (2) computes a connectedness score between user profiles by comparing the contents of the profiles and by making use of one’s close and distant networks.
People connection agent	Gathers information about a user’s network (including the network of each member of her network, and so on), identifies courses of actions (such as, connecting straight away to this particular user, or engaging in a game with her to learn more about her), and forwards them to the personal coach agent. Actions are determined based on this user’s reactions to the suggestions proposed by the agent in earlier similar circumstances, and by the actions taken by users who have a similar profile (c.f. user profile agent).	identifies users who could potentially be of value to the current user, either because they are similar, or because they are different enough, yet not too different
Asset connection agent	Gathers information about potentially relevant knowledge assets, identifies courses of actions (e.g., connections between their authors), and forwards them to the personal coach agent	identifies connections between users based on the assets they have consulted or contributed to.
Community connection agent (“concierge”)	Gathers information about the overall community, collects trends, lists events (related to the overall community of users), and forwards them to the personal coach agent	identifies relevant information by listening to system-wide events and by keeping the user updated with the latest information about the overall community

Game-like Dynamics

While finding relevant people is one way to add value to users and diminish the cost associated with the creation of rich profiles, there still remains the difficulty of actually initiating contact with someone you do not know. Connection games can make this easier.

Connection games are akin to business simulations and games, which can be defined as experiences that help participants gain awareness of a complex situation by letting them experiment with various solutions to a problem, and by showing them the consequences of their choices (Faria, 2001). They provide a situated context for learning and encourage participants to try and experiment, while gradually ensuring that they learn something out of it via feedback on their decisions (Rogers, 2003). Teams seem to provide a very good setting for games, as they regroup different users with different

experiences and approaches to a given problem. They are especially interesting because they trigger debate and discussion as to how to best solve the current situation, thus making everybody even more engaged in the game scenario (Angehrn et al, 2007).

Game-like dynamics, beyond supporting individual and collaborative learning (Wideman et al, 2007; Manzoni and Angehrn, 1997) can also provide an opportunity for users to meet and get to know each other in informal contexts. By making extensive use of professional identity profiles, such games (and the underlying agents) can help individuals better understand how to improve their own profiles, as well as to critically re-assess and redefine their lifelong learning and career development objectives and plans (Table 1). At the same time, through exposure to their peers' profiles, individuals (with the help of their agents, as we have seen previously) can identify relevant users to connect with in order to exchange knowledge. In addition, exploring profiles of peers can help individuals learn how to improve their own profile and make it more attractive to other users, hence increasing the probability of value-adding connections.

Profile-based Connection Games

In this section we present three profile-based connection games we aim to develop and test within the TenCompetence framework (Table 3).

The conceptual basis and structure of the first of these games, ProfilAMat, is inspired by successful games like ESP and Verbosity (von Ahn and Dabbish, 2004; von Ahn et al, 2006) and adapted to a competence development context. This game, played in parallel by pairs of anonymous users over the Internet (accessible anytime and of variable duration - from a few minutes to several hours), involves users in a conceptually simple but engaging and entertaining process of annotating and matching different profiles (which are extracted from existing profiles of other users). When starting the game, players are exposed to different profiles and are challenged to produce brief characterizations of the profile at hand until the characterization submitted by the second player matches. The faster the match is achieved, the higher the cumulative score of each player.

This type of game, besides being potentially entertaining, generates a number of relevant outcomes for the individuals involved as well as at the community level. When selected appropriately (by connection agents) the profiles to which players are exposed during the ProfilAMat Game provide a relevant reference point for profile comparison, the possibility to connect to other users (the users "behind" the profiles are revealed at the end of the game), as well as to a number of relevant competence development opportunities included in the profiles seen during a game session. For the users whose profiles have been used during a game (and who are actually not participating in the game itself), ProfilAMat creates value in terms of generating a continuous supply of potentially relevant annotations (how other users annotated their profiles) and hence valuable feedback for improving or refining them based on an analysis of deviations between "how I would like to be perceived through my profile" and "how other people actually perceive the person represented by my profile".

A second profile-based connection game is the "Convince Me" game. In the anonymous version of the game, people who want to work in a field can try out their stories – the short explanation that links what they have been doing with what they want to become – on a group of other people who work or have recently worked in that field. Each judge reads the story, votes yes or no, and gives a few reasons for their decision. In the non-anonymous video version, people

make a video of themselves selling their story. In the video version participants not only receive feedback about their story, but also about how they have presented themselves. People “win” when they have a story that convinces all the judges. In addition, once a person has judged a profile, they can also see what other judges have said about the same profile. In this way, the judges can compare their judgment with others, and connections can be made between judges who have appreciated each other comments.

MutAnT (Mutual Anonymous Tagging Game) is another example of a profile-based connection game. The game is played by a (selected) large group of users (synchronously or asynchronously) and the profiles used in the game are actually the anonymized profiles of the players themselves. When starting the MutAnT Game, the players are introduced to a realistic scenario and competence development-related challenge. This scenario is represented by the simulated department of an organization featuring a team of employees in a given professional area (from which the players will have been selected based on their experience or competence development ambitions/objectives). What the players do not know is that the profiles of the employees of the simulated department correspond to those of the actual players. In this context, players (operating in small distributed teams) are challenged by the mission of selecting the three most “promising/interesting” profiles to be promoted to create a new department after the existing one will have been dissolved (the typical problem of “who to keep” in an acquisition and restructuring situation). In the first phase of the game players are asked to select individually the 3 employees to “save”, indicating (1) the reasons for their choice and (2) suggestions on how each one of the selected employees should be supported through a competence development plan. In the second phase of the game the results from the individual selections are aggregated. At this point all the players will be able to access the information produced by other players (particularly the one related to the individuals they selected, as well as to the profile of the employee “representing” them). Winners in the game can be then determined as the players whose profiles has been selected in the aggregated assessment, as well as the players whose individual selection matches most the aggregated group selection.

Beyond achieving the same “connection” objectives as ProfilAMat, the Convince Me and MutAnT Games provide direct feedback related to the users’ profiles. In particular, the MutAnT game gives users the opportunity to have their profiles critically reviewed by peers to whom they have been “connected” during the game. Further personalized feedback is possible after the game once the identities of the players are revealed. Comments made by players during the game remain anonymous.

Table 3: Summary of Profile-based Connection Games

Connection Game Name	Summary of Game Play	Connection Targets Achieved
“ ProfilAMat ”: Profiles Annotation and Matching Game	In this game, played in parallel by pairs of anonymous users over the Internet, users get exposed to different Profiles from other users (including their own) and have to provide annotations/ remarks about the profiles until they match, in a similar way as in the <i>ESP</i> , <i>Verbosity</i> and similar successful internet-based matching games [1,2].	<ul style="list-style-type: none"> - browse through and reflect about relevant profiles - gather annotations related to profiles and provide feedback to existing profiles - provide opportunity to identify relevant community members
“ Convince Me ”: Profile Judging Game	In this game, played individually over the Internet, users who want to work in a field have their stories, and/or video presentations, judged by other users who work or have recently worked in that field.	<ul style="list-style-type: none"> - browse through and reflect about relevant profiles - provide feedback to existing profiles and on judging capability - provide opportunity to identify relevant community

		members
“MutAnT”: Mutual Anonymous Tagging Game	This game is played by a group of users, whose personal Profiles are anonymized and then associated to virtual characters populating the department of an organization which has to be downsized (only 3 can be retained). Players have to first individually and then jointly decide which 3 to retain, explain their choices and try to guess which 3 will be retained by the group of players.	<ul style="list-style-type: none"> - connect to other users with relevant profiles - connect to how others “assess” and comment their own profile anonymously - connect their own competence development plans with the ones others would advise

Conclusions

Encouraging users to complete, maintain and improve their electronic profiles is a challenging task. Only if users see real value for themselves will they invest their time and energy in this activity, and become active contributing members of the online community. In this article we have motivated and presented some improvements to profiles and knowledge management systems specialized in lifelong learning and career development that we believe are necessary in order to increase user value and motivation.

First, we reflected on the relevant information that should be provided in a “professional identity” profile in order to increase user value in the area of career development. We showed that social interaction, in addition to solitary introspection, is necessary to provide users with the knowledge they need to make a career change. Using this knowledge we can better design online lifelong learning and career development systems so that they provide value to users by helping them better understand themselves, by making it easier for them to shift connections, and by allowing them to test their trial narratives on an unbiased audience.

We then reported on our exploration of agents and games that use profiles as a basis for connecting people. Profile-based connection agents and games can help individuals get valuable feedback about their profiles, critically re-assess and redefine their lifelong learning and career development objectives and plans, and identify relevant users to connect with in order to exchange knowledge. We believe that users who are actively engaging with other users in profile-based connection games are more likely to complete, maintain and improve their electronic portfolios. We are currently developing prototypes in the context of the TenCompetence project in order to test these ideas.

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AUTHORISATION USING ATTRIBUTES FROM MULTIPLE AUTHORITIES – A STUDY OF REQUIREMENTS

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Abstract: This paper presents the results of a survey of requirements for attribute aggregation in authorisation systems, gathered from an international community of security professionals. It then analyses these requirements against 4 generic models for attribute aggregation and makes some recommendations for future implementations.

Keywords: authorisation, professional community

1. Introduction

Due to the global nature of today's networked resources the need for flexible and easily managed authorisation infrastructures is increasingly important. Many grid and campus based network applications are now being enabled with attribute based authorisation (ABAC) [1], in which users are granted access to network resources based on their various attributes e.g. their university affiliation, role within a virtual organisation (VO) or society membership. ABAC means that any user with a set of valid attributes will be granted access to a particular service. Although the model allows attributes to be retrieved from anywhere, in practice the set of attributes will usually be provided by a single entity commonly known as the Identity Provider (IdP) or Attribute Authority (AA). This IdP or AA will typically have access to a local database containing attributes about known users, along with the local name or identity of each user. Whilst this technology is increasingly being implemented in new grid and campus based applications to allow distributed access to network based resources from anywhere in the world, there are limitations with the current implementations, in that most ABAC systems receive all the user attributes from a single IdP, which limits the technology to receiving just one set of user attributes. This is one of the limiting factors of Microsoft's Cardspace [2]. Researchers and early adopters are realising that a single source of user attributes is insufficient for authorisation in many applications e.g. access to a medical database might require a GP attribute from the General Medical Council and a consultant attribute from the employing hospital; or online shopping might require a credit card from a bank for the purchase and a frequent flyer card to award air miles. Since the same user will usually be known by different identities in each IdP/AA, this makes the collection and aggregation of attributes from different IdPs/AAs difficult.

Before embarking on developing a solution to the attribute aggregation problem, we first thought it would be beneficial to determine a set of system requirements. We realised that determining end user (i.e. consumer or customer) requirements directly from the end users would be difficult at this stage, since most end users would not be sufficiently conversant with the problem space or terminology to present us with their considered requirements. Consequently the people we surveyed were security professionals who are already working in the general area of network authorisation and virtual organisations, and who are already aware of this problem space. We designed a questionnaire to explore the requirements for a new ABAC system that can be used to query multiple attribute authorities and return a set of aggregated attributes based on the multiple sets returned from the AAs. The methodology we employed, and the results of the questionnaire responses are presented in Section 2. In Section 3 we describe 4 generic models for attribute aggregation and analyse these requirements against those models. Section 4 concludes with our future plans for work in this area.

2. Determining User Requirements

2.1. Methodology

There are various ways of determining requirements e.g. structured interviews (face to face or via the telephone), focus groups and questionnaires. Since our respondents are distributed around the globe, face to face interviews and focus groups were not feasible. Even telephone interviews would be difficult given the large time zone differences between the participants. Consequently we decided that a questionnaire distributed by email was the most appropriate tool for eliciting requirements.

There were several different sets of requirements that we wished to gather, for example, privacy requirements, trust requirements and protocol requirements. Consequently the questionnaire was divided into six sections. The first section attempts to capture general requirements in terms of the perceived need for attribute aggregation in both the short to medium term, the likely number of IdPs that will need to be aggregated and the typical end users of attribute aggregation. The second section determines the privacy requirements that any attribute aggregation authorisation system will need to meet. The third section determines the control requirements for attribute aggregation, in terms of who should have the power to decide which attributes can be aggregated either in a user session or independent of any session. The fourth section determines the protocol requirements for collecting the attributes. The fifth section determines the trust requirements between the various entities involved in attribute aggregation, and the need for attribute (credential) signing and dynamic delegation of authority. The last section was a catch-all that allowed the users to supply any additional requirements they might have that had not been covered in the previous sections of the questionnaire. It also allowed the respondents to provide their use cases for attribute aggregation and optionally their demographic information. The questionnaire comprised 23 questions in all.

When questions needed to elicit a respondent's opinion about a topic, we usually used a Likert-type 5-point scale, with answers ranging from i) Of no importance at all, ii) Probably not that important, iii) Potentially important (50/50) iv) Important v) Very Important/Essential. Sometimes we added a sixth option of Don't Care when this seemed like a sensible choice. Other questions required users to choose one or more of several options e.g. whether digitally signed assertions should be available in all protocol exchanges, or only in some or in none at all.

The draft questionnaire was distributed to six people who had a close relationship with the project team, in order to test its semantic clarity, lack of ambiguity, effectiveness and coverage of the topic. Half of these respondents provided useful feedback to improve several of the questions.

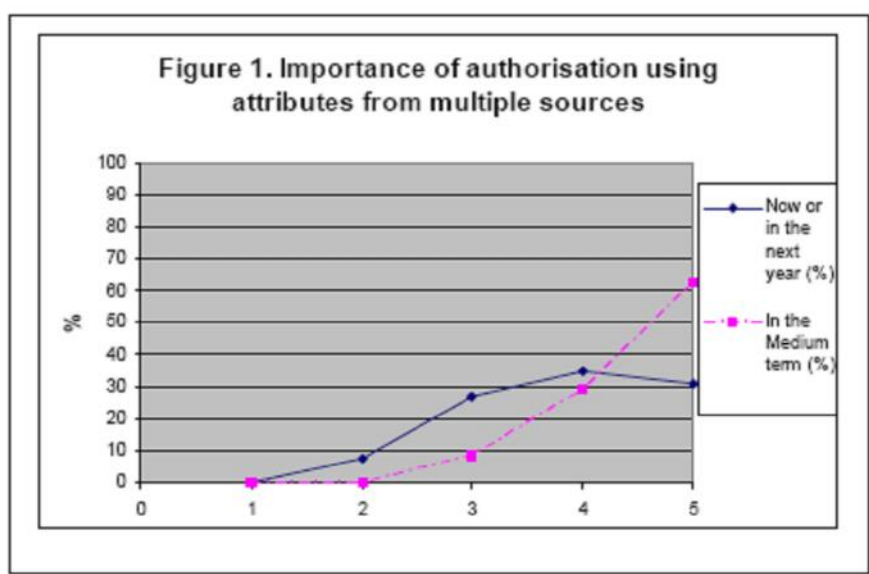
The survey was distributed to members of 12 international mailing lists (see Appendix 1). We received 26 replies within the allotted timeframe, and a summary of the results is presented below. Unfortunately we cannot provide an accurate response rate since we do not know the sizes of the various mailing lists, but it is likely to be less than 10%. 75% of the respondents said they had an above average or very good knowledge of computer security compared to the average computing professional. Only 8% (2 respondents) said they had below average or very little computer security knowledge. Over 50% of the respondents had more than 10 years of experience as a computing professional, with 13% having more than 25 years of experience. The vast majority of the respondents (92%) were from education or research sectors with just 2 respondents being from the commercial sector.

The full questionnaire can be obtained from <http://sec.cs.kent.ac.uk/shintau/Questionnaire.doc>

2.2. General Requirements

The first section was designed to gauge the importance of authorisation based on attributes from multiple attribute authorities, both now in the medium term (2-5 years), as well as how many attribute sources are likely to be needed by future authorisation systems. We also wanted to determine who the likely users of such systems would be.

65% of respondents felt that it was either important or very important at the present time, compared to just 7.6% who felt that it was probably not that important or of no importance at all. In the medium term the importance increased, with 91.7% of participants believing that it will become important or very important to them.



There was also a doubling in those who felt that it would become very important to them, rising from 30.8% to 62.5%.

We then asked how many attribute sources would be likely to be required in any one user's authentication session. Participants were given 4 options to choose from on a sliding scale from one to more than three. The results showed that 54% of participants thought that more than 3 attributes sources could be required compared to only 4% that believed a single attribute source would be sufficient.

Finally we asked who are likely to be the typical users of any attribute-based authorisation infrastructure. We provided three options: Humans via Web Browsers, Applications via APIs and Grid users via Grid clients. Participants were allowed to choose multiple values and could also specify their own users for the system. The results showed a broad spread with all of the provided options being potential users. 80% of participants believed that Humans via web-browsers would be potential users, 77% believed that grid users and their clients would be potential users and 65% believed that Application and API's would be potential users. Other suggested users were: Smart network devices to enable inter-operation with users and devices, Intermediaries such as online CAs, grid portals/gateways, IdP proxies, Experimental data collection systems, Shibboleth type enabled SPS, Command Line Interfaces and in silico computing. Consequently any provided solution should have a broad range of applicability, and cannot assume any single model of use, such as a web browser will always be involved.

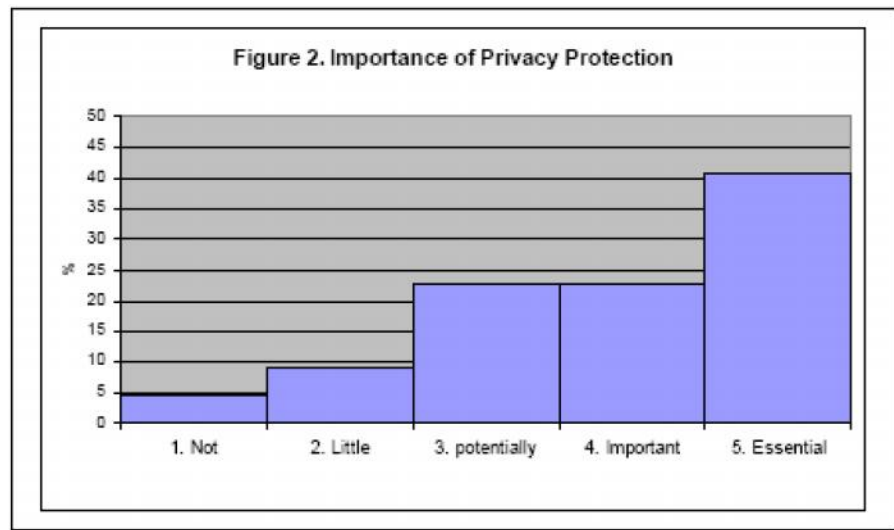
2.3. Privacy Requirements

The second section dealt with the user's privacy within an attribute based environment. We began by questioning the importance of privacy protection for user attributes using the five point Likert scale from "of no importance" to "very important/essential". The results showed that 62% of participants believed this issue to be important or very important compared to 14% which believe it be of little to no importance.

We asked how the privacy of user attributes should be enforced. Participants were given a choice of 4 options (and their percentage responses are shown in parentheses):

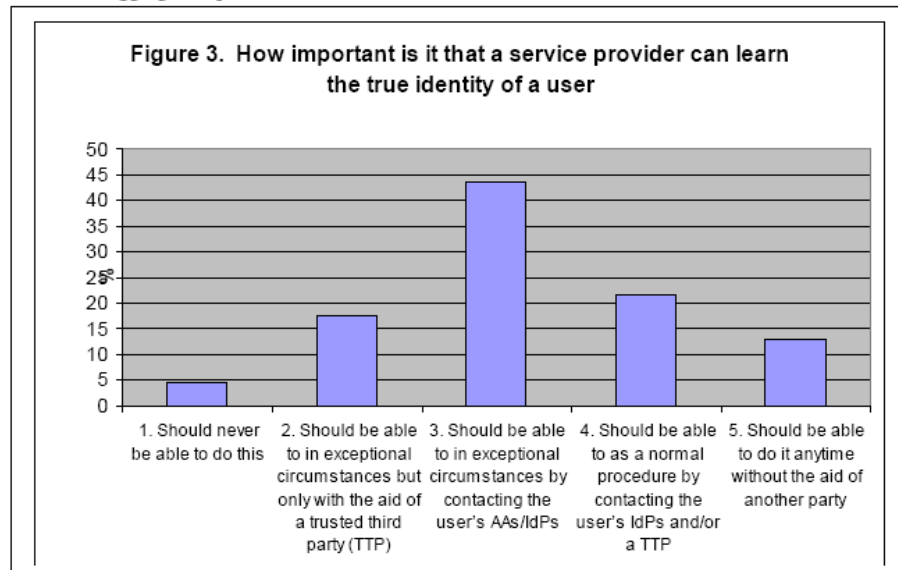
- Legal enforcement is sufficient. No technical controls are needed (4%),
- Legal enforcement should be supplemented with some technical controls (26%),
- Technical controls should be used to enforce all legal requirements (18%),
- Technical controls are essential and should be independent of legal matters (52%).

All but 4% of the respondents stated that some technical controls should be implemented and the majority believe that the controls should be independent of legal matters.



We asked whether service providers should be able to track users between sessions even if they did not know the true identity of the users (e.g. if pseudonyms were being used). Participants were asked to choose one of five Likert scale options ranging from; should never be able to do this to very important/essential for to do this for all applications. The results were that none of the respondents felt that the SP should never be able to track users between sessions and only 14% thought that this was essential for all applications. The majority of participants (56%) believed that a service provider (SP) should be able to track a user between sessions for most applications (but not for all), meaning that this must be an option of any attribute aggregation protocol.

We then asked whether a service provider should be able to learn the true identity of users, the vast majority (96%) believing that the SP should be able to, but the "when and how" differed (see Figure 3). 13% felt that the SP should be able to access a user's identity anytime without the aid of another party, whilst the majority (43%) thought the SP should only be able to do this in exceptional circumstances by contacting the user's AAs or IdPs. Clearly the "when and how" has an effect on the design of the attribute aggregation protocols.



We asked whether AAs/IdPs should be able to communicate with each other in order to link together the attributes of a user. Participants were asked to choose one of the following (and their percentage responses are shown in parentheses):

- Yes, and without the aid or permission of the user (19%),
- Yes, but only with the permission of the user (62%),
- Yes, but only with the technical aid of the user (15%),
- No, it should not be technically possible (4%).

The results clearly show that the majority (77%) believe that AAs/IdPs should only be able to communicate with each other with the permission or aid of the user.

The final question in this section asked whether SPs should be able to search or query multiple AAs/IdPs in order to look for linkages between user attributes. Participants were asked to choose one answer from the following (and their percentage responses are shown in parentheses):

- Yes, anytime it wants to (0%),
 - Yes, but only if it needs to pull more attributes in order to authorise the user (28%),
 - Yes, but only if it needs to pull more attributes in order to authorise the user, and then only with the user's permission (60%),
 - No it should not be technically possible (12%)
- Clearly any "pull" protocol design should be cognisant of the fact that a user must have given their permission first before an SP is allowed to pull additional attributes.

2.4. Control Requirements

This section was designed to establish who should be in control of attribute aggregation and the definition of the various attributes that are needed for authorisation.

The first question looked at whether there should be a master list of all the IdPs of a given user and all the attributes that they hold, and if so, who should control this master list. Participants were asked to choose between 6 values (percentage responses in parentheses); the user only (31%), an agent trusted by the user (15%), the user's primary IdP (19%), distributed between multiple IdPs (19%), each service provider (0%) and a third party directory service (15%). The

results were fairly evenly spread, except that everyone agreed that the SPs should not hold such a list, and a slight preference was given to only the user knowing who all his IdPs are.

The next question looked at which party should be responsible for controlling the aggregation of a user's attributes in an authorisation session. Participants were given the following options and were allowed to choose multiple values (their percentage responses are shown in parentheses):

- the user should collect together the necessary attributes and push them to the service provider (42%),
- the user should collect together references to the appropriate attributes and push these to the service provider for it to pull the attributes (33%),
- the user should contact an intermediate gateway that will collect (pull) the attributes on his behalf and push them to the service provider (33%),
- the user should simply contact the service provider and the infrastructure will know which attributes to pull from where (42%),
- other mechanism (8%).

Clearly there is no preference for either “push” or “pull” modes of attribute collection, or whether users, SPs or intermediaries should do the aggregation. Two of those questioned offered additional mechanisms for this process: “The user collects together the necessary attributes and pushes them to the service provider through a trusted agent” and “for Institutions and IdP maintainers to provide well thought out policies and mechanisms for genuine informed consent”.

The final question attempted to find the correct balance of power between SPs and IdPs over the sets of attributes that are needed for application authorisation. Participants were asked to choose one of the following 5 options (and their percentage responses are shown in parentheses):

1. The SP should publish policies about what attributes it needs and the IdPs/AAs should be capable of issuing these attributes (22%),
2. The IdPs/AAs should publish policies about what they can issue, and the SPs should build systems that make use of them (15%),
3. There should be prior negotiation between the SP and the IdPs/AAs and they should mutually agree which attributes are needed for each application. (22%),
4. There should be an internationally standardised set of attributes used by all IdPs/AAs and SPs (26%),
5. Other (15%).

As can be seen, no option shows significant preference, and the power to control is fairly evenly distributed between both IdPs and SPs.

2.5. Protocol Requirements

This section ascertained what types of protocol should be implemented by any attribute aggregation system. The first question asked whether tunnelling through firewalls (using http or https) was important. Everyone had an opinion about this. 79% said this was either essential or should be done if possible. 17% said this wasn't really necessary and only 4% thought it was very undesirable. We conclude that there is a very strong bias for a http based protocol.

The next question asked whether the pull protocols should be based on web services/XML/SOAP. Participants were given the same five choices as in the question above. 67% said this was either essential or should be done if possible. 8% said it wasn't really necessary, no-one thought it was undesirable, and 25% didn't care. We conclude that an

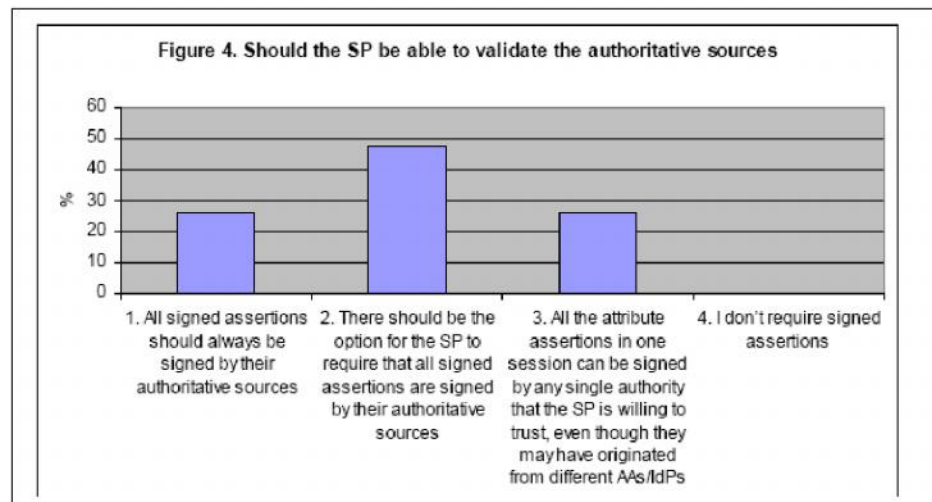
XML/SOAP based message is the favoured approach. We then asked whether existing protocols should be used and if so whether they should be extended in a standard way for interoperability. The results showed clearly that the vast majority of participants (88%) would prefer the use of existing protocols (44% said it was essential and 44% said Yes if possible). Only 8% didn't care and 4% thought it unnecessary. We also asked whether it would be excusable to break or extend (in a non standard way) existing protocols in order to achieve the required functionality. 33% said this was very undesirable, and 58% cautioned "only if really necessary". Only 8% felt that standard protocols could be broken to achieve the requirements. Clearly standards conformance is a very important issue.

Participants were asked to suggest relevant protocols to be used. Thirteen different protocols were suggested, but the most commonly nominated protocol was SAML with 31% of the votes. Finally the respondents were asked if some form of proxying of identity information should be supported. The majority of users (70%) felt that this was an essential feature, with 20% thinking that a single proxy would be sufficient but 50% believing that multiple proxys (or protocol hops) must be supported. A further 15% said proxying should be supported if possible. Only 5% thought proxying was undesirable and 10% didn't care. Clearly any attribute aggregation system will need to support proxying if it is to be widely accepted.

2.6. Trust Requirements

This section dealt with the trust issues surrounding the use of multiple IdPs. The first question asked whether it was important that each IdP be able to sign the assertions that it issues in order to allow a relying party to prove their validity. Participants were given the choice of 3 options (and their percentage responses are shown in parentheses):

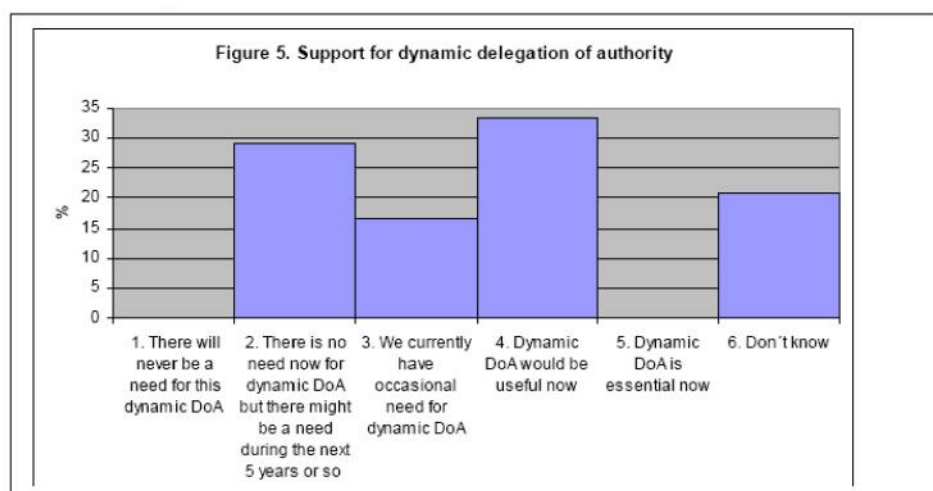
1. signed assertions never need to be supported (0%),
2. the ability to sign assertions is needed for some messages (25%),
3. the ability to sign assertions needs to be supported for all exchanges (75%).



Signed assertions are clearly an essential component of attribute aggregation. The next question attempted to ascertain whether service providers should be able to validate that the user's attribute assertions were actually signed by their various authoritative IdP sources. The results are shown in Figure 4. The results show that all participants believe that assertions should be signed in some manner, and that 47% believe that the SP should be able to require the assertions be signed by their authoritative sources.

The final question asked if dynamic delegation of authority (DoA) was important. By this we mean that an authoritative source for an attribute can dynamically delegate to subordinates to

sign the assertions on their behalf without informing the relying parties first. E.g. in a VO, the VO manager can decide to let various site managers issue VO membership certificates on his behalf, whilst the relying parties (SPs) simply say they trust the VO manager (and his delegates) to issue VO membership certificates. Participants were given the choice of 6 options and their responses are shown in Figure 5 below.



The results show that 33% of those questioned felt that dynamic DoA would be a useful feature to have now and that 17% currently have the occasional need for it. It is a feature that is likely to be increasingly needed in the future.

2.7. Additional Requirements and case studies

In this section we asked participants to provide us with any additional requirements and use cases they may have.

We received 13 additional requirements or requests for further discussion of parameters. These requirements were for any authorisation system to be interoperable with HEI in the US, EU and the wider world, for explicit testing of “novel” and unusual situations, for support for multiple sources of data that require authentication due to licensing restrictions, for a method to allow users to see who is using their data and for what purposes, for the designed systems to be simple enough to be usable, to allow IdPs to attach limitations on usage on assertions given to a SP and to provide a mechanism within delegation to know not only the target’s identity but also the issuer’s identity. The requests for further consideration of requirements pertained to the relationships between parties that wish to do collaborative research under different authentication regimes, the form of attribute aggregation, a need for further consideration of pushed attributes and a request to look

into the requirements of differing communities in order to ultimately produce a system that can be used by them all. We also asked participants to submit their current or future use cases in order to be able to best judge the way in which they would use any authorisation system produced. The common themes of the submitted use cases were the use of grid computing in projects as well as Shibboleth and federated access to resources. Virtual organisations were also mentioned often as well as access to confidential information such as NHS or government records.

2.8. Summary of Requirements

In summary, the following requirements are seen to be important by the majority of the respondents for any new multi-source attribute authorisation system:

- Attribute aggregation must be usable in a variety of ways: Humans via web browsers, Applications via APIs and Grid users via grid clients etc,
- Privacy protection of user attributes is of high importance and this should be through the use of technical controls, which are independent of legal means,
- Service Providers should be able to track users between sessions if required,
- Service Providers should be able to learn the true identity of users in exceptional circumstances, but only by contacting the user's IdPs,
- AAs/IdPs should only be able to communicate with each other to link together the attributes of a user with the user's permission,
- Service providers should only be able to query multiple identity providers, in order to pull additional attributes for authorisation purposes, with the user's permission,
- Should be able to tunnel through firewalls using existing open ports (http/https),
- System should use existing standard protocols and only extend them in a standard way if necessary. SAML is the most popular choice,
- The proxying of information should be supported through multiple hops/proxies,
- The ability to sign assertions should be supported for all exchanges,
- The SP should be able to require that all assertions are signed by their authoritative sources,
- Should be easy to use by end-users and have the minimum amount of interaction⁶⁶.

Unfortunately some of these requirements are mutually exclusive i.e. 9 and 6/11. In general it is not possible to support multi-hop proxying, where entities on one side of the proxy are not always aware of the entities on the other side of a proxy, and to have attribute assertions that are always signed by their authoritative sources and to have the SP directly query multiple IdPs.

3. Analysis of Requirements against Attribute Aggregation Models In this section we compare the 12 requirements derived above with those offered by 4 generic models which we have distilled from the literature. We believe that most, if not all, models of attribute aggregation are variations on these 4 generic models.

3.1 IdP Chaining

In the IdP chaining model multiple IdPs are accessed in succession before a single set of assertions is returned to the SP. This is the model as typified by myVOCS [4]. Each intermediary IdP in the chain is a combination of both an IdP and a SP as it both receives and issues attribute assertions. The initiating SP redirects the user to the first intermediary IdP, which redirects the user to the next intermediary IdP and so on down the chain until the terminating IdP is reached. The user is then authenticated by the terminating IdP, and is redirected back up the chain to the SP co-located with the last intermediary IdP in the chain. This redirection response contains an authentication assertion from the terminating IdP and may contain attribute assertions as well. The SP at this intermediary IdP redirects the user to the IdP component co-located with it, asking the user to authenticate to this IdP. The IdP notes that the user has already been authenticated by the terminating IdP, and therefore issues its own authentication assertion along with its own attribute assertion which will include any attributes provided by the terminating IdP. The user is then redirected back up the chain to the SP co-

⁶⁶ This last requirement was not part of the questionnaire, but was mentioned by at least one respondent, and should be a "given" for any system that is to gain wide acceptability

located with the next intermediary IdP in the chain. Eventually the user is redirected back to the initiating SP, by which time his request contains an authentication assertion and attribute assertion issued by the first intermediary IdP in the chain. The attribute assertion potentially contains attributes from each IdP in the chain.

This model can be seen to have a low level of protection for user attributes as every intermediary IdP must relay bearer credentials intended for a third party allowing for an increased risk of substitution attacks as well as the possibility of an IdP sending false authentication information through the chain causing the wrong users attributes to be released to the SP. As this model uses trust relationships between linked IdPs rather than explicit trust links with the SP all relevant attribute assertions will be returned to the SP by the last IdP in the chain regardless of what circles of trust the other IdPs in the chain might belong to. There is therefore an implicit trust relationship between every IdP in the chain and the SP, even though the SP may not be aware of it. This model allows the SP to track users between sessions if the same first intermediary IdP is used in each request. In this model we assume that each IdP-IdP link is initialised only with the user's permission, but it may not be obvious to the user what chains exist between IdPs. This model is the only one that allows for the use of multi-hop proxying as each link in the chain can be seen to be a proxy hop. Assertions signed by their authoritative sources could be supported but the protocol becomes more complex. This model requires the use of browser interactions and requires a medium to high level of user interaction.

3.2 SP-Mediated Attribute Aggregation

This model is an enhancement of the Shibboleth model [5], in which the SP now queries multiple IdPs, rather than just one, in order to obtain their attribute assertions. As each IdP is contacted, the user is invited to authenticate to it. This model can be seen to offer excellent levels of privacy protection as the user must authenticate at each IdP, fully controls the attribute linking, and each set of assertions can be encrypted for the SP. The assertions are also signed by their respective authoritative sources. As this model is primarily SP based the requirement for SPs to be able to track users between sessions is easily accomplished as is the requirement for SPs to be able to learn the true identity of users. This model however precludes the use of multi-hop proxying as attributes are explicitly requested using a SP-IdP trust relationship. Unfortunately this model requires browser based technologies and requires a high level of user interaction as users must authenticate themselves at each IdP via redirects from the SP before the attributes are returned.

3.3 Client Based Collection

The Client-Based assertion collection model is an enhancement of the model utilised by Microsoft's Cardspace [2] so that multiple IdPs are contacted instead of just one. When each IdP is queried, the user authenticates to it and a set of attributes are returned. This model requires a smart client that is able to create the attribute requests and collect the returned assertions into a single bundle to forward to the SP. The assertions obtained by the UA may be encrypted for the SP only, so that the UA or any intermediate nodes cannot read them. There is a high level of privacy protection for the user attributes, the assertions are signed by their authoritative sources, and the user is in control of the attribute aggregation. Unfortunately multi-hop proxying is precluded by this model as explicit requests must be made from the UA to each IdP, which then issues attribute assertions for the SP preventing the use of IdPs that are unknown to the UA or SP. This model also mandates the use of a smart browser or smart client that is able to make the attribute requests and store the returned assertions until the complete set of assertions have been obtained.

3.4 Identity Linking

The identity linking model relies on the ability of a user to associate identities that it controls, prior to invoking any SP. If a user authenticates successfully as different identities to two different IdPs, it can claim control of both identities and request that one identity be federated with the other. When this is done, a unidirectional persistent identifier is created that allows one IdP to point to the counterpart identity at the second IdP. This may be repeated with the IdPs swapped to create a bidirectional link with two distinct identifiers [3, 6]. When a user contacts an SP for a service, it is redirected to one of the IdPs for authentication, and this provides the SP with the user's attributes that it holds plus the unidirectional link to the second IdP so that the SP can retrieve additional attributes from there. A variation on this model is to have an IdP discovery service that holds links to all the user's IdPs [7], rather than having multiple IdP-IdP links.

This model offers high levels of privacy protection for user attributes by ensuring that all attribute assertions are signed by their authoritative sources, and IdP attribute sets are only linked with the users permission. However it requires the SP to have more trust in the IdPs when they hold links to other IdPs, and to have a high level of trust in the central discovery service as it contains links to all the user's identification details for each IdP as well as potentially a list of attributes stored at each IdP. This model also implicitly requires that each IdP trusts every other linked IdP to authenticate principals correctly. This model allows SPs to track users between sessions to find out their true identities. Multi-hop proxying is unsupported as the initial IdP encrypts the request to the linked IdP or discovery service using its public key, preventing it from being passed to any other service. As each attribute assertion is encrypted to the SP there must be explicit trust links between the SP and each IdP that issues the attribute assertions. The level of user interaction can however be seen as quite low as users are only required to authenticate at a single IdP and that authentication request is used by the system to issue attribute requests to other IdPs. Due to this low level of user interaction there is no need for this model to require the use of a browser based client.

3.5 Requirements Analysis

The table below summarises how each of the 4 models satisfies the 12 requirements presented in section 2.8. 1 indicates the requirement is satisfied, 0 that it is not satisfied

Table 1. Requirements Matrix

Requirements	IdP Chaining	SP Mediated Aggregation	Client Based Collection	Identity Linking
1. Does not mandate client interaction	0	0	0	1
2. Privacy Protection of user attributes	0	1	1	1
3. Service Provider able to track a user between sessions				
4. SP has the ability to learn a users true ID	1	1	1	1
5. IdPs can only link attributes with the users permission	1	1	1	1
6. SPs are able to pull additional attributes only with the user's				

7. Can use the standard HTTP/S Protocol	1	1	1	1
8. Uses standard protocols, pref SAML	1	1	1	1
9. Supports Multi Hop Proxying	1	0	0	0
10.Supports signed Assertions	1	1	1	1
11. Assertions signed by their Authoritative				
12. What level of user interaction is required	Medium	High	High	Low

Whilst none of the models can provide every requirement proposed in this paper, each model has its own strengths and weaknesses. Provider chaining is the only one of the four models to offer multi-hop proxying but the use of repackaged attribute assertions from potentially any IdP, which the SP may or may not trust, could present significant problems to some applications. SP mediated aggregation has a simple message flow but requires each SP to either have a list of all the user's IdPs to connect to (which places a high burden of trust on the SP) or the user must be asked for each IdP in turn. In both SP mediated and client based collection the user must authenticate at each IdP, so there is a high level of user interaction required in order to obtain the aggregated attribute set. In the latter model the smart client must be configured with a list of IdPs to query for attributes, tying users to a single configured client which may not be available in all circumstances e.g. when using a public PC or roaming. The Identity linking model, whilst not supporting multi-hop proxying, does have the lowest level of user interaction, only requires the user to authenticate once and does not tie the user to any SP or configured client as all the required links come from the IdPs or discovery service.

4. Future Work

In order to support the largest set of requirements that have been derived from our survey, we are in the process of defining aggregation protocols for the Identity linking model and intend to submit draft

OASIS profiles for peer review in the near future. The proposal is to have three protocols, one for a user linking together her attributes at a Linking Service, which is a simplification of Liberty's discovery service [7]; one to allow the Linking Service to aggregate the attributes in a user's session, and a second to allow the SP to aggregate the attributes, based on referrals provided by the Linking Service. All three protocols will be standard extensions to SAMLv2.

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Appendix 1. Questionnaire Recipients

Members of the Jericho Forum

(<http://www.opengroup.org/jericho/>) OGF OGSA Working

Group list

OGF OGSA Authz WG list

Liberty Alliance group working on attributes Sun's Identity and Access Management group

The XACML TC

JISC-MIDDLEWARE-DEVELOPMENT list

IDENTITY-PROJECT-PUBLIC JISC mailing

list Terena EMC2 mailing list

Shibboleth Dev list

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IDENTITY REPRESENTATION IN DIGITAL INTERACTIONS

Sabine Delaitre (FING)

Abstract: In a context of mobility, ambient intelligence and increasingly complex and evolving digital value chains, the individual becomes the central point of convergence for digital networks and services. Digital Identities, their nature, formation, assertion, negotiation, defence and use, is therefore one of the most challenging issues of the coming years. The "Active Identities" programme will focus on the opportunities that digital identities provide for individuals and organizations, while not losing sight of risks and threats. We will explore identity as a resource, a means for individuals to control their life and, for organizations a source of innovation and value creation. Organization of the workshop: (1) Launching session: Introduction to the different aspects (characteristics, statement, evolution) of the central topics by three or four short presentations followed by a discussion session on the main issues; (2) Short parallel workshops: Work in small groups on highlighted topics stemming from the discussion; (3) Final session: Feedback, workshop reports, areas for future work.

Keywords: active identity, digital identity

Workshop framework

FING, the *Next-Generation Internet Foundation*, is a multidisciplinary team whose mission is to foster a dynamic of digital innovation that balances economic performance and human development. Working at the crossroads of technology, business, the arts and social change, FING is a network, an idea accelerator, a think tank and a resource for innovators.

On September 1, 2007, FING launched its "Active Identities" action programme. This programme's goal is to identify, support or promote innovative tools, services, methods and infrastructures that will allow individuals and organizations actively to manage their own digital identity/ies. In this programme, "digital identities" are considered as resources and assets, as means to organise our lives, to reach our social goals, to protect and to reveal ourselves, to be who we are and become who we wish to be.

Within the framework of this programme, Fing is organizing a workshop on **Identity Representation in Digital Interactions**, connecting subjects from identity management, knowledge representation, digital worlds, web 2.0 and user control. The aim is to bring together innovators, experts and stakeholders from different areas in order to identify new paradigms, new issues, new ideas and opportunities relating to the representation of identities in the digital (or digitally equipped) world.

This workshop will take place in Maastricht (The Netherlands) on **October 16th (starting at 14.00)**, hosted by the HCSIT (Human Capital and Social Innovation Technology Summit) conference: <http://events.eife-l.org/HCSIT2007/>

“Active Identities”

In a context of mobility, ambient intelligence and increasingly complex and evolving digital value chains, the individual becomes the central point of convergence for digital networks and services. Digital Identities, their nature, formation, assertion, negotiation, defence and use, is therefore one of the most challenging issues of the coming years.

The "Active Identities" programme will focus on the opportunities that digital identities provide for individuals and organizations, while not losing sight of risks and threats. We will explore identity as a resource, a means for individuals to control their life and, for organizations a source of innovation and value creation.

From identification to Active Identity: an augmented concept

In this programme, "Identity" does not stand only for "identification" or for the identity-related data enabling one's identification. "Identity" will be a broad concept, relating to all forms of personal identifiers and data, self-expression and self-representation. Identity becomes plural and "identities" will be the preferred form of this term in this programme. "Identities" will encompass manifold aspects including traces, profile, presence, location data, collective being, avatars, self-presentation, reputation, etc. "Identities" will be regarded as an augmented concept for which the reasoning and the strategy could become the key structuring drivers of its "digital manifestations".

Representation of our identities

Digital interactions are a growing reality and individuals or organisations become more and more components of digital networks where the representation of identities is the main gateway.

At first glance, "representation" covers three principal fields of actions:

- identification, or the act of claiming an identity,
- negotiation, or the management of identity-related information disclosure in social and other interactions,
- expression, or self-representation through various means.

This workshop will focus on negotiation and expression; however it would also be to discuss the influence of identification on negotiation and expression: It is likely that strategies for disclosure and forms of self-representation vary when one's identity is considered to be known by others, or not.

What is new?

The central hypothesis we wish to discuss during this workshop is that the advent of "social computing", in its various forms, is dramatically changing the ways in which the representation of identity is managed and used, both by individuals and by the people and/or organizations they interact with through digital means.

The most obvious trend is the growth of self-representation through blogs and other networked publishing tools. Another is the strategic use of multiple and sometimes rich "digital identities" related to different contexts, social circles, goals, etc. One's eBay profile could be different from one's messenger profile(s), and wholly remote from the same person's professional profile.

But social computing is also blurring the formerly clear distinctions between "negotiation" (e.g., the more or less controlled disclosure of personal information to vendors or potential employers) and "expression". As examples, public profiles, electronic resumes, reputation systems, past appearances on various webpages, music listening logs, etc., tend to stand in between the formalized world of transaction and the less formal world of social interaction. They may both be processed by datamining software, as "data", or analyzed by individuals, as clues or messages. Personal data become means of expression, content becomes processable personal data. Both sorts require new means of control and are subject to new production and disclosure strategies.

New issues also arise, such as standardization of interoperability. Many "social software" tools that become central tools for interaction (such as business contacts sites, auction sites, picture-sharing sites, etc.) tend to lock their users and their contact into proprietary formats, thereby reducing possibilities granted to individuals and raising migration costs to very high levels.

Open questions

- How do individual strategies for asserting and representing one's identity/ies evolve on today's Internet?
- What forms of identity representation emerge as structuring tools for social and other interactions?
- What innovative tools, technologies and services could empower individuals with better means to control, express, disclose and/or protect their identity and privacy?
- What kinds of mediators could emerge in this field?
- What implications could these changes bring for social relationships, trust, commerce.

Organization of the workshop

- Launching session: Introduction to the different aspects (characteristics, statement, evolution) of the central topics by three or four short presentations followed by a discussion session on the main issue,
- Short parallel workshops: Work in small groups on highlighted topics stemming from the discussion,
- Final session: Feedback, workshop reports, areas for future work.

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III. HR Technology

HR Technology conference (HR-XML)
17th October 2007

COMPETENCE AND JOB PROFILE FRAMEWORKS

Clementina Marinoni (Fondazione Politecnico di Milano)

Abstract: The Competence and Job Profile Frameworks presentation will describe the two approaches adopted for the European eCompetence Framework and the ICT Qualifications Framework based on the European Qualifications Framework (EQF). The presentation will show the “grammar” used to define and relate ICT competences, to describe learning outcomes, to identify levels. It will indicate a way to create interoperable eCareer Services towards transparency across Europe and will also focus on the key success factors to build frameworks and standards.

Keywords: competency

1. Scenario and aims

Why are competence and qualifications frameworks becoming more and more important within the Human Resources (HR) domain?

In general, frameworks are necessary to achieve standardisation. In this case, frameworks help build a common language, i.e. they help understand and communicate the same concepts. Common language and understanding are a necessary premise to make services interoperable, i.e. each other connected, consistent, easily reachable, comparable and usable; interoperability means effectiveness and transparency and concerning HR domain, it fosters students and workers mobility, too.

In the HR domain, common competence and qualifications frameworks are the basis for interoperability between competence diagnostic assessments, learning programmes, certifications, and many other possible eCareer services, as illustrated in Figure 1. [1]

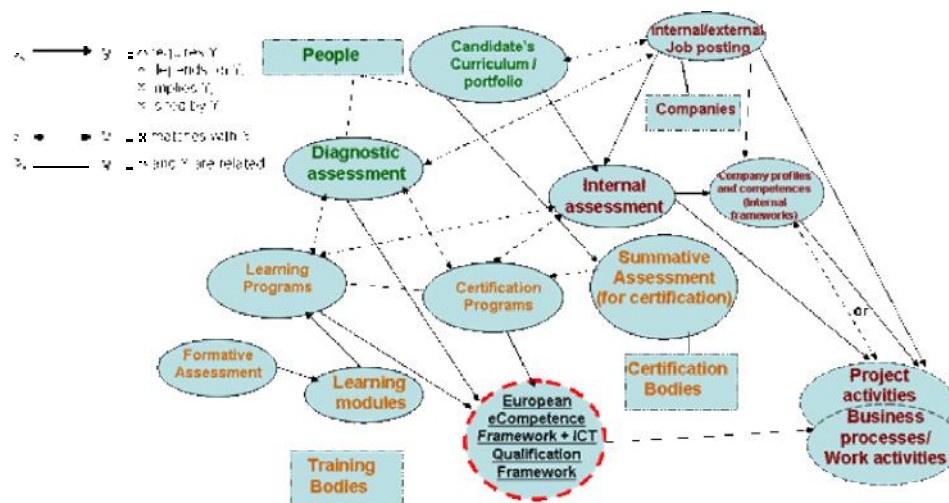


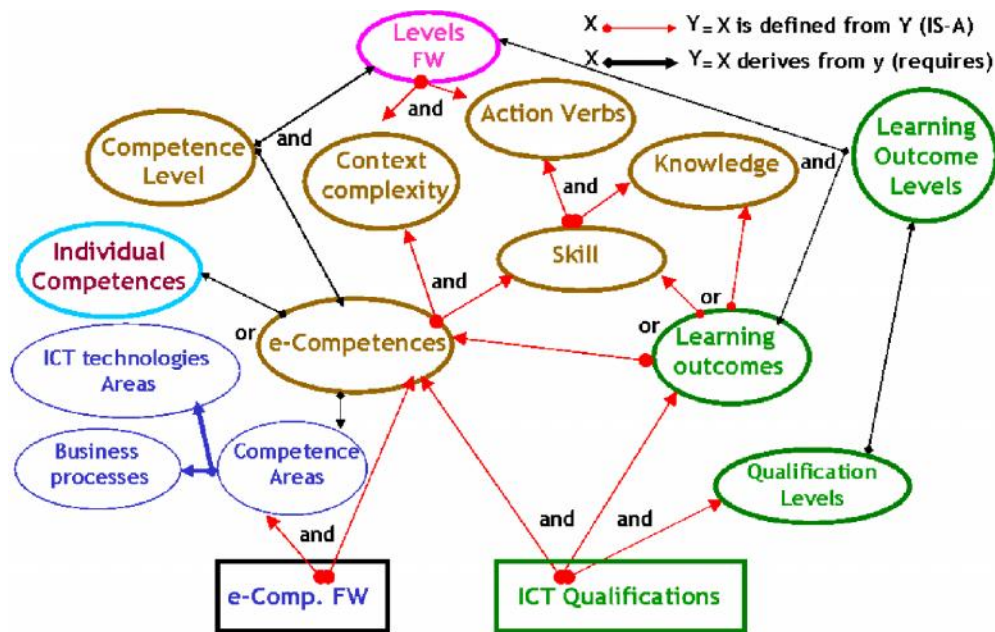
Fig. 1. HR Domain main relationships

Accordingly, some definitions are reported in Table 1.

Table 1. Definitions developed within the European e-Competence Framework, Euro ICT Lane, eCCO [7]

- **Knowledge** ≡ know-how, know-what and know-why
- **Knowledge Object (KO)** ≡ a “small enough”, self consistent set of knowledge (with respect to specific areas of analysis, targets, objectives, etc.)
- **Skill** ≡ KO put into action, KO + Action Verb (AV)
- **“Competence** = a demonstrated ability to apply knowledge, skills and attitudes in order to achieve objective results (according to a specific level of autonomy and context complexity)”
- **“Learning outcomes** = statements of what a learner knows, understands and is able to do on completion of a learning process and are defined in terms of knowledge, skills and competence” (from EQF documentation)
- **Learning outcomes** are expressed through “operational descriptions” like “to be able to do something”
- **Learning outcomes levels** depend on contexts complexity (e.g. routinary, predictable, unpredictable, subject to changes contexts) and on knowledge, skills and competences typologies (e.g. practical, cognitive, social, functional competences)
- Relevant ICT knowledge, skills and competences for ICT professionals **start from EQF level 3**

The concepts expressed by these definitions can be connected together; they generate a platform to develop an interoperable model, as illustrated in Figure 3.

**Fig. 3.** Connections between concepts

Concerning levels definition and recognition, by following the EQF levels descriptions, it is possible to assign a level to any ICT-related competence or ICT-related learning outcome typology-category (knowledge, skill and competence), according to at least two dimensions: context complexity – actions complexity⁶⁷. In fact, by reading the EQF levels descriptions carefully, we can distil these concepts at increasing complexity levels.

⁶⁷ EQF defines competences in terms of Autonomy and Responsibility. So within the EQF, levels are also assigned according to these two dimensions. Because companies prefer not to confuse competences with “organisational responsibilities”, within the frameworks developed in the projects mentioned in this Paper, the concept of

According to a common agreement among ICT stakeholders' communities, ICT proficiency and learning levels range from EQF levels 3 to 8; nonetheless, the European e-Competence Framework has developed its own scale, which starts from level 1 to level 5. In Table 2, a schematic provisional representation of levels and reference dimensions is drafted.

Table 2. Levels EQF compliant (provisional)

EQF - ICTQualFW Levels	e-Comp FW Levels	e-Comp FW Levels	Key action verbs + words
8	5	Unpredictable - unstructured	Conceiving, transforming, innovating, finding creative solutions by application of a wide range of technical and / or management principles
7	4		
6	3	Structured - unpredictable	Designing, managing, surveying, monitoring, evaluating, improving, finding non standard solutions
4- 5	2		Scheduling, organising, integrating, finding standard solutions, interacting, communicating, working in team
3	1	Structured - predictable	Applying, adapting, developing, deploying, maintaining, repairing, finding basic-simple solutions

Concerning the “key action verbs – words” column, it represents actions complexity; the descriptions inside identify the core features characterizing each level and are intended as “lower bounds”, i.e. that column indicates from which level on we can start to recognise a specific set of key actions. Accordingly, it is always possible to identify same sets of action verbs-words at higher levels but they will not play a key role there. So just as an example, if “surveying” characterizes level 6 EQF and level 3 European e-Competence Framework (Ee-CompFW), it may also be found at higher levels (7-8 EQF, and 4-5 EeCompFW) but at higher levels it will not play a key role anymore. Other action verbs-words will be key for those levels. This table is provisional and sets of key action verbs-words are in progress.

The idea behind is that the levels scale spans a spectrum from low complexity concrete actions to high complexity actions and conceptualization. In Table 3 below, a summary in progress is provided. [8], [9], [10]

Table 3. An example of provisional sets of actions

<ul style="list-style-type: none"> – "Doing", "making": related to concrete actions and referred to either predictable or unpredictable contexts. E.g.: doing, using, applying, adapting, developing, deploying, maintaining, repairing, finding basic-simple solutions; – "Coordinating", "operating": related to concrete actions and referred to either predictable or unpredictable contexts subject to changes. E.g.: scheduling, organising, integrating, carrying on, finding standard solutions; – "Observing", "analysing", "listening to", "controlling", "driving": related to “conceptualizing” and referred to either predictable or unpredictable contexts subject to changes. E.g.: surveying, designing, managing, supervising, monitoring, evaluating, improving, finding non standard solutions; – "Choosing", "communicating", "enhancing": related to “conceptualizing” and “by definition” referred to unpredictable contexts. E.g.: decision-making, team-building, personnel forming, performances reviewing; – "Conceiving", "visioning", "foreseeing": related to “conceptualizing” and “by definition” referred to unpredictable contexts. E.g.: planning, transforming, innovating.
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Responsibility is skipped. In this paper “Autonomy” dimension is not considered as well just for simplicity of reasoning.

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IV. Related papers

18th-20th October 2007

TOWARDS A LEARNING PATH SPECIFICATION

José Janssen, Adriana Berlanga, Hubert Vogten, Rob Koper
(Open University of the Netherlands)

Abstract: Flexible lifelong learning requires comparability and exchangeability of courses, programmes and other types of learning actions both in a national and international context. A uniform and meaningful way to describe learning paths is needed to enable lifelong learners to choose suitable ways to build their portfolio. This paper identifies the requirements for a learning path specification drawing on a study of literature in the field of curriculum design and lifelong learning, and on recent initiatives aimed to enhance comparability and exchangeability of learning actions. Mapping these requirements on two existing specifications designed to describe learning programmes, XCRI and IMS-LD, leads to the conclusion that IMS-LD more broadly fulfils the requirements because it has a generic way to define completion of learning paths as well as an expression language to describe all kinds of conditions. A learning path model is presented identifying the main elements of a learning path specification.

Keywords: lifelong learning; learning path specification.

1. Introduction

Easy exchange of courses and programs across national and institutional borders is an important goal in creating a “European area of lifelong learning” (CEC, 2001, 2004; González & Wagenaar, 2003; PLOTEUS, 2006; Pöyry, Pelto-Aho, & Puustjärvi, 2002; TENCompetence, 2005). In order to foster mobility of employees across Europe and to enhance flexible lifelong learning, it is necessary to remove barriers to the exchange of programs, courses, and other educational offerings (hereafter *learning actions*). Exchangeability is an attribute of the relation between learning actions indicating that one action can be substituted or replaced by another, simply because they result in similar learning outcomes (e.g. competences) or because they result in learning outcomes which are formally recognised (certified) as a valid alternative within a wider programme. To establish whether or not learning actions are exchangeable they have to be described in a way that they can be compared.

An additional challenge lies in the fact that in lifelong learning the learner might perform formal, non-formal and informal learning actions in parallel: take a job-related training course at work, retrieve information from the Internet and study for a master’s degree at a university in the evening. Instead of addressing the problem of exchangeability by agreeing on structures and formats for exchange beforehand, we would like to facilitate exchange of learning actions which are not necessarily developed within agreed upon curricular contexts.

Given the broad variety of learning actions in lifelong learning, the need arises to facilitate the selection and decision processes regarding adequate learning paths. Some automated filtering could be applied, offering learners the possibility to indicate for instance cost ranges, start and end dates, weekly study load etc. To support such filtering learning actions and learning paths must be described in a uniform and meaningful way. This paper will investigate the requirements for a learning path specification: what aspects of learning, learning actions and learning paths should be incorporated so that they can be compared and learners are provided with the information they need to make informed decisions?

In order to support learners in choosing a learning path from all available ones, the learning path specification must facilitate identification of learning paths leading to the same learning outcomes. In this sense learning outcomes are the primary base for screening. Facilitation of further screening and final choice for an option requires that the learning path specification describes most relevant characteristics to support learner’s decision making.

Besides these characteristics, the learning path specification must be able to describe the structure of a learning path and all possible rules that apply to it, like sequential structuring of learning actions due to prerequisite knowledge.

2. Method

In order to derive more precise requirements for a learning path specification we've pursued two lines of investigation.

Firstly, a review of literature on curriculum design was carried out to further investigate the structure and rules connected to a learning path. Two existing specifications in the field of curriculum design have been analysed to see to what extent they fulfil these requirements: IMS Learning Design (IMS-LD, 2003) and the eXchanging Course-Related Information (XCRI) curriculum specification (XCRI, 2006). The IMS Learning Design specification allows defining which roles should carry out which activities, using which supportive materials and services, in order to achieve certain learning objectives. It is this 'workflow-based' approach that makes it appear a suitable candidate to model flexible learning pathways (Marjanovic, 2006). The XCRI project's main focus, namely exchanging course-related information, prioritises an interest in fragments of curriculum, but the schema enables the description of linkages between curriculum fragments as well (Stubbs & Wilson, 2006).

Secondly, a number of recent and current initiatives aiming to enhance comparability and exchangeability of learning actions were analysed to see what characteristics they provide or propose to provide to learners to facilitate their decision-making. We strive for parsimony in this respect and aim to select the most important characteristics rather than strive for completeness. We compared three different types of initiatives: portals, general guidelines and metadata applications. Table 1 lists the examples of each type we investigated.

Table 1: Examples of approaches aiming towards comparability and exchangeability

Approaches	Examples
1. Portals	- UCAS http://www.ucas.com/ (UK) - PLOTEUS http://europa.eu.int/ploteus/portal/home.jsp (EU) - Curriki http://www.curriki.com/ (Global)
2. General guidelines	- Two cycles in HE: undergraduate and graduate (EU) - Quality Assurance Agency Guidelines (UK) - European Credit Transfer and Accumulation System (EU)
3. Metadata applications	- CUBER (EU) - CDM (N)

3. Results

3.1 Curriculum design literature

Building on a study of literature in the field of curriculum design and lifelong learning (Bligh, 1999; Colardyn & Bjornavold, 2004; Harden, 2000; Livingstone, 1999; Marsick & Watkins, 2001; NOCN, 2004; Ramos, Kautonen, & Keller, 2001; Tattersall, Janssen, Van den Berg, & Koper, 2006) we conclude that the learning path specification must enable the description of the following characteristics:

- *Modular composition*: learning paths must be able to be built from units;
- *Nested composition*: learning paths must be able to be composed of other learning paths;
- *Learning outcomes*: learning paths are defined in terms of learning outcomes;

- *Entry requirements*: it must be possible to specify entry requirements for a learning path;
- *Selection*: it must be possible to specify which elements of a learning path are mandatory and which are optional;
- *Sequencing*: it must be possible to specify a fixed order in which elements of a curriculum are to be completed;
- *Temporal coordination*: a learning path specification must enable to express parallel programming of two or more learning actions;
- *Completion*: the requirements for completion of a learning path must be able to be specified;
- *Conditional composition*: it must be possible to specify conditions under which learning path elements are to be included or excluded;
- *Substitution*: learning path specification must enable description of substitution rules. These rules describe which units in the learning path might be replaced and the criteria that exist regarding the substitute.

Besides the learning path specification must meet the general requirements of *formality*, so that automatic processing is possible, and *interoperability*, so that different support systems can share and exchange the information.

IMS-LD more broadly meets these requirements than the XCRI specification. It enables to describe completion of curriculum elements in a generic way and has an expression language to describe all kinds of conditional compositions.

3.2. Initiatives to enhance comparability and exchangeability of learning actions

Different initiatives place different accents in describing educational offerings. PLOTEUS and CUBER for instance seem more focused on the wish to compare and exchange educational offerings, whereas CDM pays considerable attention to information pertaining to the provider, and QAA and ECTS wish to accurately cover information concerning awarding and accrediting institutions and quality procedures.

Facilitating lifelong learning however requires that the focus of attention is on the learner and his/her learning needs. To enable learners' choices it will be more important to indicate whether or not a learning path leads to formal recognition, than to describe which institution it is awarded by. We believe that quite a lot of this more detailed information could be suitably offered by linking to a provider website. Moreover learners will need to have planning information and information on all kinds of possible prerequisites, in order to decide whether a learning path is suitable to their needs. Some of the initiatives investigated describe quite a number of planning aspects in parallel (study load in weeks as well as typical learning time for instance). We propose to use a minimum set of start date, end date and total workload. Together with information on contact hours we believe this to suffice for learners to decide whether the learning path complies with their personal schedule.

Besides we propose to use proficiency levels related to competences rather than the more general level descriptors like 'bachelor' 'graduate', because they seem more suitable in the realm of lifelong learning which clearly exceeds these 'school career' level indicators.

4. Conclusions

Figure 1 represents a model of the learning path specification we propose. The figure maps the learning paths terminology on IMS-LD elements (between brackets) and describes further characteristics to be covered by the specification.

A learning path leads to the acquirement of one or more competences or to a competence

profile. The learning path consists of one or more actions, clusters of actions or learning paths. These actions, and/or clusters, and/or learning paths are presented in a certain structure, describing the overall work/learning flow. The learning flow may depend on certain circumstances as expressed in 'if-then' rules pertaining for instance to learner preferences or the way the learning process evolves.

In other words a learning path basically describes a structure of one or more actions, clusters of actions or learning paths, in a way that explicates restrictions and degrees of freedom for the learner. Restrictions and degrees of freedom are not only defined through structuring principles describing optional and required elements or through rules, but can also be reflected in metadata describing the learning path or its constituting parts, e.g. delivery mode, teaching place, contact hours etc.

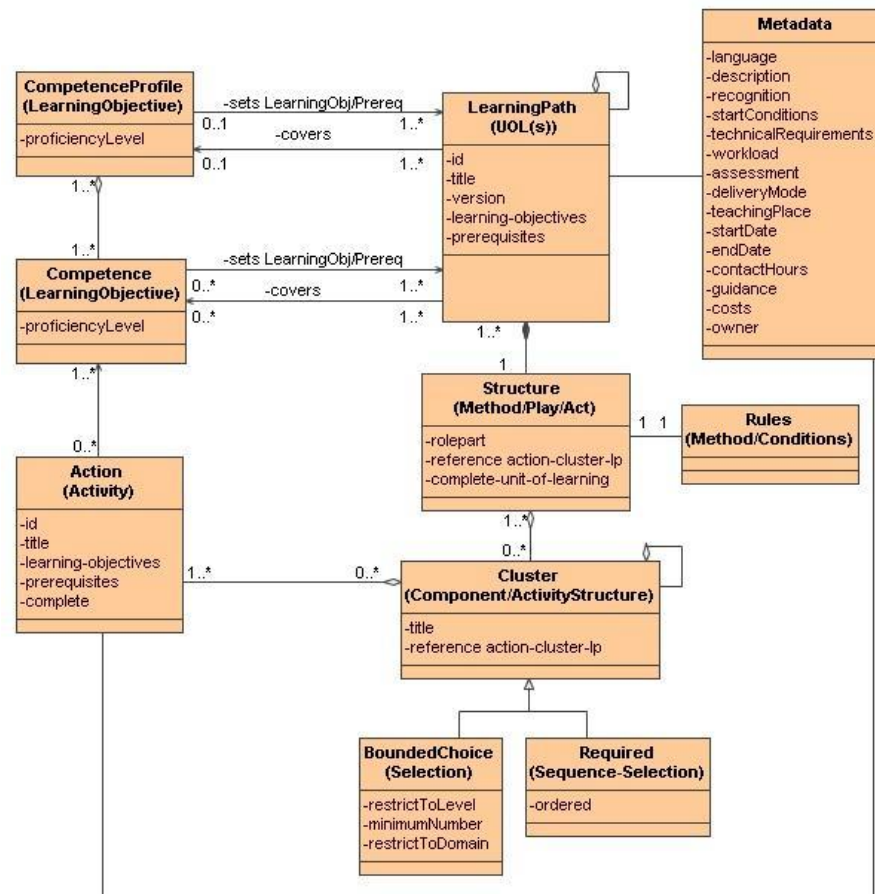


Fig. 1. Learning Path model

Based on this model the learning path specification will be elaborated in more detail and tested on a variety of actual formal, non-formal, and informal learning paths (e.g. can it describe the training programme of company X, can it describe the masters programme of university Y, the learning path of Z). Besides the specification will be tested in a pilot setting where it will become clear whether the specification has reached a balance in that it parsimoniously enhances informed decisions.

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QUESTION-ANSWERING THROUGH SELECTING AND CONNECTING PEER-STUDENTS

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Abstract: Tutors have only limited time to support the learning process. In this paper, we introduce a model that helps answering the questions of students. The model invokes the knowledge and skills of peer-students by bringing them together based on the combination of questions posed and their study progress; it supports the process with text fragments selected from the material studied. We will explain the model and the use of Latent Semantic Analysis to select and support the peers. Finally, we will discuss the results of a calibration and simulation of the model and present the first results of an experiment with over a 100 students using a prototype of the model for a period of 8 weeks.

Keywords: Elearning, Lifelong Learning, Tutor workload, Peer support

Introduction

In modern learning settings, students typically spend a substantial amount of time learning online. The advent of the knowledge economy and the individualisation of our society are two leading factors that underpin the increasing demand for flexibility: students want to be able to study at the place, time and pace of their own choosing (logistic flexibility); also, students are unwilling to submit themselves to pre-planned, rigid programmes, but want their prior competences honoured and their specific study plans catered for (subject matter flexibility). However, as in regular settings, students will have questions on where to start, how to proceed, how to understand and apply the available study material or will want to have their contributions assessed. In this paper, we will concentrate on one element of this challenge, to wit, answering questions related to the content studied.

We will do this in the context of Networks for lifelong learning ('Learning Networks'). A Learning Network (Koper et al., 2005) is a self-organized, distributed system, designed to facilitate lifelong learning in a particular knowledge domain. A Learning Network is special in that it follows a particular domain model (Koper, 2006), that defines the concepts used and the overall architecture. A Learning Network is specific for a certain domain of knowledge (e.g. an occupation) and consists of three entities:

- Students (lifelong learners): people with the intent to learn and the willingness to share their knowledge in the specified domain,
- A set of competences to be achieved,
- Activity Nodes i.e. a collection of learning activities that are created and shared in order to exchange knowledge and experience and to develop the competences defined.

Learning networks can be seen as communities for learning. In Learning Networks users can and should take on any role, including the one of tutor. For a tutor, answering questions is considered a time-consuming and disruptive task (De Vries et al., 2005). Yet, learning may improve if students can ask questions and receive timely and relevant feedback (Howell, 2003).

The flexibility required by students nowadays combined with the new forms of learning required by the knowledge society asks for a new vision on education. Students taking on the role of tutor and supporting each other can be part of this new form.

In our model (Van Rosmalen et al., 2006; Kester et al., 2007) we seek to assist staff-tutors in solving content-related questions by involving peers in answering them (peer tutoring). To that end, we identify appropriate and available students as well as relevant documents (text fragments) from the material studied, and bring these together in a so-called *ad hoc*, *transient* community. Such a community is *ad hoc* in that its only purpose is to solve a particular question; it is transient in that it vanishes the moment the question has been solved. The model distinguishes (Table 1) six main steps of which the second step depends on Latent Semantic Analysis (LSA) and portfolio information regarding personal information, profiles, goal, and competences to be able to select appropriate students. The model relies on competence measures and data to be present in portfolios, such as proof of prior learning, evidence of competences obtained. In the following section we will introduce the current implementation, next we will discuss the results of a calibration and simulation of a prototype of the model and finally we will conclude with the first results of an experiment with approximately 100 students in a Learning Network, the topic of which is basic Internet skills.

Table 1. The main steps of the model

Pre-condition	A Learning Network with a set of Activity Nodes and a set of students with their profiles indicating their progress with regard to the Activity Nodes
Main steps	<ol style="list-style-type: none"> 1. Anne poses a question. 2. The system determines: <ol style="list-style-type: none"> a) the most relevant text fragments, b) the appropriate Activity Nodes, c) the most. 3. The system sets up a wiki with the question, the text fragments and guidelines. 4. The selected students receive an invitation to assist. 5. Anne and the peer-students discuss and jointly formulate an answer in the wiki. 6. If answered (or after a given period of time) Anne closes the discussion and rates the answer.
Post-condition	The answer is stored.

Model implementation

A prototype has been developed to test the model. As depicted in Figure 1, the system consists of five modules. Moodle (moodle.org) has been used to provide the Learning Network (in the figure indicated by LN) and the Activity Nodes (in the figure indicated by ANs) to the students. A question interface (AskCQ) has been added. Additionally, each time a question is posed, a

wiki is made available that includes the question and the three most fitting text fragments selected from the Learning Network material. The wiki is populated with a selection of peer-students who are invited to help. In addition, in the background, we have three modules: a general text parser (GTP; Giles et al., 2001), a GTP calibrator (GTP Usability Prototype –GUP; De Jong et al., 2006) and A Tutor Locator (ATL; De Jong et al., 2007). We use GTP, an LSA implementation, to map the questions onto the documents in the Learning Network. The GTP module returns correlations between the question and documents. The GUP module has been built to ease the calibration. Finally, the ATL module takes care of the selection of the peer-students who will assist. The selection is based on a weighted sum of four criteria that are derived from the students' background and performance (Van Rosmalen et al., in press). The designer can adjust the weights as required.

The criteria are:

- The *tutor competency* is the ability of a student to act as a tutor. The tutor competency is derived from among other things ratings on answers given previously,
- The *content competency* indicates if a student has successfully completed the Activity Nodes related to the question,
- *Availability* is based on the actual availability as derived from the personal calendar of the students and on their past workload. Someone who has recently answered none or only a few questions should be preferred over someone who has answered many,
- *Eligibility* measures the similarity of the students. It can be used to favour the selection of students with similar competence levels.

The model relies heavily on data and information in the student's portfolio; in particular evidence on tutor and content competence; and the model is designed to take competence levels into account. Content competence on prior learning can be determined on evidence present in a user's portfolio; for new competences the grade obtained in the competence assessment could be taken into account together with other evidence in the portfolio. The current implementation of the model contained only a limited portfolio with no information on prior learning and provided no opportunity for complex competence assessment. This forced us to use a limited form of the tutor and content competence criteria: tutor competence is based on rating, and content competence is indicated as none, started and completed. Future implementation will consider competence levels and use more advanced methods to assess competence.

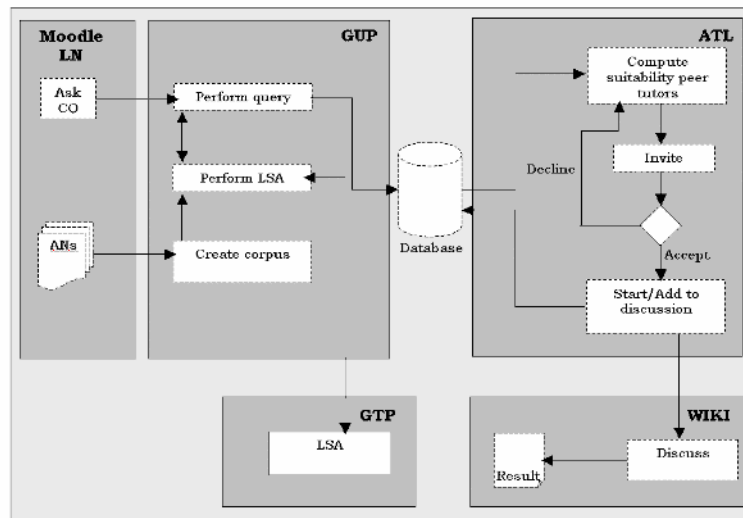


Fig. 1. The main modules of the model

The system basically consists of three phases. In the design-phase, the working context is defined. The text of all resources of the Learning Network is captured and put into a corpus for further analysis and; all parameters, the LSA and the peer selection parameters, are set. The question-phase (Figure 2) starts when a student poses a question (e.g. “when I register for a particular chat room, does my registration allow me to use several pseudonyms?”). First, those Activity Nodes which the question fits best are identified. This is done by mapping the question with LSA on the documents of the corpus and to look for the three documents with the highest correlations. Later, the same three documents are given to the ad hoc community to help the students get a quick overview of the documents most related to the question. We chose three documents because three should suffice to be of assistance to help answering the question and should not be too much to be read by the peers that will be selected to assist in answering. Next, knowing which Activity Node the question fits best, the ATL module can identify peer-students who are competent in the pertinent Activity Node(s). ATL selects 2 to 5 students who, according to a weighted sum of the four criteria, are best equipped to answer the question. Finally, in the answer-phase the students invited discuss and formulate an answer.

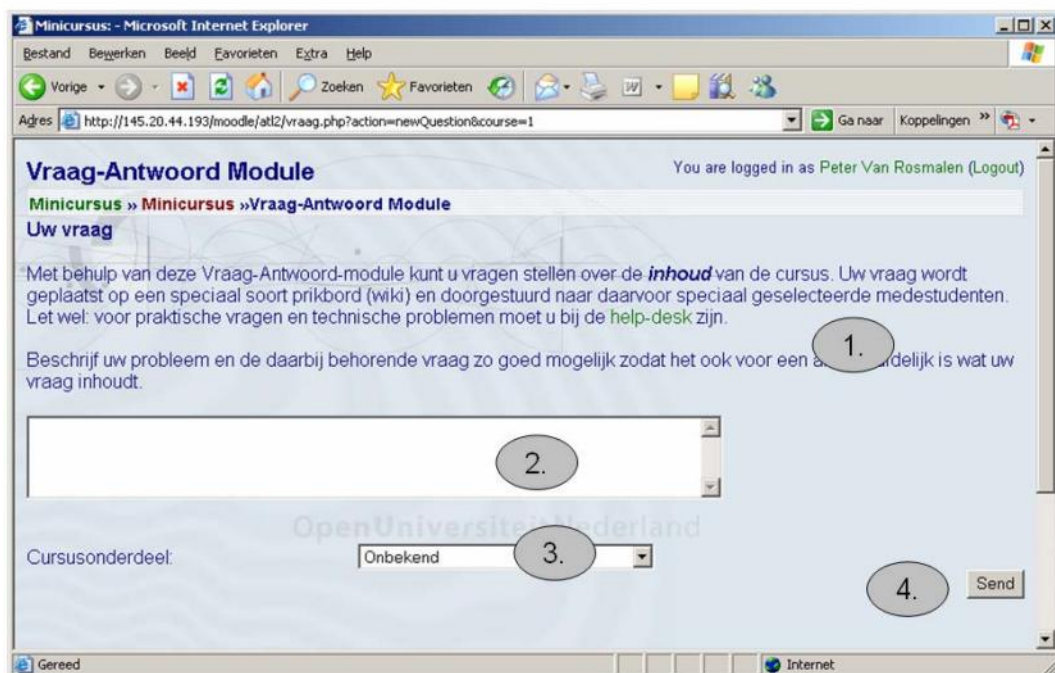


Fig. 2. The interface to pose a question containing an instruction (1), a text field to enter the question (2), a pull down menu to select -if known- which Activity Node a question fits best (3), and a send button to submit the question (4).

Calibration and a first simulation

To ensure that our system is viable we calibrated the LSA-parameters, and simulated and tested two key aspects of the system. First, we checked how good LSA is at identifying the topic of a question (i.e. to which Activity Nodes a question belongs) and at selecting text fragments useful for answering the question. Second, we checked if the peer selection criteria met our expectations. The domain of the Learning Network we used is ‘Internet Basics’, a collection of texts, links and tasks that aim to instigate a basic understanding of the Internet (Janssen et al., 2007). It contains 11 Activity Nodes, each of which introduces a different aspect of the Internet.

The Activity Nodes consist of an introduction, exercises, references to external web pages for further study, and an assessment.

For the simulation, we formulated a set of 16 test questions, each related to exactly one Activity Node. The system correctly identified the Activity Node for 12 out of the 16 questions (75%). Moreover, two developers of the Learning Network in question, evaluated the fit of the text fragments proposed by the system, three for each question. The developers indicated that for 7 of the 16 questions one or more of the text fragments were suitable for answering those questions. The developers also indicated that 5 of the 16 questions posed, were beyond the scope of the contents of the Activity Node studied. Taking this into account, the score is 7 questions with useful text fragments out of a total of 11 (about 60%, for details, see Van Rosmalen et al., 2006).

To test the peer selection criteria we created five student accounts (Table 2) and we assigned a set of test values to the parameters of the peer selection formula (for details see Van Rosmalen et al., in press). Next, student L₁ twice ‘asked’ one of the 16 questions mentioned above. The question was related to Activity Node 2. The first time the student asked the question, the peer-student with the highest rank was selected. The results of the test showed however, that we could balance the selection of peers by taking availability and eligibility into account. For the first question the value of eligibility favoured student L₂ over student L₃, i.e., it prioritised the selection of a peer-student in the same study- phase. (Note: L₂ and L₃ have content competency 1 and availability 0.5. However, only L₂ and L₁ finished Activity Node 1, therefore the eligibility of L₂ with regard to L₁ is higher) However, if we pose the same question again the balance will be shifted due to the decreased availability of Student L₂. (Note: Because of the first question the availability of L₂ will become 0).

Table 2. Content competency of student L₁ - L₅ for Activity Node 1 and Activity Node 2, and their availability score.

	Content competency Activity Node 1	Content competency Activity Node 2	Availability (at the start)
L1	1 (= successfully completed)	0.3 (= in progress)	0.5 (=moderately available)
L2	1	1	0,5
L3	0,3	1	0,5
L4	0 (= not started)	0	0,5
L5	0	0	0,5

Experiment

The results discussed in the section above suggested that the system delivers as expected. Therefore, we set up an experiment to verify the hypothesis that the task of staff in answering questions can be facilitated and significantly alleviated by following the peer-student model proposed. The assumption to be validated is that it should be possible to solve at least 50% of students’ questions without staff support.

For the experiment, we organised a course in the Learning Network on Internet Basics, lasting 8 weeks; 111 students registered. The students were divided at random over two groups. This was done to study the effect of different parameter settings of the student selection criteria. In group 1 we used a weighted selection of 1.0 x content competency, 0.5x availability and 0.5x eligibility. In group 2 we only made use of the availability criteria to select peer-tutors. Students received general instructions related to the Learning Network and a specific instruction on how to use the AskCQ-module for all their content-related questions. To avoid any unclear dependencies, it was decided that for this first experiment the students would not receive any incentives to use the AskCQ-module. We also decided that the staff-tutors would not assist during the study of the Learning Network with answering content-related questions; they would only rate the result of each question-answer pair.

We distinguished four types of data to collect. The first two, logging data and student ratings, were collected during the experiment; the last two, staff-tutor ratings and a questionnaire, will be collected after the experiment:

- Logging data. The progress data of the students and the data related to each question,
- Student ratings. For each question, the students that accept the invitation rate their own peer-tutor's suitability to answer the question; the student that posed the question rates the answer received,
- Staff-tutor ratings. At the end of the course, two staff-tutors will rate the answers of all finished questions-answer pairs,
- Finally, at the end of the course the students received a questionnaire focused on the usability aspects of the AskCQ-module.

Results

At the moment of writing, the 8-week experiment just finished. Only the first results, based on the logging data and student ratings, are available:

- In total 111 students registered for the course, one of them withdrew officially after week 1, leaving a total of 110 students. Of these 110, 80 students were active, i.e. 30 students showed no or limited activity. This means they did not complete any of the 11 Activity Nodes,
- 101 questions were posed,
- 82 questions were resolved; 10 were still under discussion when the experiment was terminated, and 9 questions failed because the invited peer-students did not react or refused the invitation to contribute. Of the 9 questions that failed, 4 were posed on the very last day of the experiment,
- the average answer rating was 3.8 on a 5-point scale (see Figure 3 for the distribution).
- 48 students posed one or more questions,
- 65 students assisted in answering one or more questions,
- In total 69 students have been actively involved either posing or answering questions.

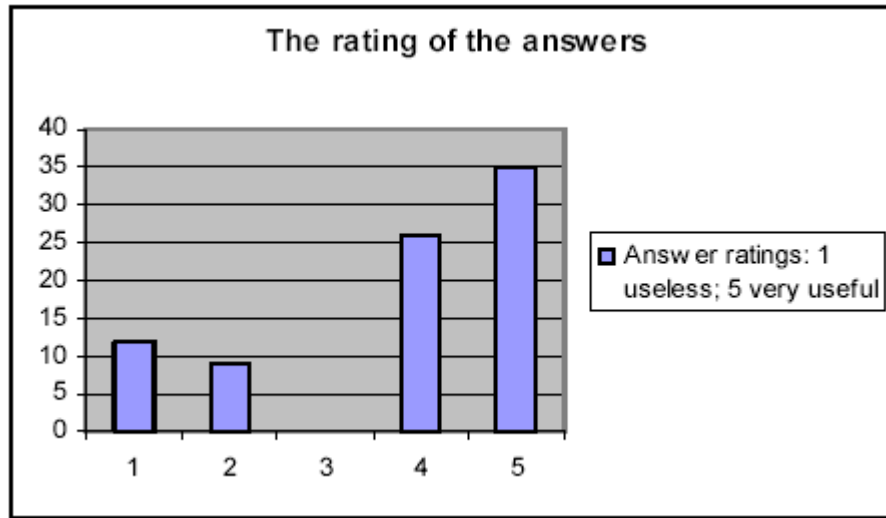


Fig. 3. The rating of the answers by the students that posed a question.

Based on the available data and the first analysis so far, it is fair to conclude that the results are promising. The overall participation level with regard to AskCQ module is high, 69 out of 80 active students used the module to ask a question or to assist in answering in the role of peer-tutor. Moreover, according to the students which posed the questions at least 60% of the questions were resolved: the answer to 61 of the 101 questions was rated 4 or higher on a 5-point scale.

As soon as the staff-tutor ratings and the results of the questionnaires are available we will analyse whether they match the first results. The most important aspects we will look at are:

- whether or not the questions posed are also solved in a way that it is satisfactory from the perspective of a staff-tutor,
- whether or not there is a difference in the number of questions resolved successfully between groups 1 and group 2,
- what is the overall opinion of the students on the usability and the use of the AskCQ module.

Conclusion

In this paper, we described a model that intends to help students with questions that arise while studying. We described how we tested the model on two of its key aspects and presented the first results of an experiment with students. The test results indicate that we were able to identify the relevant Activity Node for a question, to select text fragments useful for answering the question, and to apply our peer selection formulas to the extent that it warrants carrying out an empirical study with ‘real’ students. The first results of the experiment suggest that the task of staff-tutors in answering questions can be facilitated, even with the limited portfolio data present in the experiment. It is likely that more advanced algorithms for tutor and content competence, based on competence assessment protocols and portfolio information, will result in a more effective implementation of the model. The results also indicate that the approach taken is a suitable model for learning in a network. Obviously, without a full set of data, i.e. including the staff-tutor ratings and the questionnaire results, and a detailed analysis of them it is too early to draw any final conclusions.

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SUPPORTING THE NON-EXPERT IN THE AUTHORIZING OF PERSONALIZED LEARNING USING IMS LD

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Abstract: This paper presents an alternate classification of the approaches employed in today's IMS LD authoring tools to support the engagement of non-experts in the design of instruction for today's e-learning. The classification is based on how the authors can approach the design task and the support that is afforded to them by the authoring tool. The paper presents the case for an approach based on educational scenario-based modelling, as best suitable to actualize a higher level of involvement on the part of the non-expert authors in the creation of personalized learning based on portfolios, and learner information. Additionally, based on the classifications, the paper proposes a set of features based on which today's crop of IMS LD tools can be classified, and a new generation of tools to support the non-expert authors can be modelled.

Keywords: IMS Learning Design, Units of Learning, Design Approaches, Personalization

Introduction

The IMS Learning Design [1] specification has brought about many pedagogic benefits allowing educational processes to be modelled for subsequent sharing, critiquing, modification, execution, rating, comparison and evaluation [2]. LD allows encapsulation of knowledge using prescriptions from instructional design theory, examples from best practices in teaching and learning, or pedagogical design patterns, which can then be applied to develop concrete Units of Learning (UoLs) [3]. These UoLs can be seen as a general name for a course, a workshop, a lesson, etc. that can be instantiated and reused many times for different persons and settings in an online environment [4]. Teachers can avail themselves of the pedagogical flexibility offered by LD to create complex Learning Designs for a number of learning scenarios.

The IMS LD specification mechanisms maintain information about the learner using the level B of the specification. The Person properties in IMS LD level B provide detailed information about the learners which can be used to adapt a learning design (using IMS LD level B conditions) to the individual learner's needs. The form and structure of the Person properties where defined, can be ideally used to affect the learning flow of individual learners during runtime based on learner information [5] and learner portfolios [6] items.

The adoption of IMS LD in real education practice greatly depends on the provision of tools and processes capable of facilitating the creation of UoLs [7]. However, the provisions made in the specification have not led to successful implementations by teachers, instructional design practitioners, and other non-experts in the specification, due to the inability of this group to relate with today's IMSLD tools. Nearly all of today's IMS LD authoring tools are geared towards experts in the specification, not addressing the needs of non-experts and practitioners who are unable to relate to the technical formalisms of the specification[7-10]. The latter possesses the domain-specific knowledge of their chosen fields [11], but needs support with the modelling of their knowledge into pedagogically sound UoLs. It is clear, therefore that there is a deep conceptual gap between the needs of the non-experts and the support that is afforded to them by today's IMS LD authoring tools.

This paper presents an alternate classification of the approaches employed in today's IMS LD authoring tools in the design of instruction for today's e-learning, in order to exemplify the paucity of support for non-experts, and to inform the development of a new generation of IMS authoring tools that endeavour to actualize a higher level of involvement from the non-experts

in the efficient authoring of pedagogically-sound UoLs. This level of involvement entails the provision of support and guidance with the application of learning design rules and designing education based on, amongst other didactical scenarios, learner information and portfolios.

Background

IMS Learning Design and Personalization

IMS Learning Design [1] was approved as an open technical specification in response to the paucity of a common notational system for describing educational processes, by a consortium of universities, system vendors, providers and other e-learning stakeholders. IMS Learning Design is the only available interoperable technology which enables multi-user learning scenarios to be represented in a variety of pedagogical approaches, such as problem-based learning, competence-based learning, etc. The IMSLD specification prescribes the form and structure of UoLs so that software applications may be created for their interpretation. IMS LD is however, not attached to any specific e-learning platform; it is “computationally complete” – which, for practical purposes, means that it can be directly used for deployment [12]. XML is used as the machine interpretable language in which the learning design and the concepts specified, are represented to be IMS LD compliant. The XML representations of the scenarios along with unambiguous pedagogic scenarios using a consistent and interoperable representation can serve as a reference point and resource for other researchers.

The specification employs a Theatrical metaphor to the design of educational processes. The design is expressed as *plays* in the *method* section which can consist of a number of *acts* that have actors in different *roles* performing an *activity* or a set of activities. The method links all the components of LD, coordinating roles, activities and environments associated with the activities. This emphasis on the theatrical metaphor in IMS LD aims to facilitate the practitioner to relate to the learning design process, allowing the practitioner to model the design of instruction on these lines.

In addition to the basic language constructs, referred to as level A [3, 13], the specification provides additional concepts to cater for more sophisticated process descriptions. IMSLD level B adds properties and conditions to the basic language constructs of level A, allowing more sophisticated control and types of learning. Level C adds notifications (email, and other services) to levels A and B. Of special interest with regard to customizing the learning design with regard to the learner profiles and portfolios as per the IMS LIP and IMS ePortfolio specifications [5, 6], is the IMS LD level B. Properties enable information about learner, roles and the state of the learning design to be maintained. Conditions enable designers to define rules that govern the behavior of the UoL as a whole and what gets presented to the individual learners and staff.

Properties are of two types, the *local* and the *global* properties, which can be *General*, *Person*, or *Role* properties [3]. Local properties have their scope within a single run of a UoL, whereas the global properties persist across multiple runs - Table 1.

Table 1. IMS LD Level B

Property Type	Description
General Property (loc-, glob- property)	Attached to a UoL as a whole
Person Property (loc-, glob- property)	Attached to each individual user (learner, staff)
Role Property (loc-property)	Attached to all members of a role

Properties have many uses in the context of authoring of learning designs. Of specific interest in IMS LD level B are the *Person* properties that provide more detailed information about learners to adapt a learning design to individual needs and preferences [13]. The Person property structure (Table 2) is essentially the same as that used by IMS QTI for the results of tests and that in use by IMS LIP to handle the outcomes of activities. The latter, as a result can be used to store information that is generated during the run of a UoL to an ePortfolio repository.

Table 2. Structure of an IMS LD property

Structural Element	Description
Name (title)	Text string that acts as a unique ID for the property
Type (datatype)	A data type like integer, text, etc.
Value	Value that can be set by the designer at design time, or can be assigned at run time
Identifier	A unique identifier that is an XML ID in the binding
Restrictions	Set by the designer, can constrain the number of permissible values
Metadata	Set to describe the property

To take an example in practice, a learner's information contained in her ePortfolio can be ideally utilized to control her learning flow during the run of a UoL. Information regarding the learner's weak competences in a certain subject, for instance, can be matched to properties in IMSLD that can then alter the learning flow, by suggesting alternate learning paths that endeavour to develop the learner's competence in that particular subject. Furthermore, the results generated at the end of the course can be stored in the learner's ePortfolio repository, to mirror the progress made by the learner.

The question then crops up, how can the author model knowledge into UoLs. According to Koper [3], there are several ways to capture knowledge of the author, offering explicit guidance on how better to help students learn and develop. Based on Reigeluth [14], Koper [3] describes how *learning design rules* can be used to capture the author's knowledge and assist the author in developing the best suited learning design. A learning design rule describes the learning method that can be applied to a specific learning situation with a certain probability of success. Koper [3] proposed three categories of good rules: (1) (prescriptions) rules derived from *instructional design theory*; (2) rules derived from *best practices* in instructional design (examples); and (3) those based on *patterns* in best practices (patterns). These learning design rules form the underpinnings of the approaches implemented in today's IMS LD tools to capture the author's knowledge in UoLs that encapsulate pedagogically sound principles.

Paucity of tools for modelling personalized learning in LD

There is a common consensus amongst practitioners and in literature, that non-experts cannot design education using today's IMS LD tools [2, 7, 8, 10, 12, 15, 16]. The user needs to be fully cognizant about the kind of learning he wishes to author, as well as the underlying form and structure of the IMS LD specification before any modelling activity can begin. As a result, there is a deep conceptual gap between today's IMS LD authoring systems and the needs of the non-experts.

A plethora of general-purpose authoring tools have been designed for the IMS LD community. Tools like Reload [17], CoSMoS [18] and CopperAuthor [19] take a tree- and form-based approach to the editing of UoLs. Other efforts like ASK-LDT [20] and MOT+ [21] have added

a graphical interface to the editing process, but are hampered in the lack of scope for support for all levels of IMS LD specification (ASK-LDT), or are too complex to be used by practitioners [10]. These tools serve as editors of the UoL rather than holistic design environments and are reference implementations of the specification rather than tools directed at non-experts.

In the context of modelling personalized learning, as per the discussion in the previous section, the author needs to model UoLs making use of at least Levels A and B of the IMS LD specification. With today's IMS LD tools, for instance, to create a UoL that takes into account the learner information, the author needs to be fully cognizant of the specification and in particular, the definition of Person properties, and how these can be bound to variables and properties in IMS LIP or ePortfolio. This level of engagement is not supported by any of the IMS LD tools discussed above. The author must resort to XML level editing to actualize and integrate properties into the Learning Design, which requires a high level of technical knowledge, in addition to an intimate knowledge of the specification.

As a result, for the non-experts, the authoring and design process using today's tools, where possible, is an overly complex and time-consuming task [22] which has led to limited acceptance from this community of the benefits that IMS LD has to offer [7, 10].

Reclassification of approaches for authoring UoLs

Though the classifications in literature contrast the IMS LD authoring tools on the basis of purpose and proximity to the specification [15], they do not make allowances for how design actually takes place during the creation of UoLs and the support and guidance that can be afforded to the authors during the process, and with the specification. In the face of the gamut of IMS LD authoring tools that conform to more than one of the classifications outlined above, a reclassification is sorely required to actualize a clear demarcation of the tools and form the basis for a comparison amongst the tools on their suitability for the non-experts.

Bottom-up approach

The bottom-up approach to the design of UoLs emphasizes upon the emergence of a learning design from the lower level details of the educational modelling process, without an underlying emphasis on the type of learning to be designed forming the basis of the modelling process. In bottom-up design with regard to IMS LD [7, 10], the design is aggregated from the individual processes by first specifying the individual parts of the design like activities, roles, environments, resources, etc. These parts are then linked together to form larger components like activity structures etc, which are in turn linked until a complete UoL is formed. The learning design eventually emerges from the piecing together of the individual processes.

The approach relies on either the authors being fully cognizant of the type of learning to be modelled, or on the tweaking of worked out examples, to create a UoL. The design activity is thus relegated at a lower level to a mere editing of the UoLs *in situ*. The author needs to be completely hands-on with the specification, with regard to the elicitation and description of the properties, variables etc, to tailor the UoL to the learner's needs based on the learner's information and portfolio.

The system provides at the most limited guidance in the application of learning design rules appropriate for the design task at hand. Consequently, the bottom-up approach can be envisioned to find its appeal with authors who have a clear idea at the inception of the process of how the design would pan out, as well as with authors who rely on worked out examples to adapt their courses. This is the approach apparent in all of today's IMS LD tools.

Top-down approach

The top-down approach to the design of UoLs emphasizes upon first the elicitation and selection of the type of educational scenario to be modelled, and based on that, provides relevant guidance throughout the design process. Systems based on this approach ideally provide for underlying learning design rules, used to model the author's knowledge into effective, quality UoLs. The top-down approach is significantly different from the bottom-up approach in the flexibility offered to the author with regard to the starting point of the design process, and the guidance and support afforded to the author at critical junctures of the design process. The process modelling can be envisioned as first selecting the approach based on learning theories, next creating the overall working learning design, and subsequently elaborating at each step, creating, for instance, an activity structure and populating the same with activities and learning resources relevant for the particular scenario, guided by design rules underlying the scenario to be modelled. Alternatively, the modelling activity could begin by elucidating the approach as before and then piecing together of processes (activities, resources) to build up to a working UoL, aided at critical steps by targeted support.

Here, the author defines the learning objective or the scenario at a higher level of detail by selecting from amongst sample educational scenarios encapsulating sound pedagogical principles and learning theories. Support and guidance is then provided to the author using learning design rules (templates of worked out examples, patterns in best practices) [3, 7, 23, 24] to model the author's knowledge into pedagogically-backed UoLs. Since the author is not overtly cognizant of the underlying constructs of the specification, UoLs personalized to learner information and portfolio, can be easily created by choosing and adapting from amongst existing and relevant worked-out examples or templates.

Allowing the design to proceed from the top-down aids the author to visualize problems at a higher level, and the related features as interconnected from the main overview, rather than compartmentalized [25]. This is particularly true for non-experts, who may need to start with an overview of the learning scenario to be able to understand the connection between all elements [26-28]. The holistic approach thus, can find its appeal in the support of authors who are necessarily experts in their own domains, however are not quite experienced with the modelling of knowledge into UoLs, and thereby need support and guidance in the effective translation of their knowledge into pedagogically sound UoLs.

There are currently no IMS LD tools that support the author in the top-down approach to the authoring of UoLs.

Characteristics of the approaches

From the background of the current approaches to IMS LD tool design and our classification of the top-down and the bottom-up approaches discussed, we can summarize the salient features of these approaches. These are:

- *Scenario-based modelling* – does the authoring tool take into consideration the underlying learning design theories and rules, providing support for the elicitation and selection of the type of educational scenario to be modelled, basis and structure of which are determined by underlying educational theories and best practice recommendations?
- *Inception of the design activity* – how does the design activity commence? Can the author start from a blank Learning Design (*Tabula Rosa*) or does the tool provide support for working with and reusing templates, exemplars of existing Learning Designs etc?
- *Support and guidance* – does the tool offer support and guidance by providing and aiding with the application of learning design rules to effectively model the authors' knowledge into UoLs?

- *Proximity to specification* – does the IMS LD aware authoring tool base itself on the use of metaphors, notations etc, that are close to the author's vocabulary, or are the specification constructs laid bare in the interface and structure?
- *Authoring approach* – what authoring approach does the tool impose upon the author with respect to the design activity?
- *Target group* – who are the intended users of these tools? Are the tools designed keeping the needs of non-expert authors at mind, or do these tools cater to expert instructional designers?

The paper has presented an alternate classification of IMS LD authoring approaches implemented in today's IMS LD tools. Apparent from this classification is the lack of any general-purpose authoring tools employing the top-down approach in the support of the non-expert authors. The paper has elucidated the salient features of the approaches, which can form the basis to evaluate and exemplify the lack of support for non-experts in today's IMS LD tools, as well as serve to inform the development of a new generation of IMS LD tools.

Conclusion

The only pedagogically ignorant language for describing education, IMS LD makes provisions for the creation of personalized UoLs, amongst other didactical scenarios. Using level B of the specification to tailor the UoLs according to the learner information or portfolios, the author can create complex learning designs. However, there is common consensus amongst practitioners and in literature that today's IMS LD authoring tools are not meant for non-experts in the specification. These tools are far too complex, requiring the end-user to be fully cognizant of the structure and formalisms of the specification. Furthermore, these tools provide no support to the non-expert author in the application of learning design rules to capture the author's knowledge in pedagogically-sound UoLs. Part of the reason for these shortcomings is the lack of a common understanding of the non-experts' needs for support in the authoring of UoLs for today's e-learning.

This paper presents an alternate classification of the approaches to the authoring of UoLs, based on how the author can approach the design task and what kind of support and guidance is afforded during the design process. The classification attempts to demarcate the tools based on the support they offer the non-experts in the specification, and in that, could serve to form the basis for an extensive evaluation of the state of the art IMS LD tools. Furthermore, from the point of view of the non-expert authors, these features could serve to inform the development of a new generation of tools to actualize a higher level of participation of non-experts in the creation of learning based on - learner information and portfolio items.

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NETSTART – ACHIEVING NEW ABILITIES WITH ICT

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Abstract. NetStart Project is focus on the abilities development, beginning with basic computer science literacy, for access to tools based on the Internet and proceeding according with the established objectives, through a cycle of continuous improvement of its abilities. Project has for base the IPAT - Personalized Itinerary of Technology Adaptation, which in its first phase intends that disfavoured people like unemployed, young people with low qualifications and older actives, to accede to the basic tools of the ICT. In a second phase the IPAT will lead the user to trace its goals of career, using for that, professional profiles adjusted to the work market of and adjusted to the new and emergent types of jobs, in order to take a place in the work market. After the identification of the goals, it will be possible to develop the abilities identified in the diagnostic, considering the knowledge level and the reaching goals, through the participation in training courses using e-learning (being privileged the b-learning at the first time).

Keywords: abilities, e-learning, professional profiles, training, low qualifications

Northern Portugal region, and specially the Viana do Castelo region, is facing a real problem. New jobs are emerging and unemployed people and older employees need to develop new abilities. Another problem is the lack of knowledge and use, among this group of people, of the new Information and Communication Technologies (ICT). This region also has a relevant number of young people with very low qualifications that can only get low degree jobs. ICT allows in a more flexible and easier way, namely through e-learning, to rapidly achieve or develop new abilities. So it's necessary to increase the knowledge and the dissemination of these new technologies among the region we are settled. Netstart main objectives are the development of several instruments that will allow in an independent way people to begin using ICT and then being able, supported in those technologies, to develop new abilities, thus becoming more competitive and capable of facing new career challenges. Netstart Project is focus on the abilities development, beginning with basic computer science literacy, for access to tools based on the Internet and proceeding according with the established objectives, through a cycle of continuous improvement of its abilities. For the achievement of all these goals it was defined the Personalized Itinerary. This Personalized Itinerary consists of several phases. The first phase will emphasise in giving the target users the first steps in using and accede to the basic tools of the ICT. The products that realize this phase are a flyer (Fig. 1) and a CD-Rom (Fig. 2). The flyer will give all the directions necessary, to someone without any experience in ICT, to start using a Personal Computer (PC) till the stage of inserting and start using the CR-Rom. All the language used within the flyer and CD-Rom is very easy to understand. This is a very important factor as we are leading with low qualification people. So in the end, it was also decided that all the language in the development of the Netstart project would have a special attention, because this would allow that more people used all the tools of the project.



Fig. 1. Flyer



Fig. 2. Netstart CD-Rom

The CD-Rom consists of several games and tutorials that will allow the user, in an independent, to way to access the second phase tool and the e-learning content. The CR-Rom is divided in four main subjects: Knowing better your PC (use of the mouse and keyboard, how o use programs, etc.), the Internet (browser, hyperlinks, search motors), E-mail as an important communication tool (create an email account, how to use e-mail)and how to use Netstart (portal, tools and e-learning platform). All the tutorials in the CD-Rom are interactive and need the user to participate in them. This will allow the user to get all the necessary knowledge in a pleasant and simple manner.

The second phase, the more important and also the nuclear one of the project, will lead users to trace its goals of career, using for that, professional profiles adjusted to the work market of the

region and, also, adjusted to the new emergent job types, in order to take a place in the work market.

This phase is supported in a web based application. In this application, developed within the project partnership, the user, after an initial registration, selects the job functions were, already, has abilities, then regarding those job functions has to select what tasks/ roles has abilities. Going on, the user has to tell the level of ability that has for each task. For simplifying all the process it was previously defined three levels: simple, medium and advanced. Then the user has to select how it will be proved those levels, and he can prove it in a documental manner, for example with a certificate; his employer can also prove its abilities levels and he can also ask for a diagnose test. The next step will make a match between the profiles and needs found in the system and the information introduced by the user. For a better reading and understanding, a graphical representation is used to show how approximate is the information introduced by the user to the profiles needed or saved in the system. For finishing all the process, the user selects a profile that satisfies his goals for a career and the system will return his Personalized Itinerary. The itinerary will inform the user what training he needs to entirely satisfy, considering as a starting point his actual abilities, that professional profile.

The web application stores all the information introduced by the users and keeps track of all changes occurred, and, as needed, users can access and update the information introduced. Thus, the web application retrieves what activities - namely training courses, proof of task/roles levels - are done and what have to be finished. The web application can also be used by employers or organisations to submit and introduce specific needs, and to manage the training needs within their organisations. The development of this web application was preceded by the definition of a functional analysis (Fig. 3). For the development of this functional analysis was important the participation of the target people, the technicians and also the partnership. They together worked as a whole, thus satisfying all the requirements and defining a tool that it's important to increase the competitiveness of our region.

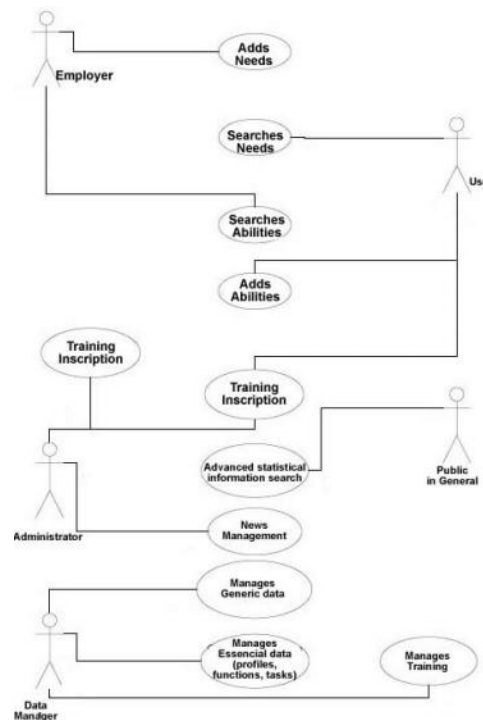


Fig. 3. Functional Analysis

When the user has his Personalized Itinerary, he can through the participation in online training courses reach the goals and abilities asked by the profile selected- this is the third phase. This phase only depends in the motivation and the needs of the user. It was privileged the e-learning system known as blended learning (b-learning), and it was also defined that all the evaluation would be done physically in a classroom. This is important for the credibility and recognition of the abilities among the employers. The training courses, if chosen by the user, can be done externally, even through traditional training system (physical classroom). After the completion of the courses, through this system, the user will be able to update its itinerary. Such a process allows the user to choose what best suits its interests.

Netstart is a powerful mean of competitiveness improvement supported in abilities development and ICT. These together surely will make the difference and will start changing the training paradigm in our region. Nowadays the traditional training is used, the tools and results of the Netstart project firmly advise that it's time to move on and to assume that training can be more flexible and accessible. All these results will be in a web portal (www.netstart.pt/novo1- Fig. 4); from here it will be possible to access the web application, the e-learning platform and also relevant information.

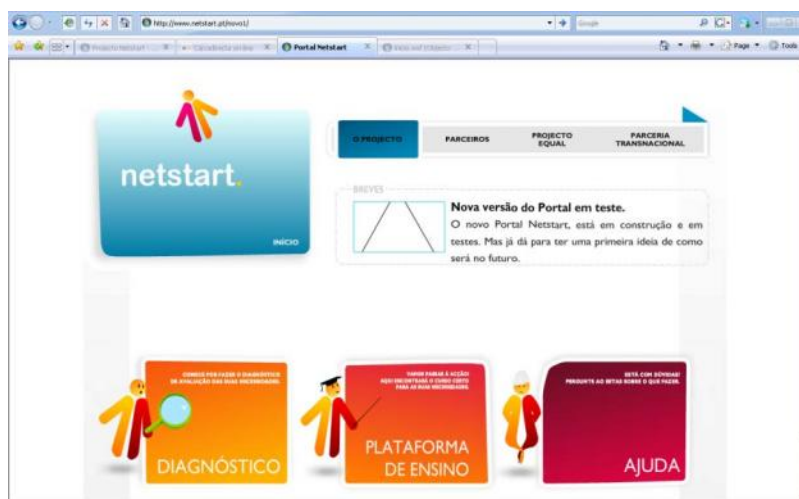


Fig. 4. Netstart Portal

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PERSONAL PROFILING TO STIMULATE PARTICIPATION IN LEARNING NETWORKS

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Abstract: Today continuous acquisition of new competences and updating existing capacities is crucial to personal empowerment and job performance. Due to the dynamics of the rapid technological change our society experiences, traditional, classroom-based methods of learning fail to meet the learning demands of today's lifelong learners. People as self-directed learners will learn via informal knowledge sharing in ad hoc learning communities and Learning Networks. The Personal Competence Manager under construction in the TENCompetence project aims to support the knowledge development of learners in social interaction with their peers in learning communities. Social encounters in Learning Networks need various cues to allow them to help meet a person's learning needs. From the multiple suggestions to bootstrap learning interaction that are available, we will in this paper look at the role personal profiling and context portfolio information can play. Our particular focus will be building a common ground for communication and trust ultimately to enhance the learning process.

Keywords: Learning Networks, ad hoc transient community, enhancing participation in communities, personal profile, swift trust

Introduction

Acquiring new knowledge and competences has become key to personal well-being and performance in our society. Lifelong learning requires a different view on education. Traditional education no longer suffices in modern-day society in which, because of the changes in culture and economy, people are expected to continually develop and maintain their competences. Learning takes place any time any place in varying contexts of a person's daily life, including learning for personal empowerment and learning on the job. This requires a different approach than the classroom-based educational propositions of traditional educational institutes. To fit a person's needs across his jobs and stages of life, the individual learner has to become the organizer of his own competence development (J. S. Brown & Duguid, 1991; European Commission, 2001). In our view, this individual's informal and formal learning will take place in the context of various Learning Networks and ad hoc transient communities therein (Kester et al., 2007). In such environments, the person with a learning demand connects to his peers, relevant experts and learning resources to achieve his learning ambitions. Instead of adopting primarily a re-active consumer role, the learner becomes a proactive co-creator of his competence development trajectories, actively searching for learning resources and asking for input and feedback from others, both known experts and peers. The TENCompetence project develops a supportive infrastructure to enable optimal learning for individuals, groups and organisations via competence development encounters, programmes and communities on the substrate of the European wide TENCompetence learning infrastructure (Koper & Specht, 2007; Vogten, Koper, Martens, & Van Bruggen, in press).

As the learner takes control over his personal competence development, it is in his interest to find suitable learning opportunities, relevant information and optimal support, particularly in interactions with others. The key question then becomes which factors in the community inhibit or enhance social interaction for effective learning. It is against this background that we investigate aspects of successful social interactions in online learning communities. In this paper therefore, we focus our attention on the question what factors stimulate active participation in the social structures of a Learning Network.

Affordances for learning in Learning Networks

In the first instance, a Learning Network may be seen as a collection of people who share the intention to learn something about a particular domain of knowledge. Defined this way, a Learning Network does not yet qualify as a community since that would presume its members somehow to interact and share a history. In a Learning Network initially this will be only accidentally be the case for a few people. However by building up and strengthening social ties within the Learning Network, gradually a genuine learning community will arise. Through active participation in the community the learning goals people have set for themselves will be attained more effectively, more efficiently, more attractively. We surmise that reshaping a Learning Network as a community enhances the quality of the members' learning experience (Kester et al., 2007).

Large networks, that allow sub-communities to arise such that a few community members get together to address a specific goal, are usually more effective (Lui, Lang, & Kwok, 2002). This principle is captured by our notion of ad hoc transient communities: small communities in the larger network formed to obtain a specific learning related goal that cease to exist when the goal is reached. Through ad hoc transient communities we aim to increase the sociability in the Learning Network and enhance the knowledge sharing process (Kester, van Rosmalen et al., 2006; Kester et al., 2007). A first elaborated example of an ad hoc transient community is the scenario of a learner, while studying a particular topic, has a question related to the course contents and seeks answers for this question from his peers (van Rosmalen et al., in press). What needs to be done to make this type of community for learning "tick"? What is important in the structure or design of this type of communities on the one hand and what triggers an individual to be an active participant in a learner community on the other hand? Within the TENCompetence project we investigate theories on community participation, collaborative learning in online communities to design triggers for co-constructive e-learning participation in Learning Networks at large. We analyze motivational factors and incentive mechanisms and their effect in successful communities as described in the literature; we look at effects of these mechanisms both as proposed by relevant theories and as found in successful online communities (Berlanga et al., submitted). Based on that, we propose and describe a design rationale for a profile and portfolio type incentive, and argue why it will enhance participation in (ad hoc transient) communities.

There is an extensive literature on how to set up and maintain communities as well as on policies for effective communication and stimulation of participation (Bitter-Rijkema, Martens, & Jochems, 2002; Bogenrieder & Nooteboom, 2004). The majority of this research however stems from the P2P systems that arose some years ago (like Napster, Kazaa), social communities such as movie rating communities, and communities of practice that have existed over longer periods of time with shared, long-term goals and a clear division of labour. In Learning Networks, however, users participate in a network for a relatively short period of time, they share a similar goal, e.g. to obtain a specific competence for a certain job or function, say travel agent, and become competent in booking complex travel arrangements using a new system. The shared interest and knowledge exchange time horizon in Learning Networks therefore are different from the mainstream public communities studied in existing literature. In the Learning Network communities of the TENCompetence Personal Competence Manager there is no division of labour, members of Learning Networks are all equal, they can take different roles and will do so depending on the issue central to the existence of the community. In addition, the ad hoc transient communities arising within a Learning Network will often start as a small community, living as long as the issue that triggered its existence is under debate and dissolving once no new issues arise. One may justifiably wonder whether policies and strategies found to work in large online communities that exist over long periods of time are applicable to Learning Networks and the ad hoc transient communities thereof that are so typical for the networked learning of TENCompetence.

As Kester, Sloep, et al. (2006) describe, effective learning communities depend on social space, characteristics of the members and characteristics of the community. Affective relationships, strong group cohesiveness, trust, belonging, and satisfaction characterise social space. Social interaction enhances the emergence of social space. For social interaction, in particular cooperation to occur there should be continuity (it must be possible and likely for people to meet again in future), recognisability (people should be able to recognise each other), and history (people should know the past behaviour of the other participants). If these conditions are not met, people are more prone to act selfishly, because they can not be held accountable for their actions (Kollock & Smith, 1996).

Further, to enable knowledge sharing and learning in communities, clear boundaries and rules that are monitored and sanctioned are required (Kollock & Smith, 1996) as well as a heterogeneous group composition (Preece, Nonneke, & Andrews, 2004), as summarised by Kester, van Rosmalen, et al. (2006).

Participation propositions

In the literature, many theories on motivation to contribute to and participate in, mostly peer to peer, communities have been described. Researchers looked at psychology and community behaviour reviews for theories to explain users' behaviour in communities and mechanisms to enhance contributions and participation. Social exchange theory is often mentioned as a theoretical framework for community behaviour. Millen and Patterson (2002) and Erickson and Kellogg (2000) argue that visualising users and their actions in a community is important to stimulate participation. Cheng and Vassileva (2005) present five theories (reciprocation theory, consistency theory, social validation, persuasiveness of liking, theories of discrete emotions) to explain why community members would participate and contribute; they applied design rules based on these theories to a P2P system used by university students. Lui et al. (2002) summarised psychological studies by several authors to explain motivation and incentives for participation in communities and reported that both individual and interpersonal factors play a role in the motivation of people. The individual factors again can be divided into extrinsic motivations (rewards, personal needs) and intrinsic motivations (altruism, reputation). Ling et al. (2005) applied design principles based on social psychology theory to the Movielens application, a movie rating site; they were able to confirm that people would contribute more when the system showed them how unique they and their contributions were, and when they set specific goals to attain. Most authors seem to conclude that incentive and reward mechanisms have to be in place for people to share knowledge.

Affording building swift trust via profile and portfolio information

Focusing on community member profile information and member portfolio information, what would be possible incentives to participation? The rationale behind this question is that in Learning Networks and in ad hoc transient communities members have to become acquainted to a certain degree to learn to appreciate the context and ambition from which peers act and interact. This, in its turn, is needed in order to develop sufficient trust to engage in the learning conversations and find enough common ground for fruitful knowledge exchange.

Visualizing the users in the system and their contributions to and participation in the community should promote contribution and participation because it raises awareness of a user's own actions and those of others; it also demonstrates people's responsibility and the consequences of their actions (Erickson & Kellogg, 2000). Meyerson, Weick, & Kramer (1996) and Coppola, Hiltz, & Rotter (2004) discuss the notion of swift trust, which emerges in temporary teams whose existence is formed around a clear purpose and common task with a finite life span. Swift trust helps to establish engagement and commitment (Sloep et al., 2007).

Community member characteristics are also important. People differ with regard to their experiences in communities. Veterans show good community behaviour in that they help others, share knowledge, and sustain relationships (R. E. Brown, 2001). Additionally, participants differ in their willingness to post. A lurker or free rider never posts (Preece et al., 2004). All these mechanisms and factors relate back to personal characteristics and information present in the user's profile and portfolio.

Bitter-Rijkema (Rutjens, Bitter-Rijkema, & Crutzen, 2003) and Rusman (Rusman, van Bruggen, & Koper, 2007) emphasize the relevance of background information on personal identity and expertise to provide a foundation for effective knowledge communication and (swift) trust. In 2003 Bitter-Rijkema (Rutjens et al., 2003) designed an easy-to-use template for community members to introduce themselves and their expertise; it also allowed them to give relevant context information and communication style preferences as a means to start further interaction. This so called pEXPi (abbreviation for **p**ersonal **e**xpertise **i**nventory or personal identity and expertise profile) was received well. It has been reused and adapted to various communities since its introduction, including various academic learning communities; the authentic virtual business learning environment OTO, a virtual software computer science company, is a case in point. Another example is the European Virtual Seminar, a community of international students in environmental sciences collaborating on European sustainability issues. More recent implementations involve the academic competence development environment (AIC) of the Master of Computer Science students at the Open Universiteit Nederland and a community of management professionals. Recently Rusman et al. (2007) investigated the value of pEXPi for trust building in a community (Meyerson et al., 1996).

Two survey studies (Ogg et al., 2004; Rusman et al., 2007) showed positive perceptions of the use of pEXPi to kick-start the learning interaction and collaboration in the European Virtual Seminar. Bitter-Rijkema and Schoonenboom (Ogg et al., 2004) found that according to both students and tutors a pEXPi did indeed contribute to the emergence of community feeling in the start-up phase of a community. It proved that pEXPi especially contributed to building up a mental picture of one's peers and to feeling comfortable to get in touch with each other. As one respondent said "Group feeling requires at the start a personal click! You need to get to know each other in a way ... for more than the task alone ..." With this insight information "it is easier to get commitment from a few mates..." Interestingly, tutors also value the pEXPi later on to use as a quick reference to the student.

The 2007 survey of Rusman showed that pEXPi increased the perceived trustworthiness of peer community members; it also pointed out pEXPi's use as a trigger for further collaboration, being especially helpful to quickly form a first image of peer community members at the start of the project, allowing subsequent further elaboration of this image based on a person's contributions to community interaction. Two pEXPi users articulated their experiences as follows: "It helps me a bit to visualize the people. Otherwise it will just be a name on the email headings. A pEXPi make them more real" (student 1, 31.50). Referring to the pEXPi, "It's the only idea that you have of your team members...It's the only way that you can get a kind of personal bond with them and see what they look like and to form an impression of what kind of person they are" (student 2, part 2, 19.37) (Rusman et al., 2007).

The current implementations of pEXPi are templates that are completed by the students. In the context of a Learning Network, a pEXPi can be extended by automatically including portfolio information into the pEXPi and supplementing the pEXPi information with evidence from the portfolio. A portfolio is a relevant source of background information on what the peer interests as well as on past performance/work results. Information on the type of (study) work a person has already done in the domain provides both the request side (the person initiating the ad hoc transient community) and those providing "answers" (supply side) with clues/background information provisional for matching expectations and tuning in on the right wavelength for a fruitful knowledge exchange (Bitter-Rijkema et al., 2002; Coppola et al., 2004; Meyerson et al., 1996; Rutjens et al., 2003). In Learning Networks portfolio information in the sense of

goal, (level of) competences attained, and personal and professional interests is equally important when trying to get into contact with experts or peers, or finding the most suitable course to continue with, or any other form of learner support. Ad hoc transient communities for which members were selected based on content competence, eligibility (similarity to peers) and availability seemed to be more successful in providing peer support than communities whose members were selected on the basis of availability alone (van Rosmalen et al., in press).

pEXPi
<p>Personal data</p> <p>First name:</p> <p>Surname:</p> <p>Position within OTO</p> <p>[[Briefly describe your objectives and which tasks you have within the team.]]</p> <p>Availability for OTO</p> <p>[[Which hours (date/time) are you available for OTO; at which moments are you active in eRoom?]]</p> <p>Mindmap</p> <p>[[Make a Mindmap. This serves a twofold objective: make a mindmap indicating your expertise; you practise mindmapping technique. Place here a reference to the location of your mindmap.]]</p> <p>Knowledge and expertise domains</p> <p>[[Indicate your areas of expertise (programming languages, methods, techniques, skills, competences, etc.). And describe how other can contact you for your expertise.]]</p> <p>Work-related interest</p> <p>[[Indicate your interests. Also those for which you have no to limit experiences, but you like to expand.]]</p> <p>Study and work-related experiences</p> <p>[[Briefly describe your study and work history.]]</p> <p>Other interest and hobbies</p> <p>[[Provide other interests and hobbies that are not related to your job.]]</p> <p>My relevant links</p> <p>[[Links to website you consider important for learning and working within OTO.]]</p>

Fig. 1. Original pEXPi template

Conclusion

In this paper we described motivational mechanisms that build on psychological and behavioural theories. The mechanisms are to stimulate social interaction and knowledge sharing in order to enhance sociability in Learning Networks and therewith ensure that the community is effective and thriving. All these factors and conditions, in some way or another are important for the working of communities and to stimulate participation and contribution in communities. For most of the conditions, factors, mechanisms, etc. theoretical backing can be found in social and behavioural studies. It turns out that most successful communities make use of this by either making the characteristics apparent, by providing incentives or even rewards. Most theories somehow relate to personal factors or characteristics. Based on this assumption we propose the use of pEXPi combined with portfolio information as incentive mechanism to

enhance participation and contribution in communities, building on the notion that trust is a result of relationships between people and can only arise when people get to know each other. This combined with other incentives and policies for online communities should enhance sociability in the Learning Network and thereby have a beneficial effect on learning. The next step forward is to determine which of the motivational mechanisms and incentives described in literature are relevant and appropriate to Learning Networks and the functioning of ad hoc transient communities, how they should be implemented and incorporated in Learning Networks and how and which portfolio information is used and required to stimulate the working of communities and promote learning in Learning Networks. To that end, we will build upon an existing prototype for ad hoc transient communities designed to promote peer tutoring (van Rosmalen et al., in press).

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CONTEXTBLOGGER: LEARNING BY BLOGGING IN THE REALWORLD

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Abstract: In this paper we represent one specific instantiation of contextualised mobile social software for learning called contextualised blogging. Contextualised blogging combines the community aspects and flexible content access of a mobile blog with the adaptation to real-world settings made possible by contextualised computing. By combining both social and physical context information, we aim to improve current informal learning approaches. A special kind of data matrix symbols, called semacodes, is used to relate information from a blog to physical objects. The contextualised blogging application in this paper is developed in three steps. First, a conceptual model of the problem domain will be described. Second, a general technical framework based on this conceptual model will be developed. Finally, a specific instantiation of the technical framework called “ContextBlogger” is presented. The paper concludes with a description of the planned evaluation of the software, a summary, and a conclusion of the results so far.

Keywords: contextblogger, m-learning, contextualised computing, informal learning

Introduction

Mobile devices offer new possibilities to support lifelong learning and integrate formal and informal learning approaches. Already a couple of years ago, Rheingold recognised the power of loosely coupled, ad hoc communities “Smartmobs”, which were based on mobile or ubiquitous access to personal social networks [1]. One of the possible applications of “Smartmob” technology would be instant access to learning peers in everyday life. Likewise, Koper & Tattersall [2] support the chances mobile devices provide for learning, by arguing that mobile devices offer new opportunities “to create flexible, rich and interactive learning environments”. Moreover, they specifically identify the potential of mobile information access for lifelong learning as being able to reach everyone, everywhere.

Already the importance of communities to support a lifelong learning process has been stressed in educational research. For instance, the strengths of embedding learning support in authentic learning contexts and communities of practice has been argued for quite some time in the educational literature [3]. Moreover, Koper & Tattersall [2] present an integrated model for lifelong learning called a “learning network”, which tries to exploit the strengths of a heterogeneous community of self-directed learners. As part of their model Koper & Tattersall present a software architecture that has its roots in social software.

Lifelong learning happens anywhere, anytime, anyplace; to support the learner in any such situation, content has to be tailored to the individual’s social and physical environment. Context-aware computing investigates systems that adapt to the user’s identity, preferences, location, environment, and time [4-6]. Combining the strengths of both mobile and context-aware systems and applying them to educational systems can lead to contextualised learning support as described in [7-11]. The integration of contextualised mobile systems and the learning networks mentioned earlier leads to mobile social software that aims to integrate learning into everyday life.

Blogs are a specific instance of social software and are simple tools for integrating formal and informal learning [12] and also support long-term informal learning processes [13]. In addition, blogs recently have become a popular way of collecting personal information and learning experiences related to formal education [14]. Furthermore, blogs offer learners a great degree of autonomy to structure information while also embed reflection in a peer community [15].

In that sense, blogs serve a similar purpose structuring learning processes as some other lifelong learning applications do, like for example KleOS [16] and Interactive Logbook [17].

In this paper, we will present an extension of current systems for blogging we call contextualised blogging. The instant access to blogging information possible in mobile blogging is extended and enriched by adding information about the user's current situation or context. One way of relating information to a user's physical environment is the use of identification tags attached to physical objects or locations. In the system presented here, a specific kind of data matrix symbols, called semacodes, are used to allow users to leave "blog traces" in the physical environment. Information created can thus be directly related to certain physical objects or places that can be directly integrated in the learning process. Moreover, the interaction of learners with community-constructed content can be used to facilitate learning in a community of practice [3]. Public objects tagged with information can be accessed by learners to view connected blog parts, comment on posts by others (peer feedback), or create new blog entries with mobile authoring appliances. The aim of this paper is to provide a description of how contextualised mobile social software for learning can be shaped and to initiate our investigation of possible applications of contextualised media for learning.

The paper is structured as follows. Section two will portray a conceptual model for contextual blogging. Based on the conceptual model, a technical framework will be developed in section three. Section four gives a concrete example of a contextual blogging application called "ContextBlogger". The planned evaluation of the software is described in section five. The final section gives a summary and conclusions of the work done so far.

A conceptual model for contextual blogging

In our research of mobile social software for learning, we aim at combining both contextualised learning and community-based learning. On the one hand, learning takes place at more places than the classroom alone and by contextualising learning, an effort is made to support the learner anywhere, anytime and at anyplace. On the other hand, recent research has stressed the importance of lifelong learning in learning networks [2] to support the formation of communities-of-practice [3] using mobile social software. Therefore, the integration of both approaches provides flexible access to learning communities in almost any situation. The contextual blogging application combines social software, a weblog, with information about the context of a learner. The information in the weblog can be accessed using a mobile device, and the content can be filtered through the application of search filters based on context information. The search filters for the contextualised blogging application retrieve the content either related to a specific real-world object or to a specific user location. Furthermore, the learner can also choose to create his/her own content and relate it to a real-world object or location. Therefore, the use of contextualised blogging provides a basis for an investigation of the usage of physical artefacts in learning. On the one hand, the combination with a physical object could provide the basis for learning, on the other, shared objects could be used to build communities of practice and couple the creation of learning networks to physical objects.

Through applying different context filters in combination with the creation or retrieval of weblog content, we expect to achieve different educational effects:

- *Multiple perspectives on real-world objects*: by viewing the object's history, a certain category of blog entries, or using other filters people benefit through an indirect learning process [18, 19],
- *Community-generated content* connected to relevant real-world objects and locations: an example for the effect and importance of self-generated contents in a learning community is presented in [20, 21] about learning to operate medical devices,
- *Community interaction* and the creation of communities of interest around certain objects and locations, supporting contextualised learning,

- *Different views about objects*, based on personal preferences. Real-world objects can also be linked electronically to create relations between those objects and to create a so-called “internet of objects” [22],
- *Increase motivation through active learning*, by actively involving the learner in the learning process, the learner involvement and motivation is increased. This as opposed to passive learning in a formal classroom setting.

To achieve these education effects the underlying concepts of a system for contextualised blogging and the relations between them should be analysed. For instance, to create *multiple perspectives on real-world objects and locations*, a user should be able to interact with a physical object and should be able to retrieve content linked to that physical object. By using shared real-world objects, multiple users can interact with them, and create information objects related to them or view, rate and comment the content added by other people (*community-generated content*). In that way, a community of users can evolve around these shared objects and the *community interaction* leads to different opinions and perspectives about these objects. The multitude of perspectives about a shared object, can lead to either a discussion between users with different opinions or leads to reflection about a situation by the learner; either by looking at the opinions of other users, or by adding content and reading it back later, as an opportunity to reflect back on what happened before [23, 24]. To prevent the user from being overwhelmed by the amount of information available in a community contextualised search filters are used that only display the relevant information for a certain situation or context. By combining these educational effects the system addresses the lifelong learner, by providing several opportunities for the self-centred learner or a community of these learners to structure the learning process. Also the system relies on the implicit assumption of lifelong learning that the responsibility for the creation and structuring of learning content resides with the self-directed learner himself [2].

From the different kinds of interaction previously mentioned several concepts can be identified. First of all, the central concept of the system is the user or learner. A user can interact with a physical or real-world object, a context tag, an information object (content) or other users. The combination of several of these concepts can lead to several forms of interaction, as can be seen in figure 1.

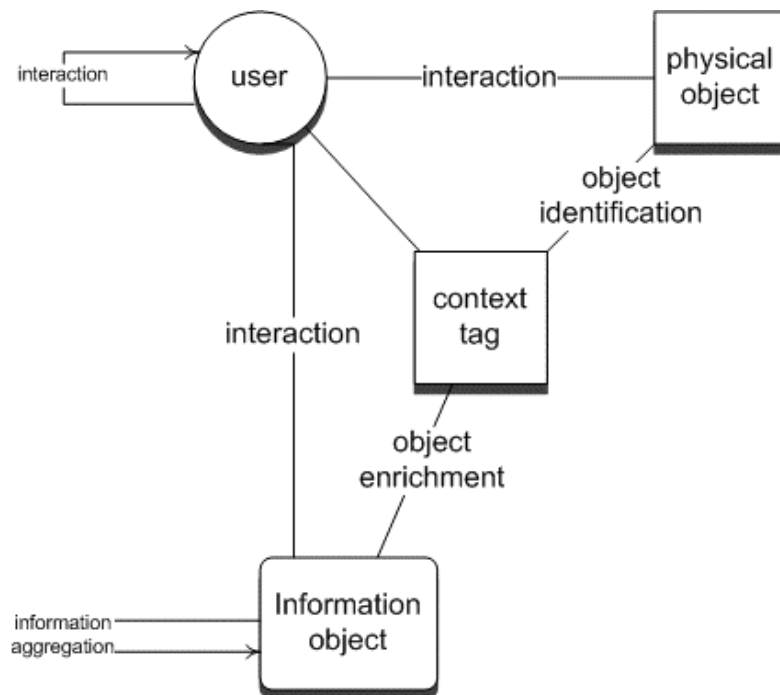


Fig 1. General conceptual model for contextual information systems based on tagging

For example, object identification can be achieved by relating a context tag to a real-world object. Users can decide to start enriching a physical object by tagging it and making it identifiable for the other users. Moreover, once an object has been tagged content can be created, attached to the objects or be displayed to other users. Therefore, the relation between a context tag and an information object leads to object enrichment. The contextual information stored in the context tag creates a kind of filter on the real-world that allows displaying information related to the current context. In this sense, the tags do not only function as a portal into the virtual world, or a way of social interaction, but also facilitate a context specific querying, filtering out all information not relevant in the current context.

Additionally, information objects can be aggregated to structure the information and provide an additional filter. The following levels of information aggregation are present:

- the entire blog, the highest form of information aggregation possible, can contain information from different users and about different object,
- blog categories, a form of information aggregation that groups similar information items, in this case similar blog entries,
- blog entries, lowest level of information possible in this model. Contains information edited by one user, attached to one object only.

The different levels of information aggregation make possible several different relations between real- world objects and information. Three possible combinations of objects with blog information are possible. First, an object can be coupled (via a tag) to an entire blog. Second, an object can be coupled to a single blog entry from a weblog. Third, an object can be coupled to a category, which makes it possible to represent specific real-world classifications or groupings often made by human learners. When categories of physical objects for instance are coupled to the same blog or blog entry, the classification takes place on the physical object level; all cars of a specific brand could be coupled to a blog about these cars. Conversely, a grouping can be represented by one physical object that is coupled to a category of blog entries; one car could be coupled to several blog entries each describing a part of the car, i.e. motor, wheels, interior, etcetera.

Figure 1 thus gives the conceptual model and provides an overview of the concepts and relations available in the system. The conceptual model will be used as a basis for the technical framework described in the next section.

Technical framework

The conceptual model already divides between information objects available in some kind of content repository on the one hand, and real-world concepts as user and physical objects on the other. The gap between the virtual and the real-world will be bridged by using the context tags that are also part of the conceptual model. The division seen in the conceptual model also reappears in the technical framework, where the following three subsystems are identified:

- a mobile client subsystem, that handles the interaction with the user in the real-world,
- a content subsystem, that stores the information that is used to enrich the interaction with the real-world objects,
- a contextual metadata subsystem, that stores contextual information that relates the context tags with the content in the system.

Each of the subsystems will be described separately in the following subsections.

The Mobile Client subsystem

The mobile client subsystem handles the interaction of the user with the system in the real-world. First of all, the mobile client acquires information about the user's context from sensors. The context information is stored in context tags that can be read by the sensors. These context tags either have a physical form, like for example RFID and Barcode tags, or give information about a specific location by using GPS or WIFI positioning. The retrieved context information is communicated to the rest of the subsystems, where the information can be used to filter the available content.

Second, the mobile client subsystem facilitates user interaction with the information objects stored in the content subsystem. The content retrieved can be displayed on the mobile client or it can be used to create new multimedia content. Moreover, also the interaction between users are made possible by the mobile client; the users can rate the already available content and add annotations for community reflection. Summarising, the mobile client provides or enhances the user interactions seen in the conceptual model by providing a way to (1) access the context information available in the context tags, (2) view the information object related to that context and (3) showing relevant content in the interaction with a physical object.

The Content subsystem

The content subsystem stores all information objects created by the users and provides a way to query and retrieve those objects. The content subsystem stores all sorts information objects, a range of multimedia content, and therefore should provide corresponding methods of retrieval (for instance, media download or streaming). Each information object is stored with a unique identifier associated to it, for later retrieval. Since, the content subsystem in contextual blogging is a weblog, all content is stored inside blog entries. Information objects thus map one-to-one onto the blog entries and the unique identifier is a URL pointing to the corresponding entry.

In addition to the storage of information, the content subsystem provides three different levels of information aggregation: on the first level the information objects are ungrouped, on the second level the object are grouped by category, and on the third level a number of categories can be grouped together. As the content subsystem is a weblog the three levels of information aggregation map onto the single blog entries, the categories of blog entries and an entire blog, respectively.

The Contextual metadata subsystem

The contextual metadata subsystem stores contextual metadata that can be used to identify a certain context. The information available from the mobile client sensors is used to find the appropriate contextual metadata and identify a physical object or location. After the identification of the user's context, the contextual metadata subsystem can query and retrieve the information objects related to a certain context. To filter the information object according to the context, the subsystem stores relations between context tags and information objects. The relation between a context tag and several information objects, also present in the conceptual model, results in the actual enrichment of a specific object or location with information. Moreover, this subsystem stores social context information about the ratings of the information objects made by a community of users.

The contextual metadata subsystem should be easily extendable for the different kinds of context information that can be measured. For now, only a relation with a physical tag, like for example a semacode [25] of RFID tag can be stored, or a physical location, in the form of a GPS coordinate can be stored.

ContextBlogger: a software instantiation of the contextual blogging framework

With the technical framework of the previous section as a guideline the ContextBlogger software was developed. The ContextBlogger software is implemented as a service-oriented architecture split up between a mobile client and a server system [26]. The mobile client is implemented using the Java Microedition technology⁶⁸⁾ and therefore can be used on a range of mobile phones. When the program has been started it first displays a list of all blog entries available in the system, which can be filtered down by using the mobile phone sensors to search the environment for context tags. The current version of ContextBlogger uses the mobile phone camera to scan so-called semacode tags and also allows to scan for GPS location information on devices with a build GPS sensors. The contextual information is communicated to the server and used to query for the content suitable for a certain context.

All communication from the mobile client to the server takes place via the SOAP protocol [27]. The server system groups both the content and contextual metadata subsystems. The content subsystem consists of Wordpress Blog [28] and the blog entries with the content can be retrieved and queried via a standardised XML-RPC [29] interface. The contextual metadata subsystem stores the context metadata in a relational database as relations between context tag ids and a link to the corresponding blog entries. The contextual metadata subsystem can be queried with context information, finds the corresponding blog entries and calls the content subsystem to retrieve the content. After that, the content is sent to the mobile client in XML format. The ContextBlogger software is available under an open source licence and can be downloaded on the ContextBlogger webpage⁶⁹⁾.

Evaluation of the software

The evaluation of the software is planned for the second half of 2007 and will be carried out in two steps. The first evaluation will be carried on the basis of a small scale experiment within an office space. The experiment will be set up as a language game, in which the users enrich physical objects by adding content in their native language and learn a foreign language by interacting with the content added by other native speakers. By combining the physical interaction with a real-world object with the content in a foreign language we hope to make language learning easier and provide a proper context for the words learned, like for example was already done to some extent in [30]. Furthermore, according to Petersen and Divitini [31] language learners also benefit from mobile technology supporting them in a language learning community. First of all, the experiment will be used to provide an overall technical evaluation of the system and to find issues that still reside within the system before the second evaluation is carried out. Additionally, the usability of the system and the user satisfaction will be evaluated. The first experiment will also be the first source of user interaction metadata, which can be used to derive the method of analysis for the second experiment.

The second evaluation will take place as a larger scale experiment regarding architectural content. In this experiment we hope to involve a bigger user group of university students to measure the effects on a larger scale. With a bigger group also we expect to collect more data that can serve as a basis for an analysis of social networks, user-object interaction and the influences of context metadata on the learning process.

Summary and outlook

In this paper, we presented an application of mobile social software for learning that combines contextualised multimedia access with learning in social networks. The software developed allows users to create, view, rate and annotate information from a weblog and couple the

⁶⁸⁾ <http://java.sun.com/javame/reference/apis.jsp>

⁶⁹⁾ <http://145.20.177.33/wordpress.contextblogger>

information to physical objects or locations. The use of shared physical objects, enriched with multimedia content, should result in formation of communities of interest around those objects. In these communities of interest, learners with different competence levels can interact which leads to multiple perspectives being gathered around these objects. The communication between the learners, the community-generated content and the different perspectives or opinions on real-world objects should improve informal learning processes in the real-world. By enabling learning with physical artefacts we also aim at supporting lifelong learning: anywhere, anytime and anyplace.

The contextualised blogging application is gradually developed in this paper. The domain of contextualised information systems has been analysed first by developing a conceptual model. The conceptual model forms the basis of a technical framework that consists of three subsystems. First, the mobile client subsystem handles the interaction with the user and provides access to the sensors to retrieve the context information. Second, the content subsystem stores the content and facilitates querying and retrieval of the content. Third, the contextual metadata subsystem stores the context information, relations to the content and makes it possible to retrieve content according to a specific set of context metadata. The software system was implemented with the technical framework as guideline and consists of two physical systems: a mobile client and a server system. The mobile client runs on a mobile phone and uses semacodes and GPS location information to derive the user's context. The server system accommodates the content and context metadata subsystems. The content subsystem was implemented as a wordpress blog and the context metadata subsystem is a database that stores metadata about the semacodes and GPS locations linked to the content in blog entries.

An evaluation of the system has been planned for the second half of 2007. In a first small scale evaluation, the system functionality will be evaluated and tested. At the same time, the small scale evaluation will be used to derive a method of analysis for a second, larger scale, experiment. The results of the evaluation will be available in future publications.

In the future, we expect to extend the context blogger software to an integrated solution for mobile learning. A challenge for future research would be adding notifications to point out people and objects of interest that deserve special attention. The use of more complex forms of context information than location or physical object identification alone, creates a challenge that future research should certainly investigate. Only a combined approach taking into account multiple aspects of a learner's environment would make learning truly ubiquitous and lifelong.

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TOWARDS A MODEL FOR NAVIGATION SUPPORT IN LEARNING NETWORKS

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Abstract: This article presents ongoing work that, by means of simulations, attempts to find out the characteristics that should be taken into account for more efficient and effective individualized support in completing learning activities in a Learning Network. A preliminary model based upon learners' profile, peer behaviour, characteristics of both the learning activities and learning context is introduced; it is accompanied by a program flow of its implementation in a simulation environment and by initial results that suggest that a combination of navigation support mechanisms does have a positive effect on the number of graduate students.

Keywords: navigation; recommender systems; collaborative filtering; content-based; simulation; Learning Networks.

1. Introduction

Lifelong learning requires a major shift in the design of current learning and training systems. As information and communication technologies may play a central role in this change, analysis and investigation of the requirements for supporting lifelong learning are needed. For this change the theoretical notion of Learning Networks has been proposed (Koper and Sloep, 2002). These networks are conceptualized as self-organizing learner-centred on-line communities designed to facilitate lifelong learning. In such networks learners participate actively, creating and sharing activities, learning plans, resources, and experiences with peers and institutions. Learning networks are formed by participants and learning activities. Participants can be learners, teachers, providers or managers, while learning activities can be any type of resource or events that help learners to acquire a competence. Examples of learning activities are courses, lessons, assignments, blogs, websites, or sets of them (called units of learning) offered in the Learning Network.

Within this framework, one of the issues we are investigating is how to support learners' navigation to find his/her way in the Learning Network (Hummel et al., 2007). This is to say, given the vast amount of available learning activities, learners need advice or suggestions that assist them to choose those learning activities that best fit their needs.

The use of recommender systems might facilitate coping with this issue; using different models and techniques, these systems attempt to help users to diminish the information overload by delivering personalized items, content and services (Adomavicius and Tuzhilin, 2005). Basically, memory-based techniques, which collect information about users and items to calculate recommendations, are divided into content-based techniques, collaborative filtering techniques, and hybrid techniques. In the first case items are suggested based on those that the user liked before. In the second, items are suggested based on those that users who have the same profile liked and, in the third, a combination of the previous two techniques is used (for a detailed overview see Drachsler et al., in press).

Practical applications of these techniques include, for instance, recommending products to buy (www.amazon.com, www.half.ebay.com) or movies to watch (movielens.umn.edu, www.everyonesacritic.net). In eLearning environments these techniques have been used, for example, to recommend learning activities (Zaïane, 2002, Andronico et al., 2003), courses (Farzan and Brusilovsky, 2006), papers on the Web (Tang and McCalla, 2003) or reading lessons (Hsu, 2008).

However, providing recommendations in Learning Networks is a different matter. In other areas the recommendation is based on interest, rating or user's history, while for learning purposes other factors have to be considered. For instance, even if an item might be interesting for a learner, it might not pedagogically relevant if it does not align with his/her prior knowledge and skills.

We hold that recommendation mechanism should not only consider learners' interest, but also learners' competences, learning goals, prior knowledge, as well as learners' preferred learning strategies. When advising the next learning activity to follow, effective navigation support needs to consider the profile of the learners, characteristics and usage data of learning activities, as well as learning context characteristics.

In the long term, we aim at increasing learners' goal attainment and minimizing their study time through recommendations that advice the learner the best next learning activity to follow. We plan to conduct experiments and run simulations to identify relevant variables for navigation support and their impact for the recommendations provided. Moreover, through simulations we can explore different learning context characteristics, such as the number of learners, the number of learning activities or the number of learning activities to be completed, that might have an influence in navigation support mechanisms. Finally, simulated environments bypass some practical constraints of field experiments.

In this article, we will focus on a preliminary model to simulate Learning Networks that include navigation support mechanisms. Simulations will help us to explore different research topics as, for instance, the difference between social-based mechanisms (based on collaborative filtering) and information-based approaches (based on metadata), and the recommendation mechanisms needed for formal and informal learning environments (Hummel et al., 2007).

The preliminary model and simulation described in this article follows a well established approach towards social science simulations (Gilbert and Troitzsch, 1999), and it is nurtured by collected data from an experimental pilot (Drachsler et al., in press). This experiment investigated to what extent different recommendation strategies influence learners' goal achievement and reduce the time they need to find and complete learning activities. For this purpose a prototypical personal recommender system (PRS) was developed. It provides advice to the learner of the next best learning activity to follow based on is her/his topic of interest (classified in domains), and on the behaviour of the peers. When only information about the learner's interest was available, a content-based technique was used to generate the recommendations, otherwise a collaborative filtering technique was applied. For more information, see (Drachsler et al., in press).

The experiment provided some promising results, but at the same time faced some practical constraints. For instance, as in most of the formal curricula, learners needed to complete all learning activities to pass the course. Therefore, even though learners were provided with recommendations, in the end, the PRS recommended all learning activities and, when few remaining activities were to be completed, the quality and personalisation of the advice decreased. This made it difficult to compare and evaluate the effectiveness and efficiency among the recommendations provided. Other issues were the limited number of learners and learning activities, and the lack of rating mechanisms to improve the recommendations.

As already mentioned, simulated environments facilitate dealing with these and other practical constraints, as well as with time and money limitations. The remainder of this article explains a preliminary model for navigation support in Learning Networks and its implementation in a simulation environment.

2. Method

Fig. shows a preliminary model for navigation support. It is based on the experiment with the prototypical PRS and on previous work on simulating Learning Networks (Koper, 2005), which used the NetLogo (Wilensky, 1999) multi-agent simulation environment.

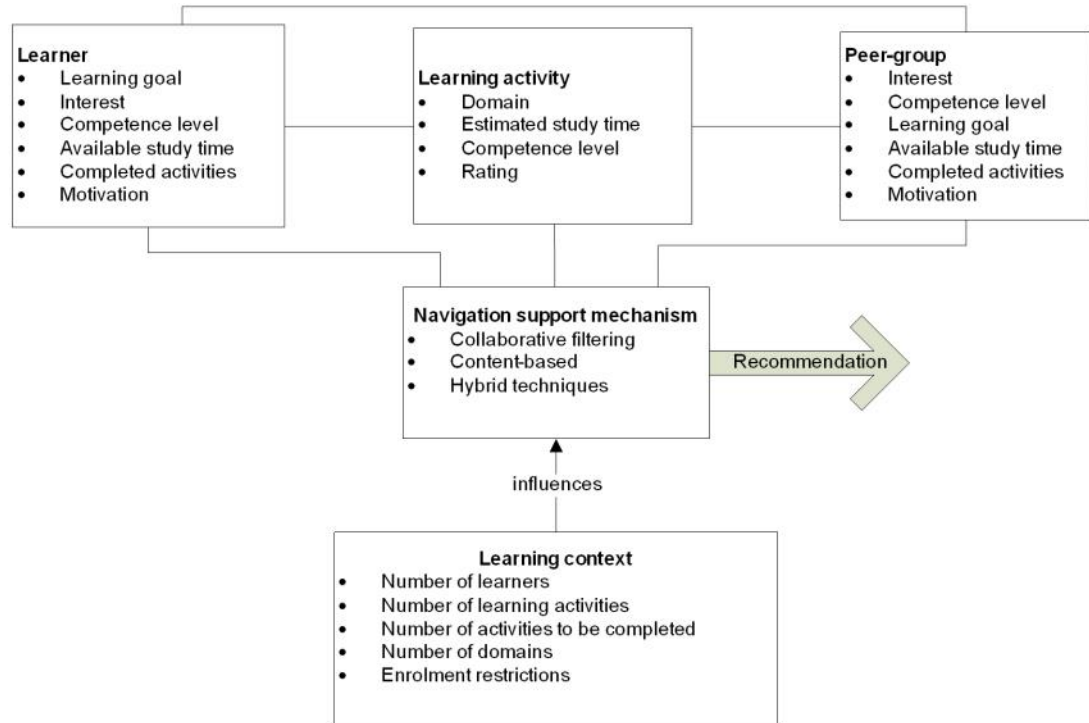


Fig. 1. Initial model for navigation support

The model considers the profile of the learner and of the peer-group, as well as the characteristics of the learning activities. The learner profile comprises learning goals (learning activities to be completed), interest (e.g., specific topics), competence level, available study time, completed activities, and motivation; whereas the peer-group profile is an aggregation of the learners' behaviour (Drachsler et al., in press). Each learning activity is characterized by the domain it belongs to, the estimated study time needed to complete it, the competence level it targets, and its ratings. Learners are linked to the learning activities they have completed and related to a peer-group when they share the same profile.

Additionally, different learning context characteristics are expected to influence the scope of the navigation support mechanisms. These characteristics are the number of learners, the number of learning activities, the number of learning activities that have to be completed to acquire a competence, the number of domains and the enrolment restrictions (i.e., learners can/cannot join the course once it started).

Figure 2 shows the initial program flow designed to simulate navigation support. During the setup procedure the following characteristics can be considered/defined: the navigation support mechanism, the learning context characteristics, and the settings of the simulation.

The navigation support mechanisms can be set as content-based and/or collaborative filtering. The former can be based on interest, and the latter can be based just on one or a combination of interest, available study time, or competence level. The learning context characteristics include

the definition of the number of: domains, learning activities, learning activities to be completed, and learners. Finally, the settings of the simulation include chance to follow the recommendations (obedience) and a criterion for the accuracy of the recommendation (match factor).

Considering these values, the setup procedure initializes the environment as follows:

- The defined number of domains is randomly assigned to each learning activity,
- A random competence level (from 1 to 3) and study load (from 1 to 4) are assigned to each learning activity,
- A random interest (one of the domains), competence level (from 1 to 3) and available study time (from 1 to 4) are assigned to each learner,
- For each learner the motivation value is initialized with a starting value,
- All other values defined on the interface are set: number of learning activities to be completed (learning goal), life cycle of the simulation (number of weeks), match factor and obedience.

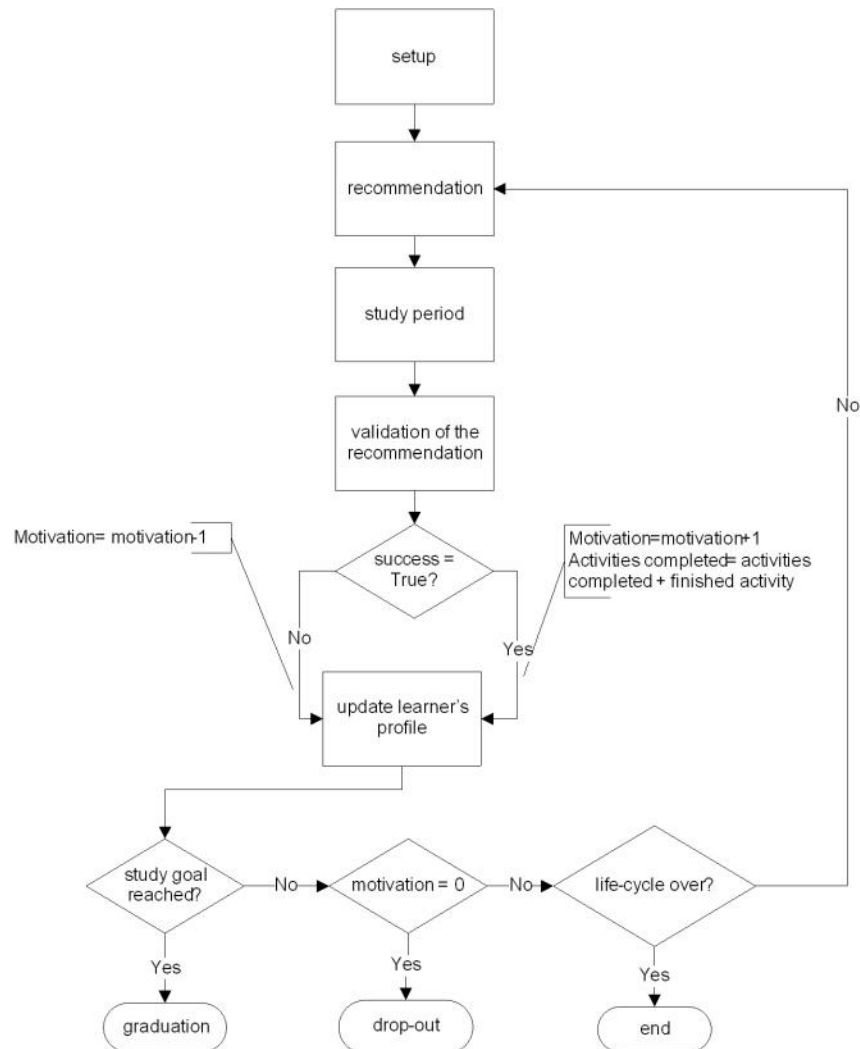


Fig. 2. Simulation program flow

The recommendation process aims at finding the best next learning activity to generate the advice. To generate the recommendation it takes into account the navigation mechanisms values indicated in the setup process. The content-based technique is entirely based on the learner's interest, whereas the collaborative filtering technique uses an algorithm that looks for peers whose interest is in the same domain, and their competence level and study time is less or equal than the current learner's competence level and study time. When a peer is found, the activities that the learner has done are randomly recommended to the current learner. If more than one peer was found, then a random selection is applied. A content-based technique is used to prevent the cold start problem (i.e., information about the peers is not yet available).

Once a recommendation has been given, the study period begins; it lasts until the learner's available study time is equal to the estimated study time of the recommended learning activity. After this, the validation process of the provided recommendation starts.

This process assumes that a perfect or sufficient match leads to a successful completion of the learning activity. The match considers if the competence level and study load of the advised learning activity were, correspondingly, smaller or equal to the learner's competence level and to the learner's study time, and if the domain of the learning activity was the same as the learner's interest. Additionally, weight factors are used to influence one criterion or the other (e.g., learner's interest is more important than study time). If the match value is equal or higher than the match factor provided in the setup procedure, then the advice is classified as successful.

This process is the input for updating the learner's profile. If the given advice was successful, then the learner's motivation increases and the advised learning activity is included in the set of "completed activities", otherwise, the learner's motivation decreases.

In the next step, if the learner's study goal is reached (i.e., the learning activities to be completed are finished), then the learner is considered as "graduated student" and, therefore, is not active in the run anymore. If the learner's study goal is not reached yet, then the learner's motivation is verified, if it is equal to zero, it is assumed that the learner dropped-out and, again, the simulation run ends for this learner. Finally, if the time cycle of the simulation (indicated in the setup process) is over, the simulation ends, otherwise, it provides the next recommendation.

Currently we are implementing and testing this program algorithm.

Fig. 3 presents the interface. It includes, on the left side of the screen, the characteristics to be considered in the setup procedure for running the simulation:

- Navigation support mechanisms (filtering strategy): content-based based on interest (on/off) and/or collaborative filtering. The latter can be based on one or a combination of: interest, available study time and competence level (each of them: on/off),
- Learning context characteristics: number of domains (1-50), learning activities (nb-LAs) (1-3000), learning activities to be completed (nb-LAs-to) (1-3000), and learners (nb-LNUs) (1-2000),
- Settings of the simulation: match factor (match-f) (0-1) and chance to follow the recommendation (obedience) (0-1).

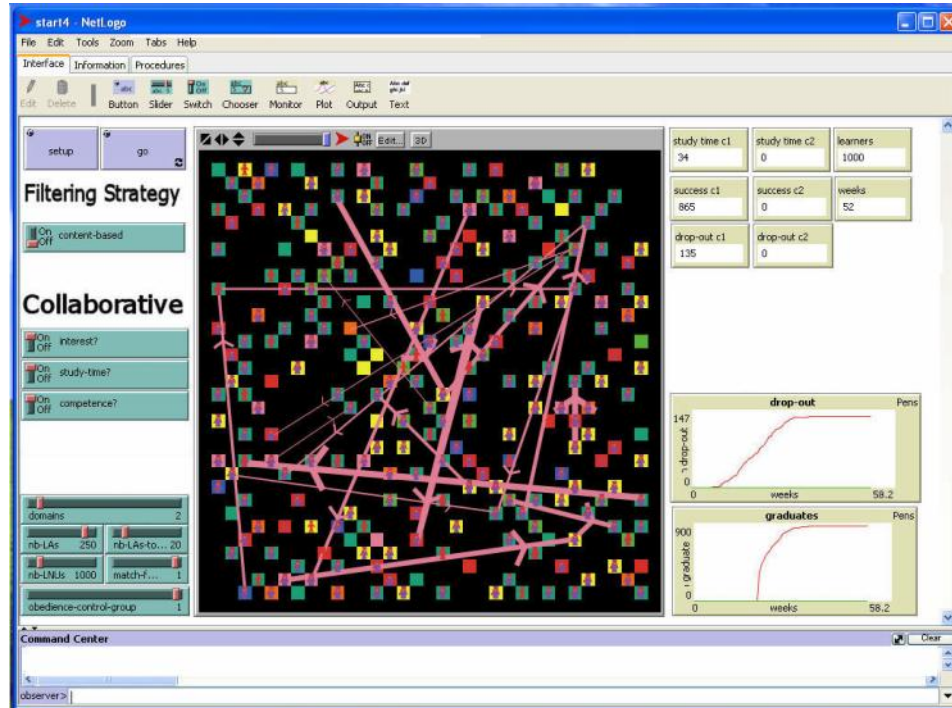


Fig. 3. Screen-shot of the simulation in NetLogo

When the simulation starts, the defined number of domains is randomly assigned to each learning activity. Then, when it is running, the centre of the screen presents the learners as “turtles” who are exploring an environment (Learning Network) that consist of learning activities (“patches”). In the right part of the screen, the number of active, drop-out, successful (graduated) learners are displayed, as well as the number of weeks of the simulation cycle. Moreover, in the right bottom part of the screen two graphs show the tendency of drop-outs and graduates over the number of weeks.

3. Preliminary results and future work

Up to now, we have conducted two series of 64 simulation runs to explore if navigation support mechanisms have a positive influence on the number of graduates. In each series the number of learners was changed. The first one used only collaborative filtering, while the second used a combination of content-based technique and collaborative filtering techniques (i.e., combined filtering). The values of the simulation were as follows:

- Content-based technique: on (only for series 2),
- Collaborative filter technique: interest, study time, competence level (series 1 and 2),
- Domains: 7,
- Learning activities: 250,
- Number of learning activities to be completed: 20,
- Number of students: 100, 500, 1000,
- Match factor: 1 (i.e., the recommendation should match 100%),
- Obedience: 1 (i.e., the student follows all the recommendations).

After running the series, we found that, no matter the number of learners, the percentage of graduates is higher if a combined filtering mechanism is used. Moreover, no matter the navigation support mechanism used, the number of learners does have an impact on the percentage of graduates. The percentage of graduates increases if the number of learners increases. Even more, if a combined filtering technique is used in a Learning Network where 1000 learners participate, then more than the 90% of the learners will graduate. Fig. 4 shows the two series and their tendency. Axis X contains the number of learners and axis Y the percentage of graduates. Series one is labelled as “collaborative filtering” and series 2 as “combined filtering”.

As future work, we will analyze how a realistic distribution for values of motivation and obedience can be included in the simulation program, we will reshape the model by adding new characteristics, such as prior-knowledge and multi-rating, enhance the advice procedure by considering weights of the learners’ characteristics while looking for suitable learning activities, and incorporate new recommendation mechanisms such as tagging. Finally, we would like to incorporate personalized competence development programmes that define for each learner different learning goals and number of learning activities to be completed for acquiring a competence.

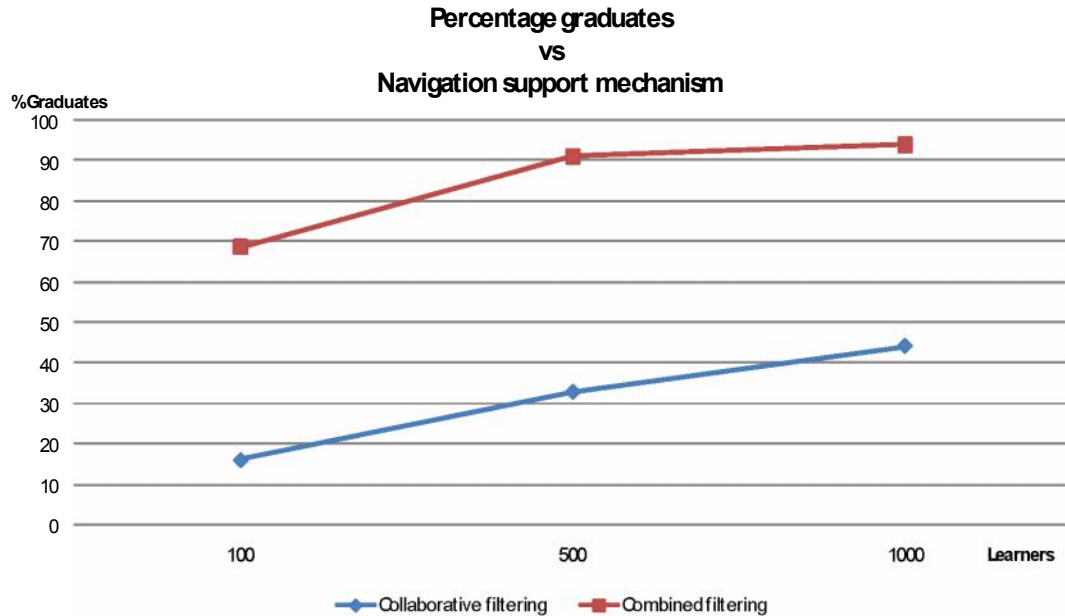


Fig. 4. Initial results

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FUNCTIONALITY FOR LEARNING NETWORKS: LESSONS LEARNED FROM SOCIAL WEB APPLICATIONS

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Abstract: Learning Networks are online communities for lifelong learning. How they should be designed to encourage interaction and active participation is a key issue in the development of technology intended for communities. Given the capacity of social web applications to encourage members' participation for sharing resources and creating communities, we hold that some lessons can be learned from them. In this paper we analyze the functionalities of three well-known social web applications, namely del.icio.us, Flickr and YouTube, and discuss how these functionalities can be used to encourage participants to manage, organize and regulate Learning Networks.

Keywords: Learning Networks; social web applications; functionality; del.icio.us; Flickr; YouTube

1. Introduction

Learning Networks are self-organized online communities designed to facilitate lifelong learning. In these communities learners participate actively creating and sharing activities, learning plans, resources, and experiences with peers and institutions (Koper *et al.*, 2005). These networks depend on the active participation of their members and, as a consequence, they need applications that enable and encourage participants' interaction (Koper and Specht, 2007) and, at the same time, guarantee community sustainability.

How these applications should be designed is a crucial issue in the development of technology intended for communities. Research in this area includes the exploration of social sciences theories (Kollock, 1998; Ostrom, 1990; Preece & Maloney-Krichmar, 2003) and the performance of empirical studies (Girgensohn & Lee, 2002; Leimeister *et al.*, 2004).

Outside the learning and research realms, social web applications are showing their capacity to promote and encourage members' participation for sharing resources and create communities. As their popularity (White, 2007) and social relevance (Pascu *et al.*, 2007) is continuously increasing, their integration into the educational practice is perceived as a major benefit for the next generation of eLearning communities (Downes, 2006; Keats & Schmidt, 2007; Owen *et al.*, 2006), and their social aspects noteworthy to understand community behaviour (Halvey & Keane, 2007; Lee, 2006).

Some lessons, therefore, can be derived from social web applications. Our goal in this paper is to identify their functionality in terms of community management, organization and regulation. We analyze three well-known social web applications, namely del.icio.us, Flickr and YouTube, and, based on that, we propose a set of functionalities, in terms of actions that participants can perform, to encourage and facilitate learners' interaction and community continuity. We aim at providing general guidelines to applications and platforms intended for Learning Networks.

The rest of this paper is structured as follows. The next section briefly elaborates on the concept of Learning Networks. Section 3 discusses the basic characteristics of del.icio.us, Flickr and YouTube, and section 4 presents a cluster structure to compare their functionality in terms of management, organization and regulation. Section 5, then, discusses the lessons that can be drawn from this comparison and the last section, finally, points out future work.

2. Learning Networks

Learning Networks are groups of participants and learning actions which are interconnected and supported through information and communication technologies in a manner that the network self-organises and promotes effective lifelong learning (Koper *et al.*, 2005). Participants can be, for instance, learners, teachers, tutors, providers, institutions or managers; while learning actions can be any type of resource or events that help learners to acquire a competence. Examples of learning actions are units of learning, courses, lessons, blogs, wikis, assessments, websites, or conferences in a given domain. These networks are self-directed and self-organized by participants who actively contribute by creating and sharing activities, learning plans, resources, and experiences with peers and institutions.

Issues in the design and performance of Learning Networks include how to support learners' navigation to find suitable learning actions (Hummel *et al.*, 2007; Kalz *et al.*, 2007) and how to compare and exchange those actions (Janssen *et al.*, 2007); how to foster members active contribution and participation (Berlanga *et al.*, submitted) and how to facilitate peer-support (Van Rosmalen *et al.*, 2006); how technology can support Learning Networks in an efficient manner (Vogten *et al.*, in press) and how to manage and organize such networks. In this paper we focus on the last item, the functionalities that encourage self-direction and self-organization in Learning Networks.

The design of such functionalities should take into account the following characteristics of lifelong learners (Koper & Tattersall, 2004):

- They are self-directed learners, responsible for their own learning process,
- They can participate, at the same time, in formal and informal learning actions,
- They are heterogeneous with respect to competences acquired and sought.

These characteristics imply a main change in the design of learning technologies. First, a bottom-up approach, in which participants lead Learning Networks is needed; as no institution then controls the learning process, participants are responsible for their own learning process and for organizing and directing the network. Additionally, participants can be involved in formal and informal learning actions, including role changes between those actions. For instance, in one learning action they could adopt the role of learner, but in other they could adopt the role of a tutor or a provider. Furthermore, the background, competence level and experience of the participants might vary from one to the other. Finally, as participants are interacting with several institutions, peers and learning actions, a dossier or ePortfolio that stores their competences, actions and results is needed. This will help to position and guide each participant through different learning actions.

Social web applications share several attributes with Learning Networks. The main one is the bottom-up approach. In these applications, users create and share their own resources, participate in existing communities or create their own communities. In addition, these user-driven applications have huge numbers of users; this allows participants to interact with other participants that might have different backgrounds and interests.

In order to identify promising novel functionalities for Learning Networks we decided to choose three well-known social web applications: del.icio.us, Flickr and YouTube. Our decision was based on the ability of these applications to encourage participants to share and organize resources, rather than on their ability to foster social relationships amongst participants, as in the case of MySpace, Friendster or Facebook.

3. Communities that foster interaction: del.icio.us, Flickr, and YouTube

3.1 del.icio.us: sharing bookmarks through communities

del.icio.us is a bookmark management and sharing web application. Launched in 2003, it was bought by Yahoo! in 2005. In the first quarter of 2007, 2 million of registered users were reported⁷⁰. This free-of-charge web application is a well-known example of social bookmarking. In this bottom-up approach users define keywords or tags to classify and organize their bookmarks in a non-hierarchical structure. This structure is used to retrieve bookmarks and share them amongst community members.

Apart from the obvious use of del.icio.us for personal aims, companies as well as communities and projects⁷¹, are also making use of it. In educational contexts del.icio.us is used, for example, to collect references collaboratively (Mejías, 2006).

3.2 Flickr: sharing photos through communities

Flickr is a photo management and sharing web application. Launched in 2004, it was bought by Yahoo! in 2005. In 2006, 100 million photos were posted on the site and 2 million registered users were reported (Graham, 2006). It has both paid and free subscriptions. In the former, users have unlimited bandwidth to upload photos, whereas in the latter they have a limited monthly bandwidth ration. At the time this article is written (June 2007), Flickr has 3685 groups; the three most popular groups have around 40,000 members (<http://dev.nitens.org/flickr/>).

According to Marlow *et al.* (2006) Flickr is not only used for photo management tasks (organizing, contribution, sharing and retrieval), but also as a means to attract attention, to play and compete, to present oneself, and to express opinions. General speaking, Flickr is used for personal, professional, business and educational purposes. In educational contexts, its most obvious use is as a showcase platform. Libraries, universities, schools and students⁷² use it to show and store their photos, but also Flickr is used as an educational tool and as learning resource repository⁷³.

3.3 YouTube: sharing videos through communities

YouTube is a video sharing web application, which allows users to upload and watch videos, as well as embedded them in websites, mobile devices, and blogs. Launched in 2005, it was bought by Google in 2006. In the last quarter of 2006, each day, 100 million videos were viewed and 72 million of registered users were reported (BBC News, 2006). People use this application to share personal, amateur and professional videos. Moreover, due to deals with content providers, particularly from the USA entertainment industry, channels that broadcast TV shows and programs are also available. Nowadays, YouTube is the “leading entertainment destination on the Internet”⁷⁴, and a marketing and dissemination medium: companies,

⁷⁰ del.icio.us blog: http://blog.del.icio.us/blog/2007/03/that_was_fast.html

⁷¹ For example, Adobe bookmarks <http://del.icio.us/adobe/>; EdTechTak network of educators <http://del.icio.us/edtechtalk/>; and TENCompetence bookmarks <http://del.icio.us/TENCompetence>.

⁷² For example, The American Library Association's photos http://www.flickr.com/photos/ala_members/; the Center for Experiential Learning (University of Washington) <http://www.flickr.com/photos/expatuw/>; the “classroom displays” group <http://www.flickr.com/groups/classrmdisplays/>; or the “photo students” group <http://www.flickr.com/groups/students/>.

⁷³ For example, clinical cases and images <http://www.flickr.com/photos/clinicalcases/>; or <http://www.flickr.com/photos/futureofmath/>.

⁷⁴ YouTube Fact Sheet: http://www.youtube.com/t/fact_sheet.

governments, and universities⁷⁵⁾ maintain channels in YouTube. Additionally, this application is used as a medium for distributing lessons and courses⁷⁶⁾.

4. Functionality for Learning Networks

As mentioned before, the success and lifespan of Learning Networks depends on their self-sustainability; they should include functionality that permits users to manage, organize and regulate resources and communities. Consequently, and considering the actions users can perform in del.icio.us, Flickr and YouTube, we cluster their functionality along three dimensions: self-management, self-organization and self-regulation.

The self-management dimension is related to functionality for administration and sharing. It includes actions that permit participants to perform tasks for creating their own profile, contacts, communities, networks, resources, and tags. These tasks are bi-directional: participants can also browse other participants' information (i.e., profiles, contacts, etc.). Table 1 shows which actions of this dimension are covered by del.icio.us, Flickr and YouTube respectively.

Table 3. Self-management functionality

Action = user create own ... / browse members'	del.icio.us	Flickr	YouTube
Profile	✓	✓	✓
Contacts	✓	✓	✓
Communities	✗	✓	✓
Resources	✓	✓	✓
Tagging	✓	✓	✓

The action *profile* means that users can create their own profile. Flickr and YouTube users can include information such as their interests (e.g., books, movies, or music), photo, gender, occupation or relationship status, whereas del.icio.us only considers the name and homepage of the user. Furthermore, in YouTube there are different types of profiles that classify a user as, for instance, guru, director, musician or partner.

The action *contacts* means that users can select or invite members to be part of their contacts by selecting current users and defining them as friends, family or, as in del.icio.us, as part of the user's network.

The action *communities* means that users can create their own communities with which to share resources and have discussion about different topics. This functionality is available in Flickr and YouTube, but not in del.icio.us. Nevertheless, the del.icio.us option "your network" permits users to connect different users in such a way that they can mutually recommend and follow up others' bookmarks. However, users cannot discuss bookmarks.

The action *resources* means that users can create and manipulate their own resources. Although this action seems obvious, it also includes resources distribution and sharing. In the three cases

⁷⁵ For example, the Google YouTube channel <http://www.youtube.com/user/google>; Downing Street channel <http://www.youtube.com/profile?user=DowningSt>; and the Open University of Catalonia channel <http://www.youtube.com/profile?user=uoc>.

⁷⁶ For example, Math problems <http://www.youtube.com/user/mathproblems>; or guitar lessons <http://www.youtube.com/user/JustinSandercoe>.

users can use other applications to share (blogs) and distribute resources (syndication). Moreover, in Flickr and YouTube users can use a mobile phone to upload and share photos or videos, respectively.

The action *tagging* means that users can define tags to classify their resources. In del.icio.us resources are bookmarks, in Flickr resources are photos, and in YouTube videos. This is an overlap action between the self-management dimension and the self-organization dimensions (see below). From the self-management dimension perspective, through this action users categorize their resources, explore others' resources and organize the existing ones. From the self-organization dimension perspective, as tagged resources are stored in a central repository, they are accessible from any computer and for anyone and, then, users can find out which are the resources related to a topic (e.g., <http://del.icio.us/tag/elearning>, <http://www.flickr.com/photos/tags/elearning>), to a community (e.g., PHP community <http://www.flickr.com/groups/phplang>), or to a particular user (e.g., <http://del.icio.us/TENCompetence>).

Being the self-management the first dimension, the second one is self-organization. It is related to functionality that permits users to interact and react to member's resources. This includes tasks such as commenting, recommending, copying, subscribing, adding favourites, rating, and seeing related resources. Table 2 shows which actions of this dimension are covered by del.icio.us, Flickr and YouTube.

Table 4. Self-organization functionality

Action = interaction with members' resources	del.icio.us	Flickr	YouTube
Comment	✗	✓	✓
Recommend	✓	✓	✓
Copy	✓	✗	✗
Subscribe	✓	✓	✓
Add as favourite	✗	✓	✓
Rate	✗	✗	✓
Related resources	✓	✓	✓
Search	Bookmarks del.icio.us Web	Photos Groups People	Videos

The action *comments* means that users can comment on others' resources. In Flickr and YouTube users can decide if they allow comments or not. This action is not available in del.icio.us.

The action *recommend*, which is available in all three cases, means that users can suggest a resource to someone else, whereas the action *copy*, which is available only in del.icio.us, means that users can redirect a resource to see it on their own account.

The action *subscribe* means that users can track additions into someone else's resources, tags or users. This option is available in all three cases. In del.icio.us subscriptions can be defined for tags and users, in Flickr subscriptions (called notifications) can be defined to receive an email when contacts upload new photos; and in YouTube users can subscribe to tags, to others' users video web pages (called channels), or to others' favourites videos. Moreover, YouTube users can become aware of who has subscribed to their videos.

The action *add as a favourite* means that users are able to mark someone else's resources, communities or tags, as favourites. This option is available only for resources in Flickr and YouTube. In both cases, users are aware of the popularity of their resources.

The action *rate* means that users can grade resources. Strictly speaking, this action is only available in YouTube where users can rate videos using the start system (1 to 5 stars) and the owner of the video can decide if ratings are allowed or not. In Table 2 this action is not marked either for del.icio.us or Flickr. Nonetheless, in del.icio.us, when a user saves a new bookmark, she or he receives information of how many people have saved that bookmark ("saved by"), which gives an idea of the popularity of the bookmark. In the case of Flickr, each picture shows how many people consider the picture as favourite, which also is an indication of its popularity.

The action *related resources* means that interrelated resources are showed, which is typically done through tags. Therefore, this action is associated to the self-management dimension "tagging". Although del.icio.us, Flickr and YouTube have this action, their level of interaction is different. In YouTube resources are showed in the same screen, in a form of small videos, while in del.icio.us and Flickr users have to select a tag first to see the related resources.

The action *search* means that users can look for resources, groups, people and so on. In del.icio.us users can search on their own set of bookmarks, on the whole collection of del.icio.us bookmarks, or on the Web. Users of Flickr can search on everyone's photos, on their own photos, on their favourite photos, and on their contacts photos. They can also search on groups (name and discussion) and on people (name or interest). Users of YouTube can only search for videos. In the three cases, search is based on free-text format.

The third dimension is the self-regulation dimension. It includes functionality that permits users to perform actions to control existing resources and communities. Table 3 shows which actions of this dimension are considered by del.icio.us, Flickr and YouTube. As the names of the actions are self-explanatory, we will not provide a detailed description of them.

Table 5. Self-regulation functionality

Action = define	del.icio.us	Flickr	YouTube
Resources as offensive	✗	✓	✓
Communities as offensive	✗	✗	✓
Private and public resources	✓	✓	✓
Private and public communities/groups	✗	✓	✓

5. Discussion

In this paper we have identified functionality of three social web applications that might help to encourage user participation and support community sustainability. Several lessons can be drawn from the analyzed functionality.

First, it is important to stress the shift away from the traditional community characterization (Kollock & Smith, 1996) that depicts communities as having well-established boundaries and a common and clear goal, as well as rules for monitoring and sanctioning mechanisms that govern the community. In social web applications there is a lack of separation between private and shared assets (Lee, 2006); the focus is on the individual rather than on the community. The individual is in control. Boundaries are not well defined as ego-centrism rules these

applications (boyd, 2007; Gallant *et al.*, 2007). Learning Networks are driven by learners that interact in diverse networks but, at the same time, need to control their own learning actions, communities, and contacts. Therefore, an important functionality needed in these networks is a desktop feature (e.g., a “MyDesktop”) that allows users to control their own activity, performance and interaction with the network.

Second, the analyzed social web applications, unsurprisingly, share almost the same functionality. Consequently, as a way of capitalising the success of these applications, Learning Networks might include functionality that permits participants to perform actions along the three dimensions identified here: self-management, self-organization, and self-regulation dimensions.

The first one then includes functionality to manage and create user’s profile, contacts, communities, resources (i.e., learning actions) and tags. In our view, *profiles* or ePortfolios are not only for keeping a historical record of the actions of the participants, but also a means to present themselves to the other participants. Moreover, it is also a means for fostering interaction (Berlanga *et al.*, submitted), encouraging participation (Brouns *et al.*, 2007), developing trust (Rusman *et al.*, 2007) and promoting visibility (Girgensohn & Lee, 2002). ePortfolios should be seen more as means of self-expression than as collections of actions; more as learner-driven stories that can receive feedback from the community members (Barrett, 2006). Therefore, in Learning Networks an ePortfolio that identifies the member and contains a tracking of his/her actions should be kept and presented to the other members of the network, and tools for the creation and maintenance of ePortfolios should be available.

At this moment, there are several open questions. For instance, it is not clear if participants should keep the same self-presentation amongst all the Learning Networks they are involved in, or if different “role-plays” should be allowed. Also, it is unclear which information the profile should include, what constitutes an appropriate level of privacy, and which characteristics and tracked actions of the participants should be included on their historical record.

Contacts in Learning Networks include, for instance, peers, teachers, tutors, institutions or even true friends (boyd, 2006). Even if the analyzed social web applications do not graphically represent contacts, it would be desirable to have such representations to support awareness and social interaction. Some examples along these lines include social browsers (Lee *et al.*, 2004) and social proxies (Erickson *et al.*, 2006). Having contacts stored using a common format, such as *Friend Of A Friend* (<http://www.foaf-project.org/>), not only makes it easier to create a view of the members of the network (Vogten *et al.*, in press) but also facilitates the exchange and the use of common information about learners’ contacts.

Creating communities in Learning Networks could be done at the level of creating a Learning Network or at a lower level, creating so called ad hoc transient communities (Sloep *et al.*, 2007). These communities, which exist for a limited period of time (their transience), aim at fulfilling a particular request (their ad hoc-ness) as, for instance, peer-support (Van Rosmalen *et al.*, 2006), peer-review (e.g., learning actions), peer-advice (e.g., which Learning Network to join), or peer-collaboration (e.g., create a learning action, gather resources such as bookmarks).

Moreover, Learning Networks should have functionality that encourages members to see the activities of the rest of participants (Millen & Patterson, 2002). For instance, when YouTube users are watching a video they can also see who else is watching the same video at that time.

Learning actions in Learning Networks can be seen as the *resources* of the network. As explained before, they can be, for instance, courses, lessons, learning resources, or assessments. Participants should own their learning actions. Ideally, Learning Networks should incorporate services and tools that permit participants to create their own learning actions, modify existing ones and exchange them. Furthermore, functionality to share and distribute learning actions using different devices it is also desirable. The combination of mobile and blog functionality (De Jong *et al.*, submitted) is one approach to tackle this issue.

Tagging should not be related only to learning actions. It is also a valuable mechanism to categorize, for instance, Learning Networks, communities and contacts. This will permit participants to classify, explore and organize not only the learning actions but also the Learning Network contacts and communities.

The second dimension, defined as the self-organization dimension, includes functionality that allows users to comment, recommend, copy, subscribe, add resources as favourites, rate them, be aware of related resources, as well as functionality to search for resources, communities and people. All this functionality can be included in systems and applications that interact with Learning Networks. Participants, for instance, can comment on each other's learning actions or profiles, recommend a learning action or a contact to someone else, have a set of favourites learning actions, or rate learning actions and communities. Moreover, participants can also use searching mechanisms to look for resources, communities and people but also to visualize and browse the relationships between them.

Finally, the third dimension, the so-called self-regulation dimension, includes functionality that permits Learning Network participants to control the level of privacy of learning actions and communities as well as to decide whether they are offensive or not. For instance, authors of a learning action can define who can modify the action, if it is available to anyone, or if it can be rated or assessed by others. Moreover, authors of a Learning Network can define who can join the community, modify its characteristics, or add learning actions.

6. Conclusion and future work

In this paper we have identified novel functionalities for Learning Networks. Our proposal, which is based on the analysis of the functionality of social web applications, attempts to define the key actions participants must be able to perform in order to manage, organize and regulate Learning Networks. Some of the functionality identified in this paper has already been implemented in the Personal Competence Manager (Vogten *et al.*, in press). This infrastructure, which aims at supporting lifelong learning through Learning Networks, currently includes the actions "communities" and "resources" (self-management dimension); "rate" (self-organization dimension); "private and public resources" and "private and public communities/groups" (self-regulation dimension). Future work will study how the whole set of functionalities described in this paper can be incorporated in this infrastructure and explore how their impact can be measured.

Furthermore, the functionalities identified in this paper provide some clues to design applications and tools aimed at creating, sharing and assessing ePortfolios from a learner-centred perspective.

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PROCESSING LEARNER PROFILES FOR SMART INDICATORS

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Abstract: Indicators help learners to organise, orientate and navigate through complex environments by providing contextual information relevant for the performance of learning tasks. Smart indicator systems support learners to reflect on their learning activities, learning progress or peer relations by adapting the approach of aggregating and presenting information to a learner's situation or context. In this paper, context is used as temporal context of the learning progress. After introducing an experimental scenario in which smart indicators are applied, the paper discusses two problems of smart indicators. The first problem is related learner and context modelling and addresses issues of information collection and aggregation. The second problem is context aware adaptation of information presentation, and focuses on adaptation rules in a learning context. This paper concludes with an analysis of current learning standards with regard to these two problems, and the implications for open learning communities.

Keywords: learner support, context modeling, informal learning, system architecture

Introduction

The term lifelong learning refers to a complex process in which people develop new and extend their existing competences. While during early phases of this process, students follow mostly prepared activities and curricula provided by schools, colleges or universities. In these environments of initial education, it is often required to support transitions of learners between topics, courses and curricula. After initial education the learning environments and the learning processes become more complex. Learners do not follow pre-designed paths that are provided by learning facilitators, but constantly change between formal training, non-formal learning, and informal competence acquisition. Furthermore, the way how people learn is different to what is known in teaching and training during initial education [20]. Therefore, many learners have difficulties in recognising and valorising their knowledge and competences they have acquired throughout life [3, 16, 31].

In contrast to these observations reflective practitioners [34] have an increasing relevance on the economical success of enterprises and organisations, and also to the social wealth of nation states and societies. Reflective practitioners are drivers of the knowledge society, because they are aware of their knowledge and competences and able to apply, to adapt and to extend these competences in their professional practice. Reflective practitioners are also referred as "high skilled individuals" in policy documents. The value of these individuals for economies and societies has become undeniable, as effects such as "brain-drain" [18] can be identified from the micro-economics of a team within an organisation to the macro-economics of a nation state. Attracting alien expertise is one approach to address this problem. However, the economical stability and social wealth depends on the ability of an organisation to establish, support, and sustain a reflective culture among the majority of their members and communities.

One aspect of this problem is how to support reflection and to raise awareness on learning processes and on competence acquisition. With respect to the changing contexts and processes of practitioners, it can be argued that such support on reflection and awareness has to adapt to these changes and has to take contextual information into account. This is because of several reasons, among which the following ones are most relevant to our research. Actors depend on the availability of external information in order to organise, orientate and navigate through complex environments by utilising contextual information [7, 38]. Contextual information on the learning process has been proven as important to support the learning process.

It stimulates the learners' engagement in and commitment to collaboration [4, 27, 32]; it helps to raise awareness of and stimulates reflection about acquired competences [24, 25]; and it supports thoughtful behaviour in navigation and on learning paths [36]. Despite this evidence on the role of contextual information for reflection and learning, little research has been conducted on adapting the presentation of contextual information to the changing needs of lifelong learners throughout their learning process.

During a process, contextual information is provided by what we call *indicators*. Indicators provide a simplified representation of the state of a complex system that can be understood without much training. The framing question of the research presented in this paper is the utilisation of indicators to support reflection and raise awareness on learning processes in non-formal and informal learning settings. It has been argued that indicators are part of the interaction process between learners and learning environments [17]. As such, indicators depend on information about previous learning activities and their contexts. The information processing for this purpose can be modelled as four operational layers: a sensor layer, a semantic layer, a control layer, and a presentation layer. This paper analyses the relations and functions of these layers.

The question for research of this paper is how to provide smart indicators to learners in an unstructured community environment. The answer to this question is based on two problems. The first problem is related to gather of learner information [6, 29] and develop context models [12], which then can be reported to the learners. The second problem is the modelling of context aware adaptation strategies that define which resources can be used to generate the appropriate information according to a learner's context. In this paper we address the second problem and discuss how to utilise learning technology specifications for modelling adaptation strategies.

This paper continues with introducing an experimental scenario in which smart indicators are applied. The following section provides a definition of smart indicators that is derived from concepts of self-regulated learning and context-aware systems. Based on this definition a system's architecture for smart indicators is proposed. Based on the preceding sections, the two problems of the research questions are addressed by discussing the implementation as it is used for the experimental scenario. This paper concludes with an analysis of current learning standards regarding the applicability in the domain of open communities.

Experimental Scenario

In order to develop better understanding of supporting strategies for learning interactions we implemented a web-based prototype of smart indicators. The prototype integrates indicators into a community system. This system combines the community member's web-logs, del.icio.us⁷⁷ link lists and tag clouds. The indicator provides information on the interest and the activity to the learners. It contains two core components: An interest tag cloud and an overall activity chart. To maintain these indicators the system tracks selection activities, tagging activities, and contributions. The system adapts the presented information according to a learner's activity and interest level: It provides richer information the more a learner contributes to the community. Therefore, new participants will have different information indicated than those who contribute regularly to a community. The community system acknowledges that its participants might already use a web-log or del.icio.us instead of offering similar services. However, it is not a requirement for participation to have both. When learners register for being "members", they can provide a URL to a feed address of their web-log and their nick-name on del.icio.us. This *personal profile* is later used for creating a *learner model*. Therefore, the community system provides only a portal to recent contributions, while the actual content is external to the system.

⁷⁷ <http://del.icio.us>

Each action within the system is considered as a learning activity and learners score “learning points” with each action they perform in order to indicate their learning progress. However, some actions require more effort than others. For example, accessing content provided by other users is easier to perform than contributing content through a web-log. Because of these differences, the actions have different scores.

The indicator system is based on immediate and delayed interaction monitoring by interaction sensors. Immediate monitoring is implemented only for selections (so called click-through), through which the system gathers information about requests of web-log entries or links from the link list. Data about contributions is accumulated from RSS2⁷⁸ or ATOM⁷⁹ feeds independent from a learner’s actions on the user interface. Information on the collected links and associated comments is gathered through del.icio.us’ RPC interface⁸⁰. The tagging activities are extracted from the data on tag clouds that is provided from both the link lists and the learner’s web-logs. A learner tags an external link or a web-log entry if a tag is added to the contribution.

The semantic layer of the prototype provides two aggregators: an activity aggregator and an interest aggregator. The semantic layer analyses the sensor data according to a definition given by the aggregators. Different to the sensor layer, the semantic layer is not limited to organising incoming sensor data, but it uses the aggregators to *transform* the sensor data into meaningful information.

The control layer defines how the indicators adapt to the learner’s behaviour. The prototype implements two elemental adaptation strategies. The first strategy aims at motivating learners to participate to the community’s activities. The objective of the second strategy is to raise awareness on the personal interest profile and stimulate reflection on the learning process and the acquired competences. The prototype adapts the strategies according to a learner’s participation to the community.

The purpose of the indicator layer is to integrate the values selected by the control layer into the user interface of the community system. The indicator layer provides different styles of displaying and selects an appropriate style for the incoming information. Two graphical and one widget indicator are provided by the prototype. One graphical indicator is used during the first level of the control strategy. This indicator shows the amount of actions for the last seven days. A second control strategy uses a different graphical indicator. It displays the activity in comparison to the average community member. The maximum value of the scale used by this indicator is the most active community member. Finally, the indicator layer provides a tag cloud widget for displaying the interests of a learner. In principle this widget is a list of hyperlinks. The tag cloud indicates higher interest values for each topic through the font size of the related tags.

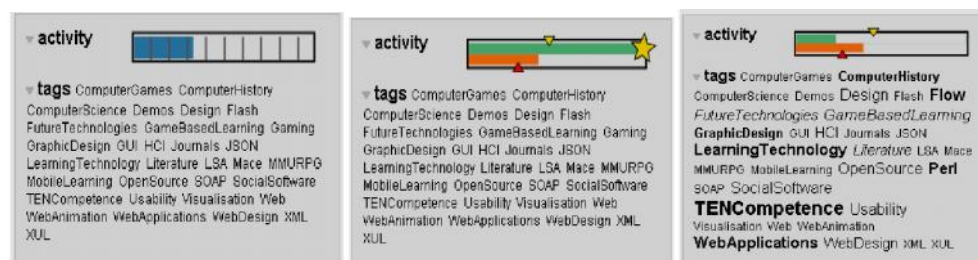


Fig. 1. Sample Indicators on different strategy levels

⁷⁸ <http://blogs.law.harvard.edu/tech/rss>

⁷⁹ <http://tools.ietf.org/html/rfc4287>

⁸⁰ <http://del.icio.us/help/json/>

Defining indicator systems

In the introduction we have highlighted some principles of indicators. With regard to learning technology feedback and recommender systems meet these principles. Therefore, it is necessary to distinguish indicator systems from them. Feedback systems [30, 33] analyze user interactions to inform learners on their performance on a task and to guide the learners through it. Recommender systems analyze interactions in order to recommend suitable follow-up activities [1]. The objective of both system types is to affect a learner's future activities by providing useful information. Both approaches are tightly coupled to goals or processes that are shared within a learning community. In contrast, indicator systems provide information about past actions or the current state of the learning process, without making suggestions for future actions. Having these considerations in mind, we define indicator systems as follows.

An indicator system is a system that informs a user on a status, on past activities or on events that have occurred in a context; and helps the user to orientate, organize or navigate in that context without recommending specific actions.

Humans actively search for relations to their previous interactions, in particular for indicators that provide information on the success and the value of their actions, if their actions depend on strategies that require alignment during the interaction process [21, 38]. In other words, people continuously seek for indicators that help them to verify or modify their actions, tactics and strategies. Thus, indicators on learning are important facilitators of these processes and are based on three general principles [13, 24, 26].

- Indicators rely on monitoring of the learning actions and the learning context.
- Indicators have to adapt according to a learners' goals, actions, performance, outcomes, and history as well as to the context in which the learning takes place.
- Indicators are responses to a learner's actions or to changes in the context of the learning process, where the response is not necessarily immediate.

Most indicators implement a static approach of providing information to learners rather than adapting to the learning process [9, 15, 19, 22, 24, 28]. These approaches are considered as static according to the third principle. In contrast, *smart indicator systems* adapt their approach of information aggregation and indication according to a learner's situation or context. In our setting context is defined by the temporal context of the learning progress.

An architecture for smart indicators

A smart indicator is a component of a context aware system that traces a learner's interactions as well as contextual data in order to provide meaningful information in response to learning actions. In this section we describe a system's architecture for smart indicators.

We applied an architecture for context aware systems as it has been described in Zimmermann, Specht, & Lorenz [40]. The architecture has four layers and specifies operations on the data and information flow through a system from the learner input to the system response (see Fig. 2). The layers are the sensor layer, the semantic layer, the control layer, and the indicator layer.

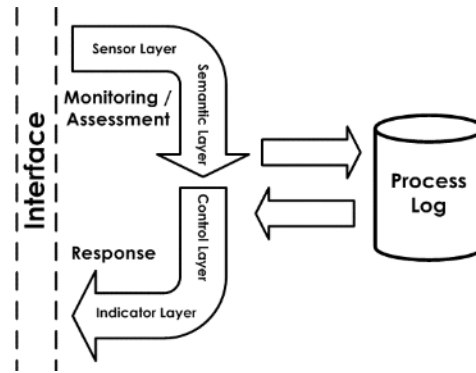


Fig. 2. Layers for context-aware information processing

The *sensor layer* is responsible for capturing the interaction footprints. A *sensor* is a simple measuring unit for a single type of data. The objective of sensor layer is to trace learner interactions. It also includes other measures that are relevant for the learning process which are not a direct result of an interaction between the learner and the system. Sensors that do not gather information about a learner's interactions are called *contextual sensors*. Examples for contextual sensors are standardised meta-data, or tagging activities and contributions of peer-learners. In the architecture the sensor layer adds data to process log in order to allow the adaptation to the interaction history.

The *semantic layer* collects the data from the sensors and from the process log and aggregates this data into higher level information. The semantic layer defines operations or rules for processing sensor data [11]. The definition of how the data from one or more sensors has to be transformed is called an *aggregator* [12]. These rules can be named according to their meaning, for instance *activity* or *interest*. The aggregated information is interpreted by the *control layer* according to the history and context of a learner. The specific approach for interpretation is called a *strategy* [11]. It defines the conditions for selecting and combining aggregators as well as their presentation according to the learner's context. A strategy also controls the personalization of aggregators. Finally, the aggregated information has to get presented to the learner. The *indicator layer* handles this part of the interaction. At this level the actual response is created by translating aggregated values into representations that are not just machine-readable but also accessible to humans. The active strategy of the control layer selects these representations and provides the aggregated information to them.

Many approaches in adaptive hypermedia implement adaptation on the level of the semantic layer, while the main strategy at the level of the control layer does not adapt to the learning process [e.g. 2, 5, 8, 9, 10, 15, 37]. In contrast, our approach of smart indicators adapts the strategies on the control layer in order meet the changing needs of a learner. By doing so, the adaptation strategies are adaptable to the different phases of the learning process.

In order to develop better understanding of supporting strategies for learning interactions we implemented a web-based prototype of smart indicators. Fig. 3 shows the data-flow between the different layers of the architecture. According to the architecture the prototype has four functional layers: A sensor layer monitors the learners' activities and collects traces of interest. A semantic layer provides two aggregators to transform the data provided by the sensors. A control layer controls the indicator behaviour according to the results of the aggregators of the semantic layer. The indicator layer transforms the information into widgets that are integrated into the user interface of the system.

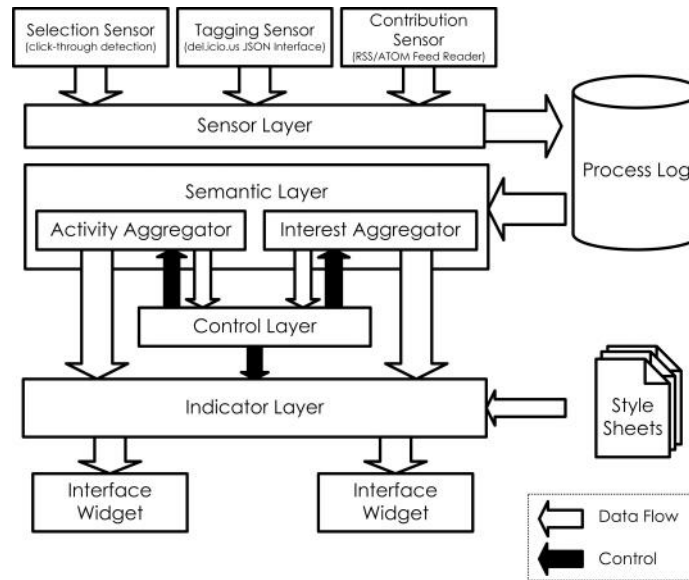


Fig. 3. Component interaction of the prototype

Learner and Context Modelling

With regard to the three defining principles of indicator systems, learner monitoring and learner modelling are central factors in the process of offering indicators for the learning process. The first requirement defines that indicators rely on learner and context monitoring and the second requirement defines that indicators have to adapt to the learning progress and learning context. These requirements specify that an indicator system has to develop concepts of both the learners and the learning context. Based on this information the indicator system can select appropriate information and representations of that information for a learner.

In order to identify learning processes and changes in the learning context it is necessary to maintain a history of the learner's interactions. A learner model is basically a collection of traces of past interactions with the system. These interaction footprints can be used to assess certain factors of the learning process, such as activity or interest [14, 15, 39]. In the proposed architecture the learner modelling is performed in two steps. The first step is the data collection and homogenisation; and the second step is the semantic aggregation and assessment.

The system's view on the learners and learning context depends on the data that is available for interpretation. This underlying data is collected and homogenised by the sensor layer. The sensor layer accepts data coming from different sensors types and origins. The sensor layer clusters the incoming data into named sensor groups in order to maintain and organise the incoming data. Within a sensor group each data set contains the same type of information. For instance, in the experimental scenario a sensor collects data about which tags were used by a learner. This data may originate from the use of tags for social book-marking or web-logging; or from detected selections of links in the system's user interface. From the system's perspectives, this data belongs to the same class and is therefore organised within the same sensor group in the learner's process- log.

The sensor data is stored in a database. This database organises the incoming data in alignment with the activity notation of the IMS Learner Information Package specification (IMS LIP) [35]. IMS LIP activity information allows collecting process information on learner activities within a learning environment which is similar to a log-file.

Within the experimental scenario context is defined by learner actions in a fixed timeframe. The boundaries of context are therefore given by social and temporal constraints. The

indicators relate the learner actions to this context and make these relations visible to the learner. This context depends on the learning interactions of all learners. The context model is based on anonymous learner information. This is achieved by calculating the arithmetic median of all learning actions within a fixed timeframe, in order to identify the “average” learner behaviour. Therefore, context is emerges through information processing of the learners’ process-logs on the semantic layer.

Although the described approach of learner and context modelling is suitable for the experimental scenario, it is limited to social and temporal contexts. The given approach excludes spatial contexts that are defined by special sensor measures that are independent from learner actions. Examples for such independent data sources are GPS sensors or thermometers. Although we are aware of these limitations, spatial contexts were excluded from this research.

Defining adaptation strategies

On the semantic layer the sensor data in the process-log is enriched. The definition of aggregators is defined as rule-sets. For these rule-sets IMS Learning Design (IMS LD) level B conditions [23] were used as an anchor. However, IMS LD conditions support neither data sets nor arrays in properties [23], while the sensor information in the process-log is available as data-sets. By extending IMS LD conditions with simple set operations such as “sum”, “average” or “range” it was possible to define the aggregators by using a well tested approach. The aggregators are referred to through unique names and are exported as global properties of an IMS LD monitoring service.

The adaptation strategies on the control layer are defined as IMS LD activities. IMS LD activities are defined by pre- and post-conditions and a set of resources that should be used during the activities. For defining an adaptation strategy the output of the aggregators of the semantic layer are used to define pre- and post-conditions for a part of the strategy. The aggregators that are used while a strategy is active are referred as resources of the IMS LD activity. The output style is also defined as a reference to the XSLT style-sheet that should be used by the indicator service.

Conclusions and further research

In this article we discussed a first prototype for smart indicators. Its implementation is based the principles of the learning interaction cycle and context aware systems. For the prototype we used IMS LIP and IMS LD to provide learner and context models and associate them with adaptation strategies. Although IMS LD provides a flexible way to model adaptation strategies as learning activities, there were limitations in these specifications for modelling contexts and aggregation rules of the learners’ interaction trajectories. Although these restrictions limit the use of this approach for general cases of smart indicators, we described an experimental scenario in which the underlying principles can be tested within these limitations.

Further research will have to focus on two main challenges. The first challenge addresses the use of smart indicators for learner support. While the experimental scenario in this paper is based on reasoning, more research is required to provide evidence on those factors that affect learner engagement and motivation. The second challenge is based on the limitation in modelling context based learner support by using the existing learning technology specification. Future work has to clarify is how contexts can be modelled and how these models can be utilised in order to support learners, effectively.

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“MEANINGFUL LEARNING” SORTING THE WHEAT FROM THE CHAFF

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Abstract: Learners engaged in lifelong learning are typically engaged in a variety of formal and informal learning activities and hence are faced with a learner-centric model wherein they are responsible for their own learning processes. Learners become involved for pleasure, leisure, economic or societal reasons. Learner involvement requires effective strategies, for the management and their thematic knowledge domains. However it is difficult to impose such strategies in an environment where learners are seen to act as individuals, rather than as part of a social world. (Crowther 2000). The task of supporting lifelong learning cannot be deferred to a single organisation, but has instead to be supported by different providers, using different technologies and within an environment where the learner's peer-group is varied in competence, interest and commitment and where the entry requirements are ambiguous. In effect it becomes the responsibility of the individual learner. Can we look to e-portfolios with integrated concept maps to assist the learner in the management, classification and organisation of content within their domain specific e-portfolios?

Keywords: Thematic Portfolios, Personalisation, Meaningful Learning,

Background

E-learning has in the past become synonymous with on-line learning, distance education and other broad-brush terms. However as many students are faced with the prospect of learning “offline” whilst undertaking e-learning courses, we need to look at sustainable strategies to assist them in collecting, organising and managing their personal knowledge repositories. Further as many users of digital material in the form of journal articles, book chapters, presentations etc. are ultimately interested in only a small part of the material provided, we need look at supporting strategies for personalised publishing, whereby a user can find, select, extract and manage pertinent information at the desired granularity, be it chapter, section or page. Finally as “new” users of knowledge repositories often do not know what they are looking for, and if they did they do not know how to find it, we need to look at integrated support for navigation, context searching, multilingual taxonomies, citation management and other knowledge enhancement and learning aids.

Whether online or offline, there is little doubt that as learners with an online presence we are overloaded with information, yet one does question if we are getting any wiser. Much of the available material is uni-functional, impersonal and isolated in that it is delivered in a non-questioning, unlinked environment with little regard to one's previous knowledge. However this is not solely the fault of the information providers who are not required to qualify their information and ensure that any metadata is relevant and based on well formed taxonomies, folksonomies or even personomies. Often the information overload is due to the limitations of the information seeker, in that they often lack an understanding of information context, coherent search strategies and the relevance of the output of their information harvesting strategies. We can be assured as learners, we will always get a response to queries and will forever be immersed in material that purports to be relevant but often is mediocre to say the least. Further much of the information that might be of use to the learner, is not found by the search engines or not available due to restrictions of copyright on the material, lack of understanding about the technology used in delivery of the material or due to lack of equitable telecommunications access to the material.

Even with the quite visible move to “open courseware” or “open education” where qualified dedicated material on specific subjects is made available by well recognised educational institutions, or with different moves to aid the authentication of material on the web through the use of web portals like Health On the Net (HON), the individual learner is still faced with a myriad of complexities prior to being able to engage in lifelong learning. Even this material needs massaging prior to it being useful in support of “meaningful learning” in a student centred learning space, which is necessary to support lifelong learning and where the learner moves from institution to institution through informal and formal mechanisms.

Concept mapping based on Ausubel’s (Ausubel, Novak and Hanesian 1986) learning theory, emphasizes the assimilation of new information into the students’ prior knowledge for subsequent meaningful learning. Although concept maps were not originally designed to define learning sequences, the technique was applied to the present knowledge structure of learners to guide them with learning planning and learning object integration.

In a learner –centric domain, facilitating a students acquisition of valid conceptual frameworks in support of their subject specific learning spaces is difficult and often learners will develop immature, incomplete or incorrect models. To assist in correcting these models we need to understand that learning is not an event of mere replacement of old ideas with new ones, the organisation, refinement and differentiation among contexts is also important. (Caravita and Hallden 1994)

Can we look to e-portfolios with integrated concept maps to assist the learner in the management, classification and organisation of content within their domain specific e-portfolios?

Objectives

Global Library Services Network (GLSN) is actively involved in the creation, deployment and management of “digital collections” to remote communities in support of meaningful and life-long learning. We define remote in terms of geography, culture, language and telecommunications. We have developed a technology platform using open source components that can be deployed to the individual’s desktop. It is referred to as a Personal Learning Centre (PLC) and offers a range of functionality including support for offline and online learning with:

- a good search engine to find things within the individuals knowledge base,
- a capability to manage citations ensuring learners actively manage context,
- support for multilingual thesaurus in support of learners who speak several languages,
- support for copyright management ensuring,
- ***integration of concept mapping*** as a means of managing and navigating knowledge domains,
- ***thematic portfolios*** as the overarching envelope with which learners can group learning assets.

The overall aim was to investigate if an e-portfolio desktop framework, managed by concept maps could support meaningful learning in the context of lifelong learning, where learners need to embrace learner-centric models developed in a dynamic framework. Further as the PLC allowed the individual learner to build on and create their own concept maps to look at the capability of using these maps to assist in the identification of knowledge misconceptions at an early stage.

Findings

There is no one fits all solution for the effective management of information with regard to individuals engaged in lifelong learning. A complex mix of issues related to learning style, purpose, content, connectivity, cost, culture, copyright etc. have to be considered, and the most appropriate option found for each individual. The use of e-portfolios with integrated concept maps as an aid to knowledge integration or knowledge enhancement within a learner-centric domain has merit in that it allows for instructor / learner, learner / learner dialogue within a contextual framework, incorporating prior knowledge as a bases for knowledge extension.

The paper will provide more in-depth information on the results of our trials undertaken at The University of Sydney, Australia with particular emphasis on the issue of concept mapping as a means of knowledge management within an integrated e-portfolio environment.

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