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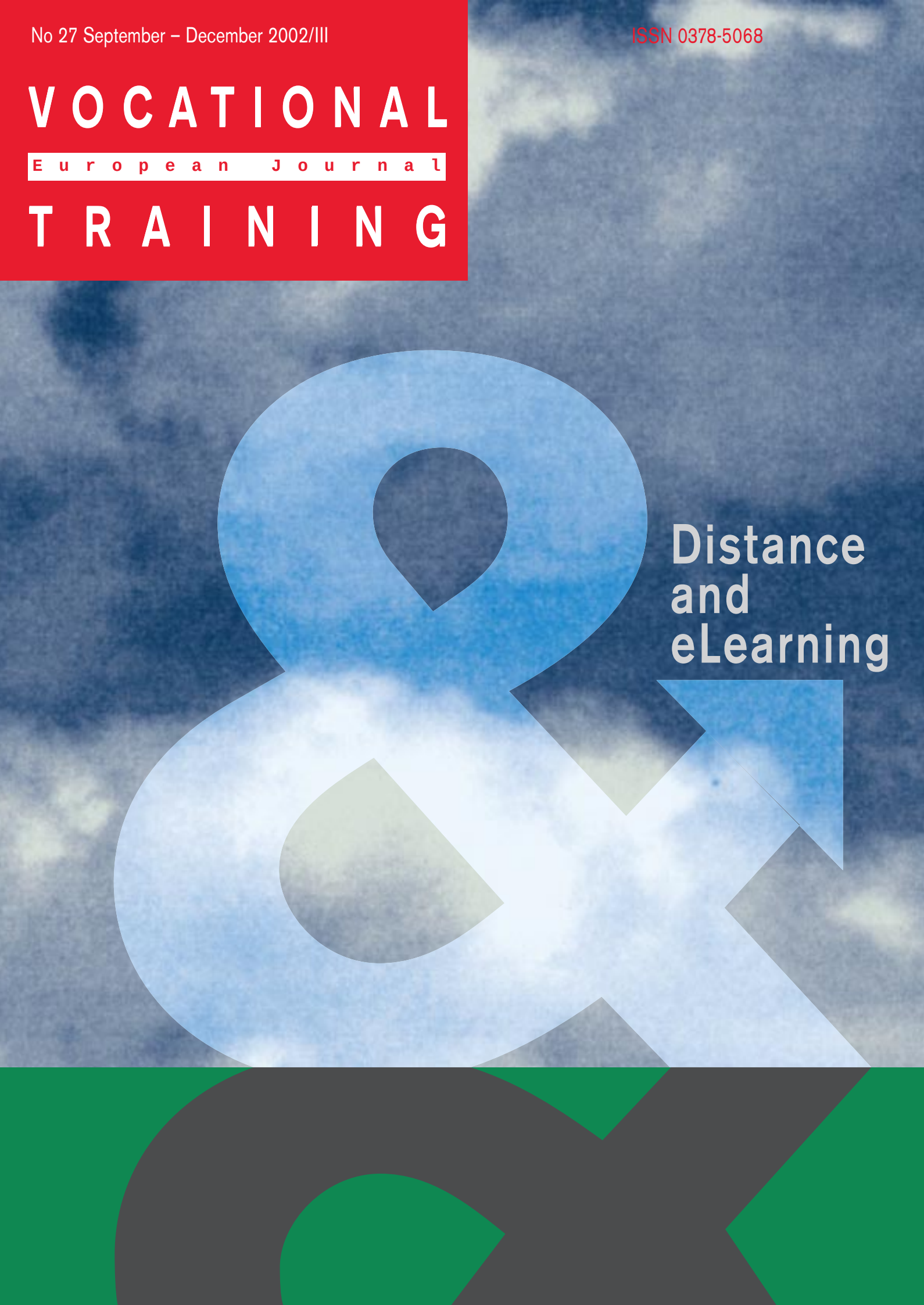

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Cedefop assists the European Commission in encouraging, at Community level, the promotion and development of vocational education and training, through exchanges of information and the comparison of experience on issues of common interest to the Member States.

Cedefop is a link between research, policy and practice by helping policy-makers and practitioners, at all levels in the European Union, to have a clearer understanding of developments in vocational education and training and so help them draw conclusions for future action. It stimulates scientists and researchers to identify trends and future questions.

Cedefop's Management Board has agreed a set of medium-term priorities for the period 2000-2003. They outline four themes that provide the focus of Cedefop's activities:

- **promoting competences and lifelong learning;**
- **facilitating new ways of learning for a changing society;**
- **supporting employment and competitiveness;**
- **improving European understanding and transparency.**

The opinions expressed by the authors do not necessarily reflect the position of Cedefop. The *European Journal Vocational Training* gives protagonists the opportunity to present analyses and various, at times contradictory, points of view. The Journal wishes to contribute to critical debate on the future of vocational training at European level.

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Bridging to the future of education

Friedrich Scheuermann
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This article explores pedagogical implications relating to the integration of ICT in education. Whereas it is becoming more popular to use the Internet as the technical platform for the distribution of on-line courses, a lot of literature promotes the thesis of almost unlimited possibilities in education that just have to be implemented. Frequently, a positive view is held which pushes the discussion of problematic areas of online offers into the background. Effective and efficient delivery of instruction in educational settings must consider the whole context and process ranging from course development, organisation and delivery to evaluation. Furthermore, new competences relating to the application of new pedagogical strategies and methods are required in order to achieve better learning outcomes. Staff development and teacher training are crucial issues for successfully approaching the new potential provided by information and communication technology in education.

The context of discussion on teaching and learning in Virtual Learning environments

There are various aspects to how information technology is used in education: as a platform for the development and delivery of products for teaching and learning and as a tool for the organisation of the learning contents and resources as well. This covers relevant aspects of both environments and courses; the latter cannot be analysed separately owing to their interdependence. The question arises as to whether open and flexible learning environments built on information technology will lead us to qualitatively better, more effective and more efficient education and how these new educational models are to be brought about.

The rising acceptance of online courses suggests that people value the advantages of studying independently of time and place. Experience shows that they appreciate more communication-oriented approaches where participants have to be actively involved and are taken care of daily.

But there are new requirements if priority is given to high quality on the stimulation of learning processes and outcomes:

(a) the development and implementation of a course with a specific didactic concept is usually more work-intensive than in ordinary courses. Details have to be prepared before the course, the sequence and interaction have to be planned completely;

(b) the teaching concept has to come with a technical realisation concept, which makes forward planning and test runs necessary;

(c) the organisation is extensive: processing of requests, collection of participant data, log-in and user identification distribution and updating data require much more time.

(d) the support of participants is required around the clock (usually even at weekends) and cannot be seen to be an inadequate relation to that of conventional seminars. Reading and answering the extensive number of messages exceeds the time available for conventional courses including office hours. It is noticeable that students have higher expectation of support than usual; the reasons still have to be researched empirically.

(e) technical, didactic, and content developments require teamwork and the delegation of assignments, creating new dependencies and requiring much coordination.

Instructional methods and the quality of courses within the different environments cannot realistically be compared, since the whole context of educational activities must also be considered. Some environments are fully based on the virtual mode, others are linked to traditional courses taking place on a local university campus. Some are taught to an international audience, others to a local community. Some course topics need different pedagogical features and, finally, the applied hardware and software technology also determines some of the key indicators of the context. This influences the structure of the virtual environment as well as the methods being applied.

A reasonable conclusion of this is that there is currently a need for integrative concepts for the implementation of open and flexible learning via IT in education that can demonstrate a methodology of good practice for educational needs. Prob-

lems relating to this lack of a full and encompassing concept have to be seen from different perspectives and within different contexts of education. Implementation, therefore, depends on pedagogical, sociological, legal, technological and organisational reasons as well as other factors.

In their study on the evaluation of environments, Britain and Liber (1999) define two crucial issues for work with Virtual Learning Environments:

❑ VLEs should provide opportunities to improve the quality and variety of teaching and learning that are not being achieved using current methods;

❑ VLEs should reduce administrative burden on teachers, thus allowing them to manage their workload more efficiently and to be able to give more time to individual students educational needs.

Considering these requirements as the bases for study of teaching and learning it becomes obvious that the approach for analysing the process must reflect various other aspects too, not just the discussion of didactical techniques within Virtual Learning Environments.

Below is an unsorted list of issues and examples for the design and development of a course:

Key issues for pedagogical design in VLEs

Wilson (1996) has described the relationship between ideas of knowledge and the consequences for the nature of the learning environment (author's comments in parentheses):

All the types of learning environment mentioned can be found by analysing the concepts of environments and courses where information is provided on the Internet. ICT, therefore, does not tend to support one particular type of learning environment. On the contrary, in the design of ICT-based educational innovations, the technology will have to be introduced in such a way as to create and support the learning environment desired. However, in practice we notice that the development of a virtual learning environment can be a result of a pragmatic decision at the institution, as indicated in some of the cases. This can also be used as a step for introducing the evolutionary transition from traditional teaching environments towards settings related to ideas of social constructivism. The evolution of learning environment is a complicated process, where the cultural and historical situation relating to practical arrangements in an institution is often the critical factor, not learning theory (see Bourdieu & Passeron, 1977).

Taking a closer look at the international courses given in Virtual Learning Environments we observe that, in practical teaching situations, the methodology used in computer assisted instruction is moving more and more into ICT-assisted knowledge construction, distributed expertise and collaborative learning. Hyper- and multimedia-based sources of knowledge have, in many cases, replaced traditional study books with electronic books. ICT and networking can make the learning environment more open in terms of knowledge acquisition in all phases of education.

To analyse key issues in the implementation of teaching and learning in VLEs, we can refer to pedagogical functions as being the practical activities and methods in the learning environment that make learning possible.

When teaching and learning take place in virtual environments it should be kept in mind that there is already a didactical concept incorporated within this environment determining the scale of pedagogical functions made available for the courses. In the context of the Internet, first the technology itself limits the range of possibilities (dominance of texts due to bandwidth restrictions). Then comes the environment, based on the functionality of the technology, containing a certain design with a set of tools, functions, bars, fixed hierarchies and positions - again with some kind of pedagogical limitations provided at the final stage of the pedagogical design of courses.

This is less problematic if the environment can always be adapted to the spe-

List 1

Issues and examples for the design and development of a course (unsorted)

Requirements (objectives)	**Goals**	**Implementation**
Using the potential of the Internet for teaching and learning	Information exchange between participants and experts	• Integrating different synchronous and asynchronous media • Expanding education to other regional areas • Implementing institutional and personal co-operation and collaboration
Public conferences	Information exchange between students and experts/public	• Conference • Café
Internal discussions	Ensuring a protected and open communication	• Login/password-identification
Stimulation of a lively environment	Providing rich and varied learning space	• Weekly quizzes • Modular organisation of work and phases • Communication based approach
Allowing different forms of communication (Flexible learning: time)	Allowing participation at different times to reduce participation barriers concerning time schedules and geographically different time zones; respect user communication preferences	• Tools for synchronous communication: chat, desktop-videoconferencing (optional use) • Asynchronous discussion boards as main communication channel
Transparency	Allowing public evaluation of activities	• Anonymisation at the end of course and open, • Public access to previous courses
Open, easy and free access	No exclusion of interested persons for financial or technical reasons; respecting legal regulations in some partner countries	• No fee • Minimum technical requirements
Allowing participation from different local, regional, national and international places	Ensuring that an access from all places with different technical infrastructures is possible	• Web-based • Easy access (low technical barriers in accessing pages)
Providing access to learning material	Providing relevant information supporting the student in learning	• Online link library
Providing language assistance	Reducing fears and uncertainties in applying English language for writing and communication	• Language support
Enhance motivation and interaction	Cutting back of anonymity and encouraging community building; encouraging competition	• Access to compare standings (Online activities, grading) • Permanent user support and moderation • Personal homepages • Competitions • Multiple activities during course • Sending reminders when absence • E-Mail forwarding of Web-messages • 'Who-is-online' module • Self-assessment of work in addition to teacher grading
Using synergies	Managing limited personal resources for running courses	Connecting with other (e.g. presence) courses • Team training
Encouraging group activities	Guiding positive outcomes of group discussions and avoiding misunderstandings and mistakes; encouraging communication	• Moderation of discussions by instructors • Implementation tools for collaborative work on documents
Low administrative efforts	Reducing technical prerequisites for administration	Forms for web-based grading • Automatisation of actions (presentation of standings, activities) • Tools for grouping • Software for upload seminar pages

Table 1

Relationship between the ideas of knowledge and the nature of the learning environment (Wilson,1996)

Metaphor about knowledge, knowing	Consequence for the learning environment
Knowledge is a quantity or packet of content waiting to be transmitted	Products that can be distributed via different methods, media. (Electronic self-study materials)
Knowledge is a cognitive state as reflected in a person's schema and procedural skills	Combination of teaching strategies, goals and means to change the schemes of thought in the individual. (Teaching programme)
Knowledge is a person's meanings constructed in interaction with one's environment	The student acting and working in an environment with plenty of resources and stimuli. (Collection of tools and resources)
Knowledge is enculturation or adoption of a group's ways of seeing and acting	Participation in the everyday life and activities of the community. (Collaborative working environment; can also include the above-mentioned items)

cific needs as can happen with (often handmade) modularised developments, flexible and open from their technical concept. But there are pedagogical barriers to overcome and compromises to be made when standard software applications are chosen which are increasingly available in the commercial market. These environments (sometimes called 'Integrated Distributed Learning Environments – IDLE' [see McGreal, 1999]) are becoming increasingly popular, especially when teachers can run and easily administer courses without the full set of actions normally associated with implementing a Virtual Learning Environment. The variety of pedagogical functions is then reduced to the tools, which are offered by the pre-defined and standardised environment.

Principles for the pedagogical design

As a consequence of this shift towards a student-centred approach the building of 'learning communities' and 'collaboration' plays a crucial issue in instructional design of (social constructivist) learning environments.

General principles for such environments are cited by Chickering and Gamson in a recent report by the University of Illinois (1999):

(a) good practice encourages student-faculty contact;
(b) good practice encourages cooperation among students;
(c) good practice encourages active learning;
(d) good practice gives prompt feedback;
(e) good practice emphasises time on task;
(f) good practice communicates high expectations;
(g) good practice respects diverse talents and ways of learning.

This leads to several other principles for the design of a learning environment as listed by Cunningham, Duffy, & Knuth (1993):

(a) provide experience with the knowledge construction process;
(b) Provide experience in, and appreciation of, multiple perspectives;
(c) embed learning in realistic and relevant contexts;
(d) encourage ownership of, and input to, the learning process;
(e) embed learning in social experience;
(f) encourage the use of multiple modes of representation;
(g) encourage self-awareness in the knowledge construction process.

The listing becomes more concrete when relating it to Xiadong's (1995) presentation of a typical instruction design process:

(a) identify objectives (e.g., what do you want students to be able to do when they have completed the instruction?);
(b) assess students' prior knowledge and skills (e.g., determine whether the students in question have the prerequisites to benefit from the instruction);
(c) specify the content to be taught;
(d) identify instructional strategies;
(e) develop instruction (e.g., a learner's manual, instruction materials, tests, and an instructor's guide);
(f) test, evaluate, and revise (e.g. how should students be evaluated to determine

the degree to which students have met the performance objectives?).

Planning and development issues in VLE

Important issues relating to the design and planning of Virtual Learning Environments and courses taught within become clearer as a consequence of such considerations. However, the lists show that providing education in virtual learning environments requires many more aspects to be considered.

It should be kept in mind that teaching and learning always take place in a specific context. On the one hand this context is drawn by the infrastructure available in terms of manpower and competences, budgets and technologies. On the other hand the context is society, including teachers and learners formulating needs in regard to the environment and courses. Therefore an environment and its concepts are based on a certain level of needs, requirements and facilities.

Several stages of course design must be considered:

(a) analysis of basic conditions (e.g. infrastructure, resources);
(b) planning;
(c) development;
(d) course execution;
(e) evaluation.

The analysis stage can be characterised by examination of the contextual conditions mentioned above. Who is the user group, what is the technological environment, what is needed, what resources are available?

Conceptualisation can then be performed during the planning phase. Here various components have to be taken into account for the development of the environment and course delivery:
(a) information selection and design (e.g., learning material, guidance);
(b) communication (e.g., language, synchronous/asynchronous, channels: text, audio, video);
(c) organisation, management: (e.g., certification, scheduling, user administration, agreements on inter-disciplinary/international collaborations, fees);
(d) technological realisation (e.g., e-mail, chat-tools, video-/desktop-conferences);
(e) pedagogical issues (e.g. how to raise/maintain/increase motivation, how to implement/hold/improve interaction (teacher-learner, learner-learner, teacher/learner-environment) considering learning-cultures, design of assignments and control units);
(f) evaluation issues: (e.g. learning process and outcomes, deficiencies etc.).

During planning, development and execution, the Virtual Learning Environment demands many other important aspects to be considered in relation to pedagogical techniques. Teaching in VLEs also means numerous organisational aspects to consider. This point increases dynamically in inter-cultural settings and even more when the benefits of technologies are applied in the context of local, regional, national or international collaboration. So, being a good teacher also means being a good organiser and designer of information, communication, didactical implementation and media integration. Ideally the course concept varies according to cultures integrated, available infrastructure concerning technology and networks. This demonstrates too that, at times, teaching becomes a complex process to a higher degree than it is usual in traditional educational situations.

Although there are no limitations given concerning the number of students participating in typical Internet-based learning environments, it is obvious that, as more students participate, more organisational and administrative work is required. If education takes place on an international and inter-cultural level there are even more aspects to be considered related with the organisation of communication, the basic language to be used and taking into account cultural characteristics. Cooperation at international level is accompanied by more barriers than characterised by curricula differences between the higher education institutions. Organising inter-cultural cooperation would mean agreeing on the schedule of the course, which can become quite a complex process.

Closely related to these issues of teaching and learning is evaluation, which must be

carried out to determine the success of the environment and online teaching. Economic factors (cost of staff and technology) have to be assessed as well as pedagogic (quality of teaching, outcomes) ones. Evaluation activities consist of validation of knowledge as well as assessment of the students. According to a constructivist approach, it is essential to involve students in validating the information produced on the course. This will lead to more critical and reflective discussions (Gokhale, 1995) of the course contents and can make metacognition possible in students' learning processes. Special discussion forums for debates, criticism and collective commenting on written materials are good tools for assessment of students in the open learning environment.

So far, it is evident that teaching issues in virtual environments are multi-dimensional and directly inter-linked with other crucial aspects of activities both within and outside of the environment. This also explains why there is such a variety of environments and courses in the market.

Most of the learning environments studied allow open and independent learning, including methods that involve individual search for information and investigation. Education is offered in a flexible and open learning environment, taking into account important aspects of academic education: access to high quality information, of communication between students and teachers, among students and also with the outside world.

Although 'transparency' of technology is one of the most important goals in the learning environment, special technical tutoring might become necessary in open learning environments to prevent student frustration. It can help learners to get to know the technical equipment and software used, and so take charge of the tools in their learning environment. Multi-function learning environments built, for instance, on Web-based technology only require students to use a single application, a Web browser. Students need only minimum knowledge of information technology. Tutors can use an increased range of alternative channels to provide efficient tutoring (telephone, e-mail, tutorials, etc.) either at a distance or in a face-to-face context.

New pedagogical Strategies and Methods

What methods can be applied to online education? In his study of teaching techniques for computer-mediated communication published in 1998, Morten Paulsen interviewed 150 teachers and identified 24 techniques applied in virtual learning environments: project groups, discussion groups, case studies, online journals, debates, internships, nominal group techniques, learning contracts, apprenticeships, simulations or games, software libraries, online applications, forums, role plays, brainstorming, online databases, online interest groups, correspondence studies, symposiums, transcript based assignments, Delphi techniques, skits, interviews, and lectures (Paulsen, 1998).

In an open learning environment, learning can be largely directed by the learners themselves. Therefore the meaning of mentoring and tutoring, a system for supporting learning and study guidance, is particularly important. Tutoring can mean support related to the learning process, study contents, tasks or technical problems. According to Daloz (1990, p 223) effective mentorship is akin to 'guiding the student on a journey at the end of which the student is a different and more accomplished person. In a formal learning situation, mentoring functions can be understood as variously providing support, challenge and vision'. Tools for providing both tutoring and mentoring should, therefore, be adaptable for each purpose in Virtual Learning Environments.

In an online environment, you can expect mentoring to take on a new dimension. Here we are challenged to mentor in ways that Feuerstein (1980) and others define as mediation. Dialogue and inquiry become a powerful medium for collaborative learning. Discussion begins to carry a flow, a meaning. Threads of conversation can be woven together. Opinions and points of view become circulated as observations, assumptions and interpretations become visible. Effective guidance and mentoring can be achieved through selective intervention. A skilled moderator is a mentor who can keep the fragile balance between advocacy and inquiry. The moderator must facilitate rather than

dominate the discussion. When we focus on Vygotsky's (1987, 1986) idea of the learner's zone of proximal development, scaffolding, and dialogue, we have to turn our attention to fostering learning via virtual discussions, using strategies that include 'voice', address learning and writing styles, and utilise Socratic dialogue. These ideas require us to tend to both the individual and group learning process. If we want to further online discourse, it is important not to forget that this learning process is complex, social and interactive. Research in social collaboration and negotiation in the vein of Slavin (1987) and others, calls attention to the design and support of what these learning environments require. Responsibilities for discussion become shared, feedback becomes integral, and all participants, including the moderator, are equal. Both instructor and learner are challenged to grow and develop in this environment. Instructors grow to become moderators and guides and students grow as learners.

Online collaboration and effective moderating must be designed if they are to have comparable impact to face-to-face instruction. Through conscious effort and application, 'virtual' moderators can bring voice and tone into an otherwise sterile and distant environment, accompanying the learner as a reflective guide or, perhaps, much like a personal muse. Moderators are mediators and facilitators; generative guides and conceptual facilitators. The same issues that can be a weakness in a virtual learning environment can be exploited creatively to make learning come alive. Active learning is at the heart of the design of collaborative courses. Designing activities that ensure active participation is part of the moderation and discussion process. Facilitating the discussion is one aspect; another is making the participants responsible for their own learning by sharing the responsibility for leading group discussion and work. All participants in a course can be given the opportunity to experience being facilitators in discussion, team leaders, presenters of information, observers, and all are responsible for providing feedback and input into the learning process. However, for any of this to occur, a certain amount of control needs to be relinquished and turned over to the group. Moderators must stay in the shadows allowing the learner to shine.

However, perhaps at the heart of design is the feedback that the moderator needs to provide in order to support the learning process. Such feedback promotes and encourages continued growth as a learner and encourages collaboration. Substantive feedback not only needs to be built into the course design, it also needs to be modelled by the facilitators if we are to expect quality feedback from students. Feedback needs to be constructive. Participants need to connect; points of agreement as well as differences need to be discussed. A shared interdependence creates a collaborative environment.

Facilitation of student learning needs to be a scaffolded process – especially given the obstacles of a virtual learning environment. These are some of the obstacles that need to be considered and overcome by the moderation and mentoring process. Individuals may not be familiar or experienced with technology. Learning in a virtual environment is very different from face-to-face learning – there is the potential isolation of the student, the unfamiliarity of the electronic classroom, and the challenge of communication in an international environment in a text-based medium. Concerns for guidelines can be centred around the need to bring relative novices up to speed rather quickly – but concerns focus on skills that will provide a quality experience for the participants.

Specific considerations for the moderators include how to scaffold this learning process in order to guide and enhance the quality of the discussion. Issues currently discussed include:

- ❏ the moderation required;
- ❏ course organisation must define the roles and goals of moderation;
- ❏ how specifically to scaffold the learning process;
- ❏ how to distribute the responsibility between moderators and learners.

For example, if part of the learning objectives for the students is to learn how

to collaborate and engage in group collaboration, part of the objectives for the course must be for the moderators to explain and scaffold those activities through the course. The participation and influence of moderators as the course progresses changes as the students become more self-sufficient. Research with web-based discussion and collaboration tools support this position.

Supporting learners to create shared knowledge is not always an easy task. It takes a blend of skill on the part of the moderator, clearly stated goals and objectives, appropriately designed tasks and questions, and the tasks, technical 'tools', and access through which these activities can be effectively engaged. Two issues come to light. First, are the issues related to supporting and maintaining quality discussion; and second, the issue of shared knowledge in a distributed or social learning environment. Related to the construction of knowledge and creating a shared knowledge base for the participants, Bellamy (1998) asks should this knowledge base be totally constructed or should there be a common knowledge base on which to build the collaborative process. Part of the argument here may be determined by the construction and parameters of the course, how much time the students have, and the level and knowledge of the learners coming into the course. Experience has led us to observe that a common ground needs to be established, and encouraging communication and interaction is critical to the discussion. However, the biggest challenge lies in getting the learner to engage deeply and reflectively with the information. This observation is not uncommon. Guzdial in his research on online discussion forums, has found student participation and engagement with the information tends to be broad rather than deep (Guzdial, 1997). How do we better support reflected chat?

Supporting improved Teacher Competence

Within the context of new educational paradigms the role of the teacher can be characterised by the shift from acting as a content provider and 'transmitter' to being a mentor guiding and supporting learners through the process of knowledge acquisition.

Whatever kind of techniques are being used, pedagogues need special training for online-education. They must especially be qualified in knowing:

- how to reduce anonymity and to establish the atmosphere of a learning community;
- how to motivate and keep the motivation of learners high; how to avoid student frustrations;
- how to establish and maintain interaction among students, between teacher and students and between the user and the system;
- how to moderate discussions.

There is a set of tools, techniques and tricks which can be learned for application in virtual pedagogical settings. Nevertheless these must be taught to the staff concerned to avoid any repetition of mistakes, explorations and even in order to improve the applied methods in detail.

But there is a new burden that cannot be ignored - new task areas have to be covered by the teacher as well. Implementing teaching in Virtual Learning Environments requires competence in technological and organisational aspects, plus new qualifications in applying relevant didactical methods within this context. Even if several steps are covered by the technology and software tools - for instance, user administration - there remains much to be done within the process of design, implementation and evaluation of Virtual Learning Environments.

Many case studies report a high level of enthusiasm among teachers working in such environments (Berge & Collins, 1995). Nevertheless there should be some kind of justification for the time and money invested in today's education, if applied concepts good practice in European Higher Education. Since virtual teaching cannot be left only to enthusiasts and third-party funded projects, new qualifications for teachers are needed. It is important that teacher training is updated with these new forms of education

reflecting all crucial aspects already discovered and identified available literature. Future teachers must be introduced to technology and its educational application in order to be enabled to measure the whole range of possibilities available for organising education and teaching in this virtual context. Even when a sharing of work takes place within a team of specialists a minimum competence of knowing what others do is required. Some soft skills, such as working in interdisciplinary teams, become more important in this context and should be considered in teacher training.

Conclusion

Activities are needed relating to research, implementation and training. The speed of technological innovation forces policy to react immediately and to stimulate the speed of educational innovation for adequate application of ICT. Without doubt education is already changing with the increasing availability and implementation of ICT in educational settings (schools, universities, home, workplace, etc.). However, the current situation in using ICT for teaching and learning at European level is not satisfactory. Whereas the speed of technological innovations is increasing rapidly, adequate concepts are still needed for educational use. Further research will contribute to a better integration of ICT in education and training, supporting more effective learning. However, in order to ensure highest impact future actions should be directed towards either solving specific problems or improving the situation of traditional education (with ICT). Furthermore, investigation is needed into the potential of pedagogical concepts and technologies of new educational approaches, which might better contribute to meeting the needs of current and future education. This includes exploration of scenarios and experimentation in order to verify the effects of different contexts for learning.

With respect to new pedagogical approaches, collaborative learning remains a crucial issue to be explored in the future from different perspectives, taking into account organisational aspects of co-operation and collaboration as well as pedagogical ones, including staff development and pedagogical work in networked educational settings. Experiences are needed that demonstrate sustainable results and concepts of good practice, analysed in multi-cultural/European educational settings and based on different technological approaches.

It is still not clear yet to what extent the use of ICT and virtual learning environments will affect the daily life of teachers and learners. Since educational activities take place in varying settings, the organisational structure of educational institutions and units has to be adapted adequately in order to allow effective teaching and learning. Presuming that pessimistic statements which refer to an incompatibility of ICT use with traditional education are wrong, there is still more consensus needed on how learning can be adequately supported in order to find sound strategies for ICT-implementation and for providing effective education in Virtual Learning Environment settings.

As many cases show, use of information technology in education and training can result in increased flexibility between working life and study by bringing learning opportunities to the work place and by bringing working life closer to school. A prerequisite of open learning systems is, however, that educational policy and stakeholders such as educational institutions, libraries and other information sources, as well as industry and commerce, begin to perceive education from the viewpoint of lifelong learning. This requires collaboration and networking between the various parties.

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Collective learning: Theoretical perspectives and ways to support networked learning

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In this paper we draw attention to collective learning in the workplace. We focus on social learning from various theoretical perspectives, and discuss different forms of collective learning processes and outcomes. We argue that it is important to consider these differences when thinking of creating possibilities for groups to learn in organisations. Three types of collective learning (networks, teams, and communities) will be reviewed. We conclude that learning in communities is a powerful way to stimulate collective learning processes and shared collective learning outcomes. Finally we argue that workers in organisations are more and more stimulated to share and develop knowledge together with the use of ICT. ICT creates possibilities for networked learning, however we stress that it is also important to focus on group dynamics. They are crucial to coordinate and structure networked learning; two models to support this will be presented.

Introduction

Looking at Vocational Education and Training (VET), it seems that much attention is given to educational issues. In our view, more attention should be paid to the learning that goes on in the workplace. Traditionally, vocational education and training curricula and processes have been based on imparting a fixed body of knowledge and skills required for identified tasks within occupational roles. With the rapid rate of change in today's workplace, these roles and tasks are no longer fixed and predictable. Workers need to be able to adapt to new skills and processes and to update their knowledge on a regular basis (Attwell & East, 2000).

Organisations, therefore, are increasingly confronted with the problem of managing and creating knowledge in order to respond flexibly to changes in their working environment. They are becoming learning organisations and expect their workers to become lifelong learners. In a learning organisation, workers are stimulated to share and develop knowledge together in or about their workplace.

The learning potential of these groups has become a matter of interest, and social and cultural aspects of learning have become important to understanding and fostering the process. In this article we focus on social learning from various theoretical perspectives and describe ways of supporting collective learning in a networked environment.

Social and cultural aspects of learning

Increasing access to computers as communication tools means they play an important role in restructuring and advancing our current perspectives on learning and instruction, knowledge management and creation, etc. In society, schools and organisations, people are increasingly sharing, discussing, and negotiating knowledge through computer networks, therefore stressing the social nature of learning.

When we study learning at interpersonal level we look at social forms of learning. Social and cultural aspects of learning have, therefore, become important to understanding and fostering learning. Influenced principally by the work of Vygotsky (1962; 1978) many authors (Goldstein, 1999; Lave, 1988; Lave, 1996; Lave & Wenger, 1991; Levine, Resnick, & Higgins, 1996; Moll, Tapia, & Whitmore, 1993; Resnick, 1991; Salomon & Perkins, 1998; Simons, Van der Linden & Duffy, 2000; Smith, 1994; Wegerif, Mercer, & Dawes, 1999; Wertsch, 1991), in attempting to define cognition in groups, have suggested that, in a group meeting, the situation itself may exert a strong mediating effect on individual cognitive and conceptual processes. The thinking of individuals is influenced by the group in which they are working. The merger of intellectual and social processes may be a fundamental feature of group mediated cognition.

A second key feature is the tension between the conceptual structure or understanding (of the problem or ideas under discussion) of the group and that of the individuals within it. Understanding may vary among individuals and also between individuals and the group. This tension is the driving force for the collective processing of the group. So, for example, when an individual member of the group expresses an opinion in relation to the shared public understanding of the group, this will be based on an attempt to synthesise personal understanding with the public one. The other members of the group will compare this new synthesis with their individual understanding of the group-accepted version and their individual disagreement with it.

Depending on the outcome of this process, there may be further interaction and negotiation until a new meaning or understanding is accepted by the group. In this process, interaction between individuals, as well as their shared and individual cognitions, are the key aspects of joint construction of knowledge, meaning and understanding.

This article accepts the premise of this social-constructivist view of learning: learners linking new knowledge to their prior knowledge (i.e. learning as a cumulative process) and learners constructing new internal representations of the information being presented (Boekaerts & Simons, 1995). Learning is a process by which the learner personalises new information by giving meaning to it, based on earlier experiences. Meaning is seen as rooted in, and indexed by, experience (Brown, et al., 1989). Each experience with an idea, and the environment of which that idea is part, becomes part of the meaning of that idea (Duffy & Jonassen, 1992). Learning is, therefore, understood as situated in the activity in which it takes place (Brown, et al. 1989; Lave & Wenger, 1991).

Whereas social-constructivist perspectives make a distinction between individual cognitive activities and the environment in which the individual is present, the socio-cultural perspective regards the individual as being part of that environment. Its supporters point out that learning cannot be understood as a process that is solely in the mind of the learner (Van Boxtel, 2000). Knowledge is distributed over mind, body, and its surroundings (Hewitt & Scardamalia, 1998) and is constructed in settings of joint activity (Koschmann, 2000). Learning is a process of participating in cultural practices, a process that structures and shapes cognitive activity (Lave & Wenger, 1991). The socio-cultural perspective gives prominence to the aspect of mutuality of the relations between members and emphasises the dialectic nature of the learning interaction (Sfard, 1998). Construction of knowledge takes place in a social context, such as might be found in collective activities.

In addition, Lethinen et al. (1999) argue that conceptual understanding is fostered through explaining a problem to other students. Therefore, in collaborative learning it is necessary to formulate learning objectives together, to make learning plans, to share information, to negotiate about knowledge and to take decisions (Veldhuis-Diermanse & Biemans, 2000). In a setting of collaborative learning, students can criticize their own and other students' contributions, they can ask for explanations, they can give counter arguments and, in this way, they will stimulate themselves and the other students. Additionally, they can motivate and help each other to finish the task.

These various perspectives on social learning and coming from different orientations such as psychology, sociology and anthropology, are present in different social configurations, in which collectives learn.

In our practice, we found that it is very useful to distinguish different variants of collective learning, because the collective ones especially are difficult for people to conceptualise. They think, for instance, that they are learning collectively when they are involved in teamwork or a network. When this occurs, people fail to organise the possible, more explicit collective outcomes. Sometimes people undergo or undertake learning together but without any actual or intended collective outcomes. Then the learning processes are collective, but the learning outcomes may be only individual ones. In other cases, however, actual or intended outcomes of

learning (in terms of learning and/or in terms of changes in work processes or outcomes) are collective.

Thus there is a distinction between learning in social interactions (with and from others) and collective learning (where the members consciously strive for common (learning and/or working) outcomes). These forms of collective learning are also called group learning and organisational learning. We prefer to use the term 'collective learning' for systems where the intended outcomes (and perhaps, but not necessarily, the processes of learning) are collective.

Table 1 shows the four possibilities, of which three are collective: individual learning processes leading to collective outcomes, collective processes with individual outcomes, and collective processes with collective outcomes. How can one make the step from individual outcomes to collective outcomes? We think that there are three answers to this question:

❑ when groups or organisations reflect upon the common implicit outcomes of learning;

❑ when they reflect on or plan common explicit learning outcomes;

❑ when they define common plans for externalisation in the group or the organisation.

Table 1

Individual and collective learning processes and outcomes

Outcomes / Processes	Individual	Collective
Individual	Individual learning	Individual learning processes with collective outcomes
Collective	Learning in social interaction	Collective learning

Forms of collective learning

Collective learning is gaining importance. The accelerating developments in our society make it necessary, but not sufficient, to have excellent groups of individuals in a workforce. Increasingly, people need to be able to work together in solving problems and innovating more accurately and more quickly. To highlight the different compositions of collective learning we propose roughly (read broad) three types of collective learning: learning in networks, learning in teams and learning in communities (de Laat, 2001).

These types share common elements, but also harbour distinct differences. The similarities let us think about social learning perspectives and contexts for learning. The differences make us realise how the intentions and outcomes of the collective affect learning practices within the group. The main difference is the learning intention of the groups. In this respect two perspectives on collective learning can be distinguished: organisation-related collective learning and profession-related collective learning.

Organisation-related collective learning refers to the processes and intended outcomes of learning at the workplace or within an organisation. Groups decide to collaborate in learning, focusing on common learning activities and processes or on common outcomes related to their work. In 'communities of practice' (Wenger, 1998), people, within an organisation, who decide to learn from their work, come together to discuss their shared practice. The collective learning outcomes are strongly related to the work context. Their interest is in improving their work.

Profession-related collective learning consists of professionals working in different organisations, but sharing the same profession, who decide to learn together from their different practices. They do not have a common interest in one organisation; they may even be competing for the same clients. Their interest is in learning. Therefore, we call this communities of learners and not communities of practice.

Table 2

Different types of collective learning

	Implicit	Explicit
Individual outcomes	*Networking*	*Learning team*
Collective organisational outcomes	*Working team*	*Community of practice*
Collective profesional outcomes	*Working team*	*Community of learners*

Collective outcomes can be partly the same as those of communities of practice, but collective professional outcomes relate to contributions to the professional field. In a community of learners (compared to communities of practice) there is a weak relationship between collective learning outcomes and work context. Each individual member has to 'translate/convert' the collective professional outcomes to their own work context.

In many cases, however, teams do not have explicitly intended (collective) outcomes. The outcomes are then either individual ones only (learning team) or they remain tacit for the group members (working team). Then the concepts of communities of practice and communities of learners do not apply at all. Table 2 presents the possibilities.

Next we will discuss each type of collective learning more in detail. First we describe learning in networks, then learning in teams and, finally, learning in communities.

Learning in networks

Learning in (social) networks is the most loose form of collective learning. People in a network share a common interest, exchange ideas, and help each other. They call on each other when they have a problem to solve or something to offer (Dekker & Kingma, 1999). They participate voluntarily and have a great deal of personal freedom. Although individuals within the network frequently meet person-to-person, the whole network rarely meets (McDermott, 1999).

Networks facilitate individual collaboration and leave it to the individuals to determine the content and form of knowledge-sharing (Walton, 1999). In such a network, according to Walton, power is distributed; everyone owns their own situation. Those who can make continuous adaptations to discontinuous change survive and flourish. People create through their network new shared meaning. They legitimise new ways of behaving. They provide systemic (as opposed to programmatic) solutions and they provide a framework in which focused improvement efforts can be launched. Walton points out competences people must have to be able to learn and participate in a set of relationships in order to operate within a network.

Several relevant competences are (see Walton, 1999, p. 541):

(a) spanning structural boundaries: establish broad networks across existing hierarchy and work them directly, making opportunistic use of meetings;

(b) making transitions: use transitions as opportunities to learn new skills, look for alternatives/role models, tend to dive in and enter quickly, stay focused on needs being served, facilitate major change through communication, set new expectations, and build trust;

(c) communication skills: engage in building shared meaning, focus on the need of others and anticipate questions, the real communication tends to go on outside meetings;

(d) problem solving: look at the whole situation (out of boundary or lateral thinking) or the big picture, and coaching others;

(e) power relationships: treat bosses as coaches or mentors, as supporters or as people who could add value to an idea. Play leadership roles without authority.

Learning in teams

Where networks are loosely coupled, teams have a more structured pattern.

Collective learning in teams is task-oriented. Where people in a network contact each other to solve a work-related problem, teams are initiated or created around a certain task or problem that has to be solved. Characteristic of learning in teams is the temporary nature of teams. They are established for a certain task; when this is completed the team breaks up.

When thinking of learning in teams, a distinction must be made between working teams (organisation-related collective learning) and learning teams (professional related collective learning). The learning that goes on in working teams is implicit but increasingly recognised as an important asset for the organisation (Nonaka & Takeuchi, 1997; 2001; Engeström, 1999a; 1999b; Eraut, 1998).

An example of learning in working teams is drawn from the work done by Engeström. He uses the activity theory to analyse work practices, also called activity systems. Activity systems are social structures in which people learn and work together. Learning outcomes can be implicit and a side effect that remains unnoticed. Activity theory provides three characteristics for analysing learning in work teams (Engeström, 1999a):

(a) activity theory is deeply contextual and oriented at understanding historically specific local practices, their objects, mediating artefacts, and social organisation;

(b) activity theory is based on a dialogical theory of knowledge and thinking, focused on the creative potential in human cognition;

(c) activity theory is a developmental theory that seeks to explain and influence qualitative changes in human practices over time.

Collective activity is driven by a communal interest. This communal interest forms the object of the activity. The object in turn is to be understood as a project under construction, moving from potential 'raw material' to a meaningful shape and to a result or an outcome (Engeström, 1999c). During this process, expansive learning may occur.

Expansive learning is a dialectical process by which contradictions lead to tensions in the activity system and enable transformation. Contradictions act as starting points and energy sources for development. Expansive learning begins with individual subjects questioning accepted practice, and it gradually expands into a collective movement (Engeström, 1999c). The activity system model developed by Engeström (1987) provides a way to describe the actions that take place within the working team. The model provides a holistic picture of a collaborative knowledge construction process and its interdependences, and can help to organise thorough description of such systems (Hansen, et al., 1999,). Human activity can be described as an interdependent system of several components, namely: subjects, tools, rules, community and division of labour (see Engeström, 1987 for a detailed description).

Learning in working teams is not only implicit but – as with the working team itself - can also be temporary. Instead of being part of a stable working team, the combinations of people collaborating to perform a task may change constantly. Yet in their basic pattern, they are continuously repeated (Engeström, 1999b).

Engeström recognizes the temporary notion of working teams and suggests the concept of knotworking to capture the innovative and creative nature of team learning. Knotworking is related to the rise of temporary groups (Meyerson, Weick & Kramer, 1996). However teams are understood as one-time formations created for the purpose of completing a task with a clear deadline. Knotworking suggests a longitudinal process in which knots are formed, dissolved, and reformed. The notion of a knot refers to rapidly pulsating, distributed and partially improvised orchestration of collaborative performance. Engeström therefore suggests that the knot itself should be the focus of attention.

The intention to learn within a learning team is different from a working team. A learning team is formed to explicitly study a certain task or problem. The members of a learning team organise meetings and make agreements on how to complete the task. Huczynski & Buchanan (2001) speak in this context about project teams. According to them, a project team consists

of individuals who have been brought together for a limited period of time (from different parts of the organisation) to contribute towards a specified task. Once this has been completed, the team is either disbanded or else its members are given new assignments.

Project teams are created when:

❑ creative problem solving is required involving the application of different types of specialised knowledge;

❑ there is a need to coordinate closely the work on a specific project.

The project teams are overlaid upon the existing functional structure of the organisation, and hence are an addition to it.

Learning teams, in summary, have the following characteristics:

(a) representative: they are representative in that their individual members usually retain their position their 'home' functional department;

(b) temporary: they have a finite life, even if their end is years in the future;

(c) innovation: they are established to solve non-conventional problems and meet challenging performance standards.

An example of team learning is action learning, a term introduced by Revans. With it he meant creating learning teams to work on real organisational problems and to structure experiences in such a way that both useful solutions to these problems emerge and substantial learning occurs for participants. This offers learning that goes on beyond the technical details of the particular problem (Vaill, 1996). Within those learning teams people come together to discuss their own real work-related problem and share this project with the other members.

Although action learning can be transferred to a wider scope, its focus was mainly on management education. Some elements of action learning are relevant here (see Mumford, 1999 for a more elaborate description). First, the learning process is social; people learn best with and from one another, but the members are responsible for their own achievements in their own project. Next, the social process is achieved and managed through regular meetings in which individual projects are discussed. The group is usually called a set. The members are comrades in adversity (Mumford, 1999). Third, the role of people providing help for members of the set is essentially and crucially different from that of a normal teacher. Their role is not to teach but to help to learn from exposure to problems and to one another.

Learning in communities

Teams are as we just mentioned created to solve a predefined problem. Communities are emergent (Brown & Duguid, 1991). Their shape and membership emerges in the process of activity, as opposed to being created to carry out a task. Communities emerge around a topic of interest shared by voluntary members. They can be characterized as an informal group that emerges from spontaneous interaction between persons as they talk, joke and associate with one another (Huczynski & Buchanan, 2001). Huczynski and Buchanan define informal groups as a collection of individuals who become a group when members develop interdependences, influence one another's behaviour and contribute to mutual needs satisfaction.

According to Ackroyd and Thompson (1999) groups organise themselves around shared interests, through establishing autonomy by defining what their community is about and creating boundaries, and by establishing identities (individual identities through group membership and group identity by which groups can be distinct from each other). Barth (1981) argues that a group can be described in terms of how members imagine the community's boundaries. Some are core members; others participate more peripherally (Wenger, 1999).

In communities the intention to learn is based upon individuals who have a certain learning goal for themselves but come together to learn as a group to help out each other. They share insights and negotiate and create knowledge together. Over time a sense of belonging arises between the participants. Membership to a community is voluntary and people stay

a member as long as they are interested in the theme that is discussed within the community. In this article we focus on the emergence of communities in two different contexts mentioned earlier. One is situated in a professional context; the other draws its attention on an organisational setting. When we speak of the professional context we refer to communities of learners. In work settings we refer to communities of practice.

First we will discuss communities of learners. Here we draw inspiration from Brown and Campione, who introduced the concept of communities of learners, and from Scardamalia and Bereiter, who introduced the concept of the knowledge-building community.

The approach of communities of learners developed by Brown and Campione (1994) is a pedagogical model that is designed to take advantage of the distributed expertise and cognitive diversity. The approach is focused on adopting the goals, values, beliefs, and forms of discourse characteristic to scientific practice. Conceptual advancement is made by cultivating each members' own expertise. The participants engage in self-regulated and collaborative enquiry, being responsible for the task as a group (Lehtinen *et al.,* 1999).

The participants are apprentice learners, learning how to think and reason in a variety of domains (Brown *et al.,* 1997). In a community of learners they try to foster supporting and overlapping zones of proximal development that stimulate growth through mutual appropriation and negotiated meaning.

Scardamalia and Bereiter (1994) speak of a knowledge-building community when there is a culture of learning that seeks to advance collective knowledge and in consequently supports the growth of each of the individuals in the community. Organisations that adopt the knowledge-building approach have to shift from learning to construction of collective knowledge (Scardamalia & Bereiter, 1999).

This shift involves treating students as participants in a learning organisation instead of as clients that receive knowledge. The students are, therefore, engaged in producing knowledge objects that also lend themselves to being discussed, tested, and so forth without particular reference to the mental states of those involved, and where the students see their main job as producing and improving those objects (Scardamalia & Bereiter, 1996).

By introducing the concept of knowledge-building Scardamalia and Bereiter give form to the socio-constructivist perspective of learning, in which knowledge is situated and distributed, and that learning must be seen as a process of participating in various communities in which knowledge is being shared, negotiated, and advanced. They let go of the idea that knowledge is solely an asset residing in people's mind. The conception of knowledge as a resource or knowledge as a product, as something that can be created and improved or found to have new uses, is put to use in knowledge-building communities. The knowledge-building process can be characterised as follows (Scardamalia and Bereiter, 1994):

❏ focus on problems and depth of understanding – the focus is on problems, and engaging community members in producing and advancing theories to explain increasingly diverse and seemingly contrary ideas, that come to light trying to solve these problems;

❏ decentralising, open knowledge building communities focusing on collective knowledge – social interactions are expected to realize constructive responses to one another's work to ensure that the community is working at the forefront of their collective understanding.

In a context of learning in work practices people refer to the term communities of practice (Brown & Duguid, 1991; Wenger, 1998; 1999). This is based on the notion of Lave and Wenger (1990) who describe learning as legitimate peripheral participation in various communities. According to Brown and Duguid (1991) workplace learning can best be understood in terms of the communities being formed or joined and personal identities being changed. Their central issue in learning is becoming a practitioner, not learning

about practice. In a community of practice, participants, who share a common interest in the field in which they work, come together to help each other, solve problems, and share and create knowledge collaboratively.

A community of practice, therefore, is a group of people informally bound by a shared practice related to a set of problems. They typically solve problems, discuss insights, share information, talk about their lives, and ambitions, mentor and coach each other, make plans for community activities, and develop tools and frameworks that become part of the common knowledge of the community. Over time these mutual interactions and relationships build up a shared body of knowledge and a sense of identity. They constitute an informal, social structure initiated by members and reflecting on their collective learning (Wenger, 1999, p. 4).

A community of practice defines itself along three dimensions (Wenger, 1998; 1999):

(a) what it is about – a joint enterprise as understood and continually renegotiated by its members;

(b) how it functions- mutual engagement that binds members together into a social entity;

(c) what capability it has produced - the shared repertoire of communal recourses (routines, sensibilities, artefacts, vocabulary, styles, etc.) that members have developed over time.

All these different forms of collective learning can be present in an organisation at the same time. An employer can even be part of various collectives both as a worker and as a learner. But how can this collective learning be stimulated and supported within organisations?

At the beginning of this article we said that ICT plays an important role in creating possibilities for communication between people. ICT has an advantage in bringing people together without time and place constraints. Organisations nowadays make use of knowledge management systems, stimulating workers to share and create knowledge. These systems are being used with some enthusiasm, but outcomes do not always meet expectations. Brown & Duguid (2000) argue in their book *The social life of information* for more attention to the contextual and social processes that are present while using certain ICT-tools. In our view (de Laat, De Jong & Ter Huurne, 2000; de Laat, De Jong & Simons, 2001) it is important to support collective learning through ICT by focussing on the group dynamics that are needed to organise and coordinate learning and to support the clarification and the aim of the discourse by providing insight into how knowledge is created.

Supporting collective learning in ICT networks

ICT tools such as groupware applications play an important role in bringing people together and offer a platform through which collectives communicate, share information and learn. Organisations are increasingly making use of knowledge management systems, which are designed not only to retrieve knowledge from databases, but also offer possibilities to discuss and update this knowledge based upon new experiences of their employers. In modern organisations, workers are stimulated to share and develop knowledge together.

There are many different ICT tools available for this purpose. We argue, however, that for learning it is important to focus attention on how to organise and support learning independent of which tool is being used. Groupware applications offer the possibility for shared workspace, but do not seem to provide enough support for the group to regulate their own learning activities. Hakkarainen *et al.* (in press) argue that members in a networked environment are not able to work productively with knowledge alone, but need considerable pedagogical guidance and expert modelling.

This is especially true for collaborative learning in an organisation. In a classroom setting there is always the teacher who can regulate the learning activities

of the group. Communities of practice, in contrast, have to be self-regulative to be constructive learners. This involves being able to apply cognitive, metacognitive and affective learning activities to regulate the discourse (Boekaerts & Simons, 1995; Van Hout-Wolters, Simons & Volet, 2000; Vermunt, 1992; De Jong, 1992).

For online communities of practice to become used to sharing knowledge, deepening their own and common understanding and creating further insights, it seems to be crucial for them to be able to coordinate, clarify and regulate the discourse themselves. A study with a centre for expertise in the Dutch police force indicated that members of an online community desire more structure and support to guide the learning activities of the community as a whole (de Laat, De Jong & Ter Huurne, 2000). This community had difficulties in coordinating discussion and clarifying the goals and direction of the discussion.

The two kinds of support introduced in this article are two possible ways, in our view, of addressing this problem. The first type of support derives from a content-driven perspective by introducing a discourse model; the second from a group dynamics perspective by assigning roles to the members of the community. These two kinds of support can be used separately but, in combination, they can strengthen each other.

Progressive enquiry

The model of progressive enquiry can be introduced to assist clarification of the content and the aim of the discourse enquiry. This model, developed by Hakkarainen (1998), addresses the way knowledge is created in scientific communities. Progressive enquiry engages members of the community in a step-by-step process of question- and explanation—driven enquiry (Hakkarainen & Muukonen, 1999). An important distinction (or addition) with reference to other problem-solving cycles is the emphasis on development of shared expertise. Making use of the distributed expertise of the community members, the aim of this model is to support the collaborative problem-solving process resulting in a shared understanding.

The successive elements of progressive enquiry are discussed below.

Creating the context

To be able to explore the problem more deeply, members have to become familiar with it. A context needs to be created to clarify why the issues in question are relevant and worth investigating (Hakkarainen, 1998). This way the community develops a body of understanding that serves as an anchor for the formulation of the problem statement or research question.

Setting up research questions

The next step is to set up questions that guide the process of enquiry. Scientific enquiry can be seen as a problem-solving process. Initial questions guide and direct the search for information.

Constructing working theories

Once the community has agreed on an initial research question, the members are invited to construct their own interpretation. Construction of personal working theories guides the participants to use their background knowledge to offer an explanation for the problem. A first knowledge base of the communities' understanding of the problem is being created.

Critical evaluation

This knowledge base or inventory of distributed expertise needs to be evaluated. Critical evaluation is important to assess advancement in the theories or explanations being offered. Through evaluating whether, and how well, the working theories explain the chosen problems, the community seeks to assess strengths and weaknesses of different explanations and identify contradictory explanations, gaps in knowledge.

Searching deepening knowledge

Considerable advancement of enquiry cannot be made without obtaining new information. By examining prior problem statements or working theories with the help of new information, the community may become aware of their inadequate

presuppositions. New information may help them to reconstruct their conceptual understanding of the problem.

Engagement in deepening enquiry

Progressive enquiry is a process of further refinement. At first the community has a broad conception of the problem that leads to general questions. After inventory of prior knowledge and searching for new information, more specific questions emerge. Advancement in enquiry is captured by examining a chain of (ever-deeper) questions.

Constructing new working theories

By finding answers to subordinate questions, the community comes closer, step-by-step, to answering the initial question or problem statement.

Shared expertise

All the above mentioned elements of this model will be performed and shared by all the community members. Cognitive research indicates that advancement of enquiry can be substantially elicited by relying on socially distributed cognitive resources, and collaborative efforts to advance shared understanding and expertise (Hakkarainen, 1998).

Introducing this model of progressive enquiry offers support in structuring and regulating the learning activities of participants.

Roles

In the second type of support, several roles are introduced to stimulate interdependence and collaboration (Johnson & Johnson, 1999; Forsyth, 1999). These roles are chairman, process evaluator, content evaluator, log keeper, and technical support.

To stimulate interdependence, each member must have a unique contribution to make to the community. Therefore the community must consist of members who deal with the work-related problem from different perspectives, which creates a heterogeneous community that can accomplish something an individual could not alone (Johnson & Johnson, 1999). To accomplish this, someone has to play the role of a chairman, who will be responsible for overall coordination.

Specific tasks of the chairman are to:

(a) invite people into the community according to their expertise;

(b) provide an introduction to the work-related problem;

(c) make sure that the members give an introduction to the others, about what their expertise is, why they join this community and what they expect both for themselves and for the community;

(d) suggest a learning agenda, in which the learning goals will be clarified, and the roles will be assigned.

Effective collaboration is influenced by whether or not the community reflects on its own learning activities. To foster collaboration is to structure the community processes. The purpose of community processing is to clarify and improve the effectiveness of the members in contributing to the collaborative efforts necessary to achieve their goals (Johnson & Johnson, 1999).

A number of roles are identified to stimulate this, the first of which is the process evaluator, responsible for evaluation of the activities of the participants. The specific tasks of process evaluator are to:

❏ Maintain contact with all the members to stimulate their engagement and to promote active participation. In order to contribute to each other's learning participants need to attend, be prepared and contribute to the community efforts;

❏ assess the quality of the interaction, by applying to the individual's expertise. Stimulate the cohesion of the community, and ask for suggestions on how community efforts can be improved.

A second role is that of content evaluator. Participation needs more than just stimulation; the content of contributions needs to be evaluated and structured. When members of a community become involved, their different expertise, perceptions, opinions, reasoning processes, theories and conclusions will result in intel-

lectual disagreement and conflict (Johnson & Johnson, 1999). Specific tasks of the content evaluator are to:

❑ structure the contributions in the knowledge base. When managed constructively, an active search for more information, a reconceptualisation of contributed knowledge and conclusions will lead to knowledge building activities;

❑ assess the quality of the written contributions in the knowledge base. For all these contributions to be managed properly, the knowledge base that has been built needs to be reflected upon. The community must reflect on whether or not they are working towards the goals that are being set in the learning agenda. They need to assess the quality of their work, conclusions and summaries have to be made to be able to engage in a deeper analysis of the problem.

A further role is that of log keeper. In addition to structuring the content of the contributions, the discussion process needs guidance. A logbook helps the community to clarify or reread various steps that have been taken during the discussion process. This can be understood as a learning agenda in which the learning goals are expressed. Other functions are to keep track of the decisions that have been taken, clarify what kinds of arrangements have been made, etc. This will provide insight into how the discussion has taken place and can help newcomers to follow the discussion so far.

Finally there is the role of technical support. This covers actions such as providing information about how to work with the programme, finding solutions for technical problems (getting logged on, uploading files, etc.).

These roles offer the community support in organising collaborative learning. The person who is assigned to a certain role does not necessarily have to carry out all the tasks alone; tasks can be delegated to other members in the community. What is most important is that people feel (or can be addressed to) a responsibility for keeping the discussion alive and moving in the desired direction.

Conclusion and Discussion

In this article we discussed the various forms of collective learning and tried to conceptualise them. We think it is important to consider that people undergo or undertake learning together, that sometimes they learn without any actual or intended collective outcomes, and that sometimes learning goals are made explicit in advance. This is important to realise when thinking of creating possibilities for groups to learn in organisations.

By conceptualising different forms of collective learning we provide an overview of what collective learning is and how it can be organised. When people are fostering collective learning in organisations, it is important to take into account that different forms of collective learning result in different learning outcomes. In our view, fostering participation in communities of practice and communities of learners is a powerful way to stimulate people to learn collectively because collective learning is manifested most in this form of social learning.

The distinctions we offered also help in considering what kind of ICT tools are helpful to stimulate learning. We are aware that there are numerous different types of ICT tools, all with their strengths and weaknesses, but in our view the most important thing in supporting group learning in a networked environment is to focus on the learning processes that are needed to foster collaborative learning. In this article we proposed two kinds of support for fostering collective learning by focussing on the social and content aspects of learning. At the moment these models are the subject of research. Preliminary results, however, indicate that these models support participants in regulating and structuring discourse.

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Can organisations learn to learn?

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Although the concept of the 'learning organisation' has acquired paradigmatic status in recent years, there are very few approaches which help us to have a better understanding of how organisations learn. If we take a look at the few available diagnoses, the picture tends to be rather dismal. Quite in contrast to rhetorical proclamations, the learning behaviour of real organisations consists of abstinence. By restricting learning to an increase in knowledge of rules, organisations relinquish the possibility of acquiring additional flexibility and autonomy and of getting a better understanding of their own learning behaviour. It is true that some unconventional forms of the learning required develop in niches, but precisely for that reason they lack relevance for the average organisation. The aim of the following article is to discuss possible gaps in this issue and to propose solutions. The approach is an ecological broadening of perspectives as a background for the emergence of additional learning option for organisations.

Nowadays nearly all material published by applied organisational research makes some reference to 'the learning organisation' as a new model for holistic, sustainable organisational development. 'Management of change' is intended to provide the key, i.e. the means and the aims of forward-looking learning organisation.

However, if we look more closely at the proposed concepts, we can see that in most cases organisational learning is equated with individual learning processes. As if that were not enough, the confusion is exacerbated by the tendency to unthinkingly apply subject-specific, reflexive learning concepts such as 'lifelong learning' or 'social learning' to organisations, or vice versa ([1]).

But simple examples have already proved that an analytical distinction must be made between the organisation as a learning unit and its personnel or members. A company's employees can engage in additional training without the knowledge they acquire necessarily having a positive effect on the company. This is particularly true when acquisition of new skills prompts employees to transfer to another company. On the other hand, strategic measures such as increasing the division of labour can provide companies with skills advantages, while at the same time dequalifying their staff.

If we take the claim of the 'organisational learning' programme seriously and view organisations as collective entities of learning processes, existing findings give cause for concern, since up to now we only have evidence of 'simple' learning processes ([2]). Organisations overwhelmingly tend to focus on acquisition and development of rule-based knowledge instead of on global skills and complex learning. 'The primary learning result is stricter conformity of activity and, consequently, predictability of organisational processes in formally regimented categories' ([3]). The instrumental rationality model steers learning processes using the minimum location principle, but this by definition excludes recursive and reflexive concepts such as innovation or management of change, since they logically contradict the economy drive and do not naturally fit into the coordinate system of regular structures ([4]).

This blindness towards new learning demands is to some extent rational since, particularly 'under conditions of extreme uncertainty ... 'stubbornly' applying a preordained set of rules results in a higher average success rate than that of experiments with strategies lacking sufficient information. The maximum attainable rationality level is that of local optimisation' ([5]). Organisations also behave rationally on another level in cases where simple learning structures are retained. Since an unbridgeable gulf in complexity exists between the organisation and its environment, learning structures must remain revocable, should new decisions entail this ([6]). Paradoxically, it is learning structures based on instrumental rationality which seem to guarantee this kind of reversibility, since the comparatively long-term learning cycles and the general reduction in learning speed allow scope for decisions on changes in the target system's decision-making process. However, regimented organisations cannot exploit these redundancies, since they are bound to abide by regulations which prohibit the acquisition of reflexive skills, i.e. complex learning, at the risk of performative self-contradiction.

Organisations focusing on simple learning thus face two fundamental difficulties.

On the one hand, in the case of simple learning, material success depends exclusively on the appropriateness of the situation. Hence learning triggers and goals are determined by catalyst events in the organisational environment and cannot be dictated by the organisation itself. On the other hand, complex environmental considerations necessarily make simple learning tautological, since newly emerging problems can only be tackled either by temporary adjustment of rules or via stricter enforcement of regulations, even if those applied prove to be obviously inadequate.

In recent years several concepts have been negotiated to break this cycle ([7]). The first proposal was the 'complex learning' model. This focuses on encouraging the growth of organisational learning by increasing behavioural variability, i.e. developing flexibility and environmental independence. In contrast to the simple learning model, which is always conditioned by the environment, in this model learning is initiated by the individual, based on changes in behaviour. The possibility of alteration to the operational, normative and cognitive conditions of organisations' knowledge systems seems directly proportional to the increase in contingency between the organisation and its environment. Ideally and typically, organisations gain 'new knowledge' during the course of complex learning processes. This organisational knowledge, which takes the form of accepted causal relationships and context variables within the relevant situation, can be updated communicatively through interaction with other organisations or the environment ([8]).

Although empirical evidence of complex systems does exist within learning organisations, it shows that the formation of structures of this kind depends on very different factors that lie partially beyond the influence of the organisation and its members. Therefore, in turbulent environmental conditions, active, explorative learning strategies for the acquisition of new knowledge can only result from prospective action based on highly selective information, whereas analytical and sustainable knowledge-boosting strategies require relatively stable environmental conditions. In contrast to the simple learning process, organisations must also expect repercussions on the organisational conditions themselves, particularly the redistribution of skill structures and the resulting (negative) reactions from the individuals and groups affected.

Ideally, 'complex learning' permits a quantitative increase in interpretations of reality, but does not yet allow for the formation of reflexive learning strategies along the lines of double-loop learning or the more complex 'cognitive strategies and attitudes' ([9]).

If we follow current debate, we can confirm that there is a clear tendency to exercise restraint on the reflexive capabilities of organisations. Neither empirical findings for the second level of organisational learning, nor theoretical-analytical interpretations of collective assets are available. In other words, organisations seem unable to refer to their own learning processes, to assess the success or failure of learning experiences, or to draw conclusions for future action. One might almost say that organisations are 'blind' to their own learning situation. Self-determined, reflexive learning thus remains the responsibility of individual organisation members. The disadvantage of this is that although they have a clear picture of the cognitive requirements of their own learning, they cannot appreciate the learning parameters underlying the entire organisational process.

Nevertheless, in the reality of everyday organisational life, cases of non-linear and 'far-reaching' learning do emerge. However, these are not usually planned, nor are they consciously recognised for what they are. On the contrary, exceptional situations, where organisations have to cope with a partial loss of control in some peripheral areas, can become potential learning situations, in which even the identity of authenticated assumptions becomes ambiguous. Sometimes organisations are compelled to face unexpected environmental occurrences, for example, in the case of intrusions. These can take the form of invasion (loss of control in regard to membership), dissidence (loss of control with regard to deviating interpretations of reality and 'rationality references') and intersection (loss of control with regard to the inter-penetrative, redirecting effect of external knowledge systems). These

([1]) Cf. for example: Meinolf D. et al. *The Annotated Bibliography of Organisational Learning.* Berlin, 2000.

([2]) Wiesenthal, H. Konventionelles und unkonventionelles Organisationslernen. Literatur- und Ergänzungsvorschlag. *Zeitschrift für Soziologie*, 1995, Vol. 24, No 4, p. 138.

([3]) Ibid.

([4]) Of course, this can also trigger organisational transformation. However, organisational learning differs from simple 'preservation of existence' in the sense that it characterises the 'process of intended, enforced change of structural and cognitive organisation variables'. Wiesenthal, H. Neun Thesen zur theoretischen Konzipierung tiefgreifenden Organisationslernens. Contribution to the workshop 'Lernende Organisation: Wie ist Lernen in Organisationen möglich? Was zeichnet eine lernende Organisation aus?' at the colloquium 'Innovation von und in Organisationen' held by the Hans-Böckler Stiftung an der Ruhr at the University of Bochum (chairman Prof. Heiner Minssen) on 17 May 2000.

([5]) Ibid.

([6]) On 'the concept of limited rationality', cf. March, J.G.; Olsen, J.P. *Ambiguity and Choice in Organisations.* Bergen, 1976.

([7]) Cf. also Dierkes, Meinolf, Camilla Krebsbach-Gnath. Organisationslernen - Ansätze zum Veränderungsmanagement in kleinen und mittleren Unternehmen'. In Folker Schmidt (ed.). *Methodische Probleme der empirischen Erziehungswissenschaft*, Baltmannsweiler: Schneider Verlag Hohengehren, 1997, p. 63-76.

([8]) On aspects of knowledge management cf. Pawlowsky, P. *Wissensmanagement in der lernenden Organisation,* post-doctoral thesis. University of Paderborn, 1994.

([9])Wiesenthal, H., op. cit., p. 144.

unconventional learning alternatives elude the grasp of organisations and, more significantly, the organisations are then incapable of determining their own learning objectives and content.

We can thus see that organisational learning basically has a bipolar structure. Generally, organisations adhere to conventional learning strategies, which reproduce members' ruled-based knowledge. In contrast to qualitative and holistic improvements to learning processes, organisational learning is, in practice, primarily steered by stochastic principles of local optimisation. The lack of empirical evidence for complex learning is unsurprising, given its highly selective conditions of a relatively stable environment on the one hand and a need for an active learning disposition on the other. No empirical evidence whatsoever exists for reflexive learning or learning from previous learning processes. Although existing research results demonstrate exemplary qualitative leaps in organisations' learning behaviour, these are, paradoxically, not controlled by the organisations themselves. Reflexive learning triggers and programme structures are usually 'imported' from outside, against a backdrop of organisational existential crises. Self-dictated learning therefore does not seem to be a viable form of organisational learning, despite rhetorical attempts to prove the opposite.

Organisational learning outside anomie and de-institutionalisation

Nevertheless, we can confirm that the research programme under consideration contains gaps in the system, which may prompt consideration of new concepts. If, for example, we recall the progression of unconventional learning processes, it is clear that they can be interpreted as the indirect result of a blurring of boundaries, indeed, as de-institutionalisation within organisations. However, this might not offer a full explanation, as crossing borders does not automatically imply a loss of control. Network research findings show that in loosely connected organisation networks, knowledge can be adapted to the rationality parameters embedded in the organisation without posing any threat.

A loose partnership between organisations creates '... a generally much broader information horizon and frame of reference... . Communication within loosely associated networks serves to roughly structure and prioritise information by increasing the possibility of association, with the focus on applicable knowledge, but the lack of hard and fast criteria renders it unsuitable for rigorous selection. Thus, in a certain sense, loose partnerships overcome the limitations of organisations. Although these limits, which take the form of binding codes and precise information channels, do improve the efficiency of internal communications, they also necessarily restrict the creativity and behaviour of organisation members.'([10]) This kind of loose partnership in intermediary networks is characterised by the capacity to combine various organisational forms with heterogeneous routines and rational procedures. This maintains the development and adaptation potential of both the individual organisation and the network as a whole. Furthermore, inter-organisational cooperation permits different types of organisation to reap mutual benefit from complementary learning processes. 'Loose partnership between networks allows many different business routines to coexist, whereby local convention governs its extent. Moreover, it does not place high demands on the organisational compatibility of the networked organisations' ([11]).

Contrary to the irrevocable limits concept of non-conventional learning, we assume that cognitive redundancies arise in an inter-organisational context. The lack of correlation between learning objectives and content (priorities, scheduling, etc.) allows these redundancies to exploit the way organisational limits can be permeated by 'weak signals'. They are thus potential learning triggers. In other words, environmental communication imbues organisations with constructive tension, without jeopardising their existence ([12]).

The possibility of redundancy results from organisations' differentiation processes, i.e., the formulation of specific semantics, which identify an organisation as an active and communicating entity, i.e. self-defining. This allows *conscious* operations and attribution processes to define themselves independently of and in relation to others and thus make themselves avail-

([10]) Grabher, G. *Lob der Verschwendung. Redundanz in der Regionalentwicklung: Ein sozioökonomisches Plädoyer.* Berlin, 1994, p. 77.

([11]) Grabher, G., op. cit., 1994, p. 74-75.

([12]) On pertinent knowledge management: Pawlowsky, P.; Seifert, M.; Reinhardt, R. Interorganisationales Lern- und Wissensmanagement: Ansätze für Klein- und Mittelständische Unternehmen. In Pawlowsky (ed.). *Wissensmanagement – Erfahrungen und Perspektiven*, Wiesbaden, 1998, p. 225-254.

able as a unit for establishing relationships. Self-definition guarantees that 'unlike ritualisation of communication processes, the process can monitor itself, even when it does not take place' ([13]). This is a reflexive process. 'Self-observation is first and foremost one moment in the internal information processing sequence. In addition, it permits self-definition by establishing which topics a system communicates when it communicates something about itself. Self-observation facilitates, or maybe even forces, reflection, in the sense of determining the identity (in relation to others) that the self-observing area provides as a unit for establishing relationship' ([14]). Seen in that way, redundancy-based system behaviour represents one of many alternatives.

However, the condition of enabling an organisation to define itself using semantics is heavily dependent on creating redundant information and communication structures. This finding is initially paradoxical. After all, this would be accompanied by a plethora of non-utilisable information. But it shows us that this superfluity is useful in practice because it makes the system more independent of certain relationships and protects it from risk of loss. This alone creates the impression of objectivity and of normative or cognitive correctness and establishes a correspondingly secure behavioural basis. Redundancy also helps to 'filter out' those elements that have proved themselves in many forms of communication, thus forming a structure.

For its part, this structure formation facilitates information processing procedures (internal and external observation and definition) because it allows elementary observations to be abstracted from specific situations. Variety in the form of information redundancy is a central condition for the reversibility of self-definition. 'At the core of a social system lies its ability to make itself a unit for establishing relationship.' Admittedly, this implies that self-definition and hence system and environmental restrictions must adapt to current activities and communication systems. In this way, redundancies provide the superfluity of possible data combinations into which self-definition can merge again and again, only to re-materialise in another communication system immediately afterwards. Intelligent action within the social system therefore demands an ability which forms the basis of initiative at individual level: reversible gestalt formation and the capacity to 'glide' from one idea to another.

However, using redundancies as learning resources will, by definition, involve leaving the level of organisational learning. Collective and co-evolutionary learning processes at meso-level will replace the quasi-solipsistic act of knowledge and skill enhancement.

Additional learning triggers in the context of environmental communication sometimes result from relationship redundancy following creation of a loose partnership ([16]) of organisations. This ensures 'ambiguity tolerance' through the resulting co-existence of different forms of logical action and rationalities or rationality conditions, which can be found in a continuum of competition and cooperation. This generates the advantages of the 'thickening of information' found in strategic networks ([17]). Precisely this constitutive blurring of loosely married systems, which ensures that objectives, priorities and timescales remain vague and unclear ([18]), favours competing development perspectives and the regional permeability of 'weak signals'. It is a kind of '... wasteful creation of development paths' ([19]).

Furthermore, an ecologically broader perspective of organisation, featuring functional-spatial angles, could use examples such as the 'industrial districts' to show that in cases where an organisation, the organisation network and the region ([20]) share a mutually dependent learning process individual investment risks are minimised ([21]), and at the same time gathering and sharing the advantages of innovation is facilitated. This would obviate the need to optimise learning processes locally at organisational level. It would also be possible to consider incorporating risky learning strategies within an organisation, without compromising efficiency criteria ([22]).

([13]) Luhmann, Niklas *Soziale Systeme. Grundriß einer allgemeinen Theorie.* Frankfurt am Main, 1987, p. 612.

([14]) Luhmann, N., op. cit., p. 234.

([15]) Grabher, G., op. cit., 1994, pp. 24-25.

([16]) On the system theory implications of partnership mechanisms, cf. Bühl, Walter L. Die dunkle Seite der Soziologie. Zum Problem gesellschaftlicher Fluktuationen. *Soziale Welt*, 1985, No 4, p. 21.

([17]) 'Networks are particularly apt for circumstances in which there is a need for efficient reliable information ... that which is obtained from someone whom you have dealt with in the past and found to be reliable ... information passed through networks is 'thicker' than information obtained by the market, and 'freer' than that communicated in a hierarchy.' Powell W. Neither Market Nor Hierarchy: Network Forms of Organisation. *Research in Organisational Behaviour*, 1990, No 12, p. 299.

([18]) Bühl, W. L., op. cit., 1985, p. 22.

([19]) Grabher, G., op. cit., 1994, p. 37.

([20]) Becattini, G., n. p., n. d., quoted in Fielding, A. J. Industrial Change and Regional Development in Western Europe. *Urban Studies,* 1994, Vol. 31, Nos 4/5, p. 697.

([21]) Piore, M. J.; Sabel, C. F. *Das Ende der Massenproduktion. Studie über die Requalifizierung der Arbeit und die Rückkehr der Ökonomie in die Gesellschaft.* Frankfurt, 1989, p. 302; Lorenz, Edward H. Trust, Community, and Cooperation. Toward a Theory of Industrial Districts. In Storper, Michael; Scott, Allen J. (ed.). *Pathways to Industrialisation and Regional Development*, London/New York, 1992, p. 195 and 203.

([22]) Preisinger-Kleine, R. *Zwischenbetriebliche Rationalisierung und Regionalentwicklung*, Munich, 1998.

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Learning through 'e-resources': the experience of SMEs

EU policy for 'e-learning' has focused on connectivity rather than pedagogy for learning; and viewed 'e-resources' dualistically rather than appreciating they are two strands of a single integrated process. The paper argues policy will continually misunderstand the significance of 'e-resources' for organisations and individuals until it encourages the development of integrated frameworks for work, technology and learning. The paper explores how 'e-resources' can support working and learning in SMEs by: identifying the connections between management strategy, technology deployment and knowledge creation environments; outlining a range of emerging practices as regards the use of 'e-resources' to support working and learning inside the SMEs; and introducing two new models that capture and explain how to assist SMEs to learn through 'e-resources' and support knowledge management and business development.

1. Introduction

EU policies have emphasised since the mid 1990s (EU 1996) the tremendous potential that Information and Communication Technology (ICT) has for extending access to learning in workplaces, homes and communities. These claims have been based on a number of assumptions about learning with ICT. First, that it is fairly un-problematic to transfer existing curriculum materials into a digital form (Webb, 2001). Second, that the emerging emphasis on self-directed on-line learning negates any considerations about pedagogy (Guile and Hayton, 1999). Third, that the chief value of ICT is to provide access to learning materials that will, ultimately, enable individuals to acquire some form of recognised qualification and companies to boost the qualification profile of their workforce.

One consequence of these assumptions has been that EU policy has primarily focused on establishing electronic connectivity, rather than considering the forms of pedagogic support required to learn effectively with ICT. Another consequence has been a tendency to view ICT as offering separate resources to support business development and individual learning, rather than as conceiving of them as two strands of a single integrated process. It is the contention of this paper however that, until policymakers recognise that ICT offers organisations common resources for supporting business development and individual and organisational learning, policy will continually misunderstand the significance of ICT for all organisations. Moreover, policymakers will also fail to address the actual issues that shape and determine working and learning with ICT; namely developing an integrated organisational framework for work, technology and learning.

The paper explores how 'e-resources' can support working and learning in SMEs to respond to the challenge of competing successfully in the 'digital economy' (Tapscott, 1997). It employs the term e-resources rather than the more common term ICT to encapsulate the two strands of ICT described above. It starts by analysing the new economic context that all organisations confront: increasing pressure to respond to rising customer expectations. It identifies three main ways that SMES, are responding. They are to:

- introduce a range of new strategies to manage their business more effectively;

- consider how to deploy e-resources to facilitate business development and individual and organisational learning;

- create environments, which support knowledge management and organisational learning.

The paper then proceeds to outline a range of emerging practices as regards the use of e-resources to support working and learning inside the SMEs. In doing so, it highlights that the effective deployment of e-resources in SMEs presupposes forms of 'knowledge-based' consultancy that are rarely acknowledged by policymakers. The paper concludes by outlining two models that capture and explain how to assist SMEs to:

- learn through 'e-resources (i.e. resources that allow the creation, storage, processing and transmission of information and access to and communication of information);

• support knowledge management and business development.

2. Background to the research

This paper is based on research undertaken as part of the 'Learning Support for Small Businesses' (LSSB) Adapt project. LSSB was a large multi-partner project[1], led by Birmingham City Council as one part of its strategy to project led by Birmingham City Council as one part of its strategy to confront structural change in the city economy and to find ways of effectively supporting SMEs to remain competitive in the global economy.

Its original primary objective was to pilot the provision of training to SMEs to evaluate the effectiveness of various media. This involved an ambitious programme of Information and Communication Technology (ICT) infrastructure development, including the provision of Personal Computers (PCs) where appropriate and some experimentation with broadband. This programme was to be supported through the development of a range of materials on a number of platforms (ATM, ISDN, CDROM, video/audio and paper) and through the provision of on-site consultancy support for SMEs.

When the project specification was written in 1996, the project team had viewed the Internet primarily in 'educational' terms and treated it as though it was a simple and effective way to access education and training materials to SMEs. The main intention was to support SMEs' specific training needs through the 'conversion of existing materials' from the partner universities to ensure that a stock of business and technology related learning materials were available. It was envisaged that these materials would provide SMEs' employees with access to National Vocational Qualifications (NVQ) accreditation and/or other relevant qualifications in keeping with the UK's national education and training targets. Once this stock of materials had been established, the second phase was supposed to be primarily concerned with recruiting and engaging SMEs to participate in the project as well as with the on-going monitoring of the efficacy of the various platforms and materials.

During the life of the project, however, an exponential change occurred as regards the global use of the Internet. Previously it had been viewed primarily as a simple and effective way to access information or exchange files. Increasingly during the late 1990s, more and more businesses recognised that the Internet constituted a tool which could be used to facilitate business-to-business, business-to-customer and customer-to-customer interaction and collaboration as well as to support individual and organisational learning. One of the consequences has been that many 'leading' global corporations decided to restructure in order to take advantage of the cost differentials the Internet offers, and to develop a 'dot-com' strategy in order to offer new and more integrated services to customers (Venkatraman, 2000).

The rapid development of the Internet as a critical backbone for the economy, coupled with the emerging debate about 'e-business' and 'e-learning' (Venkatraman, 2000), alerted the Project Management (PM) Team to the necessity of re-positioning and re-balancing the project. They decided that, in addition to providing access to education and training materials, LSSB also had to help those SME owners who were keen to try to develop a more strategic 'dot-com' vision for their company. Another development that further confirmed to the PM Team the importance of moving away from a narrow focus on encouraging SMEs to access education and training materials was the early experiences of working with SMEs. The PM Team received clear messages from a number of sources, such as the SME facilitators, external evaluators, that supply-side courses were not the only type of 'performance support' resource that SMEs wanted (Webb, 2001).

Taken in combination, both developments led the LSSB Project Team to re-focus the project's approach in a number of ways. This process of re-positioning and re-balancing involved subtle, but significant, changes in the roles of the PM Team as well as the SME facilitators. The project team adopted a more strategic stance as regards SMEs' business development.

(1) The partners were Birmingham University, the Open University, University of Central England and Wolverhampton University.

Regular meetings and workshops were convened for SME owners in an attempt to raise owners' consciousness about the potential significance of viewing e-business and e-learning as two strands of a single integrated process, rather than as conceiving of them as functionally separate. In other words, to recognise that the Internet constituted a vital resource, which could be used to reconfigure working and learning practices in all their different guises. The SME facilitators assumed responsibility for certain aspects of the research process. Instead of only being required to pass on information about business strategy and technological options, the facilitators were asked to act as 'first-line' gathers of information about the business challenges SMEs participating in the LSSB project confronted and the contribution that e-resources might make to overcoming these challenges. The approach adopted is described in greater detail below.

3. A brief note about methodology

Conducting research in SMEs is notoriously tricky, especially in the UK, for the following reasons: tight staffing and short deadlines means it is difficult to release people from their work roles; lack of space means that it is difficult to convene meetings; and the lack of a 'learning culture' means that SME owners are often reluctant to give up their time and that of their workforce to participate in a research activity.

In an attempt to overcome some of these difficulties, the research team formulated a methodology that reflected some of the principles of the 'boundary crossing laboratory' methodology pioneered Yrjö Engeström (1996). This methodology is based on an agreement between a university department and a workplace about their respective roles and responsibilities within the research. Organisations have to ensure that their staff participate in regular discussions, which occur within the 'boundary crossing laboratory' which is set-up inside the organisation. This 'space' provides people with opportunities to articulate the 'contradictions' (Engestrom, 1996) between existing working and learning practices in relation to organisational goals and work collaboratively to resolve them.

The research team recognised the difficulties associated with trying to set up a boundary crossing laboratory in SMEs. They felt, however, that they could take the concept of contradiction as a starting point and use this to identify the tensions owners were experiencing with their existing business strategies. The research team also recognised that the facilitators would require some additional resources, see Diagram 1 and 2, to identify the implications of the business and technology contradictions that they encountered. In order to fulfil this role, the SME facilitators were supported through a series of workshops led by the research team, to identify how to use the concept of contradiction to identify a number of SMEs who were committed to re-thinking their working and learning practices.

In order to reflect the diversity of starting points of SMEs, the facilitators used the concept of contradiction as an orientating principle in two senses. First, it helped them to identify in their initial discussions with SMEs' owners the new business challenges owners felt that they confronted, and that warranted the introduction of new working and learning practices. The facilitators and the research team then used questionnaires, interviews and on-site observations to build up a more detailed picture of each SME. Second, it helped the SME facilitators to identify 'secondary contradictions' (Engestrom, 2001), which occur when organisations, that is SMEs, adopt a new element from outside. In this case, the introduction of ICT led SME owners to have to re-think working and learning practices throughout their company, and not just treat ICT as a technical resource that gave the workforce access to education and training materials.

4. Competing in the Digital Economy: the challenge for SMEs

4.1 Responding to rising customer expectations

SMEs in most sectors in Birmingham and the West Midlands have been confront-

ing a very turbulent and volatile environment for some time. This is due to the rapid changes occurring in the different industrial sectors they serve as well as in the operational strategies and methods of the large companies who dominate those sectors and who determine the type of work offered to SMEs operating in their supply chains. At a national level, this has been well illustrated by the BMW decision with respect to Rover and the continuing impact this is having on the 30 000 employees that make up the manufacturing supply chain to the automotive industry. At a local level, the continuing turbulence is evident from the high level of business start-ups and the number of business that have ceased trading (Burfitt, *et al.,* 2001).

Irrespective as to the sector in which they are working, Birmingham City Council's Economic Development (BCCED) Department has acknowledged that all SMEs are under intense pressure to be sufficiently alert, agile and anticipatory to respond to their customers (Spooner, 2000). This is partly because customers are getting more demanding and partly because their expectations are rising and customers are more fickle (Guile and Fonda, 1997). Increasingly, customers will look elsewhere if they are dissatisfied with the product or service they receive. There is, therefore, a growing consensus in Birmingham and the West Midlands that SMEs, will have to try harder to establish and maintain a lifetime relationship with customers, to remain their preferred suppliers and, as a result, reduce the cost of getting new business (Spooner, 2000).

Implied in such relationships is, in many cases, a change of traditional business practices towards customers and the workforce. SMEs are being actively encouraged by BCCED to replace adversarial attitudes with partnership and collaboration (Spooner, 2000). The developments described above are ushering in a new challenge for SMEs. They have to succeed in two kinds of performance. Apart from remaining solvent and hopefully increasing profit margins, they also have to build and sustain a reputation with their customers for competing on the basis of cost and quality and a reputation with the workforce for active involvement in planning business processes and supporting human resource development. One consequence of this new business climate is that many SMEs have gradually recognised that although they will always be beset by forces and events for which they do not have adequate responses, *ad hoc* measures will not plug holes quickly enough nor well enough nor guarantee survival. Clearly, the solution is not to try and to 'do better' what they have always done.

4.2 Introducing new business and management strategies in SMEs

An interesting parallel can be drawn between the experience of many of today's 'leading' organisations and SMEs in Birmingham. Over the last decade, most of these organisations have gone through a process of evolution, which often has included revolutionary episodes, provoked by dire threats to their survival. The process of evolution has involved 'leading' organisations passing through three significant stages in the development of their business and management strategies and with a further stage on the horizon (Guile and Fonda, 1999). These stages can be defined as: the *task management stage*; the *workflow management stage*; the *value-added management stage;* and the *knowledge-management stage*. Diagram 1. identifies the relationship between different business principles and their likely relationship to management strategies.

One common issue at each stage of development, however, is that the process of introducing new working and learning practices stems from having to address qualitatively different business challenges. Furthermore, the introduction of new working and learning practices presupposes distinctly different contribution from the workforce and the management to the success of the business (Guile and Fonda, 1997).

There are many affinities between these stages of business and management development and the experience of the SMEs who participated in the LSSB Project. This can be seen in a number of ways. For SMEs whose current business and management strategy could be characterised as task management, the imperative for change appeared to stem from owner managers trying to move beyond: (i) a command and

Diagram 1

Business Development and Management Strategies: implications for SMEs (Based on the work of Guile and Fonda 1999)

High output	High productivity	Stakeholder value	Positioning for uncertainty
TASK MANAGEMENT	**WORK FLOW MANAGEMENT**	**VALUE-ADDED MANAGEMENT**	**KNOWLEDGE MANAGEMENT**
Production model	Accountancy model + Business process re-engineering	Investment model + Balanced scorecards	Sustainability model + Co-opt customer capability / co-produce with customers
Tasks	Supply chains Outsourcing	Value-based management	Conduct risk assessment

control management style (i.e. owner dominated and directed); and (ii) a reactive approach to quality control (i.e. wait for complaints). The experience of the LSSB project indicated that SMEs' typical response is to reconfigure work processes and devolve some responsibility to work teams for monitoring work flow. The imperative for SMEs to introduce further change usually comes from one of two sources: rising expectations from customers, or the recruitment of someone who has acquired business expertise outside of SMEs and the industrial sector(s) they serve and who can initiate and support change management processes.

Furthermore, evidence from the LSSB project indicated that the tensions experienced by SMEs, who are trying to move from workflow management in order to offer high added-value products and services for customers, is rather different. They are usually concerned with identifying how to re-organise work around the flow across physical and departmental boundaries. As a result, SMEs encounter internal and external tensions. Owner managers have to be prepared to include suppliers and customers in the 'workflow' by creating self-managing teams, who are responsible for their own performance, including quality. Although the main challenges of added value management are now widely accepted, the responses are just beginning to settle into generic and recognisable patterns (Edvinson and Malone, 1997). In the case of SMEs, it appears to entail introducing new divisions of labour, establishing new 'rules' for dialogue between different sections of the workforce and creating new organisational 'communities of practice (see section 5).

Some 'leading' companies have recognised that, in the advanced stages, value-added management introduces a new tension; since it begins to include features of a new business and organisational strategy. It is centred round the management of knowledge within organisations. As yet, however, this knowledge management is still in its infancy and this presents real difficulties in generalising business and management strategies. The emerging characteristics of those organisations who are experimenting with knowledge management appear to be a desire to co-opt customer capability, to develop a 'dot-com' strategy, and to be willing to share learning experiences with internal and external stakeholders (Prahalad and Ramaswamy, 2000).

4.3 The challenge of deploying e-resources in SMEs

In addition to responding to customers' demands for lower prices and higher quality, SMEs have also experienced in the last few years growing demands for customers to use intranets to monitor work flow of products and services and from suppliers to track and process orders. Coming to terms with different technology platforms and software and hardware systems has been a particularly daunting challenge for a number of reasons.

Throughout the 1980s, the role of e-resources had typically been viewed in multinational companies (MNCs) as an efficient way to provide the required level of information support for management (Keen, 1993). From this perspective, the key issue was whether a company was either prepared to or could afford to invest in e-resources. From the early 1990s onwards, however, multinational companies started to explore how to use e-resources to help them to redefine the boundaries of markets, alter the fundamental rules and basis of competition, redefine business scope and reorganise work design (Castells, 1995; Scott Morten, 1991; Tapscott, 1997). One of the spins-offs of growing interest in computer supported collaborative work in MNCs in the 1990s was an awareness that, depending on how it was deployed, e-resources could support organisational learning and human resource development within companies (Orlikowski. 2000).

Responding to the evolving potential of e-resources has proved to be an extremely steep 'learning curve' even for multinational companies who had access to extensive financial and consultancy resources (Scott Morten, 1991). The experience of supporting multinationals to use e-resources to reconfigure their working and learning practices, led researchers at the Massachusetts Institute for Technology (MIT) to suggest that there is a trajectory of development that companies move through before they maximise the full range of benefits e-resources offer. This trajectory of development can be characterised as movement through the following five phases (Venkatraman, 1991).

The first phase - *localised exploitation* - is concerned with the exploitation of e-resources within business functions such as manufacturing, marketing or workflow management or even isolated business activities within those functions (see 5.2.). This involves deploying technological applications that improve task efficiency of operations, thereby achieving some function-specific goals (i.e. localised without necessarily influencing related areas of operations).

The second phase - *internal integration* - is a logical extension of the first in the sense that e-resources are exploited in all possible activities within the business process (see 5.3.). Two types of integration are critical here: technical integration, namely the integration of different systems and applications using a common 'e-platform'; and organisational integration of business processes to enhance efficiency and effectiveness.

The first two levels can be viewed as 'evolutionary' since they require relatively incremental changes in existing organisational processes. In contrast, the other three levels imply a more 'revolutionary' approach since they require fundamental changes in the nature of business processes (Venkatraman, 1991). This distinction becomes clearer when considering the 'jump' between the second and third stage of implementing e-resources.

The third phase - *business process redesign* - involves the reconfiguration of the business using 'e-resources' as a central lever (see 5.4.). Therefore, instead of treating the existing business processes as a constraint in the design of an optimum 'e' infrastructure, a conscious effort is made to align the 'e-infrastructure' and the business proceses.

The next phase - *business network redesign* - is concerned with the reconfiguration of the scope and tasks of the business network involved in the creation and delivery of the products and services (see 5.5.). This includes both the tasks within and outside an organisations' formal boundaries and the consequent redesign of this 'virtual' network to integrate key partners in the changed business network.

The final phase - *business scope redefinition* - is concerned with the *raison d'être* of a company (see 5.6.), pertain-

Diagram 2

Types of Business Transformations Supported by E-Resources (Based on the work of Venkatraman, 1991)

Degree of change and development	localised exploitation	internal integration	business process re-engineering	business network redesign	business scope redefinition
Working Practices	set-up PC / email / link to Internet access PC/ email and Internet individually	use PC to: • monitor stock, cash-flow, etc. • exchange information • support discussion & business planning	re-design process of working and learning and use 'e-resources' to: • monitor workflow • develop new competences	create a 'networked' organisation and use 'e-resources' to: • support internal dialogue and collaboration with existing customers • support knowledge creation and sharing	transform the scope of the business and use 'e-resources' to: • co-opt customer capability • manage customer diversity • co-create new products & services with customers

ing to the possibilities of enlarging the business mission and scope (through the co-opting of customers' capabilities and the co-creation of products and services with customers) as well as shifting the business scope (through the transformation of traditional capabilities with 'e-skills').

The experience of deploying e-resource has also been very steep learning curve for those SMEs who participated in LSSB, many of whom are still in the 'foothills of e-commerce', compared with multinational companies (Webb, 2001). It initially appeared as though its imply involved deciding what level of investment in e-resources the SME could afford, and deciding learning how to deploy those new resources to support the changes that they wanted to achieve in their business and management strategies. This proved to be a slightly optimistic view, since there was an additional challenge that had to be faced.

4.4 An additional challenge

The original assumption that had informed the LSSB project, in common with many other ADAPT Projects, was that the provision of Internet access to SMEs and their employees would to increase the up-take of learning. At the time, this had appeared to be a fairly revolutionary step in number of ways. On the one hand, the provision of the Internet connections and a PC provided a sector which had traditionally been perceived as under-investing in human resource development with greater access to, and a greater range of, learning resources. On the other hand, the education and training resources could support learning in different contexts since they could, in theory, be accessed in the workplace and at home. The question of using e-resources to support learning, however, has to be considered alongside the question of introducing new business and management strategies and deploying e-resources to support business development, discussed in the previous sections.

There are two main types of types of e-resources that can support learning: computer-accessed resources (e.g. CD-Roms, databases or web sites) and computer mediated communication resources (e.g. audio, textual and video conferencing) (Bates, 1995). These two types of resources, however, offer quite different

possibilities for working and learning (Guile, 1998). The former are primarily either interactive teaching and learning materials or sources of data, while the latter support collaboration and communication across networks. The LSSB Project provided SMEs with access to a varied range of computer-accessed resources, for example Directors Briefings, 'converted' education and training materials, on-line libraries, and computer mediated communication resources (e.g. e-mail) as well as access to search engines to help them to refine their on-line inquiries.

The provision of these two slightly different types of e-learning materials presented the SMEs and the facilitators, who were supporting them, with an additional challenge. Apart from supporting owners to re-think their strategy for business and management development, and the deployment of e-resources, they also had to assist them to utilise e-resources to support learning in the workplace. Instead of only encouraging SMEs' owners to ensure that employees could access the education and training resources that had been made available, the facilitators had to introduce a more strategic dimension into their work. They had to assist owners to identify:

❑ how to use e-resources to develop online relationships with customers;

❑ the competences their business would need in order to enable the workforce to use the e-resources that were available to them;

❑ how to act as change agents in their own company and identify how to use e-resources to transform business and management strategies.

Motivating owners in any type of organisation to develop their strategic vision, however, is primarily a social and cultural issue concerned with changing mindsets rather than a matter of offering technical advice (Argyris, 1991). Consequently, it required the SME facilitators to 'provoke' the owner into addressing the following question:

❑ 'how can we use e-resources to support working and learning?'

4.5 What does it mean to learn through e-resources?

Treating learning in the workplace as though learning itself was a generic activity is not particularly constructive for a number of reasons. First, the context where learning occurs influences through opportunities to participate in 'communities of practice' not only what skills are learn, but also how identify changes as a result of such learning (Lave and Wenger, 1991). Second, there are different types of learning and they serve different purposes (Engestrom, 1995).

One way of highlighting this issue about different types of learning is to distinguish between the following types of learning:

❑ adaptive learning (i.e. acquiring information or knowledge);

❑ collaborative learning (i.e. working with others to discuss/solve problems and changing current practice);

❑ reflexive learning (i.e. conceiving of new ways of working and learning).

These distinctions represent a continuum reflecting the extent to which learning is related to but separate from discovery (Guile and Hayton, 1999). Furthermore, they also reveal that each type of learning has a different type of outcome. Adaptive learning is valuable but it does not lead to new knowledge since it takes contexts as given and unchangeable. Investigative learning does generate discoveries, but only if it occurs in a community of practice. In other words, it is not merely an issue of acquiring information from the Internet; individuals need opportunities to transform that information into worthwhile knowledge by clarifying thoughts, ideas and opinions in discussion with other people. In contrast to the other forms of learning, reflexive learning implies that individuals sometimes need to be able to think about how to go beyond the immediate context because they encounter contradictions that cannot be solved within existing working and learning arrangements.

The challenge SMEs confronted, therefore, was how to re-design work to take account of the possibilities different e-re-

sources offered and to foster different types of learning amongst their workforce.

5. Emerging practice as regards the use of e-resources in SMEs

5.1 Introduction

This section of the paper explores the implications of the issues raised in 4.2 to 4.5 It has used the frameworks outlined in Diagram 1 and Diagram 2 as a template to interpret the very markedly different patterns of and the distinctions between different types of learning to analyse the emerging practices as regards the use of e-resources in SMEs to support: (i) business and management development; (ii) the transformation of business activity; and (iii) the introduction of new working and learning practices.

5.2 Localised exploitation of e-resources: the experience of Manufacturing Company A (MCA)

MCA specialises in producing ready cooked Indian cuisine for independent retailers and wholesalers. The company employs five full-time staff and a part-time sales manager. The management style is based on the ethos of the 'extended family'. The owner, in collaboration with the sales manager, makes all the primary business decisions and each employee is responsible for performing a designated role. At the point MCA joined the LSSB project, the company was not using any e-resources in any area of its business.

Supported by the SME facilitator, the owner recognised that in order to expand his business he would have to exploit e-resources in two stages. The first stage involved expanding the company's customer base via use of the LSSB website; implementing a 'credit screening' check to ensure that the company minimises business risks by attracting 'credit worthy' clients; and accessing learning resources to develop the level of the owners' computer literacy skills. These developments enabled MCA has to improve its business and management efficiency in the following ways. The owner now uses e-resources to monitor customer orders and receipt of customer payment. MCA have also transformed their marketing strategy. By advertising via the web the company can provide potential customers with a profile of the company's products and services. Although early days, marketing the company via the web has already led MCA to receive orders from new clients in the UK and Europe.

The second stage will involve MCA use e-resources to put a just-in-time inventory in place to monitor the procurement and use of essential ingredients. The owner recognises that, at this point, more staff will need to acquire basic computer literacy skills.

5.3 The integration e-resources within an SME: the experience of Enginering Company A (ECA)

ECA is a family engineering business, employing 11 people. The company specialises in the production of springs and circlips for the manufacturing industry and customised spring products for the leisure industry. Its customer base has been eroded in recent years because ECA has a fairly restricted product range, faces stiff competition from overseas and is operating in a shrinking market. Furthermore, the company has an ageing workforce, which has specialist skills that it will not be easy to replace.

In response to these challenges, the owner, working in collaboration with the SME facilitator, initially attempted to address his business challenges by establishing an on-line training centre. This provides all employees, including the owner, two Modern Apprentices and the remainder of the staff, with access to web-based learning resources. In addition, access to on-line learning materials are being used to improve the skills of staff who are responsible for managing financial systems, data processing systems and marketing products and services on-line, as well as helping the apprentices gain a Modern Apprenticeship at NVQ Level 3.

During subsequent meetings with the facilitator, through attendance at project network meetings and in discussion with the researcher, the owner identified tension in his business strategy and manage-

ment style. He has been hoping that his business could survive by competing on the basis of price and by overseeing every aspect of the production process himself. He has gradually recognised that this business strategy and management style will not enable his company to either improve their efficiency and effectiveness or retain existing customers.

The owner has decided that business survival depends upon the re-organisation of work and the creation a 'knowledge creation' culture within the company. The first step is that ECA has started to establish self-managing teams who have responsibility for project management in relation to the functional area, for example administration, spring manufacture, of the company in which they work. One of the main features of this development is an expectation that relatively junior and inexperienced staff will accept responsibility for circulating information that they hold about aspects of the production process to one another to ensure that customers order are delivered on time.

New CAD programmes have also been purchased to enable the company to improve the quality of the springs and clips they manufacture and appeal to a wider range of customers. In order to maximise the benefits of this purchase the owner is trying to evolve a 'inquiry-based' culture amongst design and production staff. He is encouraging them to talk to one another about the problems they respectively experience when basic designs have to be changed to meet customer's requirements, and, how through sharing this knowledge, they can anticipate potential problems and work in advance to address them.

Another development underway at ECB is to diversify the range of services the company can offer customers. 'E-resources' are being using to monitor workflow across functions and identify production hold-ups at an early stage in their development. Furthermore, staff are also being encouraged to liaise by email and through using the Electronic Data Exchange systems to provide customers with information about progress with orders, to elicit swift responses as regards customer satisfaction with products and to identify new requirements by inquiring about their emerging business requirements and offering to prove costings for them.

5.4 On the threshold of business process redesign: the experience of Jewellery Company A (JEC)

JEC is a one-person company which designs and makes specialist silver tableware, deskware and coasters. The company has a burgeoning customer base amongst prestigious organisations, where the need for excellence transcends cost considerations. The company also undertakes commissions for individual clients. The owner is very conscious that the Birmingham jewellery industry is subject to intense competition from overseas as well as ever rising customer expectations. For this reason, he has worked closely with an SME facilitator to redesign his business processes rather than simply overlay 'e-resources' on top of his existing business practices.

This objective has been tackled in two main ways. By exploiting the potential of the Internet, JEC has created a 'virtual' shopping arena which comprises ten different sites, which are linked 'thematically' and through shared 'imagery'. Each site provides details about and illustrations of different aspects of the standard product and service range. Customers can, therefore, not only enjoy a very rich and varied 'browsing' experience, but also inquire about commissioning special designs. This strategy allows the owner to respond immediately to inquiries for different products or services without overly disrupting his own work process.

A further development has been to use the access to training that LSSB has provided to help the owner to develop new skills, which will enlarge the product and service range offered by his company. By acquiring more knowledge about CAD/CAM, 3D Imaging and Digital Photography, the owner will be able to enhance the design and delivery of current and future products and services.

'E-resources' have, therefore, been deployed very creatively to support strategy development, portfolio construction and delivery, trading and account administration. To avoid Internet 'free-raiders'

from stealing JEC real 'intellectual capital', the owner does not advertise his highly personalised designs via the web. Business is still conducted face-to-face.

5.5 Moving from business process redesign to business networks: the experience of Engineering Company B and C (ECB & ECC)

ECB is a small light engineering company specialising in presswork and toolmaking and employs over 100 people. Currently, in order to maintain its existing contracts, the company uses electronic data interchange (EDI) to provide customers with up-to-date information about progress with their orders. Increasingly, however, ECB's customers are operating just-in-time inventories and, therefore, ECB want to deliver short-term orders, such as five days notice or less, for products and receive regular feedback about when orders are likely to be delivered.

One of the major problems that ECB faces is that its major customers dictate the type, form and deadline by when they require information about their orders. This means that ECB are considering up-grading their interorganisational information systems (IOIS), in other words, the systems that they employ to process inputs/outputs and the protocols they use to support the transmission of data, so that their IOIS systems can easily accommodate customers' diverse demands as well as the technical features of customers' own IOIS systems.

By participating in LSSB led ECB to recognise that their EDI systems will have to be supplemented by the more consistent use of the company-wide email system. This will ensure that staff can communicate with one another about the precise details of orders; share and exchange files; and monitor the sequencing of different aspects of the production process so that all orders are delivered on time. This development implies a shift towards a more de-centralised management system committed to identifying how ECB can add value in comparison with its competitors. To facilitate this change in work practices, ECB have provided IT training for staff.

ECC, in contrast to ECB, specialises in the production of powder coatings for the automotive industry and also employs over 100 people. Both companies, however, are currently experiencing similar business challenges. ECC are also under intense pressure to use their EDI system to provide customers with up-to-date information about progress with their orders. The owner is aware that sustaining competitive performance in the global economy depends crucially on striking the right balance between exploiting e-resources and developing a new strategic direction for the company.

One part of CCC's response has been to improve the performance of their IOIS system, so that, in addition to accommodating customers' current requirements, they can also promote new supplier services on-line to existing customers and potential new customers. In order to attract new business ECC have formed a small intermediary network with four other companies and the University of Wolverhampton. Members of the network broker new business and whoever secures the business acts as a managing agent and allocates contracts to network members.

Another part of ECC's response has been to offer all staff access to training and development by encouraging them to make use of the learning resources LSSB has made available. ECC have 'customised' existing training engineering modules since they are considered to be too generic and do not help to develop the knowledge and skills the company needs.

Finally, ECC and ECB have both begun to grasp that the next stage of development might be to electronically integrate (EI) their business systems with their customers systems. This would add-value for customers in the following ways: the companies might develop EDI systems which automatically pass data, for example date of order entry, order progress and payment progress, between companies. They might also share inventories between companies in the manufacturing industry so that it was possible to ascertain the 'status' of an inventory and to 'trigger' the movement of goods. Such developments do not just rely on the use of sophisticated e-resources; they also call for a commitment to value-added management.

5.6 Redefining the scope of the business: the experience of Engineering Company D (ECD)

ECD is a split-site forging company which works with brass, copper and aluminium and, therefore, is subject to intense pressure from low-cost overseas competitors who are increasingly winning contracts from its existing UK customer base. The company re-engineered work processes some time ago and established self-managing teams to empower employees to take responsibility for adding value by managing work processes, resources and relationships with suppliers more efficiently and effectively. Moreover, it benchmarked its current use of 'e-resource' against competitor companies. One result was that ECD have developed a more strategic approach to the use of e-resources. They are now used to support data exchange and communication networks with its customers, to enable the local FE college to provide customised 'virtual' training for engineers and to support greater dialogue and the sharing of knowledge between both work sites.

Participation in LSSB has led ECD to join several local and European 'knowledge management' networks and to recognise that, in order to prosper in future, the company will have to redefine the scope of their business. At present, ECD are tackling this challenge in two main ways. First, they are using 'search engines' to identify market intelligence which they lack, to gain technical information which may help them to enhance their 'risk-management' strategies and minimise the risks which may be associated with future business ventures, and to identify patents which the company may need to buy to support improvements in product and service delivery. Second, ECD are developing communities of practice inside the company who are exploring how ECD can co-opt customer and competitor capabilities and use e-resources to draw the new product and service range to customers' attention.

6. Working and learning with 'e-resources' in SMEs

6.1 Towards a model of learning through 'e-resources'

The diffusion of e-resources throughout SMEs to support business redesign and knowledge sharing, described in the previous section highlights is a radical departure from previous technological revolutions (Castells, 1996). In the past, computers were primarily used as a substitute for, or supplement to workplace activity. For example, telecommunications companies replaced mechanical telephone exchanges by computerised telephony systems, and used Computer-Based-Training (CBT) systems to offer technical training to staff.

Depending on how they are used, therefore, e-resources have the potential to transform the way people work and learn. They can be used to: (i) process, store, retrieve and communicate information and experience in whatever form it may take - oral, written or visual - to be unconstrained by distance, time and volume and site; (ii) reconfigure the business by helping to enlarge and shift the scope of the business thereby helping companies to develop the products and services that they offer to customers; and (iii)providing on-line form it may take – oral, visual, written – to be unconstrained by time, distance and volume; (ii) reconfigure the business by helping to enlarge and shift the scope of the business thereby helping SMEs to develop products and services that they offer to customers: (iii) provide on-line access to subject specialists, mentors and tutorial support, and 'communities of practice' (i.e. clusters of people with common interests).

E-resources, however, are not by themselves a vehicle for assisting people to adopt new business practices, improve productivity, become acquainted with new ideas, or to think more strategically. As the emerging practices presented in this paper indicate, in common with any other learning resources, their true value is only realised when there is clarity about the goals of learning so that they can actually enhance the process of working and learning. This requires, as the experience

of the LSSB project indicates, some form of human intervention within companies and from outside companies.

Based on the experience of the LSSB project, Diagram 3 below is an attempt to conceptualise the relationship between different e-resources, different types of learning and the resulting different outcomes for individuals and SMEs. It outlines the relationship between:

❏ the three different types of learning;

❏ the human resource management and development practices that support particular learning goals;

❏ the contributions that different certain e-resources (i.e. computer-accessed resources and computer-mediated communication) make to this process.

In many respects exploiting the potential of e-resources to support working and learning is quite different from the way these activities have traditionally been undertaken. For example these activities:

❏ do not rely upon synchronous and discrete working and learning experiences that are time-dependent interactions;

❏ do not rely upon the delivery of segmented 'blocks' of information;

❏ can provide continuous linked communication, interaction and opportunities for learning that occurs synchronously or asynchronously.

Nonetheless, as the experiences described in the previous section indicate, in other important respects working and learning through e-resources' is not dissimilar from traditional forms of working and learning. It still requires SMEs to have:

❏ a common business purpose which is understood by all employees;

❏ a strategy for achieving that business purpose and for developing the new capabilities that are needed;

❏ taken account of how organisational mindsets may inhibit and constrain the implementation of new process of working and learning.

Furthermore, SMEs also have to recognise that for learning to take place, learners require:

❏ opportunities to reflect on experience and to try out new ideas in practice;

❏ opportunities to participate in and discern the rules and protocols of the 'community' who have produced the ideas they come across;

❏ the opportunity to use new ideas as frameworks to reflect on practice, and the opportunity to undertake activities to assist them to develop new knowledge;

❏ performance challenges which allow them to develop appropriate habits of behaviour.

This suggests that in order for individuals and SMEs to develop the potential of e-resources, they need opportunities to transform their understanding, beliefs, behaviours and actions on the basis of formal (i.e. planned and managed) and informal (i.e. incidental and contingent) interaction and discussion with a range of other parties.

6.2 Supporting SMEs to use e-resources: the process of knowledge-based consultancy

One of the greatest challenges in supporting people who have little time and an endless concern for the bottom line, to initially understand and subsequently exploit the value of e-resources is to build a relationship based on a firm understanding of the needs of the business. The experience of the LSSB project suggests that one of the main reasons why SMEs felt confident about using e-resources to transform working and learning practices was, in part, due to the face-to-face consultancy support owners received,

Although each SME facilitator operated in accordance with their own personal style, the methodological approach, described in Section 3., enabled them to understand the interrelationships between the following three factors. The are the business context and management strategies, the difference between evolutionary and revolutionary deployment of e-resources and the different styles of working and learn-

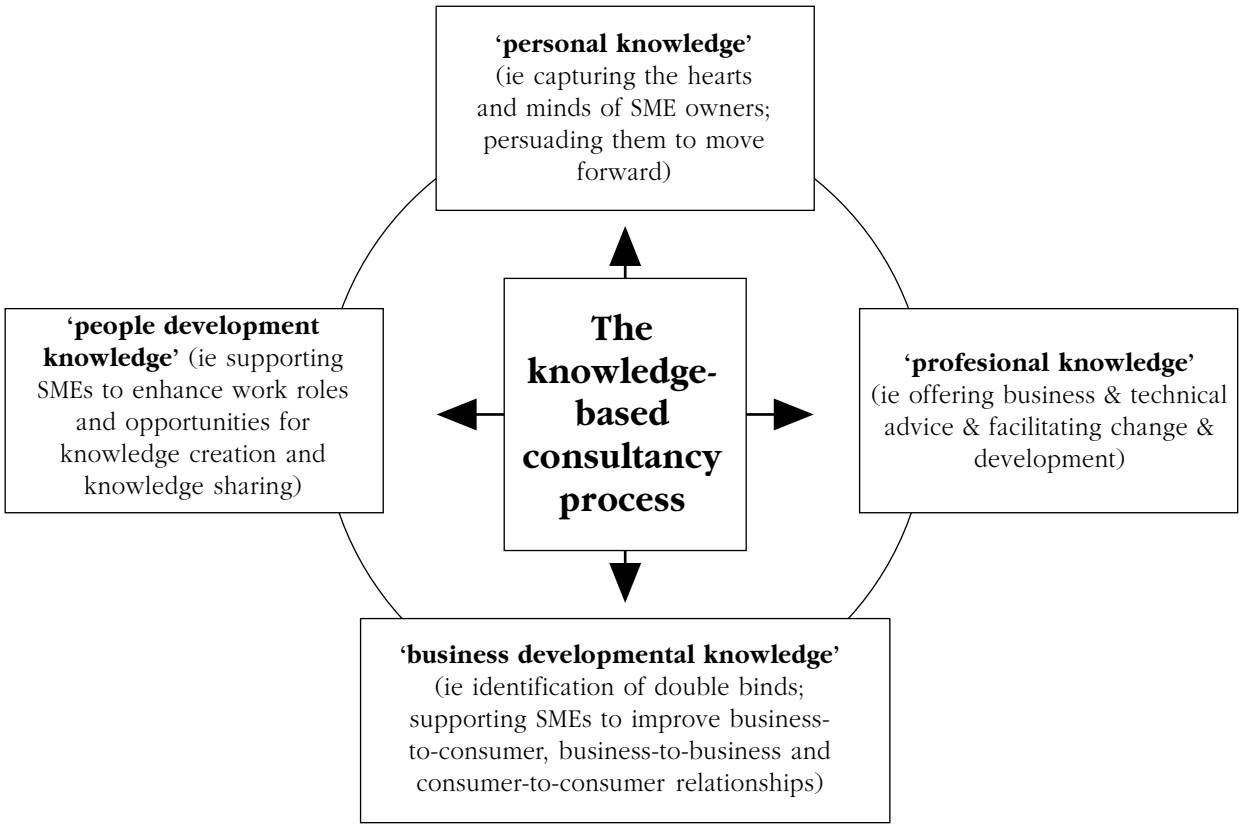
Diagram 3

A framework for using 'e-resources' to support knowledge creation and competitive advantage in SMEs

Types of learning	Types of 'e-resources' for SMEs		Implications for SMEs and Individuals
	Computer-accessed resources (CD Rom, Directors Briefings, on-line Library, Websites etc)	**Computer-mediated communication** (Email, file exchange, video conferencing etc)	
Adaptive learning. For example, accessing information or knowledge	e.g. fulfil set 'learning' tasks / tasks 'posted' on Web/ tasks built into CD Rom eg. retrieve information from company databases, remote databases, Web Sites	e.g. acquire information from expert(s) e.g. focus on pre-set task(s)	facilitate employees' access to learning resources encourage employees to use 'e-resources' to address known problems
Collaborative learning. For example working with others to: • discuss / solve problems • change current practice	e.g. re-think tasks, identify solutions for set tasks e.g. discuss information retrieved / feedback received	e.g. participate in an on-line 'community of practice' e.g. develop new ideas about work practices e.g. share new ideas and change practice	encourage employees to form 'communities of practice' provide opportunities for employees to: • participate in discussions • solve problems • change current practice • develop knowledge and skill
Reflexive learning. For example, conceiving of new ways of working and learning	e.g. question set tasks / information accessed e.g. search for additional information e.g. introduce new working and learning practices	e.g. identify new issues that need to be addressed e.g. work with other 'communities of practice' to co-construct solutions, to problems e.g. introduce new working and learning practices and share knowledge about them	provide opportunities for employees to: • develop new knowledge and new skill • relate their knowledge and skill to other 'communities of practice' knowledge and skill

Diagram 4

A knowledge-based model of consultancy



ing with e-resources. On the basis of this understanding, the facilitators were able to call upon and use four different types of knowledge to help the SMEs to address the following two issues. The first issue is to identify their business challenges, the double binds between their business aspirations and their current management practices. The second issue is to identify the potential of e-resources to support their aspirations and the implications different patterns of deppoyment present for their current working and learning practices.

This process of 'knowledge-based consultancy' involved the facilitators supporting SMEs by using undertaking four key activities. These activities can be helpfully described as:

❏ using 'personal knowledge' of the business context to capture the hearts and minds of SME owners;

❏ applying 'professional knowledge' about business development and management strategies and the potential of e-resources to offer business and technical advice and facilitating change and development;

❏ calling upon 'business developmental knowledge' to identify how to overcome the double binds that threatened to inhibit the development of an organisational culture that would contribute to improving business-to-consumer, business-to-business and consumer-to-consumer relationships;

❏ utilising 'people development knowledge' to assist SME owners to enhance work roles and opportunities for knowledge creation and knowledge sharing.

Diagram 4 above is an attempt to conceptualise the relationship between these four roles. This model of knowledge-

based consultancy reflects one of the main conclusions presented in the final LSSB evaluation report (Webb, 2001) namely that face-to-face relationship building is central to persuading and supporting SME owners to align 'e-resources' to support business and people development.

7. Conclusions

The 'e' revolution poses enormous challenges for business, education and for every member of society. The drive to get closer to customers become knowledge creating organisations and optimise the value e-resources can offer has meant that all types of organisation as well as intermediary agencies increasingly require new capabilities.

Yet, paradoxically, while there is a growing acceptance about the importance of such capabilities, there is far less clarity about how to develop them. Certainly, the idea that e-resources will provide 'learning on demand' or 'just in time learning' has captured the hearts and minds of many educationalists, business leaders and politicians; however, converting this rhetoric into a reality is still at an early stage of development. Nevertheless, as this paper has argued, e-resources do not constitute, by themselves, a vehicle for learning. Putting people 'on-line' is an important step, but in itself does not automatically guarantee the creation of learning networks, learning cultures, knowledge creation and knowledge sharing.

Despite the daunting nature of this challenge, the paper has highlighted that if SMEs want to support their own growth and survival and their employees employability, they will, in future, increasingly have to re-think their business development and management strategies. Otherwise they will run the risk of being excluded from supply and value chains as sectors restructure to respond to the demands of the digital economy and, thus, miss the opportunity to extend their market reach and presence.

Those SMEs who have grasped this connection between business development and management strategy have recognised that it can only be tackled effectively by also re-thinking their strategy for deploying e-resources. Consequently, it has resulted in SMEs not only beginning to:

❏ move away from *task* management towards *added-value* management and *knowledge* management;

but also to begin to:

❏ move beyond *localised exploitation* of 'e-resources' towards the creation of *business networks* and a *redefinition* of the *scope* of their *business*.

By making this step-change, the SMEs described in this paper have had to learn how to develop new core capabilities in order to use e-resources to:

❏ develop more *collaborative* and *reflexive* ways of working and learning which allow them to continuously improve existing work processes and find solutions to their own business challenges;

❏ support business transformation through introducing *knowledge management* processes which involve the benchmarking, data collection, participation in networks and the creation of 'communities of practice' within the company itself.

If the momentum generated by European funded projects, such as LSSB, to support SMEs in playing a key part in restoring regional dynamism is to be sustained regionally, it will be necessary to ensure that future EU projects:

❏ identify how to support SMEs to grow beyond their first stage of their 'innovation';

❏ ensure SMEs' investment in and use of e-resources ideally favours 'added-value' and 'longer life' products and services;

❏ motivate SMEs to join existing networks and build new networks in order to redefine the scope of their business to help them respond to rising customer expectations;

❏ develop greater knowledge about how to use the consultancy practices, described

in 6.2., to support e-resourced business development.

Achieving these goals regionally, nationally and more widely throughout Europe will involve regional agencies:

❏ designing a 'locally configured' inward investment strategy which seeks to support SMEs move from 'evolutionary' to more 'revolutionary' uses of 'e-resources';

❏ developing a bespoke knowledge-based consultancy strategy to support innovation and knowledge management in SMEs;

❏ establishing closer links between higher education, SMEs and intermediary agencies to help to spread 'best practices' more widely within the region and internationally.

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Young women in initial training in the new information and communication technology occupations in Germany

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Although one could have hoped that, in a professional field which is of recent origin and in full evolution such as that of information and communication technology (ICT) occupations, equal opportunity between the genders would have had some prospects of developing, it is seen that old models of gender representation in work continue to persist. Fewer young girls go in for training in ICT occupations than young men, and if they do, their choice tends to turn more towards relational and commercial options than to predominantly technical areas. This article shows why and how gender-based discrimination is getting a foothold in this sector. The author calls for quick intervention before gender-oriented occupational identities become firmly rooted. This calls for political commitment on the part of all concerned, first and foremost the enterprises, in order to establish some simple principles which will make it possible to curb this economically and socially unjustified development.

Introduction

Access of young women to training for new areas of employment in the information, communication technologies (ICT) and related services is gaining increasing attention in Germany. This is related to interest in the fast development and expanding innovation in ICT and ICT applications. As information and knowledge are seen as the new resource at the centre of economic growth and development (OECD, 2000), ICT is one of the most important future areas for increasing innovation, profit and employment.

The ways in which new technology has changed the working lives of individuals and transformed industrial sectors and work organisation has been described and analysed in many publications over the past decade. In discussion on the emerging knowledge economy (OECD, 2000) there is a new focus on the role of ICT for supporting learning and innovation. 'Knowledge services' are keywords; they imply ideas around knowledge management, marketing and consultancy services seen as integral to many core activities in modern enterprises.

There is growing demand for skilled workers from the ICT industry and other related sectors, which increasingly depend on applying ICT technologies([1]). At the same time there is a lack of qualified workers on the labour market. The number of new job profiles within ICT and ICT application services have increased substantially during the last decade. Although the German VET system was slow to react, since 1997 training in four new ICT occupations has been implemented to bridge the gap between labour market demand and lack of qualified workers. A new programme, initiated by the Alliance of Labour, Vocational Education and Training and Competitiveness([2]) in 1999, aims to support training on ICT-related competences and skills. The objectives of the programme include increasing initial training provision for ICT occupations, providing continuous training programmes for different groups on the labour market, developing practical training pathways from apprenticeship training to higher education, and developing ICT-based continuous training.

Are there reasons to assume that the ICT economy and other occupational fields using ICT will increase employing women in skilled work? Recent evidence does not bear this out. In Germany, only 14% of those undertaking initial training in new ICT occupations are young women. Although the total number of training places has almost doubled during recent years, the number of young women participating in initial training in new ICT occupations is decreasing. What are the reasons and what can be done to bring more women into skilled jobs in new employment areas? These questions have been the focus of recent policy discussions, both for developing VET and for strategies for labour market intervention in Germany.

This paper reflects on the reasons and effects of underrepresentation of women in initial training in the new ICT occupations in Germany. The results of evaluations and other empirical studies, including information on access of young women to training and their experience of training processes, are analysed with a reflection on the different views of training providers and female apprentices.

Initial findings suggest that new gender segregation in these new fields of employment is emerging.

Arguments are based on several different sources of empirical data, including:

❏ A survey of 758 companies, either providing training in the new occupations or intending to soon. This survey was undertaken by an author of the Federal Institute for Vocational Training and Education (BIBB) during 2000 and 2001. It aimed to explore why the number of female apprentices in the new occupations remains rather small compared to male apprentices([3]).

❏ An evaluation on acceptance and implementation of the new ICT occupations by companies and apprentices. This study is based on a survey of 569 enterprises and 1 100 trainees started in 1999 by the Berufsbildungsinstitut Arbeit und Technik (Biat) at the University of Flensburg, and commissioned by the BIBB. Empirical evidence taken from this study is based on the final report of the first section of the study([4]).

In the first section of this paper the German context for institutionalising and implementing new ICT occupations is introduced from a gender perspective. The paper goes on to analyse empirical evidence of gender segregation including:

❏ participation rates of women in the new occupations;

❏ occupational orientation and choices of young women;

❏ relevance of companies' organisational setting for supporting women;

❏ gender-related quality aspects of training;

❏ gender images of occupational profiles.

Thirdly, these results are discussed to examine in what way they point to gender segregation. The final section puts forward recommendations for policy-makers and practitioners.

Institutionalising the new ICT occupations and its importance from a gender perspective

The dynamics of the ICT economy and the effects of ICT on other sectors is a big challenge for VET systems. Firstly, there is an increasing shortage of qualified workers in these fields of employment. Surveys suggest there is a shortage of between 70 000 and 150 000 ICT specialists in Germany, a figure which could increase to 300 000 if enough training is not provided. A similar situation exists in the European Community. Recent estimates point to a shortage of 600 000 ICT specialists in Member States. Forecasts for 2002 estimate a shortage of 1.6 million, if VET systems are not able to provide training (Petersen, Wehmeyer, 2001, p. 3).

Secondly, not only has introducing ICT led to new occupational profiles, but also to changed skills needs in other occupational fields and a blurring of occupational boundaries, as the same skills and competences are required in different occupations. Defining ICT-related tasks and skill needs at vertical and horizontal levels is increasingly problematic within existing occupational structures.

The new ICT skill needs do not fit existing occupational structures and cannot easily be related to training profiles and programmes. This may be one reason companies are failing to supply enough apprenticeship places, as existing training profiles become outdated so quickly. Companies have problems in accessing skilled workers from the labour market because qualifications no longer match the work and competence needs of companies. A large number of employees in the ICT economy have no formal qualifications or certificates, but have a high level of expertise based on their personal competence and experience.

([1]) Different definitions of ICT-core branch appear in publications. We use the definition of the Employers Association, where the information and communication economy includes: information technology, telecommunication, production of electronic component parts, consumer electronics, commerce and distribution of media (Bitkom, 2000, p.18). It is important to recognise that employment intensive fields of the ICT economy are found in non-ICT branches as well, as application and services are important factors in almost any other occupational and employment field.

([2]) Offensive zum Abbau des IT-Fachkräftemangels. Beschluss des Bündnisses für Arbeit, Ausbildung und Wettbewerbsfähigkeit vom 6. Juli 1999.

([3]) See: Brandes, H., Dietzen A., Westhoff, G. (2001).

([4]) See, Petersen, W.; Wehmeyer, C. (2001).

These factors have profound consequences for the existing qualifications system and structure. They provide a challenge to the VET system and practice in its capacity for modernisation and reform.

Different approaches and policies have been put forward for the German VET system to respond to these challenges. One priority is to develop and implement new occupational profiles. Since 1997 four new ICT occupational profiles have been introduced. These are information technology specialist, IT electronic technician, IT support specialist, and information technology officer([5]). Each of the new profiles involves three years training. Training is provided through the Dual System venues at companies and vocational schools.

It is based on a common core qualification amounting to 50% of the course with the other 50% focused on specialised skills and knowledge for each different occupation.

Two of the four profiles, 'IT system support specialist' and 'information technology officer' could be characterised as more commercially-oriented occupations. IT system support specialists provide customers with solutions for information and telecommunication systems, primarily in marketing and consultancy, providing services and acting as central contacts for customers. Information technology officers are employed in commercial and business management in different sectors. They link the needs of specialist departments to appropriate information and communication technology.

The two other IT profiles, 'IT system electronic technician' and 'information technology specialist' are more technically oriented. 'IT system electronic technicians' plan and install ICT systems and develop customised solutions by modifying hardware and software. 'Information technology specialists' translate specialist needs into complex hardware and software systems, providing customers and users with technical advice, support and training.

Institutionalising these new occupational profiles represents a new approach to designing occupational profiles and providing training pathways and will extend to other occupational fields (Lennartz, 1997). In that sense the new IT occupations represent a milestone in modernising of the German VET system. The features of the new IT occupational profiles which will be transferred to other sectors include:

- ❏ flexible apprenticeships;
- ❏ work process-orientation;
- ❏ regulated training pathways to continuous training and higher education;
- ❏ a comprehensive training approach, including technical, business, economic and management qualifications, competences and skills;
- ❏ new assessment procedures;
- ❏ new contents – for skills and knowledge - which better address changing working environments and needs.

Gender is an important issue. New occupations and employment areas appear to be more open to people, who, in the past, for different reasons, had problems in entering the labour market. Previous pilot projects which aimed to promote women in technical occupations have been largely unsuccessful, because of the difficulty in opening and changing already established and traditional male-structured occupations.

Another reason gender is important is providing equal opportunities to take part in the 'knowledge society'. If women do not have access to ICT-based information and knowledge, they will not be able to enter future labour markets and more fundamentally, culturally, they will be excluded from the resources on which future society will be based.

The new ICT profiles were seen as an opportunity to break from traditional gender stereotypes, where technical skills were associated with male occupations and communication, organisation and commercial skills with typically female occupations in health, care, services, and business administration. More comprehensive integration of these skills into the new ICT occupational profiles was intended to provide a role model for other occu-

([5]) New occupational profiles in multimedia have also been developed and implemented. This paper focuses only on the evaluation of the four ICT occupational profiles.

Figure 1

Distribution rates of women in ICT occupations

Information technology specialist	12%
IT system electronic technician	4%
IT system support specialist	28%
Information technology officer	23%
All training profiles	40%

(*Source*: Federal Office of Statistics)

pations, in blurring traditional boundaries between gender-typed occupations and employment fields.

A further issue is the concept of *Beruf*. The new ICT occupational profiles are based on a new conceptual approach, as 'supply differentiated' apprenticeships. They involve common core qualifications and differentiated special qualifications, a client, business and service orientation, and a work process orientation. There are opportunities for recognising continuous training occupations through modular programmes, additional qualifications and new regulated, training occupations.

Given the potential for transfer to other occupational fields, the opportunity to develop a new concept of *Beruflichkeit* has arisen. Of course, this is not only linked to ICT occupations, but they are the first where a new approach to *Beruf* is going to be proved. The gender aspect of this theme is a complex question, and not especially linked to ICT, so it can only be touched upon here. It involves questions of how the societal and cultural institution of *Beruf* should be constructed in a new framework, considering that gender plays an important role in building occupational identities.

We have inadequate understanding of how gender segregation is constituted and renewed within occupations and how gender-based definitions of occupations, skills and competences are constructed at a cultural level. Existing research is mostly based on a historical perspective (see, for example, Cockburn, 1983) on technical occupations or Rabe-Kleberg (1993) on health and caring professions). To prevent new gender segregation in the ICT economy and other occupational fields being transformed by ICTs, it is important to introduce a gender perspective from the start in designing and institutionalising new qualificational and occupational profiles.

Training young women in new ICT occupations

In this section the results of different empirical studies are introduced and examined for emerging trends of gender segregation.

Women taking part in ICT occupations

Since initial training courses in ICT occupations started in 1997, women have made up 14% of total trainees. The following figures show the distribution of women between the new ICT occupations in 1999. The figures compare to the 40% average of women taking part in all training courses. Where women apply for initial training in ICT occupations, they are more likely to choose more commercially-oriented occupations than technical ones.

Comparing distribution rates of women in the new ICT occupations with corresponding rates in previous 'outdated' ICT occupational profiles reveals a continuation of the gendered occupational structure of training in ICT (Petersen, Wehmeyer, 2001, p. 177). There are no benefits from the pilot programmes and initiatives in the1980s and 1990s to open traditional, technical male-dominated occupations to women. The number of women remains low and is even decreasing. Although each new ICT occupation integrates technical, commercial and managerial skills more comprehensively, introducing the new profiles has had no obvious effect on changing young women's choice of career to more commercially or technically oriented occupations.

As total numbers of trainees in the four new occupations have nearly doubled since 1997, the trend of young women moving away from ICT occupations is even more strongly highlighted. This trend may have several negative effects. Large gender differences in numbers always produce 'majorities' and 'minorities' in any field of action. Not only does it affect the

social interaction between men and women on the shop floor, but it also influences societal and cultural ideas and values linked to occupations and occupational images (Dietzen, 1993, p. 83 ff., Althoff, 1992). Gendered occupations also influence occupational choice and motivation of companies to organise training courses.

Company strategies and behaviour to hire trainees

Young women are less successful than young men in being accepted for training places in the new occupations. The percentage of women applying for apprenticeships in the four new occupations is 17% (Petersen, Wehmeyer, 2001, p. 178)([6]). As the rate of female trainees is only slightly lower – 16% - this suggests companies neither discriminate in favour or against women.

More revealing is the gender difference in numbers of applicants and apprentices by each occupation. There is a substantial difference between the number of applicants and the number of trainees for the more technically-oriented occupation of IT systems electronics technician. Double the number of women apply for a training place than are accepted. Companies appear to prefer male applicants.

In the more commercially-oriented occupation of IT systems support specialist firms appear to prefer female trainees. The female rate of applicants is slightly lower than the rate of trainees. For the profile of the information technology specialist/ application development([7]), the rate of female applicants and trainees is more or less identical.

Companies seem to follow existing gender stereotypes deciding whom to accept as a trainee. They prefer women for more commercially-oriented occupations and discriminate against women applicants in more technically-oriented occupations.

We know that gender stereotypes mostly work implicitly and tacitly by influencing perceptions and interaction. This is one reason it is so difficult to change stereotypes. Therefore it is important enterprises become aware of gender issues in assessing and hiring personnel.

As the findings of the enterprise panel survey (Brandes, Dietzen, Westhoff, 2001) underline, enterprises rarely reflect critically on their strategies for hiring trainees. Only 8% of companies are ready to reflect critically on procedures for assessing and hiring personnel, and are willing to review procedures to address gender issues (Figure 2, in annex).

Occupational orientation and choices of young women

Discussions on the reasons for young women being underrepresented in new ICT occupations have focused on motivation and choice in applying for training places. It is said that women still prefer to choose traditionally female occupations. In reality, little is known about gender-related choice and orientation, beyond traditional stereotypes. In the enterprise panel survey (Brandes, Dietzen, Westhoff, 2001), respondents were asked how to increase the training rates of women in ICT occupations. Most proposed strategies to interest and motivate young women to apply for training in new ICT occupations. Of respondents, 64% proposed more technically-oriented work placements in occupations oriented towards young women. Of the enterprises, 61% suggested more contact and better cooperation between enterprises, schools and institutions of vocational guidance are necessary to support women in their occupational choice (see Figure 2).

But what are the experiences of young women compared with those of young men during periods of orientation and occupational choice? According to Petersen and Wehmeyer (2001, p. 180), 75% of all trainees on initial training courses in one of the new ICT occupations stated they had found an apprenticeship in their first-choice occupation. But distribution between men and women is interesting. Only 50% of women were successful in their preferred occupation – that means every second woman has chosen an occupation which was only her second or third preference. Individual choice for training within an occupation is dependent on the supply of apprenticeship places. Women are more likely to accept an apprenticeship in another occupation if the enterprise is not able to provide a training place in their first preference.

([6]) This rate differs from the results of the enterprise panel study, where it lies at 20%. (Brandes, H., Dietzen, A. Westhoff, G. 2001).

([7]) This occupational profile of the information technology specialist has two specialist areas: system integration and applications development.

Women appear to be more flexible in accepting alternatives – or descriptions of training profiles are so open that they offer occupational alternatives for female applicants. Occupational choices of young women are obviously more dependent on the supply of training places and alternatives than those of young men. This might be one explanation for the fact that the percentage of female trainees increases when the number of apprenticeship places increases. (Petersen, Wehmeyer, 2001, p. 180).

When asked what influenced their occupational choice, 90% of female and male trainees said it was their 'interest in working with computers'. For 75% of young women this was also the most important first motivation. The influence of family and friends was also decisive for young women. Only one in four women said computer courses at school were influential. This might suggest the enterprise strategy of promoting work placements and improving vocational guidance is largely ineffective in influencing young people.

Relevance of company structure for supporting women

Enterprises place little attention on internal processes for promoting female trainees in ICT occupations (see Figure 2). Their major focus is motivating women to enter existing training places. However, 32% of companies state that improving the gender awareness of leading staff and managers could help develop a 'working culture', which might in the long run result in a gender balance within companies. Only 20% think employing more women in leading positions would result in more women entering ICT occupations - either because women in leading positions are more aware of gender issues or that they provide role models for young women. Of companies, 20% recognise that action to promote gender equality in the workplace would motivate young women to apply for training in IT.

Gender-related quality aspects of training

The survey investigated several issues related to quality. One question was whether employing female trainers would improve training courses for women and whether companies should provide additional support for female trainees. Of the companies surveyed, 90% did not believe these measures would improve in-company training or increase the number of women in ICT training (Figure 2).

Of both male and female trainees, 90% are content with their training in the new ICT occupations. Positive points were the variety of tasks and learning content, the need to be independent and organised, responsibility, communication with customers, work-based learning and project work. Trainees were interested in applications and software development, PC techniques, and support and marketing. The high rates of satisfaction among young women was despite only 50% following training in their first-choice occupation and the lower prior motivation than young men to work with computers (Petersen, Wehmeyer, 2001 p.182).

While general satisfaction with the training courses showed little gender difference, there were significant differences between male and female trainees in information technology specialist - applications development. More female than male trainees found the standards of training contents too low. In following up this response it appeared that female trainees are rarely trained in writing software or systems development despite this being a core, and demanding, component of training and work-based learning in this occupation. Women are less often given 'difficult' learning and training tasks during in-company training than male trainees and therefore feel not sufficiently challenged (Petersen, Wehmeyer, 2001, p. 183).

There are remarkable gender differences between trainees' views on contents and tasks in intermediate and final examinations. Three out of four female apprentices found the examinations too difficult([8]), especially the new holistic examination tasks. To interpret these results it is important to consider how trainees are supported and prepared by in-company training for their final exams. Female trainees argued they had received inadequate or no support.

([8]) The content and tasks of examinations in the new ICT profiles are organised according to a new approach, which includes, for example, more holistic tasks.

Gender images of occupational profiles

Companies, especially large enterprises (between 50 and 499 employees) believe ICT occupational profiles display a 'male bias'. Of companies surveyed, 35% said it was important to change the image of ICT occupations. They say the technical aspects are too heavily emphasised in presenting the occupational profiles, compared to other skills needs such as customer service and managerial and communicative skills, which tend to be neglected (Figure 2).

How big a role images of occupational profiles play in reconstructing and reinforcing gender stereotypes is shown in replacing the profile of 'mathematics-technical assistant' with 'information technology specialist'. The 50% participation rate of young women in the former training programmes for mathematician–technical assistant decreased rapidly to 20% when replaced by the new profile, even though the technical training content remained basically unchanged. The major change was in providing supplementary elements for non-technical competences (Borch & Weissmann, 2000, p. 10).

Changing the designation of the occupation must have something to do with the decreasing numbers of women in the new occupation. We know from other occupational profiles termed 'assistants' that women are more likely to identify themselves with the occupational role of 'assistant' than - in this case - information technology specialist.

Emerging trends of new gender segregation in the new ICT occupations?

Institutionalising new occupational profiles must integrate the gender issue as a basic approach. The survey results and empirical evidence describe only certain aspects of how gender typing in occupation is socially constructed. Our analyses examine the following dimensions of gender typing:

(a) motivation, orientation and occupational choices of young women;

(b) training cultures and companies organisation;

(c) the cultural and symbolic constitution of gendered occupations.

The reason young women are underrepresented in training for new ICT occupations is often attributed to lack of motivation and interest in technical occupations. We do not know enough about the motivation, strategies and processes of occupational choice of young people. Studies in this area are increasingly out of date. The processes of individualisation, indicated by rates of divorce, single parents and single person households will affect more societal concepts of working life and occupational identity towards other aspects of life. Patterns of occupational orientation and criteria for occupational choice have changed as cultural values, attitudes, commitments and gender roles have changed during the past decade. Work-related life concepts of men and women are more and more similar (Baethge *et al.,* 1989).

During the 1970s, a large VET pilot programme was launched to open traditionally male occupations to young women. One main objective was to support women choosing an occupation to base their decision for training on a broader spectrum of different occupations([9]). Our recent research suggests the positive effects of this programme are limited. Of female apprentices in Germany, 54% still select a training profile in one of the 10 most preferred female occupations. Althoff (forthcoming) analysed longitudinal data from official statistics for vocational education and training and found that female rates of concentration in a limited number of occupations are much higher than for men from 1975 to 1999. Althoff shows the percentage rate of concentration is dependent on the rate of supply of apprenticeship places. In times of shortage of apprenticeship places the rate of concentration is lower, as applicants decide on training in an alternative occupation if they are not successful in their first choice. In times of high availability of apprenticeship places, concentration on a limited number of occupations is high because enterprises are able to offer more apprenticeships to match applicants' first choices.

([9]) Pilot program to test industrial/technical training occupations for girls of the German Ministry of Education and Science of 9 March 1978.

By analysing the different rates of concentration of young women and young men, Althoff found the rates of concentration of men tend to decrease more - if the supply of apprenticeship places is low - than of women. If young men are not successful in gaining a first-choice training place, they more easily choose alternatives in other occupations. In the same situation, women tend to choose school-based training, rather than applying for alternative in-company training in another occupation. In German school-based vocational training there is an above average concentration of traditional female occupations in the healthcare sector. Obviously, in-company training is responsive to the demand for training places for young men - but not for young women.

This causes different effects on the training system. Althoff points out that the educational level required for entrance to popular occupations becomes higher in times of limited training places. Trainees who choose to apply for training in alternative occupations are more successful in final examinations than trainees who undertake training in their first-choice occupation. And finally, if women decide on training in a 'male occupation' because they fail to gain their first choice apprenticeship, they more easily leave before finishing.

Althoff found a high rate of failure to complete training for those minority gender groups in an occupation. To explain this, it is worthwhile examining the social interactions which take place in groups of apprentices with large differences in numbers of male and female trainees. The minority are forced to adapt to the rules, expectations, behaviour and social setting of the majority (Kanter, 1977). This could lead to conflicts and pressures on individuals, leading to them leaving before finishing training.

These findings provide a basis for analysing persisting gender-specific occupational choices and the results of continuing gender division of occupations. Secondly, it suggests a need to analyse social situations and training conditions in companies, considering the social effects of unbalanced numbers of men and women in training and at the workplace. Results of the enterprise survey (Figure 2) are unhelpful. Most companies state the problem of lack of female apprentices in the new ICT occupations is solely because of the occupational choice of young women. There is little consideration of in-company training conditions or sensitivity to gender issues in organisations. To consider why the traditional gender typing in occupations is so persistent, it is important to analyse the complex way in which gender is socially constructed at the workplace and within organisations.

Quantitative data are limited and empirical surveys into differences between female and male participation rates are often difficult to interpret. Further studies need to undertake qualitative research and examine experiences of companies and trainees([10]). Also we need to know more about examples of best practice – of companies which integrate gender-related issues into a more holistic approach. Particularly interesting are companies working with new management concepts such as 'total e-quality management', or more integrated policy measures such as the 'gender mainstreaming approach' to organisational and personnel development strategies.

On the symbolic and cultural impact of occupational images, it is important to remember the new ICT occupations are strongly linked to computers which are culturally accepted as 'male occupations'. Although training profiles of new ICT occupations try to overcome existing stereotypes of technical skills for men and communicative, social and service-oriented skills for women, they fail to develop new occupational images allowing women and men to identity equally with ICT occupations.

Some closing recommendations

Gender issues have been debated for 25 years in German vocational educational training and labour market policy. From the outset, one focus was the problem of female underrepresentation in traditional male-dominated occupations and the negative effects of gender division in occupations, between occupations and dif-

([10]) Another research project at BIBB which is interesting for gender issues, aims to explore new fields of employment in the service sector and their potential to supply initial training, see Westhoff, 2001, and Westhoff, (forthcoming).

ferent fields of employment. There has been little obvious progress.

The gender-based division of labour markets and VET results in serious limitations. It implies that human resources are underutilised, with men and women being channelled into VET and the labour market according to their gender rather than their capabilities. Empirical surveys suggest that at a fairly early stage of institutionalising the new ICT occupations, the trend of gender division both limits opportunities for individuals and creates labour market rigidity in recruitment, job performance, and mobility on the labour-market. We know from other occupations and employment fields that gender segregation is a major source of inflexibility in individuals' pathways into and through VET, and in their entry, performance and progression on the labour market. Without intervention the negative effects will become even stronger.

The situation requires political commitment to focus discussion on how gender typing can be stopped, and how VET policy and practice can reverse the trend. The following recommendations are starting points for such a debate.

Occupational orientation and choice pose big challenges for providing flexible pathways for women and men into VET and the labour market. It is not enough to think how young women could be better motivated to select technically-oriented training profiles. Young men also select a training profile according to existing gender stereotypes in one of the 10 most preferred male occupations. This raises questions on how gender preferences for entrance into occupations come about and continue and what role existing gender division between and in occupations and occupational fields has. Obviously, images of occupations as 'male' or 'female' have an important effect on individual decisions. Both men and women avoid choosing a training profile in an occupation where they have the 'wrong' gender. Secondly, the differences between female-dominated and male-dominated occupations in terms of occupational standards, occupational perspectives and career opportunities influence the attractiveness of occupations.

As female-dominated occupations have lower social prestige, lack career and occupational perspectives and work is comparably lower paid, young men selecting a training profile in a 'female' occupation lose prestige and social recognition. We know from historical studies, that men only enter typical female employment areas, if they have no chance of employment in their preferred job or if they expect to get a higher position in a 'female' occupation.

To break gender segregation between different occupations and employment fields, it is important to change the existing scale of values and social prestige which influence definitions of occupational standards for training profiles, competences and qualifications, and continuous training and lifelong learning[11]. An important challenge is upgrading 'female' occupations, especially those dealing with personal services, such as nursing and other care occupations in Germany.

For individuals and their occupational choice, it is necessary to consider systematically their personal orientations, abilities, competences as well as gendered cultural and societal values attributed to work, competences and occupational profiles and their influence on personal decisions. This cannot be limited to a certain transition period from school to initial training or work, it requires monitoring individual development over a longer period. It raises a need for new, innovative approaches to occupational guidance which introduce a more developmental perspective for young people in finding their way to training and work. It also requires better cooperation between individuals, families, schools, companies and occupational guidance organisations.

A second challenge is the symbolic and cultural impact of ICT occupational profiles. ICT profiles include commercial, project-oriented, electronic and computer skills. All profiles have a strong service orientation. Customers expect individual, company-specific services and problem-solving. The needs and expectations of customers are central to ICT work profiles. Consulting is another large work requirement in ICT occupations. But still, the technical needs of ICT occupational profiles are recognised as dominant.

([11]) For an historical analysis of deficits of professionalisation in the field of nursing in Germany, see Mayer, Ch., 2001.

Figure 2

Figure 2 represents the answers of enterprises, asked for good strategies to support women training in the new ICT occupations.

Additional technically oriented work placements	64%
Improved strategies of occupational orientation and vocational guidance	61%
Changing the male bias in occupational profiles	35%
Improving gender sensibility of leading staff and managers	32%
Promoting women for leading positions	20%
Institutionalising gender mainstreaming within enterprises	20%
Gender equality as leading concept of enterprises	11%
Additional female trainers	11%
Additional support for female trainees on training courses	9%
Improved strategies of personnel assessment	8%

(Brandes, Dietzen, Westhoff, 2001)

To change existing images of ICT occupations, service and person oriented elements linked to technical requirements have to be highlighted.

The public image of the ICT economy is linked to individualism, competition, working around the clock and constant availability – the so-called 24/7 society. This may not be attractive to either men or women – but may be less so for women. To be more attractive to women, the ICT economy and related areas of employment within non-ICT specific occupations have to change their image.

Individuals have different ideas, methods and strategies of learning and of handling technical tools and instruments. Learning and training courses have to be sensitive to individual learning styles, and recognise different approaches for women to acquire technical skills and knowledge. We have gained much experience from women in project networks for use in developing better target-oriented and individual training measures and learning supplies. Until now, this experience has not been used enough in ICT initial and further training. Quality assurance instruments for women's training courses could also be of use in ICT training. These are good ideas for creating suitable learning frameworks and environments for the successful training of women. They stress holistic training concepts, which promote personal and professional development by linking cognitive, social and emotional learning. They also recognise typically female organisational needs, such as child caring and limited mobility.

A major challenge is to motivate companies to improve their personnel recruitment strategies. Total e-quality and gender-mainstreaming are examples of approaches which link the economic interests of companies with promoting women. Total e-quality companies stress various advantages of gender balances within organisations. For example, teamworking is much more successful if the number of men and women are balanced within the team. Companies continuously promoting women is an important strategy for creating a stable and skilled staff unaffected by a changing labour market. Total e-quality enterprises are more flexible in providing part-time positions and ways to link parental breaks and return to work periods with training and learning. They show that different career planning, based on typical female approach does not necessarily contradict the economic interests of companies. Companies need to develop different work and organisational cultures and integrate gender issues into the overall organisation.

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ICTs, e-learning and community development

ICTs are a valuable id for local development both because of their educational qualities and because of their effectiveness in collecting data and analysing solutions, two indispensable pre-requisites for strategic planning. However, one should not forget that local development is a process which cannot be undertaken effectively unless it is based on the grass-roots and takes the real needs of the developing communities into consideration. It would also be expedient to make use of locally available resources. Under these conditions, ICTs prove to be a great help because they support, accelerate, reinforce and disseminate practices rooted in the local context and contribute to the attainment of collectively fixed objectives.

NEXUS has implemented a number of projects involving distance learning and the use of ICTs, but with a focus on community development and empowerment. In the course of this work, a number of principles became clear.

The deployment of ICTs in distance learning has not in any significant way changed the content and approach to teaching and learning *per se*. Rather, existing modes are simply transposed into electronic form. Thus the medium changes, from face-to-face or television/video, to multi-media, computers and the internet; but little else. This approach has a number of shortcomings.

❑ It fails to address some of the shortcomings of conventional approaches to education and learning, as they relate to disadvantaged communities and to empowerment.

❑ It fails to take advantage of certain aspects of ICTs that render them particularly useful in this context.

Working in a development context, for instance in less industrialised countries, or in disadvantaged communities here in Ireland, training and education may often take place in far more informal and action oriented settings than that of the formal classroom or workplace. The main actors in these areas are often community based organisations (CBOs) of one kind or another, generally set up by and employing local people and acting as a centre of advocacy, action for change, research and/or learning. Whether in Pakistan or Plymouth, Togo or Tallaght, groups of people organising for social change tend to have similar needs and evolve and apply the same principles.

These needs include learning and education – but very often not the kind available in institutional contexts and official curricula,. Although many of the same tags can be attached – training of trainers, lifelong learning, work-based earning – they simply mean something else for these CBOs. Here it is not a question of looking to the outside, and selecting from a range of available courses suitable for individual (or even group) education. It is a case of looking to the inside and asking: **what kind of learning and education can make a difference to us?**

Furthermore, with the use of ICTs, their approach is also different. The question is not how to deliver what exists to a wider audience, more efficiently; nor of disseminating supposed 'excellence' in education to those where such facilities are presumed needed but not to be available. Rather it is a question of asking: **How can ICTs be used to deliver the kind of learning and education that will make a difference to us here?**

It is the bottom-up and needs driven approach that is different in each case. Community and collective development is not about matching existing courses and facilities to individuals seeking personal education. It is about how communities can educate themselves, using tools and resources available to them, to enable them to overcome the obstacles they confront, and empower themselves. This is not achieved through delivery of external courses and curricula. It does not begin by seeking out what is available out there. It begins from where people are at, the problems they face, the resources they can build on.

Understanding Motivation

The key difference, therefore, is one of motivation – expressed most clearly in the distinction that needs to be made between individual and collective motivation. Peo-

ple who come together in locally established structures – or in issue-based associations – do so as a response to particular development challenges. Where the communities or groups have a history of exclusion from mainstream opportunities, the challenges are about identifying and removing the causes of exclusion. Low individual attainment levels, as measured by formally recognised achievements in education and training, are frequently identified as the most formidable barriers in this respect; and many local responses designed and delivered by CBOs have training and educational activities at their core.

An ideal context, one would imagine therefore, to successfully introduce and exploit the opportunities afforded by development in ICT. After all:

❑ These CBOs are ideally placed to deliver appropriate courses to the most excluded and marginalised members of the community – those for whom the more formal or mainstream education or training system may not have been appropriate.

❑ ICT offers the opportunity to bridge gaps.

While these are important starting points, the most significant contribution ICT can make to tackling social exclusion is missed – essentially because the motivational base or raison d'etre of CBOs is missed. Expressed in its most simple terms, CBOs become involved in training and educational initiatives as a way of strengthening community capacity. Individual progression through education and training is, therefore, a means to an end, and not an end in itself.

The distinction with formal providers becomes more apparent when questions of evaluation are raised. For example, a CBO may be able to demonstrate considerable and very worthwhile outputs or results in training terms – measured typically by numbers of people participating successfully, numbers accessing further educational or employment opportunities etc. However, these opportunities may exist outside the community in question, resulting in participants leaving the area to access them. The CBO may (typically) be working towards the longer-term development of sustainable development and organisational infrastructure within their community. In this case, where the organisation may have trained potential leaders to leave, shorter term successes may in fact contribute to longer-term failures.

If this motivational distinction isn't drawn, then the introduction of ICT is likely to contribute positively to short-term individual progression objectives; at the risk of damaging longer-term community sustainability goals. The effect can then be seen as successful in terms of dealing with the individual effects of social exclusion, while at the same time re-enforcing its underlying causes.

With this in mind, much of the work of Nexus at this interface has been in assisting groups and organisations in clarifying objectives, assessing needs and identifying barriers. In this way, ICT is introduced because it is seen as a way of meeting *particular* challenges encountered; and not because it is necessarily the way in which *all* challenges should be met. Details from the two projects cited below help to illustrate this key difference.

The CEDIS Project

CEDIS (*Community Empowerment through Distance Training in the Information Society*) was an EU funded Project initiated in 1997. It was applied in Greece, where it linked up environmental NGOs into a network, providing the support and training needed; in Rome, where immigrant workers were provided with the facilities and resources to develop relevant internet applications; and in Ireland, where it worked with community development projects to explore learning and networking needs. NEXUS led the project overall and ran the work in Ireland with Community Media Network.

Community Development Projects in Ireland (CDPs) comprise a distinct set of independent local initiatives set up to address issues of exclusion and empowerment. They each receive funding from the government under the Community Development Support Programme (CDSP)

which is run by the Department of Social, Community and Family Affairs. Their learning needs are practical. They relate to the specific objectives of each organisation, and to ensuring that their activities are effective and having an impact. As such, this Programme represents one of the most important vehicles for the delivery of training and educational responses in the most economically deprived areas of the country, to some of the most socially excluded members of the community.

The CEDIS project worked with about thirty of these (there are over two hundred in total spread throughout the country). Each was provided, as required, with equipment, internet addresses and ISP access. Most of the effort, however, went into assessing needs based on their experience. Participative workshops were run, and in the end a limited number of projects went forward with practical applications, such as developing databases to be shared by all of external expertise required; setting up discussion groups, Websites and so forth. In short, the process was about jointly determining needs, and then building capacity in the effective use of ICT to meet these needs. Subsequent success in delivering training and educational initiatives was influenced by a number of factors in this context:

❑ Firstly, it became evident that using ICT to address specific development challenges had a 'knock-on' effect that ultimately embedded the effective and focused use of technology in all development activities – including the design and delivery of training, education and social awareness courses. What began with a very limited application to assist with a practical task([1]) often ended with the successful embodiment of ICT in every aspect of project activity. Several of these went on to establish their own internal ICT department – securing resources for equipment, staff and training. In a couple of the most successful cases, these projects are now delivering training on a variety of themes to people in their communities.

❑ Secondly, the real benefit – or 'difference' – afforded by ICT options was very much linked to the increased capacity for flexibility and responsiveness created as a result. Successful ICT introduction to the project was based on matching project needs or challenges to possible ICT solutions or applications in the first place. So also was subsequent design and delivery of training and educational courses based upon matching specific target group needs with available and appropriate trainers, modules, course delivery methods etc. This was an essential and fundamental pre-requisite, and one that serves to illustrate one of the most successful facets of ICT application to socially excluded areas and groups. The community development process or approach – as followed by all these projects – dictates that local responses or initiatives should be based firmly upon an understanding of local circumstances, strengths, weaknesses and opportunities. This in effect translated into a very wide range of development activity and development themes([2]) – and therefore very particular inputs in VET terms. Access to on-line databases of trainers, and to the facility for ongoing collaboration with them, greatly increases the capacity of projects to identify, design and deliver appropriate training and educational responses to address identified local needs.

Self-Evaluation and Strategic Planning in the Community Development Programme

NEXUS subsequently worked with all the community development projects (CDPs) in the Community Development Support Programme (referred to above) to develop bottom-up monitoring and evaluation systems. Using a model already tried in several community development contexts, NEXUS and the CDPs worked hand-in-hand to devise a system whereby projects could, all over the country, monitor their own progress and the impact of their work based on criteria developed in consultation with all stakeholders. This work was undertaken as part of an overall evaluation of the Community Development Support Programme undertaken by Nexus in 1999 and formally published by the Department of Social Community and Family Affairs in 2002. However, the process of self-evaluation has continued beyond the external evaluation period and is now

([1]) One notable example of this was where a project wanted to connect with others – through basic information retrieval and active discussion and sharing of experiences – on the issue of urban regeneration and community development.

([2]) Development challenges faced by these projects, for example, ranged from co-operative shellfish production in the West of Ireland, to housing estate management or drug addiction counselling in some of the larger urban communities.

being built upon and consolidated to allow for ongoing project and programme review.

As a result of the process of assistance in self-evaluation, a number of evaluation instruments were developed. Using paper-based forms, both quantitative and qualitative information is collected in a structured fashion. This information allows individual projects, or their sponsors or evaluators, to gain an understanding of their project, its activities, and the broader impact of those activities. Because the data is structured, and to a large extent quantitative, cumulative data interrogation and presentation is possible. For example, it is possible to build an understanding of all the projects in a particular region, or those who are, say, particularly concerned with persons from the Traveller community. This facilitates programme-level understanding, evaluation and management.

Projects underwent an intensive period of learning as the evaluation and monitoring system became a part of their everyday management and operational activities, using the paper-based instruments which were developed. However, it quickly became apparent that the process was one which could be facilitated through the use of ICT.

NEXUS is currently working with the projects to develop software which will train them in the use of the evaluation tools and assist them in their application. The software is being built using standard office software database and presentation packages, but will be migrated to a web-based platform in the future. This will be distributed to CDP projects nationally to help them in their work.

The CDP case is a good example of ICT being utilised in the context of community development and empowerment. There are a number of main reasons for its success:

❏ A process had already been developed without using (or even considering) ICTs. This process had proved useful to, and was 'owned' by, the projects involved.

❏ The process was amenable to *implementation* using ICTs. As noted, it involves the collection of structured information, much of it numeric. Therefore, it was possible to implement the existing process without losing, or diluting beyond recognition, any aspects that had made it acceptable to projects in the first place. This will not always be the case, and it is important to understand what may be lost when considering the use of ICTs in a community development context.

❏ The process was amenable to *augmentation* using ICTs. In particular, it is possible to add items such as help systems or background information which are not possible using paper-based forms. Also, of course, it facilitates the dissemination of material among projects.

❏ Critically, use of ICTs (and the process they are supporting) makes the work of the programme funders and administrators easier, therefore ensuring their support and encouragement. The use of ICTs considerably eases programme management and evaluation tasks. The structuring and population of a programme database, which can be interrogated and analysed, is central to this. This database is a natural outcome of ICTs activity at project level.

❏ The networks of actors which ICTs may be used to support are already in place. There are already regional and national forums in which they participate.

❏ The technology used is available and familiar to the projects. Therefore, no substantial investment in either technology or training is required. This is very important, in the context of projects which are operating with finite, and often overstretched, budgets.

❏ The available infrastructure is more than adequate. High speed connections are not required. Were this the case, many projects in more rural areas of Ireland may have been excluded from full participation.

Evaluation and strategic planning functions are therefore being successfully upgraded at both local project and national programme level. As with the CEDIS Programme, building ICT into the culture and everyday operations of projects will inevitably impact positively upon the way

in which training and educational initiatives are implemented. The significance of training and education to the CDPs is evident from the information already collected by the projects as part of their evaluation work. For example, between 1996 and 1999 38 projects (out of a total of 83) had provided training courses, 25 had provided courses on self awareness and self development and 27 had provided educational courses. A total of more than 7500 people had participated on these courses. With regard to training, the most common course content covered estate management, health and community development. Education courses included literacy and health and social care. Social awareness course content included community arts, communication and local democracy.

There is already evidence of an increased tendency towards projects exploiting the obvious potential for peer learning within this context. The programme database – to date only piloted in one region – has allowed projects to identify particularly relevant skills and experiences resident in other projects in the region; and to actively collaborate with these in designing training responses in their own communities([3]).

Policy Influence

There is also early evidence of an even more significant and longer-term contribution to be made to the design and delivery of successful training and educational initiatives within more excluded communities and groups. The community development sector in Ireland generally (and the Community Development Programme in particular) is going through an important transition in its relationship with the statutory sector. Marked by recent national legislation redefining this relationship, change is most evident in the interaction between local experience and mainstream public service policy and practice. In the area of education and training for example, three CDPs have already noted changes in statutory policy regarding the provision of community based education as a direct result of successful CDP-led educational programmes. Two of these were cases where the local Vocational Education Committee made an ongoing commitment to replicating the educational programme delivered; in the other the Local Authority provided physical space and resources to assist with continuation.

The intention, at national level, is to make maximum use of the experiences and lessons emerging from ongoing work with disadvantaged areas and communities: with a particular focus on how the design and delivery of mainstream services can be improved. The instigation of ICT-supported planning, evaluation and networking has allowed projects to explore common experiences and lessons and to communicate these externally as well as within the Community Development Programme.. With the establishment of regional policy Committees (just put in place this year) the possibilities for linking on the ground learning into mainstream provision is likely to improve, as there is now a forum through which particular lessons relating to educational and training provision nationally can be identified and taken up.

This benefit, together with the others noted in relation to the CEDIS and Community Development Programmes, would not have been possible had a 'technology driven' or 'technology push' approach been adopted. On the contrary, they accrue from an approach that marries the most inherently beneficial aspects of community development (collectively designing appropriate responses to locally identified need) with the most inherently beneficial aspects of ICT (the capacity to quickly and effectively match challenges with potential responses – in a way that removes rather than imposes limits on the search for these).

([3]) Two cases where this has already begun are in relation to training in community childcare management and to training in anti-racism and equality promotion.

E-learning as a strategy for creation of regional partnerships

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In 1999 18 projects involving 102 partners and covering ten of the fourteen regions in Denmark were selected following a call for tender entitled 'The regional challenge – education in technology innovation perspective'. These projects dealt with:
– regional partnerships,
– the organisation of partnerships and innovation within the institutional and educational framework,
– ICTs as the lever for change.

This article reviews the results of these projects and shows that, although companies and organisations agree that partnership and interaction are essential for the production, collection, distribution and renewal of most types of knowledge and information, they have difficulties in getting away from the traditional pattern for the transfer of codified information characteristic of the institutional classroom whether it is conventional or electronic.

Introduction

In 1995, the Danish Ministry of Education founded the National Centre for Technology Supported Education as an independent unit with its own board of governance. The aim of the centre was to initiate and promote institutional and educational change through the application of Information and Communication Technologies (ICT). This included inter-institutional collaboration, the design and delivery of education, and the design and implementation new skill initiatives. The intention was that an increasing number of the Danish government supported institutions would offer dual mode learning – face-to-face learning and ICT supported distance learning.

The Ministry had previously formed an expert group to investigate different scenarios for the integration of technology-supported provision within mainstream education and training programmes and to look at the pedagogical, curricular, organisational and economic implications. The study showed that in the early 1990's Denmark was lagging behind other countries and was still at a pilot stage in integrating technology in the education and training system. Given the growing national focus on life long learning for economic development and social sustainability, technology-supported education was deemed a priority area leading to the legislation to establish the Nation Centre.

The Centre has supported and co-ordinated a series of research and development projects and programmes. It has also undertaken evaluations of different initiatives in ICT and education and training. One of the most recent of these studies was a survey of projects on ICT and institutional innovation.

This paper looks at some of the outcomes of that survey and in particular at projects developing public-private partnerships for regional innovation. These projects mainly focus on adult education and training through enterprises and regional resource centres. The paper looks at the issues of project design and the multidimensional nature of institutional innovation.

Regional Innovation - Background to the call for proposals

In 1997, the Centre for Technology Supported Education published a report entitled '*Borderless Education*'([1]) based on interviews with policy makers on the challenges for the education system of the future. The main conclusion was that in the future the Danish education system would face demands for major innovation from the knowledge based, networked society.

The following year the Centre organised a series of regional round table debates on how such change should be organised and how to involve both public and private actors. In spite of Denmark's small size and relative homogeneity, the regional debates highlighted the differences between the regions in terms of education levels, knowledge intensity in manufacturing and service industries, and traditions in collaboration between the public and private sector. There were also

([1]) Center for Teknologistøttet Udannelse *"Grænseløs Udannelse- et debatoplæg om fremtidens uddannelse i et teknologisk udviklingsperspektiv"- 1997.*

considerable differences in the uses of ICT to support collaboration and education and training.

The round table debates also stressed an interest in opening up the 'educational monopoly' so it would not only be within the educational system where people acquire skills and learn. Both public and private participants demonstrated an interest in rethinking approaches to skills and knowledge acquisition and to opening up the educational monopoly to new providers to promote increased participation in lifelong learning including from those presently outside the education system.([2])

Local partnerships and commitment were seen as essential elements in mapping out a new regional knowledge based landscape. ICT was seen as a lever of change for inter-institutional collaboration and the flexible organisation and delivery of education, resources and materials. There were already a number of existing partnerships focused on education and learning to provide the basis for ICT based regional learning partnerships.

The 1999 Call for Applications on theme of *'The Regional Challenge – education in technology innovation perspective'*([3]) resulted in support for 18 projects with 102 partners in 10 of the 14 Danish county regions. This paper reports on an evaluation survey on the outcomes of these projects.

Main Survey Themes

The survey into the project impact and outcomes was undertaken by the Danish Technological Institute. The following were the main issues to be looked at:

❏ The partnership in a regional context;

❏ The organisation of the partnership and innovation in the institutional and learning setting;

❏ ICT as a lever of change.

Project managers and 20% of the partners were interviewed and asked a series of questions regarding their perceptions of the project. The following section summarises the replies.

Reasons for collaborating

The project managers were positive in their assessment of the regional dimension and focus of the projects. This is mirrored in the wide participation by educational providers in the regions. The main motivation for the education providers was:

❏ To create economies of scale in the development of materials, infrastructures and local resources centres;

❏ Because of demand from potential users – mostly enterprises - to create greater transparency and increased supply;

❏ To enable small institutions to compete with providers from larger cities – and to prevent unnecessary competition between each other.

Many of the projects built on previous relationships between the providers, many of who saw the project as a step in a direction of more inter-institutional collaboration, between similar institutions and also between different types of educational institutions. In a long term this could result in easier pathways and bridges for individuals in the context of lifelong learning

One of the projects had tried to develop more flexible arrangements between different education providers but had faced difficulties in providing transparent entry points to network provision and access to resources.

There were some interesting variations project managers and project partners in perception of the extent to which a project had addressed the objectives. Three project managers pointed to only limited progress. All were from projects in counties with a high rate of educational attainment, a high population density and with good access to education and knowledge resources at all levels. These projects aimed to co-ordinate educational resources and create a shared infrastructure through a common ICT platform. The creation of common platforms is still at a prototype phase and has not yet been

([2]) *"Rapporter fra de regionale Rundbordssamtaler"* – Center for Teknologistøttet Uddannelse, 1997.

([3]) *"Support Material for the Call fot Applications"- 1999*, Center for Technology Supported Education, based on material from Shapiro and Såby, Center for Competence & IT, Technological Institute.

used for the delivery of education. It could be argued that the problem is relevant to only a few regions and it is debatable if such a broad approach is adequate to meeting the specialised needs of knowledge intensive firms and sectors who typically utilise multiple education and training providers.

Although most partners were enthusiastic about the project objectives, some felt the outcomes to be unfocussed and vague. This was especially so of the small and medium enterprises. Companies in the metal industries had expected the project would help them with the use of ICT for innovation. However these enterprises, which operate as sub-contractors, are labour intensive, with low levels of ICT skills level and an underdeveloped ICT infrastructure. Most managerial attention is taken up with day-to-day operations and there is little time for broader strategic thinking. The interviews reveal that managers expected that participation in the project would assist them in developing flexibility through the use of ICT applications.

Other participants saw little advance in existing collaboration and partnerships from the project. Whilst new providers had joined the networks and they had profited from infrastructure development, there had been little operational change. This was particularly so for projects seeking to develop on-line access to databases of educational providers.

Those partners most positive about the projects were involved in the joint development of digital resource materials, the development of open access resource centres, or projects targeting medium and large enterprises, sometimes also involving their suppliers.

The projects developing materials and resource centres were of high quality with considerable institutional learning in the design and implementation of ICT supported learning. The institutions would not have been able to afford to undertake this work without the project support. It is also notable that the projects were integrated in institutional innovation strategies for the development of multiple modes of education provision.

Those projects working with medium and large enterprises were mainly working with manufacturing companies in regions suffering from a shortage of skilled labour and problems with retaining skilled workers, partly due to the development of ICT based economy. Whilst larger companies often have an internal Human Resource Management department, facilitating collaboration with local educational institutions, and consciously investing in human resources as part of their strategic development, this is not always so for smaller enterprises. This is especially so in periods of skills shortages when companies are forced to rely on flexibility for growth.([4])

Project outcomes in relation to original program objectives

The original call for proposals had recognised the major differences between the counties in Denmark, despite the relatively small size of the country and the high density of educational institutions.

These differences are related to the knowledge intensity in products and processes between industrial clusters, such as the electronics cluster in Northern Jutland or the biotech cluster in Frederiksborg county, as compared to the cluster of textile and furniture industries in Mid and West Jutland. Differences also include access to and collaboration with research-based institutions, average educational attainment and ICT skills level and the use of ICT as part of the overall innovation strategy.([5])

From an institutional point of view most of the projects are well defined in a spatial context and with their broad institutional coverage. Seen from an industrial innovation perspective this is probably less so - most of the projects are so broad in their objectives and target groups that it is difficult to see what the value added is from a specific regional perspective, whatever merits the projects might otherwise have. It might be suggested that a regional problem and network has been constructed or extended to obtain funding for existing collaboration, particularly in the regions around the larger cities. A number of the projects had already secured regional funding or support from the Digital Denmark initiative.

([4]) *"Den flexible virksomhed – Disko projektet"* Gjerding m.fl. Ålborg Universitet. 1997.

([5]) *"Competitiveness, Localised Learning and Regional Development"* Maskell, Eskelin Hannibalsson, Malberg and Vatne. Routledge Frontiers of Political Economy, 1998.

Another group of projects focus on structural problems in remote regions with relatively low levels of educational attainment and low population density. These projects aim to raise the general skills level in the region to maintain or attract investment from companies, and to guarantee the future of existing educational institutions through the development of specialised and flexible networks of providers.

The regional aspect of the projects has a dual dimension. The networks are attempting to create transparency and coherency in education and training provision within a spatially defined area, although ICT applications are at times used to gain access to specialised research institutions outside the region. The second regional dimension is the industrial development context involving clusters of industries, for example the harbour industries in West Zealand or the iron industries in West Jutland. The evaluation data suggests the latter approach is more successful. The companies participating in the project feel the work is meeting well-defined needs. The regional networks of institutions have been attempting to meet much broader needs with diverse groups of companies. The needs are less well defined and companies were less satisfied with the project outcome, despite the flexibility of ICT based education and training provision. Furthermore the ICT infrastructure was poorly designed in terms of how the companies use ICT and failed to match their expectations for a 'one-stop' education and training service. This problem may be more organisational and conceptual, rather than an issue of the use of ICT, although the ICT was the problem companies raised in the interviews.

Although the projects in the remoter regions most nearly met the objectives of the call for proposals, most had failed to involve micro enterprises despite their original interest in the proposals. There would appear to be several reasons for this. The companies were not actively involved in the development of the project proposals and were essentially passive partners. Secondly many of the projects had such a broad focus that the enterprises were unable to perceive how their active participation could contribute to improved performance by the company, which had been their prime concern and motivation for participating in the first place. Finally, the organisational and learning models developed by several of the projects did not advance beyond the idea of an electronic classroom. In terms of content, delivery, organisational models and technology platforms, these projects failed to meet the needs of the small companies. These issues will be discussed further in the following section.

Evaluation Theme 2: Content and organisation of the collaboration

A number of the project managers interviewed were interested in innovation in building infrastructures and partnerships between local education institutions and firms. They expected that in the medium term this could lead to business-based learning partnerships. The projects had some impact in terms of providing a better common understanding and trust that could serve as a platform for new forms of networked collaboration with enterprises. Previous studies have suggested that, especially in ICT based education and training for managers in small firms, there is a lack of transparent, coherent and flexible provision and a failure to bridge and certify formal and informal learning.(6) The Danish Ministry of Industry has recently launched a major initiative to establish local competence centres to support knowledge-based business development in regional clusters and networks or assist in new cluster formation.

Firm assessment

There is a clear division between the way the small enterprises and the larger companies viewed the outcomes of the projects. The small firms had expected an immediate response to their education and training needs, and for them participating in the projects seemed a waste of time and effort. Nevertheless, they did value being able to discuss problems of the use of ICT with other small firms, though this more informal learning was not part of the original proposal. The larger firms were much more positive in their assessment. They particularly emphasised the importance of having built relationships with local groups of educational providers, and saw the most important contribution of the project in the use of ICT for flexibility and the develop-

(6) Vejle County, "*Behovet for IT kvalifikationer,*" Teknologisk Institut, Kompetnce & IT og Arbejdsliv, 2000. Nordjyllands County ,*"Behovet for IT kvalifikationer"*. Teknologisk Institut, Kompetence og IT og Arbejdsliv, 2000.
"Ledelse og Vækst". For Erhvervsfremme Styrelsen. Teknologisk Institut, Erhvervsanalyser og Kompetence & IT, 1995.

ment of the one-stop-shop concept. The question is raised as to whether the projects dealing with small enterprises would have been more successful if they had taken a two-step approach.

The first phase of the projects could, for example, have organised a learning network among a group of small firms with similar business problems in relation to ICT and logistics - or focused other issues close to their immediate needs. Consultants could have facilitated this process. Much of the learning takes place through interchange of experience between the enterprises participating.(7) The second stage could then develop the interest in partnerships with the local education and training institutions and focus on more long-term issues. Several community colleges in the rural south of the United States have had a positive experience in working with micro enterprises in regional modernisation programmes and in using ICT to simulate different business problems.(8)

Future plans

Some of the projects had plans to further develop collaboration. One of the projects from Southern Jutland working with a number of production companies were planning an initiative targeted at low skilled workers with little or no ICT skills working on night shifts in an on-the- job, on-line training model. Another project, also from Southern Jutland, planned to establish an ICT based peer group network to supplement more formalised learning provision.

In spite the fact that relatively simple technology has been used in most of the projects, both project managers and project participants are generally positive about this. They point out that project collaboration has led to a general raise in ICT skills and to a more positive outlook on the possibilities for using ICT. This applies to both the educational institutions and the firms. Some of the small firms in particular point to the value of meeting with other small firms to see how they adopt ICT in their business and how they handle the ICT skills issue.

Both the project managers and partner organisations were positive over the value of collaboration in developing education, learning and Human Resource Management through the projects.

60% of the project managers believed that the projects and networks would be essential to their future organisational strategy. All associate project participation with a business development strategy. However, few of the enterprises see a direct correlation between investment in Human Resource Management and their business strategy, though they are aware of the need to invest in HRM to develop greater flexibility because of skills shortages in certain areas. One reason for this could be that the firms have not been actively engaged in the project formulation. Another is that the time span from project submission to approval and funding is far too long to play a key role in company development strategies. This is also a problem in EC funded programmes.

Evaluation theme 3: Usage of ICT for regional and institutional innovation

A little over half of the project managers and half of the project partners believe that the ICT has been a lever in regional and institutional change. Technologies have been applied for the following purposes:

❑ **The development of information services** (on-line databases and intranets or extranets as part of a regional infrastructure);

❑ **The production of digital materials** (Internet, CD-ROM and database services);

❑ **The exchange of information and collaboration between partners** (internet and computer conferencing, conferencing);

❑ **The delivery of education** (Internet).

The technologies used have been relatively simple. Some planned developments were dropped for economic and user reasons. Despite this there were a number of problems in the applications. Some of these problems could easily have been avoided with a prior assessment of ICT platforms and infrastructures in the participating enterprises, and an assessment of ICT skill levels and attitudes

(7) Technological Institute has a vast experience with facilitating such business networks in many different technological or more managerial areas as a successful outreach instrument towards micro firms.

(8) Stu Rosenfeld, regional Technology Strategies, North Carolina. (various non-published papers).

among the participants. Surprisingly this had not taken place in any of the projects.

The information services have been little, if at all, used so far. There are several reasons for this. Firstly, many of the projects have had financial problems because of cuts in the project funding. More importantly, they have been developed without involving potential users in the design process, in terms of technical functionality, navigation and functional services. The enterprises have found the information services difficult to use, if they have been able to access them, difficult to navigate, and time consuming.

The projects developing digital materials had not been been tested in a delivery setting at the time of the evaluation. It is therefore too early to say if they will be successful in creating distributed virtual resources and learning centres for firms and individuals.

Attitudes to ICT

Project managers and project partners are positive about using ICT for communication purposes, though some of the small enterprises were only just starting. Some of the project managers also reported resistance to using ICT from first time users in the educational institutions. Systems have been used more for sharing information than for communication. Communication tended to take place in face-to-face meetings. This may partly be due to lack of experience in on-line collaboration, but it may also reflect patterns of project design and delivery with project managers driving development and partners acting as passive recipients of information.

The larger firms are very positive over the potential of on-line education. Typically, this has been developed through the electronic classroom in an on the job setting. For some of the larger firms there have been problems with access to computers in their premises, as well as problems concerning platform compatibility for computer conferencing. Small enterprises are far more negative. Even if the delivery has formally lived up to their demands for flexibility and for on the job learning, the concept of the electronic classroom has failed to integrate daily business and work in the learning process, especially in terms of content, which the enterprises see as too broad and unfocussed. There has been a failure to develop processes and platforms for the enterprises to share knowledge and experience with each other. Finally, insufficient attention has been paid to the fact that many of the firms are new users of ICT.

Summary and Conclusions

The regional context

In the original Call for Proposals a region was understood as a spatial entity for a set of educational challenges linked to industrial, demographic or cultural changes in a particular region.

Conceptually, the regional call was situated in the 1990's discussions of clusters for specialisation and innovation based on socio economic theories of industrial districts.

Interactions within and between enterprises and other organisations([9]) are central to the production, accumulation, distribution and renewal of most types of knowledge and information. In this context information and knowledge is highly tacit in nature. Such tacit knowledge and the learning processes that sustain it, together constitute key components of 'social capital' as the source of product and service innovation. As such, these are properties of collective systems, rather than single enterprises, individuals or physical entities. Social Capital can take on a wide variety of forms, from the corporate culture within *individual firms*, to the 'culture' and practices which prevail in *regional economies*.

Newer research in this area talks about a "*global knowledge topography*" with knowledge corridors such as Silicon Valley, the research triangle in North Carolina, the Ransted Corridor in the Netherlands, the Paris Axe South, and the transborder Oresound region between Sweden and Denmark([10]). One common characteristic of these regions is their access to regionally situated specialised core competencies. Through this they are able to exploit a global demand and supply for knowledge.([11])

([9]) Universities, research centres, investment banks, schools, government ministries etc. These organisations can be public, private, governed primarily by profit seeking motivations or non profit-oriented ones.

([10]) The Futures Project, Knowledge and Learning; Major Challenges for Europe, 1999.
Matthiessen, C.W & Å.E. Andersson (1993): "*Øresundsregionen – Kreativitet, Integration, Vækst*". Endvidere: Berg, P.O. m.fl., Handelshøjskolen/ SAMS (1998): Science Region Øresund: "*Vetenskab, innovation och näringsliv i Øresundsområdets utveckling till ny modellregion i Europa*".

([11]) Professor Martin Kenny, University of California- Research on Silicon Valley.

However, many of the projects that were supported under the regional call for proposals are much wider in their aims. They target general structural problems that are common to several regions or to a particular institutional setting across several regions - for example the role of the adult learning centres as virtual resource centres in a knowledge economy.

One way or another, most of the projects have aimed at more efficient and advanced match of demand and supply through network collaboration.

One of the positive effects of the projects is an increased interest in and focus on the potential of collaboration as a way to create quality, scale and coherence in the educational supply. Many of the educational institutions feel that participation in the project has provided them with a better understanding and acceptance of the role of different educational actors in their region and has clarified the role they play in the overall local education system. One of the limits in all of the projects seems to be that they have not involved institutions at the industrial interface, which typically have a much broader contact to and knowledge about business issues. Their lack of involvement seems to have limited enterprise involvement to the original pilot firms. Their participation could also have been a lever in various forms of dissemination activities in a later stage of the project. The focus there would have been to develop the networks further, for example by creating a broader set of integrated on-line services to increase the innovation capacity and knowledge base in firms.

The networking value added

Many of the projects have an added value in creating a greater transparency and coherence in educational provision. This is important for smaller firms and individuals, and for larger firms, which often use local educational suppliers for the training of their semi -skilled and skilled labour. However it is not necessarily the case when it comes to a specialised labour force or managerial staff or individuals with a high skills profile, especially given the global expansion of advanced on-line university courses and programmes.([12])

For the learning networks to be of real value regionally, it will require active collaboration following the project, closely integrated with a regional modernisation strategy for the ICT based knowledge economy.([13]) This does not seem likely to happen with many of the projects funded under the regional round of proposals. Some of the projects did have ideas for specific activities to continue their collaboration beyond the funding period, and some of the projects do have strong potentials to develop the networks as a business venture. Many of the projects have given little thought to issues of complementarity in the networks that could form a basis for a business model and a branding strategy for the mutual benefit to the individual institutions.

The issues that need to be considered include which services should be part of the institutional network and which services should still remain at an individual institutional level? Would the regional network benefit from a virtual collaboration with specialised national or international research institutions, to give added branding value and credibility? What could be the governance structure and what type of integrated services should be offered and to whom? With increased speed in knowledge processes how - and should - users be involved in the knowledge formation processes in new ways?

Whereas partners from the educational institutions seem to have been brought together to consciously reflect on issues of complementarity or the added value they could bring to the delivery of educational services, this does not seem to be so for many of the enterprises.

Inter-organisation co-operation takes place when organisations pool some of their capabilities or resources (financial, technological, information, or other) in a formal or informal manner. A number of different dimensions on which such co-operative networks or clusters form have been identified in other studies: ([14])

❑ ***Geographical***: the spatial clustering of economic webs from local (e.g. craft industries) to regional (surface transportation, & haulage), to global (telecommunications, shipping, music industry);

([12]) See Boston Globe July 17, 2001.

([13]) Jeremy Millard, Technological Institute, SIBIS and other Support measures under the 5th framework, the IST programme.

([14]) Unpublished paper *Platforms for New Combinations within the 5th Framework Programme,* 1998, by D. Jacobs, TSM Business School, Enschede and Eindhoven University of Technology, the Netherlands.

❑ ***Horizontal***: the classical grouping of economic activity into sectors;

❑ ***Vertical***: adjacent phases of the production process - value chains, *filières*, supplier networks;

❑ ***Lateral***: different sectors with which certain capabilities can be shared and economies of scope achieved leading to new clusters (multimedia);

❑ ***Technological***: A collection of organisations which share a basic technology (the biotechnology cluster);

❑ ***Focal***: a cluster of organisations around a central actor - a firm, an extended family, a research institution, an educational institute.

Different groups of enterprises have been involved in the projects, but the character of these groups and the challenges they face in a knowledge economy does not seem to have formed the basis of learning activities and learning strategies.

ICT as a means to create shared contexts

In the call for proposals ICT was seen as a method to create local identity and shared contexts and as a knowledge lever through network collaboration and through the flexible delivery of education.

Digital communication - synchronous or asynchronous – has a dual character. By its nature, it is borderless and fleeting and as such holds the risk of "detribalisation"([15]). But it can also transcend the immediate surrounding space of the individual. In that sense it can be argued that it is cortex to the creation of regional social capital. In that sense, ICT based communication can evoke a *"synchronicity in rhythm"* through virtually shared contexts which some anthropologists see as a prerequisite to genuine interaction and common identity formation and permanence in relations - also in forming a regional identity.([16]) The rites in a religious society have precisely that very same function.([17])

Beyond the electronic classroom – new metaphors for a knowledge economy?

The actual application of ICT by the projects was relatively simple. In terms of interaction, it was mainly used to supplement face-to-face meetings and for the exchange of information. It has not been used as a collaborative tool in the more genuine sense. One of the most likely reasons is that most of the networks do not seem to have been formed and shaped by a common purpose and a long-term vision. Projects were developed by promoters and the enterprises were not involved until acceptance phase. This was partially due to the application procedure. Many of the networks were constituted as simple one-way knowledge transfer organisations. The project promoter is the developer (holder of knowledge), and the partners typically play a much more passive role as recipients. It is questionable if that form of knowledge transmission is viable.([18])

The ways in which the ICT have been applied remains within traditions of network project management and the electronic classroom aiming at the flexible delivery of education and training (and codified knowledge). Most of the projects have not managed to develop networks for shared collaborative learning and knowledge formation and knowledge creation spaces.

There is a question as to whether the metaphor of the electronic classroom is a sufficient to meet the demand for newer forms of knowledge creation and collaboration. We are confronted with an emerging and increasingly internationalised and specialised knowledge industry([19]). More companies are demanding a better match between formal and informal situated learning arrangements in supplier networks, with customers or clients or in value chains. At the same time, the nature of skills demand is changing ([20]) in firms with closely integrated business strategies. Business and services are in a process of continuous renewal. Learning is not only a process of the acquisition of codified knowledge, but also a process of creating, recreating and discovering new knowledge for the as yet unknown and unimagined business of tomorrow.([21])([22])

The institutional classroom, whether electronic or not, cannot cope with that new learning and knowledge scenario. Future scenarios point towards situated learning communities ([23]) – about which there has been considerable research but little developmental and operational experiments.

([15]) Term used by McLuhan- in *"the Media is the Message"*.

([16]) "The Dance of Life" – Edwin Hall.

([17]) PO Berg- *"Envocation of a Metropolis- The Birth of the Oresound Region"* Studentlitteratur 2000.

([18]) Peter Maskell mfl *"Competitiveness, localised learning and Regional development"* Routledge, frontiers Political Economy, 1999.

([19]) Etienne Wenger *"IT – and changes in th global Education Market"* Unpublished working paper, 2000.

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Europe International

Information, comparative studies

A new economy the changing role of innovation and information technology in growth.
Organisation for Economic Cooperation and Development - OECD
Paris: OECD, 2002, 92 p.
(Information society)
ISBN 92-64-17694-2 (EN)

What is driving recent growth in OECD countries? Why is it that their levels of GDP per capita are no longer converging? Why is it that some countries, operating at the technological frontier, where advances are difficult, appear to be widening the gap? Whether or not it is appropriate to speak of a 'new economy', innovation and technology play crucial roles. This study shows that success requires not some silver bullet, but a range of complementary factors that support the innovation-intensive growth exemplified by new information and communication technologies such as the Internet and Internet applications like electronic commerce. Supportive policies include those favourable to innovative start-ups and to financial systems able to support them, those that facilitate the reorganisation required to reap the full benefits of ICT, regulatory and institutional frameworks that facilitate links between science and industry, and efforts to train and obtain the necessary human capital, as well as public support for basic scientific research. While this study is far from exhaustive, it represents an important step in understanding the conditions under which economies flourish.

Development of a joint model for the accreditation and /or certification of prior learning: model and methods.
European Vocational Training Association - EVTA
Brussels: EVTA, 2001, 36 p.
EVTA,
E-mail: info@evta.net,
URL: http://www.evta.net/index.html

The subject of the present work is to devise a methodological model of assessment, accreditation, and/or certification of prior learning in conformity with the Leonardo project 'Development of a joint model for the accreditation of prior learning', which was put forward by the European Vocational Training Association. This project aims at working out a joint method with a view to furthering the accreditation of prior learning through experience and transparency of professional skills, through the conception and experimentation of a joint model for the accreditation and certification of prior learning at a national level and at the level of the Member States that are partners in the project. It will make it possible to enhance life-long training, by fostering the permanent adjustment of workers to companies' needs and to create the conditions of admission of unqualified adults to continuous training, through the accreditation of prior learning outside the formal educational and training systems. The methodological approach must rest on principles which, related to national procedures, will make it possible to take into account the assessment of prior learning through experience in national accreditation or certification systems. This project aims at unifying these procedures and their clarity from one Member State to another. It aims, in the long term, at facilitating professional and geographic mobility inside the European Union. The model must consider the statutory problems in the field of informal apprenticeship, by developing a strict and shared methodological framework allowing for the inclusion of the national procedures of the partner countries so that attempts at legitimacy can materialise in the value of accreditation or certification granted by each of them. In the rather near future, clarity of accreditation in partner Member States, seen as the result of the implementation of a joint procedure, will have to be added to this.
http://libserver.cedefop.eu.int/vetelib/euorg/EVTA_2002_0002.pdf

This section has been prepared by
Anne Waniart,
and the Documentation Service with the help of members of the national documentation network

This section lists the most important and recent publications on developments in training and qualifications at an international and European level. Giving preference to comparative works, it also lists national studies carried out as part of international and European programmes, analyses of the impact of Community action on the Member States and national studies seen from an external perspective.

European Union: policies, programmes, participants

Access to employment for vulnerable groups.
European Foundation for the Improvement of Living and Working Conditions - EFILWC
Dublin: EFILWC, 2002, 40 p.
(Foundation paper)

The objective of the papers is to make past, present and future work of the Foundation relevant and accessible in a synthesised format. This second Foundation paper focuses on improving access to employment, specifically for groups who are disadvantaged in the labour market.
http://www.eurofound.eu.int/publications/files/EF0246EN.pdf

A general vision of the information society.
European Economic and Social Committee - CES
Brussels: Economic and Social Committee, 2001, 110 p.
Cat.No. ESC-2000-020

The information society is currently generating high expectations in the European Union. The information society is necessarily a global society. Globalisation is not, however, solely a process of economic integration, but also a process which affects culture and technology and which must preserve European cultural pluralism in order to prevent the development of a 'monocultural' world. Information technologies can help renew urban and regional development and activate ecologically clean technologies in other fields. Their structural impact on the Community economy is fundamental, as they mobilise a major 'brain power' component, thus creating an intelligence society. This is why the Economic and Social Committee (ESC) has participated from the outset in the debate launched by the construction of the information society in Europe and the world.

Erasmus world: a European higher education scheme to attract more students from third countries and enable European students to study in other countries.
European Commission, Directorate-General for Education and Culture
Luxembourg: EUR-OP, 2002, 30 p.

Erasmus World is the instrument that Europe needs, both internally and in relation to the outside world, to be a winner in the globalisation of education. By opening our universities to the world, we also open them to Europe. Erasmus World seeks to meet the aims set by the Lisbon European Council. This programme does not replace, but complements in an innovative way, existing regional programmes such as TEMPUS (mainly with countries from the former USSR, the Western Balkans and the Mediterranean Basin), agreements with the United States and Canada, ALFA and ALBAN (for Latin America), Asia-Link, pilot projects with Australia, etc. Compared with these programmes and with national initiatives on cooperation with third countries, Erasmus World will offer third-country students and teachers a greater opportunity for mobility and an enhanced European added value. It will also enable universities in all the Member States to take part in a Europe-wide project, whereas at present over three-quarters of the 400 000 students from third countries who come to the European Union are concentrated in a few countries.
http://libserver.cedefop.eu.int/vetelib/eu/pub/commission/dgeac/2002_0026_en.pdf

Candidate countries Eurobarometer.
European Commission
Brussels: EUR-OP, 2002
ISSN 1683-5042

The first wave of the Candidate countries Eurobarometer was carried out in October 2001 in all the 13 countries applying for membership. Its methodology is almost identical to that of the Standard Eurobarometer. One report is published each year, excluding the special reports. It replaces the Central and Eastern Eurobarometer (CEEB).

European basic skills network.
London: European Basic Skills Network, 2002

EBSN is a partnership of national agencies with a responsibility for basic skills in member countries. Through this project it aims to: share information about innovative approaches which combat social exclusion and promote inclusion by improving levels of basic skills; establish a network of national organisations working in this area which are in a position to develop and promote effective basic skills strategies; influence national and European Union policy and funding priorities. The United Kingdom (including agencies in England, Scotland and Wales), France, Denmark, Spain, Belgium (Flanders), Ireland and Latvia are members.
http://www.eurobasicskills.org/

Presidency Conclusions: Seville European Council, 21-22 June 2002.
Council of the European Union.
Brussels: General Secretariat of the Council of the European Union, 2002, 42 p.

The European Council which met in Seville on 21 and 22 June 2002 welcomed the considerable momentum that had been given to the dialogue between the Parliament, the Council and the Commission in the new partnership referred to In the conclusions of the Barcelona European Council, and gave a favourable reception to the setting up of the High-Level Technical Group for Interinstitutional Cooperation. Among the issues discussed were: 1) the future of the European Union; 2) enlargement; 3) asylum and immigration issues; 4) sustainable development; 5) growth and competitiveness leading to full employment; and 6) external relations.
http://europa.eu.int/council/off/conclu/index.htm

Quality of work and employment in Europe.
European Foundation for the Improvement of Living and Working Conditions - EFILWC
Dublin: EFILWC, 2002, 36 p.
(Foundation paper)
ISBN 92-897-0156-0

Foundation papers aim to highlight knowledge and analysis emanating from the Foundation's research themes: employment, equal opportunities, social inclusion, time use and diversity. The objective of the papers is to make past, present and future work of the Foundation relevant and accessible in a synthesised format. The subject of each paper will be linked to current social policy issues and thus offers a timely contribution to the debate at European level.
http://www.eurofound.eu.int/publications/files/EF0212EN.pdf

Report on the Commission communication on making a European area of lifelong learning a reality: (COM(2002) 678 - C5-0165/2002 - 2002/2073(COS)). C5-0165/2002.
European Parliament - Committee on Culture, Youth, Education, the Media and Sport
Session document, A5-0224/2002
Luxembourg: European Parliament, 2002, 29 p.

With the purpose of improving the prospects for lifelong learning in the European Union in November 2000 the European Commission began a consultation process through the publication of its 'Memorandum on Lifelong Learning' which set Europe the ambitious target of becoming the most competitive and dynamic knowledge-based economy in the world. Education and training play a key role in the realisation of this goal. The communication notes that a knowledge-based economy offers European citizens a number of opportunities. These opportunities, however, can only be fully exploited if individuals are sufficiently well trained and educated to embrace the advantages of modern technology. In terms of definitions, the Communication proposes that the following four objectives/definitions should be presented when discussing lifelong learning: 1. Personal fulfilment; 2. Active citizenship; 3. Social inclusion and 4. Employability /adaptability. These objectives have been established to highlight that lifelong learning is important not only in terms of filling gaps in the labour market but also in terms of the value it offers for a more inclusive, tolerant and democratic society. A further strategy for the fostering of lifelong learn-

ing is improving access to learning opportunities. The Commission urges greater visibility, integration and targeting of lifelong learning processes. This could be achieved through: 1) Removing social, geographical, psychological and other barriers; 2) Adapting entry, progression and recognition requirements to take account of non-formal and informal learning; 3) Tailoring measures and offering specialist provisions to meet any unmet demand; 4) Securing adequate investment by employers in their workforce. Lastly, a further plank in this strategy is the need to foster excellence in lifelong learning in terms of quality assurance, evaluation and assessment and/or revision of strategies.
http://libserver.cedefop.eu.int/vetelib/eu/leg/eprep/2002_0224_en.doc

The Europe of coal and steel through education and culture.
European Commission - Directorate-General for Education and Culture
Luxembourg: EUR-OP, 2002, 18 p.
EUR-OP,
2 rue Mercier,
L-2985 Luxembourg,
or from its national sales offices,
Tel.: (352-29) 2942118,
Fax: (352-29) 2942709,
E-mail: info.info@opoce.cec.be,
URL: http://www.eur-op.eu.int/

The Economic Coal and Steel Treaty was concluded in 1951 for a term of 50 years by Belgium, Germany, France, Italy, Luxembourg and the Netherlands and is seen as the first mainstay of European integration. The treaty officially expires on 23rd July 2002. On that date, a symposium entitled 'Past and Future of the European Union' is to be held in Brussels in the presence of Mr Romano Prodi, President of the European Commission. For this special anniversary of the ECSC, the Directorate-General for Education and Culture has produced a press pack entitled: The Europe of coal and steel through education and culture. This pack puts together the projects supported by the Directorate-General for Education and Culture.
http://libserver.cedefop.eu.int/vetelib/eu/pub/commission/dgeac/2002_0020_en.pdf

Working conditions in candidate countries and the European Union / Paoli Pascal, Parent-Thirion Agnès and Persson, Ola.
European Foundation for the Improvement of Living and Working Conditions - EFILWC
Dublin: EFILWC, 2002, 8 p.

In 2001, the Foundation carried out a survey on working conditions in 12 candidate countries: Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia. The questionnaire-based survey is identical to the three working conditions surveys carried out in the EU Member States in 1990, 1995 and 2000, allowing for comparisons to be drawn between these two groups of countries. This leaflet presents the main findings of the candidate countries' survey.
http://www.eurofound.eu.int/publications/files/EF0246EN.pdf

Women and technical professions.
European Commission - Directorate-General for Education and Culture.
Luxembourg: EUR-OP, 2002, 18 p.
(Leonardo da Vinci Series: Good Practices, 1)
Cat.No. NC-41-01-050-EN-C

Access of women to the technical professions is still very restricted. While equality between men and women in access to vocational training is enshrined in Community texts, the fact remains that scientific and technical careers are still a male preserve.

From the Member States

A Bildungsinformation: Sektion Berufsbildung.
[Educational information: focus on vocational education.]
Bundesministerium für Unterricht und kulturelle Angelegenheiten - BMUK
Vienna: BMUK, 2002, various pagination
BMBWK,
Minoritenplatz 5,
A-1014 Vienna,
Tel.: (43-1) 531200,
Fax: (43-1) 531204499,
E-mail: mailmaster@bmbwk.gv.at,
URL: http://www.bmbwk.gv.at/

General information about the Austrian vocational training system provided by the Federal Ministry of Education and Cultural Affairs: charts of the training system, vocational schools, colleges, training firms, further education, glossary.

Efit Austria: Willkomen in der Wissensgesellschaft.
[Efit Austria: welcome to the knowledge society.]
Bundesministerium für Bildung, Wissenschaft und Kultur - BMBMK
Vienna: BMBWK, 2002

The EU's Action Plan 'eEurope 2002' aims to teach all EU citizens the skills for living and working in the information society. Austria implements the educational objectives of the EU Action Plan under the eFit Austria programme, targeted at supporting and promoting the optimum use of modern information and communication technologies in education, science and culture. eFit Austria sees itself as a progress platform for the numerous initiatives and projects dealing with these issues of the future. The 'Computermilliarde' (1 billion schilling computer literacy plan) of the Austrian Federal Government for education provides the basis for these activities, amongst others. Evidently, eFit Austria also aims at improving infrastructural conditions.
http://www.efit.at

B Politique de l'emploi et concertation sociale (1999-2002) / Étienne Arcq.
[Employment and social concertation policy (1999-2002)]
Courrier hebdomadaire, 1744
Brussels: CRISP, 2002, 46 p.
ISSN 0008-9664
CRISP,
Rue du Congrès 35,
B-1000 Brussels,
Tel.: (32-2) 2183226

The author examines the dynamic elements of intersectoral agreements against the background of overall government policy and analyses the positions of the social partners. The different points of the 2001-02 intersectoral agreement which deal directly or indirectly with employment are analysed in terms of their context, their content and their implementation; through this it is possible to show the practices (bipartism or tripartism) underlying each measure. In conclusion, the author evaluates how much autonomy the social partners have in the field of collective bargaining and the status of coordination between the different bargaining levels.

D E-Commerce / E-Business - eine neue Qualifizierungslücke?: Qualifikationsnachfrage und Weiterbildungsangebot / Peter Bott und Hans-Joachim Schade.
[E-commerce/e-business - a new skills deficit?: skill requirements and the provision of continuing training.]
Berufsbildung in Wissenschaft und Praxis, Vol 31, No 1, p. 29-31
Bielefeld: Bertelsmann Verlag, 2002
ISSN 0341-4515

The authors present the results of a study of skill requirements and the provision of continuing training in the area of e-commerce/e-business. The study was based on a job announcement analysis using the tools provided by the Federal Institute for Vocational Training's (BIBB) early recognition system for detecting skill developments as well as the further train-

ing databank KURS. The analysis of the provision of continuing training corroborates the results of the job announcement analyses. Both suggest that the demand for training in this area is still in its early stages. Skills in e-commerce/e-business can currently be met by participating in specialised continuing training measures. No pressing need for new federally regulated occupations and training programmes for e-commerce/e-business is currently discernable.

E-Learning: Erfolgsfaktoren und Einsatzkonzepte mit interaktiven Medien / Ullrich Dittler *et al.*
[E-learning: success factors and implementation concepts using interactive media.]
Munich: Oldenbourg Verlag, 2002, 318 p.
ISBN 3-486-25807-9

With the help of numerous examples, the authors show how e-learning measures may be successfully designed and introduced in enterprises. The report covers basic implementation concepts and success factors relating to training courses using traditional computer-based training as well as cooperative learning with web-based training. Instruction in the context of virtual seminars and approaches to designing e-learning portals are also described. Practical examples from companies illuminate the discussion.

E-Learning: Märkte, Geschäftsmodelle, Perspektiven / Ulrike Bentlage *et al.*
[E-learning: markets, business models, prospects for the future.]
Bielefeld: Bertelsmann Verlag,
2002, 166 p.
ISBN 3-89204-574-7

The authors study and compare the development of the e-learning market in Germany and the USA and present WINFOLine, a virtual course of study in business computing that is guided by four universities. The International Certificate Program for New Media (ICPNM), an internationally recognised university-level further training program is also described. According to the authors' predictions, e-learning in Germany will increasingly take place in the context of corporate learning in combination with presence courses. The report concludes with a discussion of the future prospects for e-learning and its likely impact on a mobile and globally active society.

E-Learning für KMU (Kleine und mittlere Unternehmen): neue Medien in der betrieblichen Aus- und Weiterbildung / Andreas Kuhlenkamp.
[E-learning for small and medium enterprises: new media in in-company training and continuing vocational training]
Wiesbaden: Hessisches Ministerium für Wirtschaft, Verkehr und
Landesentwicklung, 2002, 56 p.
ISBN 3-933732-31-X

The brochure provides an overview of existing vocational training, continuing vocational training, and teaching and training provision on the Internet designed specifically for small and medium enterprises. Given the rapid change and expansion of training offered on the Internet, the listed training portals only reflect a snapshot of what is currently available. The Internet training offered by the various Chambers of Industry and Commerce and the e-learning offered by the Central Agency for Continuing Training in the Crafts Sector are of particular interest.

Erfolgsintelligenz: die acht Wege zur beruflichen Karriere / Thomas Eckardt.
[Intelligence for success: eight paths to a professional career.]
Renningen-Malmsheim: Expert,
2002, 86 p.
ISBN 3-8169-1986-3

The author offers a variety of ideas for improving personal 'intelligence for success' and makes practical suggestions for the everyday work situation. The eight intelligence factors that play a role in successful career development are described in detail: the willingness to innovate, a sense of responsibility, self-motivation and the ability to motivate others, the ability to process information, a heightened awareness of cost-benefit factors, the initiation of organisational improvements, flexibility and client orientation.

Handbuch E-Learning: Expertenwissen aus Wissenschaft und Praxis / Andreas Hohenstein und Karl Wilbers. [E-learning handbook: expert reports on theory and practice.]
Cologne: Deutscher Wirtschaftsdienst, 2002, various pagination
ISBN 3-87156-298-X

In the form of articles, checklists and reports from the field, this loose-leaf collection contains expert reports that systematically cover the field of e-learning. The authors report on experience gained in the implementation of e-learning with the focus on didactic design. Issues pertaining to the analysis of the personal and cultural conditions of e-learning as well as individual learning environments are considered. The development of e-learning strategies and the didactic design of e-learning require the integration of knowledge management, e-management of human resources (E-HRM) and e-business. The broad spectrum of themes and the different types of contributions offer a valuable source of e-learning know-how.

DK Helhedsvurdering af elever: efter grundforløbet / Ole Dibbern Andersen, Albert Christensen og Torben Størner. [Generel assessment of trainees: after the basic course.]
Danmarks Erhvervspædagogiske Læreruddannelse - DEL
Frederiksberg: DEL, 2002, 44 p.
DEL,
Rosenørns Allé 31,
DK-1970 Frederiksberg C.,
Tel.: (45-35) 247900,
Fax: (45-35) 247910,
E-mail: del-lib@delud.dk,
URL: http://www.delud.dk/

In this publication, the assessment methods in use after completion of the basic VET course are described. The assessment is to clarify whether the student is ready to continue on a main programme or special consideration should be shown in order to ease the transition from the basic course to the main programme. The assessment includes both summative and formative elements. The student is to participate actively in the overall assessment and be able to evaluate own strengths and weaknesses. The overall aim is however to ensure that the students have acquired the vocational, general and personal competences described in the regulation for the VET programme. The publication includes a number of case studies in which different student types and assessment and guidance methods are described.

Multikulturel vejledning / Karin Jakobsen og Per S. Søndergaard. [Multicultural educational guidance.]
Undervisningsministeriet - UVM, Uddannelsesstyrelsen
Copenhagen: UVM, 2002, 68 p.
(Uddannelsesstyrelsens temahæfteserie, nr.2-2002)
ISBN 87-603-2143-1
Undervisningsministeriets forlag,
Strandgade 100 D,
DK-1401 Copenhagen K,
Tel.: (45-33) 925220,
Fax: (45-33) 925219,
E-mail: uvm@uvm.dk,
URL: http://www.uvm.dk

Today, guidance counsellors have to be able to offer relevant and targeted guidance to people with many different cultural backgrounds. This calls for further education and training of the guidance counsellors to develop their intercultural competences and ability to reflect on how different cultural backgrounds influence human interaction. Furthermore, there is a need for developing new guidance methods and tools which can support the guidance counsellors in meeting the demands of new target groups. This publication describes how guidance counsellors need to train themselves to become 'culturally reflective guidance counsellors'. The publication is based on experiences from local innovation and development projects and offers a number of methods and tools which guidance counsellors can use in their own development process. Apart from Danish experiences, the publication also draws on experiences from the USA, the UK and Canada.
http://pub.uvm.dk/2002/multikulturelvejledning/

Uddannelse, læring og IT: 26 forskere og praktikere gør status på området / [Education, learning and information technology: state of the art from the perspective of 26 researchers and practitioners.]
Undervisningministeriet, Uddannelsesstyrelsen
Copenhagen: UVM, 2002, 250 p.
ISBN 87-603-2121-0
Undervisningsministeriets forlag,
Strandgade 100 D,
DK-1401 Copenhagen K,
Tel.: (45-33) 925220,
Fax: (45-33) 925219,
E-mail: uvm@uvm.dk,
URL: http://www.uvm.dk

In 2001, the Danish Ministry of Education launched a new strategy for education, learning and IT in which emphasis was put on content, knowledge sharing and the development of educational IT competences. An important aim of the strategy is to analyse how teaching, learning and IT can be combined in a fruitful way that exploits the vast opportunities offered by IT. Prior to the launch of the new strategy, the Ministry of Education had asked researchers and practitioners within the Danish education system to describe the state of the art within the cross-sectoral field of education, learning and IT. 26 contributions were submitted offering various perspectives on the main theme. This publication contains all 26 contributions and they are further subdivided into the themes of; qualifications and competences in a network and knowledge society; open learning centres and flexible learning environments; virtual learning environments; IT integration in class-room teaching; children, media and IT; and teacher culture, organisational culture and knowledge sharing.

E El sistema de formación profesional en España: breve descripción / Carlos Otero Hidalgo, Andrés Muñoz Machado, Aitor Marcos Sánchez.
[Vocational education and training in Spain: short description.]
Luxembourg: EUR-OP, 2001, 46 p.
(Cedefop Panorama, 13)
ISBN 92-896-0082-9
ISSN 1562-6180
Cat.No. TI-41-01-389-ES-C
CEDEFOP,
P.O. Box 22427 - Finikas,
GR-55102 Thessaloniki,
Tel.: (30) 23 10 49 01 11,
Fax: (30) 23 10 49 01 02,
E-mail: info@cedefop.eu.int,
URL: http://www.cedefop.eu.int/

This document gives a short description of the vocational training system in Spain which has undergone a complete reform since the early 1990s. Special attention is devoted to each one of the sub-systems: regulated training, where the progressive implementation of the system created by LOGSE is stressed; occupational training; and the training of persons in employment marked by the recent adoption of the III National and Tripartite Agreements on Continuing Training. Other aspects such as financing, the teaching staff in vocational training, and the information and vocational guidance system, are also dealt with. There is also a brief chapter on the on-going decentralisation process in the vocational training system which is viewed as a further step in the transfer of competence from the State to the Autonomous Communities. Finally, we have included a chapter on trends and perspectives. Throughout the work, we have tried to show how the Spanish vocational training system is adapting to the new economic and social context in Europe.
http://libserver.cedefop.eu.int/vetelib/eu/pub/cedefop/pan/2001_5122_es.pdf

F La formation ouverte et à distance: l'heure des solutions mixtes.
[Open and distance learning: the time has come for combined solutions.]
Forum Français pour la Formation Ouverte et à Distance - FFFOD
3èmes rencontres du Forum français pour la formation ouverte et à distance.
Paris. 2002
Paris: FFFOD, 2002

Combined solutions turn e-learning into an innovative technique of classical training methods, or they bring about an enrichment or improvement of pure e-learning measures through the addition of the time needed for face-to-face instruction in order to improve overall effectiveness and in order to reach a sufficiently large target group. Combined solutions retain

the two principal strong points of e-learning: full use of information and communication technologies, but only to the extent needed by the learners, and as much customisation of training as necessary.
http://libserver.cedefop.eu.int/vetelib/nat/fra/ngo/2002_0004.pdf

La validation des acquis professionnels: bilan des pratiques actuelles, enjeux pour les dispositifs futurs / Chantal Labruyère, Bernadine Rivoire et Josiane Tessier.
[Validation of professional prior learning: review of current practices, the crucial elements of future measures.]
Marseilles: CEREQ, 2002, p. 1 - 4
(Bref CEREQ, 185)
ISSN 0758-1858

With the adoption last January of the section on 'validation of prior learning' (validation des acquis de l'expérience - VAE) in the law on social modernisation, the measures for the validation of acquired professional competence (validation des acquis professionnels - VAP) introduced since 1985 have undergone a major development. A review of these practices, of the demand for certification expressed by individuals and enterprises and the build up of provision in line with this demand, makes it possible to have a better understanding of the crucial factors which will in future play a leading role in the validation of prior learning.
http://libserver.cedefop.eu.int/vetelib/nat/fra/ngo/2002_0006.pdf

L'Europe de la formation tout au long de la vie reste à construire / Michel Théry, Patrick Rousset et Christian Zygmunt.
[The Europe of lifelong learning remains to be constructed]
Marseilles: CEREQ, 2002, p. 1 - 4
(Bref CEREQ, 187)
ISSN 0758-1858

In the last few years, the European Union has launched a debate on 'lifelong learning'. This ambitious venture, sometimes controversial, should however take account of the specific traits of each country to be found today. A comparison of the measures undertaken in companies for the continuing training of their employees, shows that there is much diversity in this field in the Europe of the Fifteen.
http://libserver.cedefop.eu.int/vetelib/nat/fra/ngo/2002_0007.pdf

La construction de la certification: quelles méthodes, pour quels usages? / Yves Clot *et al.*
[The construction of certification: what methods, for what uses?]
Documents CEREQ série séminaires, No 161 (Février 2002), 151 p.
Marseilles: CEREQ, 2002
ISSN 1249-5107
CEREQ,
10 place de la Joliette,
BP 21321,
F-13567 Marseilles cedex 02,
Tel.: (33-4) 91132828,
Fax: (33-4) 9113288,
E-mail: cereq@cereq.fr,
URL: http://www.cereq.fr/

In the course of the meetings on 13 and 14 September 2001, the participating experts examined methods for the construction and, above all, the use of reference frameworks for occupational activities: what do these reference frameworks state, who makes use of them, how and why? The recently reformed validation of acquired professional experience makes these questions a crucial issue. How can the professional experience acquired by the individual be 'translated' into a diploma?

IRL

Frameworks of qualifications: a review of developments outside the State / National Qualifications Authority of Ireland.
Dublin: NQAI, 2002, 55 p.
NQAI,
4th Floor,
6-9 Trinity Street,
IRL-Dublin 2,
Tel.: (353-1) 6127080,
Fax: (353-1) 6127095,
E-mail: info@nqai.ie,
URL: http://www.nqai.ie/

This paper reviews approaches to the task of developing frameworks of qualifications. It presents current international policy developments and summarises and

compares the existing frameworks in twelve jurisdictions in Europe, Commonwealth countries and the USA. The approach to framework development that has been most comprehensive in ambition i.e. including all sectors of education and training is that associated with the Commonwealth countries, which all have, in the last decade, developed a national system of qualifications. Many Continental European countries have traditionally differentiated between different sectors of education and training and maintained parallel frameworks for vocational or professional education and training and academic education and training. Qualifications in these countries have a strong legal base. The system in the United States, on the other hand, is underpinned by a strong principle of voluntarism, with qualifications afforded minimum public legal protection. A framework of sorts exists based around a series of 'portal' qualifications - high school diploma, associate degree, bachelors degree and graduate degree which allow for progression. There are also programmes which result in certificates. These are largely vocationally oriented and are delivered though community colleges.

Statement of strategy, 2002-2005 / Irish Business and Employers' Confederation – IBEC.
Dublin: IBEC, 2002, 36 p.
IBEC,
Confederation House,
84/86 Lower Baggot Street,
IRL-Dublin 2,
Tel.: (353-1) 6601011,
Fax: (353-1) 6601717,
URL: http://www.ibec.ie

IBEC represents the interests of business and employers in Ireland. Their strategy document has been produced following extensive consultation within the organisation. It focuses on eight policy priorities: measured global competitiveness; infrastructure; education and training; liberalisation; information and communication technology; labour market and human resources development; responsible business and quality in our public sector. Under the 'Education and training' goal, it says that IBEC has an important contribution to make in the formulation of an education policy and measures to reflect the full spectrum of skills that will be required in business in the future. The aim is to prepare the Irish skills base to be attractive to foreign investment in the future in the light of EU enlargement and World Trade Organisation developments. The 'Labour market and HRD' goal focuses on achieving an appropriate balance in the labour market supply, maximising workforce flexibility and promoting best practice in HRD. There will be an annual review of progress in implementing the strategy.

NO Attraktiv læringsarena / Kjetil Taraldsen.
[Attractive learning arena.]
Oslo: Aftenposten, 2002
Aftenposten,
P.O.Box 1178 Sentrum,
N-0107 OSLO,
Tel.: (47-22)863000,
Fax: (47-22)426325,
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URL: http://www.aftenposten.no

A variety of institutions are offering services related to e-learning in Norway. A market of more than NOK 500 million is an attraction to approximately 40 companies competing in this market. The article focuses on the e-learning and presents the main sectors in which e-learning is being used to day. It was thought the large international chains for development of software would dominate the e-learning market. This, however, has not happened. The present trend is that companies focusing on pedagogical method, organisation and implementation are doing well in the e-learning market and there is no visible relation between success and company size according to IKT Norge, an organisation representing 355 companies working on development, distribution, sales and counselling of ICT services and products. According to IKT Norge the quality of e-learning software depends on the amount of intelligence. Pedagogical use of e-learning may provide quality instructions on how to perform a task. Approximately 60 per cent of the companies using e learning are applying e-learning to train the staff on how to use software. Technology, however, will never replace teachers. Likewise the pedagogical method behind the e-learning system is developed by teaching staff and is dependent on the quality of this work.

Læring 2000: internettbasert teorilæring i elektrikerfaget / edited by Elbus.
[Learning 2000: inernet-based learning of theoretical subjects for electricians.]
Oslo: Elbus, 2002, 112 p.
Elbus,
P.O.Box 23 Blindern, N-0313 Oslo,
Tel.: (47-22)955650,
Fax: (47-22)605001,
E-mail: elbus@elbus.no,
URL: http://www.elbus.no

This report is an evaluation of an e-learning project trying out new learning arenas among adults. The target group was electricians with a minimum of six years of work experience. The need for updated knowledge was important in this group as the profession is characterised by rapid change. The updating of competence should be based on a flexible but structured learning environment so that participants are able to study when it suits them best. It was intended that each individual would reach the level of theory of upper secondary school for electricians. The objective of the project was to identify success factors for vocational net-based learning. The project decided on a model of combined learning with net-based learning accompanied by classroom learning. The project outcome will be a guide to net-based learning for in-service training of electricians. Electro-entrepreneurial professions had no prior experience with net-based learning. One important issue for the participants was the fact that they had little knowledge and skills in using computers and due to this they had problems getting started. Thus the participant not only got an update in themes relevant to their profession, but they also acquired computer skills.
http://www.elbus.no/

Sluttrapport Kongsbergpiloten: Utvikling og test av nettbasert læringsarena for kunnskapsområdet prosjektstart / Anne, Swanberg.
[Final report from the Kongsberg pilot project: development of net-based learning arena for project start-up.]
Handelshøyskolen - BI
Asker: BI, 2002, 35 p.
ISBN 82-7042-521-4
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Just-in-time online learning in the workplace has been the focus of this pilot study 'the Kongsberg pilot'. The pilot project is one of seven organised under the Norwegian research project NEMLIG which is examining how online learning can support the continuously learning employee at his or her workplace. The pilot took place in a Norwegian technology company and was limited to focus on project managers' learning needs. 5 employees tested the Internet based learning arena, which the pilot group developed, over a period of 12 days. The idea of building an online site for knowledge sharing between project managers in the company was raised, but the employees admitted that the culture for sharing is not yet there. The pilot was conducted from January to July 2001.

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