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Method to select an e-learning platform and discussion of features supporting problem oriented project based learning

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Abstract

Selecting e-learning platforms is a big investment for an organisation in the middle of adjusting to the new technology, training the teachers, managers, pedagogical designers and students, paying for the software – if not open source is chosen as the strategy, and integrating the software with other tools in the organisation. The learning platforms are not pedagogical neutral, but support better or worse the pedagogical approach. We therefore need methodologies, which can help in the process of selecting the right e-learning platforms for the organisation /the university. In this paper we have described a comprehensive methodology using different evaluation techniques – from desk top studies to in-situ scenario - and persona based workshops. Further more the article discusses different features needed to support problem and project based learning as well as presents a classification of different systems and platforms related to the needs of problem and project based learning.

We describe the process of analyzing a series of virtual learning environment platforms in order to select a new system to be used within a concrete pedagogical framework at Aalborg University. The process is described with an overview of the phases and the different techniques applied for the analysis of the systems, a list of different feature requirements selected to support the pedagogy, and a review done of the platforms against these requirements. Last, the requirements are divided according to three dimensions, communication, collaboration and teaching.

Resumen

Seleccionar plataformas de e-learning es una inversión grande para una organización que está ajustándose para la nueva tecnología, entrenando a los profesores, encargados, diseñadores pedagógicos y los estudiantes, pagando el software – si no el uso de programas libres se elige como estrategia, e integrar el software con otras herramientas en la organización. Las plataformas de e-learning no son neutros pedagógicamente, sino apoyan mejor o peor el acercamiento pedagógico. Por lo tanto necesitamos metodologías, que pueden ayudar en para proceso de seleccionar las plataformas apropiadas de e-learning para la organización/la universidad. En este artículo hemos descrito una metodología comprensiva usando diversas técnicas de la evaluación – de estudios de escritorio a la escena "in-situ" - y talleres basado en descripciones de personaje. Además el artículo discute diversas características necesitadas para apoyar el aprendizaje en trabajo de grupos basado sobre problemas, así como presenta una clasificación de diversos

sistemas y las plataformas relacionadas con las necesidades del aprendizaje basado en trabajo en grupo y enfoque sobre problemas.

Describimos un proceso de analizar una serie de plataformas o entornos virtuales de aprendizaje, con el fin de elegir un nuevo sistema para ser utilizado dentro de un determinado marco pedagógico. El artículo proporciona una descripción de las fases y de las diversas técnicas aplicadas para el análisis de los sistemas, una lista de diversos requerimientos de características que apoyan la pedagogía, y repasa las plataformas contra estos requerimientos.

INTRODUCTION

Technologies designed with the purpose of supporting virtual learning environments are not neutral (Tolsby, Nyvang et.al 2002). They reflect a certain understanding of communication and a certain understanding of learning, which is represented and incorporated in the functionality of the system, in the system architecture and in the interface design. But system developers rarely provide an explicit definition of the underlying pedagogy of their system and therefore it is difficult to choose an appropriate technology when designing and organizing learning environments. Furthermore, educational organisations seldom are aware about their needs and the functionality which best serves their practice.

The purpose of this paper is to contribute to the development of a methodology for evaluation of technological solutions, which aim to support a certain pedagogical approach. In this case it is a pedagogical practice and a blended learning environment based on problem oriented project based learning (POPP/POPBL) (Dirckinck-Holmfeld, 1990).

However, a methodology for selecting learning technologies implies different approaches and different aims. One approach is functionally motivated and consists of technical specifications of functions that must be included in a proper design. While evaluating technologies that support communities of practice, Etienne Wenger (2001) presents a set of technical functions used as a basis when evaluating different computer systems. This kind of survey provides an overview of the systems technical functionalities in perspective of community of practice (Wenger, 1998). It is a survey based on expectations of the technology instead of actual pedagogical experiences.

Another approach is based on a pedagogical or learning theoretical mapping. Dr Tom Reeves (1997) has described fourteen pedagogical dimensions of computer-based education (CBE). The universal dimensions are used for evaluation of CBE and for comparative evaluations. The question is whether or not universal dimensions correspond with the specific aspects of different educational systems and different pedagogies. This paper argues that they are too general and have limited value when evaluating technological solutions for e.g. problem oriented project based learning.

The methodology in this paper is based on a third approach for selecting Virtual Learning Environments (VLE's) where the focus and requirements derive from the practice of problem oriented project based learning.

The argument is that a methodology of selecting learning technologies must focus on how learning activities evolve through the technology in use. The central aspect is the learning activities, and learning activities should be in focus when analysing and choosing learning technologies. Problem oriented project based learning is characterized as a learning process powered by the students. The enquiry problem is defined and formulated by the students in collaboration, and they are in control

of the process of negotiating and defining what to be learned from the study of the problem. The students work in groups, and they need tools to support group work as well as more traditional course work. The methods used ranges from traditional lecture formats, to dialogical organised seminars, to project work and knowledge sharing in communities of practice. The challenge is therefore to select and choose between technologies and platforms where these processes and formats are supported.

However, pedagogy is not the only concern when selecting a platform – interoperability with other systems in the organisation, tailoring and adjustment, implementation and maintenance, costs, as well as robustness and sustainability of the design organisation are also factors to reflect in a methodology for selecting VLE-systems.

The methodology, which we have applied and further developed during this case was originally inspired from the work in the SOFTPRAX-project (a project about the evaluation of ICT systems for doctors) and a project about evaluating and choosing ICT systems for distance learning (Georgsen & Dirckinck-Holmfeld, 1993). In these early approaches to choosing software and hardware guiding principles for developing criteria and setting up supplier and decision workshops were worked out based on practice experiences with virtual learning as well as scenario design and stakeholder decision techniques.

In the actual case, the work has been carried out during a much longer period, the methods mentioned above have been supplemented by a much broader desk study, the criteria for communication, collaboration, teaching and management are based on more solid practice and research on blended learning based on POPBL, and finally has newer interaction design techniques as persona design been included.

The work on selecting the platform was managed by one of the authors, Marianne Riis. Ian Semey contributed especially to the technical assessment, while Lone Dirckinck-Holmfeld has participated in the work – both as a teacher, and as a member of the steering committee for Master in ICT and Learning (MIL), the educational organisation, which is looking for a new VLE platform. Further more, all of us are as researchers interested in reflecting on our experiences and contributing to the development of the methodology.

About the context

Several of MIL – experienced teachers and researchers have contributed to the development of selection methodologies, HCI methodologies in general, as well as they have made some of the first analysis in a Danish context regards different VLE-platforms. Moreover MIL is – as described above – based on a certain pedagogical approach, that of POPBL. MIL also sees itself as the leading Danish education on ICT and Learning and as so the platform should be up-front. The system used since the beginning of the master program is a Canadian system called Virtual-U, implemented at the university in 1994 (system homepage: <http://www.virtual-u.org/>). The version of the system used has a powerful discussion board feature, but other parts of the system are very cumbersome to use and from our perspective the interface and the interaction logic is rather outdated.

The systems used for MIL are hosted by Aalborg University, and after this study was done, the university has chosen to switch from Virtual-U to another of the systems that has been in use at the

campus for long time and where there exists staff with long time experience in providing support, FirstClass.

System selection phases

The work on selecting a VLE system successor to Virtual-U has gone through several steps and phases. Starting in September 2004, the Requirements Analysis Process was initiated.

The process consists of the following phases:

- **Phase 1, Pre-selection, sept. 2004 – January 2005**
 - Overall assessment of 20+ systems:
 - Angel (<http://angellearning.com/>)
 - Click-to-meet (<http://www.radvision.com/EnterpriseSolutions/VideoconferencingProducts/ClickToMeet/>)
 - Blackboard (<http://www.blackboard.com>)
 - FirstClass (<http://www.firstclass.com>)
 - Fronter (Class & Project) (<http://www.fronter.com>)
 - Lotus (Workplace Collaborative Learning) (<http://www-306.ibm.com/software/lotus/>)
 - Marratech (<http://www.marratech.com>)
 - Ping Pong (<http://pingpong.se/a/pingpong.en.html>)
 - SiteScape (Enterprise Forum) (<http://www.sitescape.com/>)
 - Microsoft's Share Point Portal Server (<http://www.microsoft.com/office/sharepoint/prodinfo/default.mspx>)
 - Atutor (<http://www.atutor.ca/>)
 - Claroline/Dokeos (<http://www.claroline.net/>)
 - Moodle (<http://www.moodle.org>)
 - Based on deliverers specifications from their webages and on using test versions where available
 - Evaluation focussing on
 - Communication, collaboration, production – completion of tasks, curriculum design and management capabilities
 - All pedagogical methods from presentations to collaboration (which in our opinion demands all types of communication forms from asynchronous to synchronous with/without video)
 - The criteria were derived from the practice within MIL, previous work on analysing VLE-systems, as well as appropriate guidelines developed by other groups.
- **Phase 2, february 2005 – May 2005**
 - Pedagogical analysis of 7 systems
 - Technical analysis
 - Status meeting with technical staff at faculty of Humanities, AAU
 - Status meeting with steering committee for MIL

- Result: 4 systems to further analysis: FirstClass , Marratech, Microsoft Learning Gateway, Moodle (Marratech was regarded as a supplement – not a system which could stand alone, since it has no asynchronous features)
- **Phase 3, June 2005 – sept. 2005**
 - Personas and scenario design with teachers (Nielsen 2004)
 - Developing a comprehensive specification based on typical personas: teachers, administrative personal, and different types of students as well as a number of scenarios based on typical use-situations
- **Phase 4, Preparation of selection workshop. Sept. 2005 – October 2005**
 - Result from further analysis:
 - Microsoft system creates dependency on their systems, servers. Weak asynchronous tools (fx. Forums)
 - Marratech turned out to be very expensive even though it could only be regarded as a supplement
 - FirstClass and Moodle last contestants.
 - Next steps:
 - Contact to deliverers for presentation at workshop
 - Planning of workshop
- **Phase 5, October 2005 – June 2006**
 - Workshop:
 - Deliverers present elected systems, based on scenarios and personas description
 - Pedagogical/user oriented focus
 - Selection of system by MIL steering committee
 - System selected is FirstClass. The steering committee finds both systems suitable as the basic VLE infrastructure for MIL though missing the synchronous functionalities in both systems. The tools for dialogues seem more elaborated in the FirstClass system, while Moodle as an open source system seems more upfront. However, the host organisation will only offer support and maintenance for FirstClass because of existing knowledge of that system. The steering committee therefore decides to go for FirstClass – at least for the next couple of years.
 - Implementation including design and pedagogical setup
 - A Design committee representing all different educational activities consisting of five members will produce prototypes which will be used in the implementation phase.
 - Current students are invited to use a prototype in spring 2006 on an explorative basis in order to accustom to the new VLE.
 - Training of staff, teachers
 - Expected kickstart of VLE: September 2006.

Preliminary analysis

For this analysis, Marianne Riis sat up the following list of required features:

Communication

Asynchronous, written (Discussion boards)

Asynchronous, audio-visual (Streamed video)

Synchronous, written (Chat)

Synchronous, audio-visual (Telephone meetings, Video meetings)

Instant Messaging (Who's on-line)

New information

Production

Word-processing

Image processing

Sound processing

Library

Shared whiteboard

Mind-map

Web-browsing

Search function

Save/Print

Bookmarks

General

Navigation

Help

On-line – off-line synchronisation

Integration with home page

Integration with STADS (main student administration system)

Cooperation

Calendar

Project management

E-mail

Individual / group learning space (portfolio)

Curriculum management and design

Course management

Templates Adaptable look-and-feel

Tests

Polls

Table 1

For each of these topics, a score was made on how well different systems performed. The score was 0 – 3. The 7 evaluated systems in phase 2 and their score were:

	Evaluated systems						
	Angel 6.2	Site Scape Forum 7.1	Black Board Academic Suite	Atutor 1.4	Click-to-Meet 4.0	Micro Soft Learning Gateway	Oracle Collaboration Suite
Communication (max. 18)	11	14	8	8	9	16	13
Production (max. 30)	16	16	14	6	3	18	17
Cooperation (max. 12)	9	8	7	8	9	12	8

Curriculum (max. 15)	14	10	12	6	3	13	12
General (max. 15)	9	6	7	8	6	9	9
Total (max. 90)	59	54	48	36	30	68	59

Table 2

Apart from the score, the systems were classified in three groups, shown with coloured fields in

Table 2:

The blue group contains systems that are readymade when installed, with little flexibility regarding changes in the fundamental design. This means that within the courses you can configure the contents to a large extent, but the basic system logic is fixed. Blackboard could also be placed in the green group since it is an application suite of different components. Atutor is the only open source system. In the blue section you would also find Virtual-U, FirstClass and Moodle.

In the yellow group you find highly specialised systems typically for synchronous communication. They cannot stand alone as a system for the Master education, but has to be supplemented with a system from the blue group. In this group you would find Marratech, Go-to-Meeting and Lotus Sametime

In the green group you find systems based on separate components, where each installation is configured with a selection of these components. Oracle offers different solutions, but it is debatable that the Collaboration Suite is in this group or in the blue.

The requirements were further elaborated through a workshop with the MIL teachers focussing on describing some prototypical personas and scenarios for the specific learning environment based on POPBL.

Technical analysis

In order to get an overview of the technical requirements of the different platforms, a technical analysis was done. The following headings were used for the analysis:

1. General information

Webpage
Name of vendor / developer

2. Economy / Technology

Economy
Acquisition price

- Up-front payment
- Yearly cost
- Cost of renewal of versions

License conditions

- For each server
- For the number of users
- Renewal (how often)

Open source

- Access to source code

Other accessories

- test version

Support from vendor

- On-line
- On-site

3. Technology

System requirements

- Hardware
- Software
- Security

Demands of support team

- Number of technical staff persons
- Hours

Training Needs

- Technical administrative team
- Professors / Lecturers
- Students

4. Summary

Economy / Technology
Pro
Cons

Table 3

Overall the conclusion of the technical analysis was that the analysed systems are technically very different but all systems have a solid technical foundation. Some of the systems are very complex and are technically very demanding, other systems have a lighter technical footprint. Real assessment of pricing was very difficult because it is still debated how to calculate the total cost of implementation, especially when open source systems are in the game.

List of required features

The list above of required features reflects a pedagogical approach based on problem oriented project based learning (POPBL). As such it has a much broader scope than content delivery, and they also do not only address collaboration. This can be shown with the following figure:

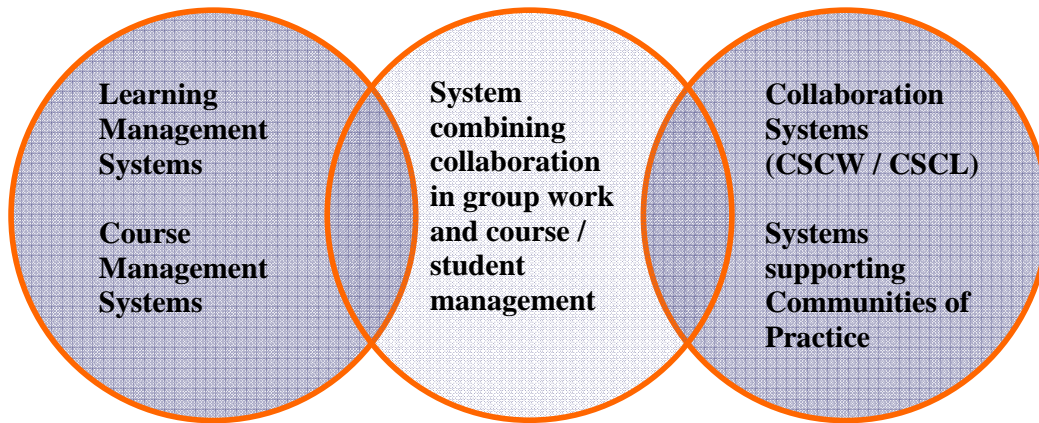


Figure 1

Learning Management Systems and Course Management Systems, in the left circle, focus on giving teachers and academic administration staff tools to set up courses, integrate content in them, give students access to the courses and stage the activities that students are capable of in these. In the course and learning management systems the authoring possibilities of students are limited mainly to tasks like answering assignments, uploading files with responses or writing in forums.

The collaboration systems, in the right circle, are more focused on things like allowing members of a group to work together on shared resources, coordinate and plan activities, and share knowledge. In the collaboration systems, all members in a group usually have the possibility to modify the shared resources, and in some systems it is possible to allow all members to modify the collaboration environment itself.

The learning method in the Master of ICT and Learning, the Project Oriented Project Pedagogy method requires a system that combines features from both the right and the left side. If we distribute the features across the circles, we get the picture on the next page. On one hand, the management of courses, grouping of students, the curriculum management and design, and integration with student administration system is among the requested features. On the other hand, collaboration features like strong emphasis on asynchronous and synchronous communication, shared tools for production, project management are features common to collaboration systems. Some of the features requested are common features of both types of systems, and finally there are some that are general requirements enhancing the user-friendliness of the system, like save/print, navigation, help, synchronisation and integration with home page.

We have put the asynchronous audiovisual communication in the left box as a feature more common to systems of learning, because normally the production of video for on-line display or download demand high technical and professional expertise, and easy-to-use tools are still not widely in use. (But this might change, because services for delivering voice messages as a net service are being developed: See <http://www.springdoo.com>).

If we put the features from the analysis into this diagram, we get the following figure:

Features common to Learning Management Systems and Content Management Systems

Course/site management

- Course management
- Templates
- Adaptable look-and-feel
- Integration with home page
- Integration with main Student Administration System

Learning management

- Asynchronous audiovisual (streamed video)
- Tests
- Polls
- Help
- On-line / off-line synchronisation

Features common to CSCW / CSCL systems

Communication features

- Synchronous written (chat)
- Synchronous audio-visual
- Instant messaging
- New information

Cooperation features

- Image processing
- Sound processing
- Shared whiteboard
- Bookmarks
- Project management

Features that belong to both categories:

- Asynchronous written communication in discussion boards (forums)
- Word processing
- Mind Map
- Library
- Web browsing
- Search function
- Calendar
- Email
- Individual / group learning space
- Portfolio

General features, dealing with more basic usability:

- Save/Print
- Navigation
- Help
- Integration with home page
- On-line / off-line synchronisation

Figure 2

A grouping of systems worked out by the “Learning net” project (www.learningnet.dk), where the systems are grouped according to what is labelled teaching (“undervisning”), collaboration (“samarbejde”) and communication (“kommunikation”), give the following picture:

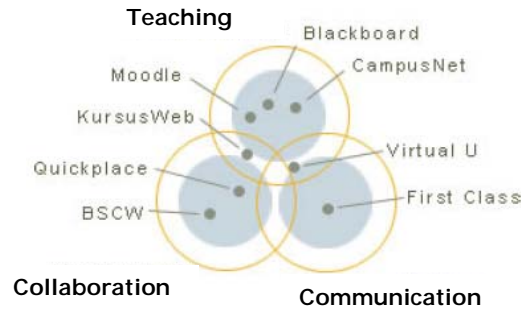


Figure 3. Source: <http://www.learningnet.dk/L%E6ringsplatforme/index.html>

The main change from the previous model to this one is that communication is a separate category here. This does not mean that communication does not take place in the teaching or collaboration systems, only that the main purpose of the systems are primarily that of being a communication tool. If we put the systems evaluated from the phase 2 together with the existing system, Virtual-U, we get:

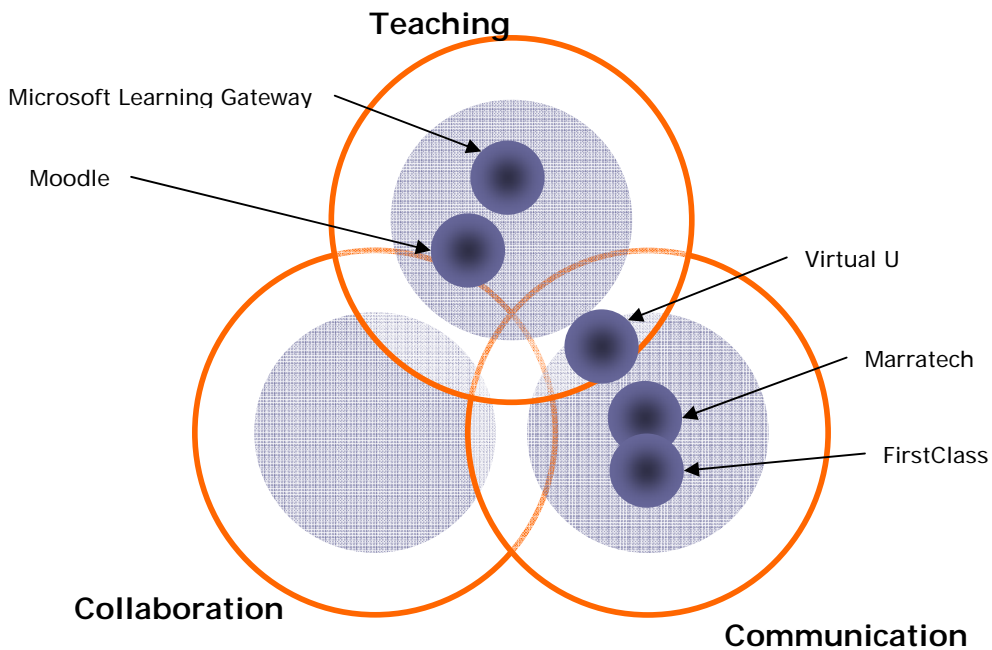


Figure 4

An important point to stress is that this is based on the configuration ‘out of the box’. A system like Moodle or FirstClass can be configured to a certain extent to be more focused on collaboration or teaching depending on the actual setup of a given course. For example, if we create a Moodle

course with only wiki and forum tools, then the collaborative aspect of the course is much higher than if the course only contains articles to read or questionnaires to fill-out. To support collaborative group work it may be necessary to make a course for each group where the participants become teachers and this way are able to control the content in greater extent. In FirstClass it is possible to make webpage-like backgrounds to structure the included resources for a given group or course participants, which makes it possible to create a course-like structure. The main question here is to what extent the teacher is in control of this design, how much the teacher is able to use and adapt the tool to the learning process he/she wants to have, and how difficult it is to go against the inherent paradigm of the system.

If the system is less tailorable and more difficult to adapt, and if the complexity of the system requires profound knowledge of the configuration or programming of the system, then it is important that the teacher is provided with different templates of courses focusing on communication, collaboration or teaching, that can be used as basis when designing the learning process. This can also help new teachers when they do not have a deep understanding of the systems.

Summing up

To select the right system for an educational institution is a difficult task. Traditional focus on technical requirements is not enough. To select the right system in an educational setting, it is vital to understand the characteristics of the pedagogical learning processes. As an example, we have seen that to be able to select a system to support the learning process used in the Master of ICT and Learning at Aalborg University, the project oriented problem based pedagogy (POPP), demands that the requirements are not only those of a typical learning management system (LMS) but also draw on requirements that are more common of systems that support collaboration (CSCL) and communication.

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