

Implementation of the Web-based Learning in PhD Education

Valentina Terzieva, Katia Todorova, Lilia Simeonova

Abstract: *One of the continuing challenges of education is enabling those who attempt to improve teaching and learning to take advantage of the rapidly changing new environment created by information and communication technologies. To do so, educators should engage in re-assessing learning and teaching practices and use new technologies to enhance educational process and support collaboration. This paper has tried to clarify the nature and concept of web-based learning and some of the issues and implications of the learning and teaching within a web-based learning environment.*

Key words: *Web-based Learning Environment, Learning Resource, PhD Education, Flexibility, Collaboration.*

Introduction

During the last decade unprecedented changes in society have occurred as a result of the quick increase of the variety and power of new kinds of information resources. New Information and Communication Technologies (ICT) contribute both to the necessity and the means for keeping up with this innovation. These changes have significant effect on the whole life and in particular on a higher education system. PhD-education is richer with options for improving teaching and learning than ever before, and these options are developing more rapidly than ever before.

As a consequence, it is identified a need for new paradigms of education. These new paradigms must take advantage of the interactivity of the internet and web. The use of technology as an integral part of the learning process, as a medium of delivery or a tool will enable the efficiency and effectiveness of education. In addition, academics have to renew and develop their model of the learning process well beyond the traditional transmission model in view of the fact that research students demand more flexible methods of study.

Towards web-based learning

The traditional learning theory reinforces a view that knowledge is attained passively by information transfer from a knowledgeable authority figure to the learner. Since this concept of learning emphasizes the role of the educator as a dispenser of knowledge, it leads quite naturally to a lecture format and a passive learning perspective. Though, the active involvement of the students in discussion encourages retention of information, application of knowledge and development of critical thinking skills.

The constructivist learning perspective asserts that the learner constructs new knowledge through a process of relating new information to prior knowledge and experience [1]. Educators become advisers rather than dispensers of knowledge, and learners are more active in the learning process. Rather than being the passive recipients of knowledge, students are capable of constructing their own knowledge with guidance from their tutor and can become lifelong learners by being enabled to locate in the web the resources necessary to continue learning.

In order to shift towards more flexibility in education and greater involvement of the students in learning process there is a need of web-based learning. It is characterised by the use of information and communication technologies to create web-based learning materials and to make the courses available on an intranet, extranet, or internet and to deliver links to learning resources outside of the course, such as references, electronic libraries, electronic mail, discussions and video-conference. This form of education uses web browsers to provide access to learning materials and to supply on-line support for

learners. One major difference between ICT-helped and traditional learning is the collaborative nature of much of the interaction and the co-learners' group support and uses the tutor as a facilitator rather than a content-expert. Interaction is at the heart of web-based learning and the skills and attitudes required to make most effective use of web are distinctly different to those normally operating within a traditional post-graduate education.

For web-based learning to be successful, academics must use their learning experience to help students engage with the knowledge and skills they are teaching. This means that the teaching tools used from academics must incorporate the experience of what works for the learners, and must be easy to use. A learning activity model should provide a virtual teaching tool for the academic that includes good pedagogic practice, building on an iterative design and evaluation process.

A benefit of working within a web-based learning environment is that learners must make effective use of a range of ICT tools that can result in the acquisition and development of essential key skills.

Taking into account above mentioned, the main results achieved by implementing web-based learning in PhD-education are:

- Increased flexibility - time and space independence of learning;
- Expanded numbers of potential students because of the easier access and offered conveniences;
- Supported personalization of learning course by variety of content or presentation styles;
- Allowed self paced learning or accelerated learning according to the students' preferences;
- Offered multiple-platform compatibility - expanded possible usage;
- Enabled post-participation review or access for reference;
- Enabled communication structure many-to-many, which provides greater information flow;
- Enabled quick development times because there is no need of specific programming skills;
- Allowed easy updating of educational content because of the embedded learning resource databases;

To be successfully implemented and to show all of its features, web-based learning has to be realised in web-based learning environment, which is to become widespread in post-graduate education. This environment is a software product used to facilitate e-learning, which fully integrates these main elements and provides sophisticated support, tracking and assessment tools:

- Learning resource - self study learning materials, simulations, drills, multi-media components;
- Supporting materials – additional and reference materials such as articles, case studies, e-books and hyperlinks;
- On-line assessment - progress and term tests, quizzes and assignments;
- Administrative functions - such as registration, managing tutors' and students' access and work, and maintaining institution database.
- On-line support - via e-mail, video conference, chat rooms, bulletin boards and on-line discussions.

Motivation for developing web-based learning system for PhD-students

A primary reason for us to develop web-based learning is to increase the convenience and flexibility of post graduate and doctoral students in our institute. Most of the learners who prefer the online education are attracted by two major reasons: to avoid

conflicts between class meetings and other responsibilities and to avoid travelling. So, on average, students choosing the web-based courses have greater outside responsibilities like childcare, part-time or fulltime work. In addition to flexibility, web-based learning offers greater convenience since the web-based courses can literally be accessed anywhere and anytime when there is an access to the internet, hence it will draw more participants in PhD programs. Another reason to develop web-based learning environment in our institution is the fact that non-traditional students typically did as well or better in course performance than lecture students [2].

One of the main objectives for implementing the web-based learning is concentration on the students' needs, not the educators' - to personalize learning course according to the individual PhD-learning plans, student's educational background and preferred learning styles by combining appropriate learning objects. Another objective is helping students to learn collaboratively at a higher level than in a traditional classroom. This can be performed by taking advantage of the internet which allows access to the course materials and common task at anytime and from anywhere.

The web-based learning requires the student not only to read, listen to, or view content materials, but also to answer questions, solve problems, and make decisions designed to encourage active learning [3]. Access to the learning recourse is a necessary but not sufficient condition for learning, and is only one aspect of the learning process. Most research students do not expect to learn solely on their own through web-based learning recourse even with easy access to the world's greatest libraries and best organized web-based content archives. They need to be tracked through course materials according to their individual learning plans. The goal is to optimise the learning process by supporting the students in developing their understanding through reflection and adaptation in relation to a problem-oriented task. They are required to iterate through a cycle of attending, questioning, practising, adapting their actions, using feedback, reflecting, and articulating their ideas. A textbook, even with exercises and answers, is incomplete as a learning activity because of the limited iteration it offers for practice, feedback and discussion. It is expected that web-based learning as an interactive method can improve on this.

Key success principles for effective web-based course design

The ordinary course instance has to be redesigned to improve learning outcomes and educational flexibility for both tutors and students by incorporating effective educational practices enabled by technology. There are several design principles for effective course design that are founded in Behavioural learning theory. These principles are contiguity, repetition, and feedback [4, 5].

Contiguity is the concept that the response should follow the stimulus without delay. The longer the delay of the response to a learning stimulus the less is the likelihood of correct answers to future similar questions.

The second principle of repetition states that practice strengthens learning and improves a learner's retention. A teaching style based on drill learning and memorization is encouraged. Modules should be built with many exercises that are example driven.

The principle of feedback requires that educators inform the learner if the answer was correct or incorrect. If the answer is incorrect feedback may be designed to include a new path to solve the problem. This new path could be a hint at the correct answer, a restatement of a prior fact, or even a new example that is less complicated. In addition, feedback that the answer is correct is as important as feedback for incorrect answers.

There are many factors affecting web-based learning success. Especially important is the concept of a non-linear approach to a lesson. It is defined as the capability to move through a lesson plan with a variety of learning paths. This non-linear approach permits

the learners to control the flow of the lesson to some degree [6]. The learning is not predefined and well structured. The objectives are not defined in detail and a structured didactical lesson plan is not possible. Usually non-linear learning is initiated by the learner and the interaction is one of its main characteristics. Other unexpected parameters are the activities of a student when s/he has to do a task him/her self - s/he searches for different sources on the internet or contact his professor to get things clear. What is most important is the fact that more responsibility for learning must be shifted to the learner.

Development of a web-based PhD course by means of Microsoft Class Server

The course management systems, such as Microsoft Class Server [7] are a software program for organizing and managing the learning delivery process and can be a tool for redesigning pedagogy to improve learning outcomes and increase the flexibility of the educational process, independent of whether lecture is delivered in a classroom or online or in some mixture of the two. It is quite suitable for PhD-study as it provides students with evolving opportunities to learn at their own rate and to be advised by experienced tutors. PhD-students are expected to be active participants in the structure, process and content of the doctoral program. They are deeply involved in the process of program formation. Their study is extremely individual and self-determined. It is obligatory for them to take self-selected courses in addition to courses that are core PhD-program requirements and other courses recommended by the tutor based on the student's research interests and learning background. The courses as well as articles and reports, which students must take or produce, have to be completed within the time limits specified in the PhD-student's personal program of study.

So, the tutors have to create individualized educational plan for every student. Consequently, a lot of their time is spent making worksheets, problems and tests for lessons. The whole process can be simplified by using Microsoft Class Server for creating learning materials and assigning them to a particular PhD-student according to her/his field of study or to group of them in order to promote collaborative work and learning. Assignments also can be archived for future work in case it is temporary unused.

Microsoft Class Server offers content authoring functions for creating online modules, called Learning Resources, that bring together all of the components - text presentations, graphics, questions and links to appropriate learning material based on learners' responses and tracking of student performance. Unlike traditional materials, Learning Resources are designed to be distributed, completed, graded, and returned to learners over the internet or the academic network. Educators can work offline for content creation and editing as well as grading, so a permanent internet connection is not required. Data can be synchronized online later. The tutors are allowed to create and distribute assignments, manage students' work and then communicate with students by means of Assignment Manager. Assignments are a set of task to complete, such as a test or research project and can contain a specific information – directions for students about how to complete the tasks, start date and due date. It can also include a learning activity. Tutors can use Class Server's grade system to track individual student progress and then tailor lecture and instructional methodologies to meet specific learners' needs. Students receive real-time feedback about completed assignments on their personalized assignment web-page, which includes their Learning Resources, works and message boards with important information about PhD study such as opportunities of conference participations, interesting events and so on. All this information is recorded and transferred to the institution's student information system.

Class Server allows integration of communications tools like video conferencing, web communications and audio chat into assignment as well as sharing Learning Resources and assignments, which makes it easier for other educators to find them online and adapt

for their own use if it is allowed. The goal is to create a Curriculum Library of Learning Resources that can be exchanged with other institutions thereby expanding access to learning materials for those who are interested in. To ensure compatibility with other learning management systems, Learning Resources have to be saved in IMS standard format (*.ims) in an easy-to-use package.

Having in mind above mentioned features of MS Class Server we have developed a web-based course for PhD-students in our institute. The following picture depicts the organization of Learning Resources, assignments, classes, PhD-students and groups of them, formed according to scientific subjects in Assignment Manager. The assignments shown on figure 1 are Learning Resources created on Andrew Tanenbaum's course "Computer Networks". It is used a function that allows a Learning Resource based on an existing Microsoft Word document to be created.

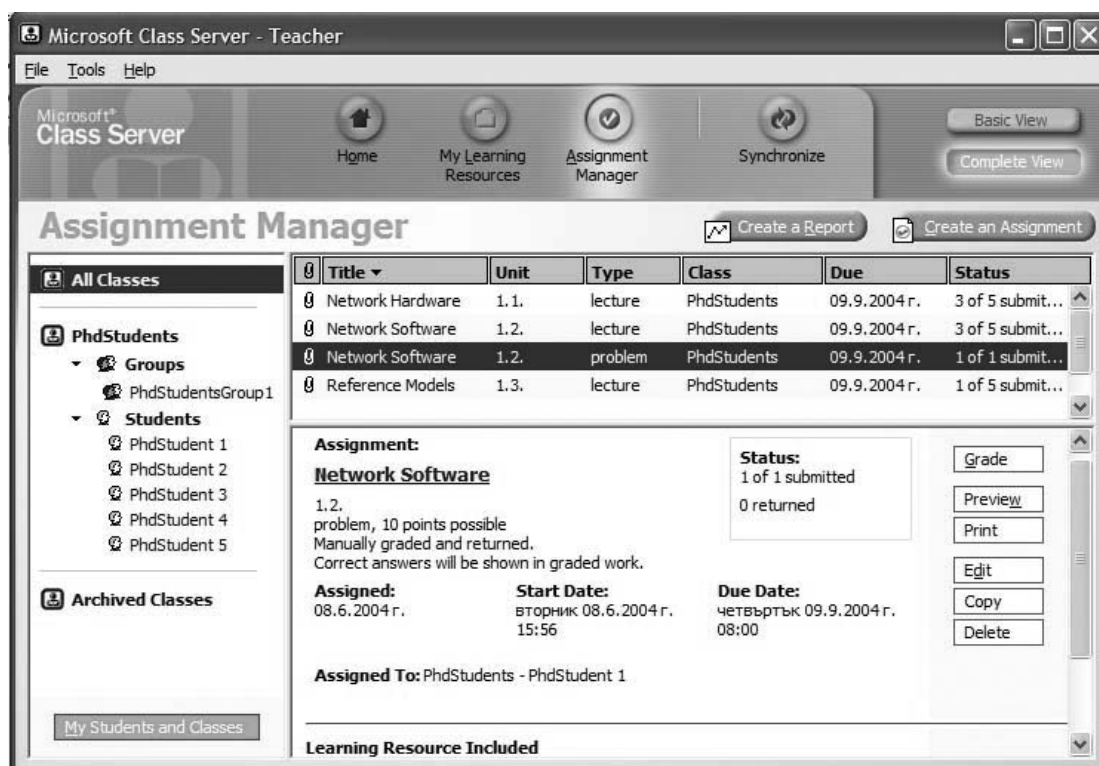


Fig.1 Assignment manager of the Learning Resources assigned to PhD-student class.

Learning Resource included in Fig 1 is illustrated in Fig.2 - it is a question of the type Short Answer. It is assigned only to Phdstudent1 who has to complete it to the Due Date written on Assignment manager page in Fig.1.

Conclusions and future work

This paper has attempted to begin the process of understanding the dynamic nature and concept of web-based learning and some of the issues and implications for learning, teaching and training in PhD education within a web-based learning environment. Although, Microsoft Class Server is not exactly intended for higher education, it is quite appropriate for our goals, because it allows Learning Resources to be individually combined and assigned to the different PhD-student according to their learning needs.

The further work will be concentrated on the development of a web-based course grounded in Concrete Mathematics, A foundation for Computer Science, R. Graham, D. Knuth, O. Patashnik, by means of Microsoft Class Server. According to us, such an implementation will be an improvement for effective learning due to its capability to be

personalized to a learner's needs as well as time independence. Computer assisted learning has evolved from a focus on drill to the learning environment in which the student determines the sequence of what happens in the learning process. The web-based learning have an approach in helping the learner not just get the right answer but understand the path to that answer through self discovery and the taking advantage of the web's resources and multi-media capability.

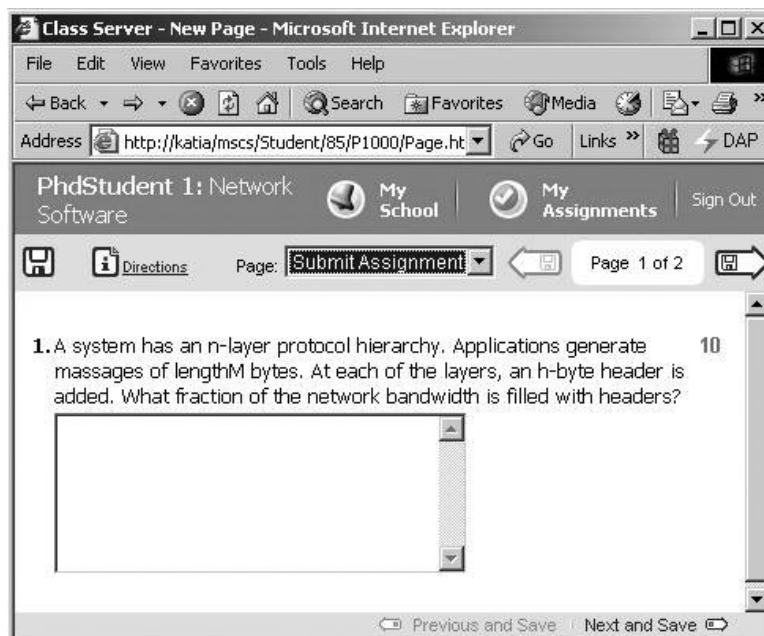


Fig.2 Included Learning Resource in the highlighted assignment depicted in the Fig.1.

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ABOUT THE AUTHORS

Valentina Terzieva, Department of ISDIP, Institute of Computer and Communication Systems, BAS, Sofia, Phone: +359 2 720 132, E-mail: valia@agatha.iac.bg

Katia Todorova, Department of ISDIP, Institute of Computer and Communication Systems, BAS, Sofia, Phone: +359 2 720 132, E-mail: katia@agatha.iac.bg

Lilia Simeonova, Department of ISDIP, Institute of Computer and Communication Systems, BAS, Sofia, Phone: +359 2 720 132, E-mail: lili@agatha.iac.bg