

# E-learning implementation at University

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Today's economic and social changes force universities to try to find new learning approaches. The student-centered learning approach emphasizes independence and the responsibility of the student in his/her own learning. E-learning seems to be appropriate tool in this respect. However, making e-learning work is not an easy task. It has to be carefully implemented into the organization. Authors of this paper will elaborate on the process of the introduction of e-learning into the university. This article is based on the experience with e-learning and the implementation of WebCT learning environment at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic.

**Keywords:** e-learning, e-learning implementation, student-centered learning, e-learning at university

## 1 Introduction

Today, not only in the Czech Republic, universities and colleges are in a transition period because the way they do their business is changing. The combined forces of political, social, economic restructuring together with globalization and advances in information technologies have a great impact on the future approach to students, teaching and learning (Morison 2002). Even though universities are not commercial institutions, they have to fight for their students the same way as for-profit organizations do for their customers. The main role of the university is to prepare students for their future professional careers. In this sense businesses create the demand for graduated students and designate their profile. Today the increased demand is for positions that require long-life learning.

## 2 Student-centered learning

The traditional approach of universities is mostly teacher or subject-centered. In teacher-centered approach the difficult access to learning resources often caused that the teacher is the one and the only source of knowledge for students. This has many drawbacks starting from strong dependence on teacher, bottlenecks in communication, etc. Strong dependence on teacher might sometimes be created artificially due to the self-centered nature of a teacher. The subject-centered approach is focused mainly at transmitting knowledge. While transmitting knowledge is all right, such an approach lacks the motivational aspect of learning. Subject-centered approach is based on disseminating as much knowledge as possible. These approaches are no longer viable in today's education process and universities should take an approach more aimed at students' satisfaction and responsibility for ones' learning. However, new approach requires shift in paradigm. The old paradigm assumes that the classroom is the place where all knowledge disseminates and the lecture is the ideal form of teaching. Students are grouped around the teacher/instructor and passively accept the knowledge from him. New paradigm looks at the student/learner being an active knowledge seeker that intelligently uses various kinds of information resources to constantly learn depending on the personal or professional needs (Rosenberg 2003). The new paradigm proposes a student-centered approach to learning. The student-centered approach encompasses the more active, cooperative but self-paced learning programs where students are responsible for his/her advances. Using this approach creates a distinct environment. 'The student-centered environments have a heightened advantage over the traditional teacher-

centered, subject-centered environment in that they provide complimentary activities, interactive in nature, enabling individuals to address their own learning interests and needs and move forward into increasingly complex levels of content to further their understanding and appreciate subject matter. The student-centered learning environment has the student need satisfaction as its primary focus' (Clasen 1974: 9). It is assumed that the students who are given freedom to explore problem areas in a way that is based on their interest and who are appropriately supported by a facilitator not only achieve higher academic results but also experience an increase in personal values, such as flexibility, self-confidence and social skills (Rogers, 1983; Aspy, 1972). These are the attributes of competent employees that the industry asks for. Universities therefore, to be successful in their role should start adapting to such an approach.

The idea of student-centered learning is not new but it was difficult to realize. One of the reasons was the lack of appropriate tools. Today however, the latest advances in information technology would help to accomplish the concept of student-centered learning in providing the right tools. The computer-enhanced environment supports the learning of self-regulation skills, active learning, and individual construction of knowledge so that individuals assume a greater responsibility for their own learning (Nanney 2004). This is the point where e-learning as a new supportive means in the learning process comes into play.

### **3 E-learning**

Initially e-learning stood for electronically enhanced learning. This had the form of materials and/or to a certain degree dynamic and interactive courses distributed on CD-ROMs. With the boom of the Internet and intranet technologies e-learning became a synonym for online but mostly asynchronous training. Online training offered two main advantages. It saved time and money. Thus, the reason why e-learning had been introduced was to cut costs by automating a recognized learning process (Hall 2004). This should have been achieved by replacing a teacher as a middleman between the learning objects and the student and also by cutting the costs for teaching materials, equipment and classroom and other facilities. The on-line training did not require stopping the work and going for learning at a particular time. It rather offered a more individualistic approach. People could study when and where they preferred. That was what made the learning more accessible to virtually everyone. The e-learning solutions were mostly technological. Today the e-learning encompasses asynchronous (self-paced) and synchronous (real-time teacher led) online learning supported by various kinds of technologies. However, e-learning is no more a technological solution. It has broader cultural and pedagogical implications.

#### **3.1 E-learning at the Faculty of Informatics and Management, University of Hradec Kralove**

At first, e-learning found its position at universities in modernizing distance education programs. The first stage of e-learning was to transform materials to electronic form and provide some kind of access for students (e.g. via TV, Internet or CD's). Unfortunately, such e-learning did not fulfill the expectations. E-learning in this form lacks the interaction both with the instructor and also among individual participants (Poulova 2003).

E-learning at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic (FIM UHK) has a fairly long tradition in comparison to other universities and faculties in the country. Today e-learning at FIM UHK has almost a seven-year history. The history started with MUDILT (Multimedia in Distance Learning for Teachers) project within the framework of a TEMPUS programme. The team of six teachers/instructors created first

course called “Internet ve vzdělávání” (Internet in Education). This course was developed entirely in-house and was not of much particular success among participants due mainly to the lack of communication (Poulova 2003).

The first attempt did not persuade the faculty management to abandon the e-learning initiative. Nowadays e-learning is firmly rooted in the education process at UHK. E-learning belongs to one of the strategic research activities of the whole university. The project that develops the on-line education at UHK is called *Information technology and its potential in interactive education for the 21<sup>st</sup> century*. One of the major outcomes of this research activity is the project OLIVA (**O**n-**L**ine **V**ýuk**A** – On-line Education) at UHK. One part of this project was also implementation of commercial e-learning system WebCT (www.webct.com). The system started its operation in the academic year 2001/2002 and is now widely used by the whole university. Up to the July 2004 it contained about 229 courses out of which 124 are already used in education programs and 105 courses are in the progress of development. These courses were used in education of the whole university as well as in various training programs for external customers and in so called life-long education for the whole public.

Prior to an extensive use of e-learning courses in WebCT the faculty went through several stages of e-learning implementation in the education process. First the analysis of the opportunities and needs was undertaken. Analysis was focused on faculty employees in order to answer questions that belonged to the following categories (Poulova 2003):

- use of computers and Internet at work
- the level of computer literacy
- frequency of use of various software
- interest in further development in ICT

Based on the analysis the management of the faculty decided to continue in the effort to introduce e-learning into the education process. The commercial virtual learning environment WebCT was selected to be used for designing and creating courses. Next the team of specialist was formed. The members of the team have the following roles (Poulova 2003):

- *technician* – responsible for the administration and configuration of WebCT
- *expert on virtual learning space* – provides courses and consultation
- *specialist in distance on-line education* – provides training and consultation for course designers about the form and content of the appropriate course
- *subject matter expert* – designs the form and the content of the course
- *instructor* – delivers the course subject and communicates with students

In the winter term of the academic year 2001/2002 the team built the first two pilot courses (Database Systems 2 and Computer Networks). Winning the competition organized by FIM in cooperation with National Center for Distance Learning in Prague and EUNIS CZ association rewarded the effort of the team members. It also motivates the management of the faculty to further support the e-learning initiative. The goal was to increase the quality of education by offering students another learning resources and thus supplement the face-to-face learning.

#### **4 Implementing e-learning**

E-learning is a process that needs to be implemented among other processes of the organization. Implementation of e-learning can be hindered with countless problems. The problems can be derived from the three basic elements in every organization. These elements

are people, processes and the technology. The overall performance of the organizations depends on how these elements are linked together and creates coherent unity. This creates a sort of problem space with three dimensions. The dimensions and corresponding problems that played a major role at FIM UHK are:

- **Human dimension**
  - *Skills*
  - *Attitude*
  - *Motivation*
- **Process dimension**
  - *Implementation of e-learning*
  - *E-learning process architecture*
- **Technological dimension**
  - *System selection and ways of acquiring*
  - *Integration*
  - *Infrastructure for e-learning*

In the following sections the problems outlined will be discussed based on the theoretical background and experience from the e-learning project at FIM UHK. Since the e-learning often has cultural impact the focus will be aimed mainly at the human dimension.

## **5 Human dimension**

### **5.1 Skills**

The skills that are necessary in e-learning projects differ when the project is in the implementation phase or when it is in the normal operation. Integrating e-learning process into the organization is not an easy task and requires specialist with various skills to be at the implementation team. One member can have more than one skill and can have therefore more than one role. However it is highly unlikely that the team has less than three members since the skills that are required belong to different fields of science. An e-learning project should bring together specialist with pedagogical, technical, creative skills. The skills that are important are depicted in the figure 1. Shepherd suggests that the skills in extreme corners should be left to dedicated professionals. This would result in good quality work (Shepherd 2002).



sessions to get acquainted with the WebCT environment. Faculty also organized about 15 seminars for both teachers and also students to get or extend skills in specific areas. The seminars that took place were for example as follows (Poulova 2003):

- Preparation of study materials for distance learning format – core principles
- Practical creation of graphical elements in e-courses
- Artistic aspects in e-courses
- Templates in e-learning courses

Besides training and seminars the UHK organizes e-learning competitions where it is possible to see courses of a superior quality and also exchange knowledge, experience and get new insight into the e-learning.

## **5.2 Attitude**

The e-learning projects are successful only if users accept them. Accepting e-learning often requires a change in attitudes of users. Basically there are two groups of users, creating two distinct perspectives of how to look at e-learning. These perspectives are:

- **Teachers' perspective** – involving the teachers, assistants, tutors, and course designers,
- **Students' perspective** - involving students, learners, etc.

E-learning solution can be valuable for members in both groups. For each group a carefully thoughtout strategy should exists to overcome the obstacles rooted in the unwillingness to change attitude towards something new. We can presume that the resistance in attitude will be much higher at first because of the necessity to grow accustom to the new conditions. Later, the benefits coming from more effective and productive learning and teaching should be seen, making both groups accept and use e-learning.

### **5.2.1 Students' perspective**

Since students can benefit from better access to learning resources, the warm acceptance of e-learning can be expected but should not be taken for granted. If not properly incorporated into the students' curriculum, the e-learning courses might be of interest only to a few enthusiasts. This means that mandatory subjects for a given study program must have corresponding supportive e-learning courses. The overall evaluation of students depends also on the evaluation of the assignments from the e-learning courses.

And yet, the attitude of students might not be positive at first. Students tend to resist using the e-learning because they have to learn how to use the tools which were not necessary before. They can see e-learning as a superfluous burden. But later, as the use of e-learning system becomes a normal thing, they will appreciate the unique interface that is common for all of the courses and the possibility to practice and check their understanding with the help of various kinds of self assessment tools.

E-learning systems also improve an accessibility of learning resources. This can have implications in many aspects. Though many teachers can have their own website or shared folders with resources, it might be quite difficult for students to navigate and find the appropriate one. The more severe problem arises when a teacher leaves the university. S/he probably removes his resources from the website or his/ her website is destroyed. Since courses are the property of the university, this might not happen.

E-learning gives students much greater choice since they are no longer forced to visit every lecture. It is up to the student to decide whether to go for a particular lecture or not. Some of the students might prefer to study on his or her own pace and consider going to the lecture as a waste of time. As a result, lectures are attended only by the students who are really interested in the subject. Teachers can address fewer students; it is less demanding and also easier to facilitate discussions that can help students to better understand the problem.

### 5.2.2 Teachers' perspective

The great advantage of e-learning systems is the ease of publication. Even teachers who do not master the HTML can publish over the Internet. The overall accessibility for a wide public and the prestige among colleagues could be a motivation for good quality work being published. Therefore, it is desirable if the teachers are also course designers. The reason for that is also based on the need to update the content so that it can promptly reflect the changes and new trends in the particular subject. Being a course designer should not be a problem for teachers of technical subjects. However, most present e-learning systems offer user friendly and intuitive tools for content creation so that it can be also mastered by teachers from the other departments. Experience shows that even language teachers who are only casual users of the computer are after a few training sessions able to create a course in a professional e-learning system.

Introduction of e-learning system in the university environment can have positive effects on teachers' collaboration. It is quite common that one subject is taught by more than one teacher. By dividing the work of preparing the course materials, they can mutually cooperate. This may result in less work for each of them but mainly also in higher quality of such materials. In cooperation teachers often need to discuss the topic and extend their own understanding of this subject. The reviews from others also help to find and correct random mistakes. For student there is advantage in the unique syllabus that is common for all students of the same subject independent on the teacher.

### 5.3 Motivation

From teachers point of view the e-learning movement would be seen as change in their activities and in their way of teaching. It is obvious that some teacher might try to resist those changes. It is therefore necessary to have an appropriate motivation and evaluation system to promote e-learning. The process of evaluation should be based on certain criteria.

Table 1 shows criteria that are used to evaluate courses at the Faculty of Informatics and Management of the University of Hradec Kralove (FIM UHK), Czech Republic.

<b>I)</b>	<b>Basic Criteria</b>	<b>Weight 38%</b>
	Course objectives as a value for the student	3
	Design	1
	Use of multimedia	1
	Clarity	2
	Inventiveness	1
	Quality and appropriateness of attached resources	7
	<b>Total Score for Basic Criteria</b>	<b>15</b>

<b>II) Student buy-in</b>		<b>Weight 25%</b>
	Use of mail, discussion, chat, whiteboard	2
	Workgroups and group projects	2
	Theory applied on examples	6
	<b>Total score for basic criteria</b>	<b>10</b>
<b>III) Planning and Organizing of the Course</b>		<b>Weight 8%</b>
	Syllabus	1
	Calendar	1
	Glossary	1
	<b>Total Score for Planning and Organizing</b>	<b>3</b>
<b>IV) Feedback</b>		<b>Weight 30%</b>
	Self-tests	4
	Assignments	4
	Quizzes	4
	<b>Total Score for Feedback</b>	<b>12</b>

**Overall Total Score**

**40**

**table 1: Criteria for evaluating online courses on FIM UHK (Poulova 2003)**

Every course that is submitted for evaluation is reviewed according the following rules. In the evaluation each criterion has its value (price) that shows the importance of a certain feature of the course. Criteria are divided into groups. Relative importance of a particular group is given by its weight. The course is then judged by a panel of experts who decide to what degree the particular criterion is addressed (see table 2).

<b>Degrees</b>	<b>Coefficient</b>
Not implemented	0
Implemented with objection	1
Well implemented	2

**table 2: Evaluation degrees for each criteria (Poulova 2003)**

The value (price) for a given criteria is then multiplied by the achieved degree. The overall result and corresponding evaluation is in table 3.

<b>Course Status</b>	<b>Points Achieved</b>
Started	20 - 35
Implementation at progress / Corrections necessary	35 - 54
Ready for use by students	55 - 80

**table 3: Status of the course (Poulova 2003)**

The implementation of courses that have the status “Ready for use by students” is rewarded in the form of money for the course designer. To motivate a teacher not only to design courses but also use them, there is also a reward for the active use of the course during the teaching.

To stimulate teachers to create courses is a part of knowledge management strategy at FIM UHK. One of the goals of this strategy is to eliminate the problem with “reinventing the wheel” when one teacher leaves the university and another is asked to replace him. Usually it was the case that the new teacher started preparing study materials almost from the scratch, since the old teacher had taken away all his materials. By creating courses, the human capital of the old teacher was transferred to the structural capital of the university. It is therefore much easier for a new teacher to start where his predecessor left off.

## 6 Processes

In the university environment there are two primary processes. These processes are the education (teaching/learning, etc.) process and the research process (Cech 2003). E-learning is a knowledge intensive supportive process since its role is to enhance the teaching/learning process. Primary processes are based on the vision and the goals. Primary processes than determine other (supportive) processes and individual tasks for people. The technology is tool that is used to perform the tasks given by the processes. In e-learning we can distinguish two processes. First, the process of e-learning implementation into organization. Second, the process that supports the education.

### 6.1 Implementation process

Before the real implementation of e-learning process among other processes of the organization takes place the project should go through a several steps or phases. Dividing project into steps helps to deal with the complexities of the e-learning initiative. The steps specifically prepared for e-learning projects are based on the systems approach. The system approach focuses on the important elements and relationships and neglects the ones that have little impact on the proposed system. While there are numerous methodologies most of them are built on the generic ADDIE model (Kruse 2004; Nocar 2004). The steps in ADDIE model are as follows:

- 1) **Analysis** - define the needs and constraints
- 2) **Design** - specify learning activities, assessment and choose methods and media
- 3) **Development** - begin production, formative evaluation, and revise
- 4) **Implementation** - put the plan into action
- 5) **Evaluation** - evaluate the plan from all levels for next implementation

The advantage of ADDIE is the independency on any particular technology. The ADDIE model stresses the important of education aspects not technological ones. However, sometimes the ADDIE model is criticized for being too liner and not flexible.

### 6.2 Process architecture

Besides the distinct process of implementing the e-learning into organization the e-learning used in education curriculum is also a process. E-learning as a process encompasses other sub-processes. Arranging these processes creates a process architecture. The process architecture that is used in connection with e-learning is based on the Porter’s value chain (see figure 2).

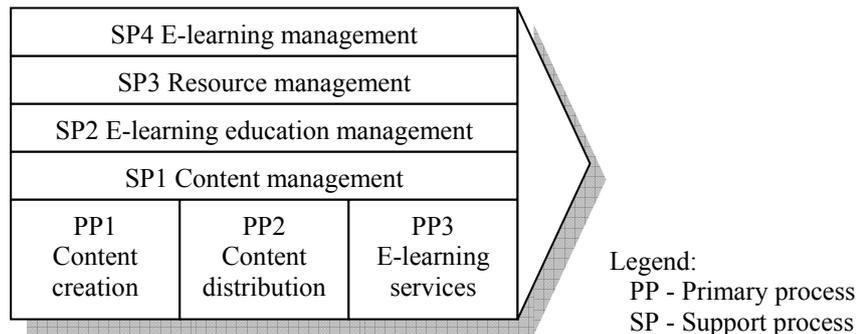


figure 2: Value chain in e-learning (Danis 2001)

The value chain process architecture distinguishes the primary processes (PP) and the supportive processes (SP). In case of FIM UHK mostly the university teachers are engaged in the process of content creation. The content distribution process is provided by the WebCT technology. Teachers with the help of the WebCT tools and other technology assure other e-learning services such as evaluation, mail communication or discussion with students. The faculty takes the responsibility of guaranteeing the supportive processes.

## 7 Technology

### 7.1 System selection and ways of acquiring

E-learning is not about technology. In fact, when the primary focus is on technology the e-learning initiative is very probably destined to fail. Still, technology plays an important enabling role in e-learning. Technology offers a set of tools that make e-learning possible and that greatly simplifies some of the processes. Basically universities have two options. The options are either to develop the e-learning tools in-house or to buy a commercial solution. The FIM UHK decided to take the later approach. While developing in-house solution would have also been possible since the faculty had had many experts but they had mostly been engaged on other projects. Buying commercial ready to implement solution had the advantage of relatively quickly starting the content creation process.

It is the task of the management to select appropriate e-learning tools, i.e. technological solution that will be bought or developed. The most common supportive systems are the so-called learning management system (LMS) and learning content management system (LCMS). Their names might sound similar, but they have different functions. The LMS is a design to manage learners. The task is to keep a track of their progress and performance across all types of training activities. On the other hand, the LCMS is responsible for managing the content or learning objects so that they can be used by learners (Hall 2004). Whatever the difference is, in most cases these two systems are often integrated into one virtual learning environment (VLE). However, the distinction is necessary because some universities might have their own systems for tracking student progress that needs to be partly independent on LCMS. These tools can be integrated into the university network or can be run separately. In both cases it is necessary that there is a person in information system department who is responsible for administration of the e-learning system(s). Today, the WebCT environment at FIM UHK is partially integrated with other systems of the faculty. Users use the same login as is used to the faculty network. The registration to individual courses is done based on the information form the student tracking system. So far, only the evaluation of e-courses is not directly linked to the student tracking system.

## 7.2 Infrastructure

Successful e-learning requires an appropriate computer infrastructure. Students as well as teachers must have an easy access to on-line courses so that their effort can be focused on fulfilling the task, not on finding a free computer. On the FIM UHK there exists a network with 140 computers in laboratories. The computer student ratio is 1:12 counting all the students i.e. including students in the distance form of study. Considering only the students in present form of study the computer student ratio is 1:8. To make it even better, the laboratories are open from 8 am to 11 pm. Internet access is also provided in most of college buildings where students can have their own computers or have another laboratories with the same opening hours as in the main building. The full-time teachers in technical departments have their own computers in their offices. The part-time teachers share the computer with colleagues.

## 8 Conclusion

The changes in social and economic environment as well as advances in information technology drive the universities to change the traditional strategy to businesslike strategy. The businesslike strategy is more focused on students using student-centered approach in education process. E-learning, with the possibility of combining content in many forms, dynamic or even interactive functions, and with the use of Internet as a communication medium is ideally suited for active, self-paced, individual study programs. However, e-learning projects often failed to deliver the results expected, mostly because poor implementation. It is necessary to understand that e-learning is not a technological solution but rather a process with cultural consequences. Successful implementation of e-learning process requires reflection in three main areas people, processes and technology. Early in the year 2001 the management of the University of Hradec Kralove decided that e-learning together with improvements in education process would be one of the strategic research activities. Since that time e-learning became a vital supplement in many courses at FIM UHK.

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