

APPLICATION AND EFFICIENCY ASSESSMENT OF E-LEARNING SOFTWARE

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Abstract. The network information technologies enable to construct a global educational space. It is very important, that it has to be friendly for all participants of educational process and open for all layers of the world population regardless nationality, social status, language of dialogue, place of residing etc. In the paper the example of e-learning using for study of compulsory subject "Descriptive Geometry and Engineering Graphics" for extramural department students of the Riga Technical university (RTU) is presented. The Blackboard (BB) system of e-learning was used for accommodation of a teaching material. The general structure of materials placed in environment of BB include: theoretical material, performance of training exercises, and performance of the test. Results of research presented in this paper give possibility to make conclusions on efficiency of use of similar systems in mastering subject of Descriptive Geometry and Engineering Graphics.

Key Words: Descriptive geometry, engineering graphics, Blackboard Learning System, e-learning.

1. Introduction

The use of modern information technologies in training (network distance training; network distance courseware; virtual universities; etc.) opens new opportunities for development of the system of education [1]. However, the effective introduction of information technologies in training is connected both to adaptation of the participants of educational process to information technologies, and to adaptation of opportunities of computer engineering and program systems to the purposes, tasks and participants of educational process. Recently, a variety of distance learning schemes have arisen that use electronic ways of linking the learner and the source of instruction with increased interaction between them.

Distance learning (DL) is a strategy developed to harness the power of learning, information, and communication technologies to modernize education and training [2]. The DL initiative is intended to implement the "anytime-anywhere" learning concept to provide access to the highest quality education and training that can be tailored to individual needs and delivered cost-effectively, whenever and wherever it is required.

The DL is structured learning that takes place without the physical presence of the instructor. DL is enhanced with technology. It may draw upon resources which are physically distant from the location where learning is taking place.

Learning technology standards now use the learning management systems which include new functions and capabilities such as back-end connections to other information systems, complex tracking and reporting, centralized registration, on-line collaboration and adaptive content delivery. Blackboard Learning System was used for improvement of education quality in Riga Technical University.

2. Subject “Descriptive Geometry and Engineering Graphics” in BB environment

The BB delivers a course management system, customizable institution-wide portals, online communities, and an advanced architecture that allows Web-based integration with administrative systems. The BB is a family of software applications designed to enhance teaching and learning. Intuitive and easy-to-use for instructors, the Blackboard Learning System is built on a scalable enterprise technology foundation that facilitates growth and performance.

Institutions around the world use the Blackboard Learning System to:

- Create powerful learning content using a variety of Web-based tools;
- Develop custom learning paths for individual students or groups;
- Facilitate students’ participation, communication, and collaboration;
- Evaluate students’ work using a rich set of assessment capabilities;
- Bring top publisher content into e-Learning.

Students using BB need only a browser. Most students in Latvia have a personal computer with fast Internet connection. Those who do not have computers can access them in libraries or in computer classroom of RTU. Hence instructors may assume that everybody is able to practice using the e-materials offered. Students can access systems like BB using their hand-held devices like e.g. the new Nokia E61 cellular telephone [3]. This mobile phone has a full keyboard and the conventional browser software that runs on it can connect to the Internet. Browsing such hand-held devices, which can be expected to be very common in the near future, also make the use of automatically graded quizzes and examinations a reality in any class room.

The duration of bachelor studies in civil engineering in RTU is 7 educational periods, each consisting of 16 week semester and additionally 4 week exam session. Compulsory subject “Descriptive Geometry and Engineering Graphics” is limited to 2 credit points and is taken in the first semester. In this course the students have to complete all the individual home assignments and test exercises.

The learning material of subject “Descriptive Geometry and Engineering Graphics” has been placed in BB environment as an experimental prototype to help students in mastering topics of the subject. The given subject traditionally is difficult for studying and mastering, in particular for extramural students. The use of BB system was not obligatory for students. Use of BB environment was provided as an additional opportunity of study of a theoretical material, consultations with an instructor and performance of exercises with the purpose of better mastering of “Descriptive Geometry and Engineering Graphics” subject.

The materials of the “Descriptive Geometry and Engineering Graphics” course in BB environment include [4]:

- A brief course description and table of contents;
- Announcements and important information for participants;
- Instructor's e-mail address, telephone, faxes number, and regular mailing address including office hours;
- The themes of theoretical material of course including goals and objectives;
- A list of all exercises, assignments and other course tasks;
- Explicit information on how students will be graded on assignments, tests, participation; each assignment should be linked to relevant course documents;
- A list of supplementary books and other resources;
- A possibility of interactions with the instructor by means of e-mail communication and an opportunity of discussions between participants of educational process.

Using e-mails for dialogue with the instructor motivate the students for more competent formulation of questions. Hence, to ask the question, some understanding of a topic is necessary. Necessity to ask questions and to discuss them induces the students for preliminary independent work with a material of the subject.

Participants of BB carry out exercises and tests placed in BB environment before a final test. Exercises, which are placed after corresponding topics of the course, are offered to be performed by the students so that they become more self-prepared for the tests. Performance of the

exercises is not limited by time and enables attempts for repetition of tasks performance. In result the information on the earned points and right answers is accessible to the students. Thus, students can independently estimate a level of self-readiness for performance of the test tasks. The tests in BB have time limits and there is only one opportunity for the students to perform the tests. Only final points are accessible to the students. During the distance course of education, students are assessed formally. The formal assessment is a continuous assessment of a student's contribution. It indicates student's level of achievement on the course and the standard attained. It is intended to verify how well students are able to meet the session objectives on the one hand, and the degree of transfer of knowledge they can make, on the other.

3. Feedback from the students

Performance of the exercises and tests placed in BB environment provides development of skills in the performance of tasks in a subject learned and consequently more successful performance of final tests in comparison with those students, who did not use the system of BB. Comparison of results of the tests of the students, who learned the subject in BB environment and who did not learn it in BB system, gives opportunity to make conclusions on the efficiency of similar programs, which are used in improvement of training quality [5]. It also is interesting to note a change of frequency of visits of consultations, which arise in studying process, so as quantity and quality of the questions asked.

The best results under the tests placed in BB environment have been shown on the following issues: Fundamental Views - Point, Orthographic Projection and Drawing Procedure. Less successful results of the tests are shown on such topics as Line, Plane, Sections and Intersections. By results of the tests it is possible to draw a conclusion that lectures and graphic works, which the student carries out independently, are necessary for mastering descriptive geometry, connected with methods of designing.

The usage of BB was a free choice of the students. So it makes an opportunity to observe a degree of interest of the students in using this method of training, revealing main problem of topics learned and mastering necessary skills. The deadline of registration for persons interested to use BB has been limited to one month. Thus, during the limited time of registration a group of participants, which consists of 73 people, has been generated. The students chose pace of studying of course materials independently. Intensity of the work in BB environment is shown on Fig.1. It is visible, that the greatest activity of the students has been shown immediately after registration in BB. It makes an opportunity to display the difference between a level of students' interest to a new method of training in a period of time immediately after registration in BB and, traditionally, the same their interest at the end of term of training.

An anonymous evaluation was carried out at the Riga Technical University in the end of the course "Descriptive Geometry and Engineering Graphics". All the students responding to the survey stated that they would recommend the course to their fellow students. Since the assessment was conducted anonymously, the responses reflect students' perceptions of the course. Students feedback was very positive, and it is clear that course "Descriptive Geometry and Engineering Graphics" in BB environment will emerge as a real option at the university level.

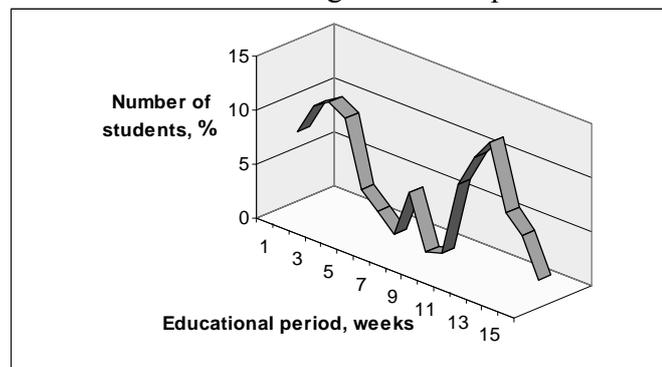


Fig. 1. Correlation between activity of the students in BB environment and duration of educational period

3. Conclusions

Experience in using the BB system in actual teaching confirmed the potential of BB as a beneficial and usable system for teaching. The system enables the user to produce electronic course materials simply as a by-product of teaching. Its reach is extended to extensive use of modern learning system, enhancing the quality of teaching in engineering education.

The main challenges in all education are how to keep students focused in the subject matter, how to motivate them to work independently and how to fight the high drop out rate. These challenges are accentuated in the on-line setting in which the direct contacts between the students and the instructor are limited. It is easier for the students not to focus when the instructor does not see them. And it is easier for them to drop out because, in the on-line setting, they interact with a computer and not with a person [3].

Like the development of good textbooks, the development of good educational software is a long-term process of trial and error that will need continuously to draw on the experience of the best tutors, those who are responding to the needs of individual learners. Since education is the main pillar of our society's future, all efforts in that direction are well spent.

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WYKORZYSTANIE I OCENA SPRAWNOŚCI OPROGRAMOWANIA NAUCZANIA NA ODLEGŁOŚĆ

Sieciowe technologie informacyjne umożliwiają tworzenie globalnej przestrzeni edukacyjnej. Jest niezwykle ważne, by była ona jak najbardziej przyjazna dla wszystkich uczestników procesu edukacyjnego i otwarta dla na wszystkich poziomach rozwoju intelektualnego ludzi niezależnie od narodowości, statusu społecznego, języka i miejsca zamieszkania. W niniejszym artykule przedstawiono przykład nauczania na odległość na bazie obowiązkowego przedmiotu „geometria wykreślna i grafika inżynierska” dla studentów studiów niestacjonarnych na Uniwersytecie Technicznym w Rydze (RTU). „Tablicowy” system (Blackboard system - (BB)) nauczania na odległość jest wykorzystywany w przyswajaniu materiału nauczania. Ogólna struktura materiału zawartego w środowisku BB obejmuje: teorię, wykonanie ćwiczeń i test. Wyniki badań prezentowane w niniejszej pracy dają możliwość oceny efektywności wykorzystania podobnych systemów w nauczaniu przedmiotu geometria wykreślna i grafika inżynierska w ogóle.