

ISSUES OF DISTANCE LEARNING IN ENGINEERING GRAPHICS COURSE

Birutė JUODAGALVIENĖ

Vilnius Gediminas Technical University
Sauletekio ave. 11, LT-10223 Vilnius, Lithuania
email: birutej@fm.vgtu.lt

Abstract. Distance education is rapidly becoming an increasingly important method of instructional delivery for many educational contexts. Distance-learning programs have many benefits, but a great number of distance learning courses suffer from extremely low student completion rates when compared to their traditional classroom-based counterparts. It may be tempting to point to instructional content and methods as the source of low distance learning completion rates. At the same time it can be shown that there are often motivational problems which lay at the root of these statistics.

The article considers some problems and perspectives of teaching Engineering Graphics in a distance teaching system at Vilnius Gediminas Technical University on the basis of practical experience of the author's methodical literature. The peculiarities of distance teaching as a new educational technology, the specific character of educational process organization of distance teaching are discussed among the most important problems. A special emphasis is laid on the importance of methodology providing of Engineering Graphics distance teaching.

Key Words: distance education, engineering graphics, AutoCAD, methodical teaching material.

1. Introduction.

The main challenge for educational systems of any country is the world globalization. An integral part of this process is a free movement of intelligence resources: information, scientific ideas, technologies and qualified personnel. The integration of educational institutions, creation of international educational programs and networks reflect the tendency to form a unique international educational space. Transition to information society forms new inhabitation environment and new rules of behaviour, including an attitude to education and to the choice of profession. In the first instance it affects young generation. Being guided by an employer's requirements, in their turn they demand much from the content and quality of the educational services offered to them.

Each higher educational institution aims at being competitive in its inner market. Such aims are put by each discipline – to be competitive in the educational institution.

Among the disciplines which lay the foundation of engineering education Engineering Graphics occupies a particular place. The aim of the course is to develop students' spatial thinking, abilities to analyse and synthesize spatial constructions on the basis of their graphical models, to acquire knowledge and skills of engineering documentation on the basis of modern achievements of technique and technology. Distance technologies are being widely used in the organising of an educational process, and the phenomenon of their success lies in the ability to satisfy simultaneously the needs of both educational institutions and students. The possibilities of higher educational institutions providing on-line education services are not limited by area and seats, and students combining study with business do not need to sit in classrooms. Therefore, colleges and universities all over the world constantly enlarge the number of students by tens and hundreds times owing to the use of distance technologies.

2. Lithuanian Distance Education System

Modern distance education in Lithuania began to develop in 1995-1999 realising PHARE international distance education program. Since 2001 the Lithuanian distance learning system has developed according to the Ministry of Education and Science program 'Information Technologies for Science and Study' (2001-2006), one of the subprograms of which is Lithuanian distance learning network (LieDM). At present LieDM network connects 25 institutions, and geographically it embraces nearly all Lithuania (Fig.1), but it is more developed in large towns as there are more universities, colleges and also students and teachers there.

The opportunity of distance learning in Vilnius Gediminas Technical University was provided in 1999. In order to popularise distance learning and increase its effectiveness and quality, Distance Learning Centre was established in VGTU in 2001 [1].



Fig 1. LieDM network at the end of 2004

3. Pedagogical Aspects

Can Engineering Graphics be taught in a distant way? According to V.B.Yasinsky '...at the beginning stages it makes sense to test these technologies in a full-time educational system' [2]. And only after that having acquired necessary experience and work through the methodology it will be possible to go over to careful use of these technologies in a distance system of providing education services.

A large number of teachers imagine a distance teaching course as providing material by Internet site which anybody can use. In this way a teacher provides an opportunity to part-time and not attending lectures students to get course material when and how it is convenient for them. It is very useful but only in theory is not a course which is similar to a classroom one, so it is necessary to prepare control works, assessment system, provide possibilities to email to teachers or other students to exchange information or apply for consultations. But it is not reasonable to create completely individual distance education programs which correspond to each need and possibility because the cost of preparation is excessive.

Information technologies are becoming very important means of science and education system for improving the level of teaching. The influence of information technologies on the process of learning cannot be evaluated only from one point of view. A number of authors researching the influence of new technologies on studies state that it is a good chance to develop students' abilities, to increase their interest and to encourage them to work more actively [3,4]. On the other hand, the opponents of this idea think that

these technologies not only discourage the interest but even suppress it. Besides, new technologies are often not adapted in the process of learning, their application is often understood as a means of information transforming without feedback.

Therefore, e-studies system is being created to use all the advantages of information and communication technologies for science and education system and in this way to create a more approachable course for studying not in a university classroom and at the same time to develop attractive studying environment which would assess a student himself.

4. Informational Aspects

Computer-aided technologies can be effectively used not only for preparation of teaching programs but also for checking knowledge and skills of students. Prepared for working in computer network they enable to control each student's work who is engaged in the corresponding study program.

The teaching material is prepared with IBM Lotus LMS Authoring Tool Program (AT). AT operates in a planning and creating mode. The system provides a potential to prepare group and individual study plans, to execute programs. Teachers have teaching rights using them they can manage the process of learning, plan, examine the results of students' studies and make changes.

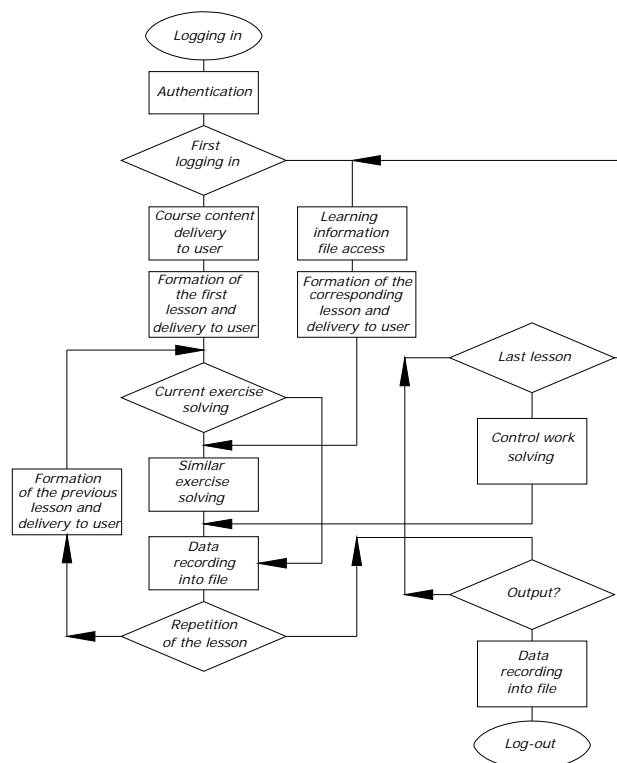


Fig 2. Course Study Algorithm

User's connection is checked by LDAP server. Identification is accomplished by entering user's name, password and executing connection (Fig.2). The system automatically assigns a student's right and other rights can be assigned by administrator. While logging in each user undergoes authorization in order to enable the system to work with him individually. Here the file is created which contains the data about the previous lessons and control works. If user logs in the system for the first time, it delivers him the first lesson, but if it is not the first logging in, it delivers the lesson according to the records in user's file. After studying the lesson the system delivers exercises to the student. The results of exercise

solving are recorded in user's file. Then the student can choose repetition of the lesson, log-out of the system or continue studying but only in case the exercise solution is correct. Before transition to another lesson the system checks if the completed lesson was not the last one. In case it was, the system delivers a test to the student. The results of the test are recorded into user's file and he can again choose either repetition or logging-out. If the test is not completed, the student will be offered to do it once again after repetition of the lessons according to his desire.

5. Methodology

In order to prepare good and quality material for distance teaching it is necessary to know certain principles for such preparation. While preparing teaching material in electronic form teachers often encounter different problems:

- difficulties in using information technologies;
- ignorance of electronic material preparation principles;
- problems of teaching material presentation algorithm.

We are not going to consider the first two problems because the purpose of the paper is different. It is important to understand that preparing electronic teaching material, a teacher should present it in an understandable way not only to himself or his colleagues but taking into account the students to whom the material is assigned. By creating attractive design of hypertext documents the teacher influences the students' learning.

While preparing the teaching material ('Engineering Graphics in AutoCAD Environment' [5]) such teaching techniques as *descriptive* and *demonstrative* ones [6] which approved themselves in traditional teaching were combined. Using the descriptive technique the computer-aided description was prepared how to carry out a certain type of work and after that it was asked to carry it out. By using the demonstrative technique in the created audio and video recording insertion it is demonstrated how to carry out the task and after that it is asked to repeat the actions of the similar task. The course begins with an introductory video lecture which is intended for acquaintance of part-time students with their teacher and subject.

Taking into account the audience for whom the program is intended (young people who are used to traditional school learning, supported by control in a learning/teaching way and because of that may lack personal discipline), the teaching material is supplemented by tests. Besides, less freedom is left in choosing studying sequence (the plan of learning – reporting terms is made), meetings take place periodically.

The most important purpose was to pass the knowledge to user and adapt him (if it is necessary) according to new employers' requirements.

The presentation of the course material is natural: the parts of the course are clearly singled out, described and joined (Fig.3). The course is presented according to the principles of progression, the segments and parts are easily observed and singled out. It is in good order, and from the beginning to the end it follows the corresponding sequence. All necessary information is easily observed and clearly defined. The navigation is easily understood. The pages are logically linked for both beginners and experienced users. Reference instructions are presented to users.

The assessment corresponds to the chosen learning purposes and activity (a learner corresponds to a student's level). Tests of different levels are provided for beginners and advanced users according to the progress principles. The task corresponds to the purposes of learning. Four graphic works are presented in the course. Each of them finishes with an individual task corresponding to an examination task. Teaching Engineering Graphics every academic year, the author systemizes the most often asked questions which are given at the end of each graphics work. The course is clearly oriented to teaching students by using the tasks. It is clear that individual assessment influences the course level. The dates of

assessment tests and individual tasks are clearly defined because the level of knowledge should be assessed on time.

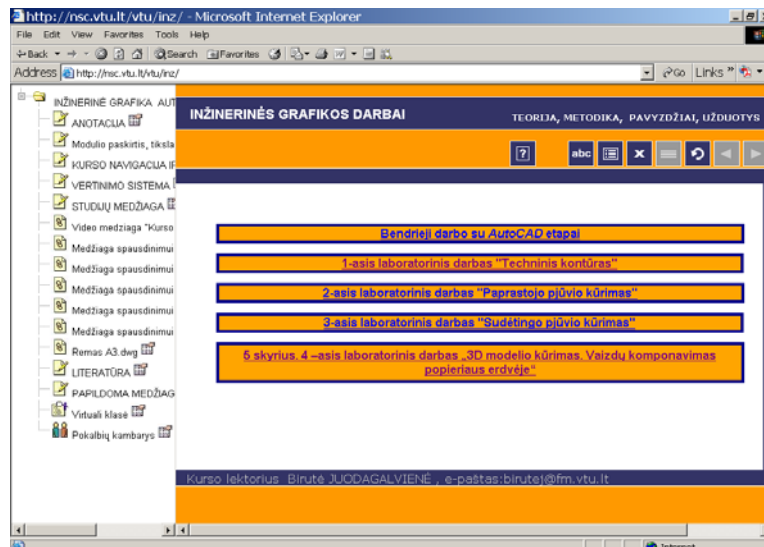


Fig 3. Window in which a user can begin any graphics work

A student can choose a run of studying: either he learns all the material in turn beginning with acquaintance with AutoCAD system, or passes to other works after carrying out control tests. The text parts of the teaching material are not big; the most important terms are defined, and the illustrations are given next to the text (Fig.4).

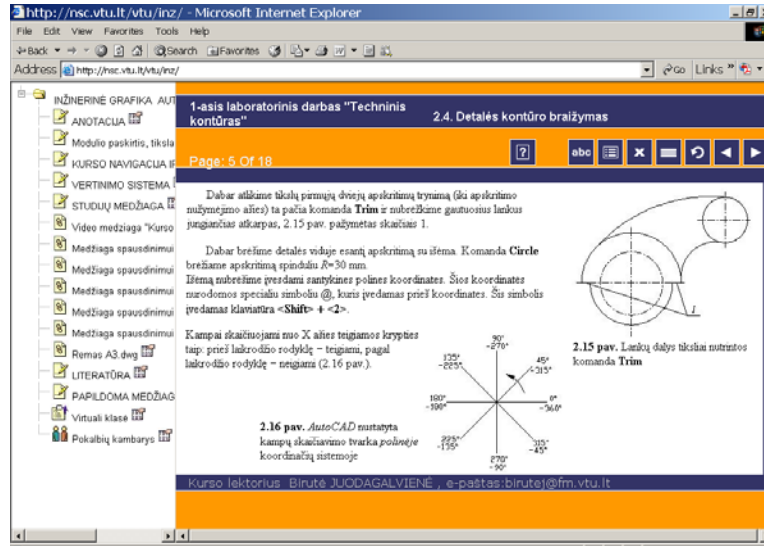


Fig 4. Instruction names which are seen in the text part and above the modelled object in the context menu

6. Conclusion and future work

The teaching material is prepared with IBM Lotus LMS Authoring Tool program. WCL enables to follow the process. The material is split into parts and the course content is planned. After each part the self-control questions follow. According to the presented content students learn WCL, get percentage information about each considered part of the material and self-control test results.

The course teaching strategy conforms to teaching purposes. The distance teaching module 'Engineering Graphics in AutoCAD Environment' is intended for distance studies, full-time studies (as an auxiliary means) and continued studies (of those students, for example, who studied some decades ago).

Allocation of teaching literature on servers of higher educational institutions in HTML or PDF formats will enable to solve the problem of its operative renewal when necessary and will help a large number of students to get access to the newest and necessary information at any time. The problem of imparting skills to working in the network will be also solved.

It is planned to improve the process of presentation and check of self-control tests and examinations. As AT system gives an opportunity to see directly the result of each test carrying out, the tasks should correspond to these criteria – they must be prepared in such a way that students could see the result without teacher's checking or interfering.

References

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PROBLEMY NAUCZANIA NA ODLEGŁOŚĆ W KURSIE GRAFIKI INŻYNIERSKIEJ

Edukacja na odległość szybko staje się ważną metodą nauczania i to w wielu kontekstach edukacyjnych. Programy nauczania na odległość mają wiele zalet, ale też znaczna liczba kursów nauczania na odległość charakteryzuje się niezmiernie niskim tempem uczenia się studentów w porównaniu do metod tradycyjnych. To może sugerować, że źródło niepowodzeń tkwi w samej metodzie. Równocześnie można pokazać, że u podstaw tej statystyki leżą często problemy motywacyjne.

W artykule rozważa się pewne problemy i perspektywy nauczania grafiki inżynierskiej, w systemie nauczania na odległość, na podstawie doświadczeń autorki na Uniwersytecie Wileńskim. Dyskutowane są między innymi właściwości nauczania na odległość jako nowej technologii edukacyjnej i specyficznego charakteru organizacji tego procesu. Specjalny nacisk położono na znaczenie metodologii nauczania na odległość grafiki inżynierskiej.