

ASYNCHRONOUS DISTANCE LEARNING MODEL (ADL)

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Abstract *¾ This paper deals with the asynchronous model which we have developed for distance learning. All lectures have been recorded and a multimedia has been made on CD ROM as a combination of lectures in Power Point, simulations in Matlab, animation, video and speech. Apart from those on CD ROM, the material is available to the students through Internet: lectures, drill sessions, tests, quizzes. Laboratory sessions have also been organized through asynchronous distance learning. This kind of teaching organization enables both the students and the professors not to be tied to a fixed place and time, while being in contact at any time. Asynchronous distance learning is going to be described in all its integral parts, its results and both the advantages and disadvantages of this model.*

Index Terms *¾ Asynchronous distance learning model, education, Information and communication technologies, multimedia,*

INTRODUCTION

The basic disadvantage of the classical way of learning is that it is confined to a fixed time and place. Various factors influence the quality of learning: the place, the surroundings, the time, light, temperature, etc. [1]. Each student is an individual with different wants and abilities, and it is extremely difficult to satisfy all of this at the same time. An additional problem which occurs is education at geographically distant places. The very first ideas of distance learning stem from the 18th century, while in the 19th century serious educational projects were made [2]-[4]. However, only the appearance of Internet has brought about a revolutionary development in “distance education”. An important factor in the quality of education is a “two-sided communication”. The appearance of Internet enabled a fast “two-sided communication” between the professor (mentor) and the student (pupil).

The introduction of Informational and communicational technologies (ICT) and Internet into the educational system enables the student to make a transition from passive to active learning and thus to partake the role of research worker who is responsible for his own learning process. The aim of each lecturer is to prepare the best lecture possible and to transmit his knowledge to the students. The introduction of new technologies into the educational system offers great opportunities for a good education. This is the case with the teaching of the basic subject “Signals and

Systems” which we are trying to bring closer to the students by using ICT. All the lectures have been prepared in the form of presentations in Power Point, and the numerous practical examples have been simulated on Matlab. The material is also available to the students on the Internet [5]. The students attending our lectures can be divided into three groups as follows:

- first group attending the lectures at a fixed time and place – the classical teaching method in combination with new teaching technologies [6],
- second group located at a physical distance, the lecturer being at one place lecturing students who are located at a different place through videoconference [7]-[9]
- third group listening to the lecture regardless the time and place [10]-[13].

This paper is going to concentrate on the third group and the results are going to be compared with regard to the first two groups.

How were the students selected for the experiment? In the first phase 30% of the students with higher marks were chosen as it can be assumed that they learn regularly. We applied the “research for readiness” for the acceptance of ADL on this group. We did a general presentation on distance learning and shown what this is going to look like when applied to our subject. The students showed a great interest in this method of learning, but unfortunately not all of them were able to accept it, as not all the students own a computer. There remained a group of 15% students, enough to perform the experiment and to prepare part of the material.

The subject “Signals and Systems” is one of the basic subjects at the Faculty of Electrical Engineering and Computing and the students attend it in the fifth semester of studying. The subject has been prepared as a combination of lectures, auditive drill and laboratory sessions. The introduction of new technologies into the teaching system makes it possible for the lecturer to prepare the lectures extremely well in order to enable the students to cover the syllabus.

DESCRIPTION OF THE ADL MODEL

With the application of new technologies the teaching process acquires a new form. Figure 1 shows the connection between the lecturer, the student and the hypermedia

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technology in the process of the transfer of information [14].

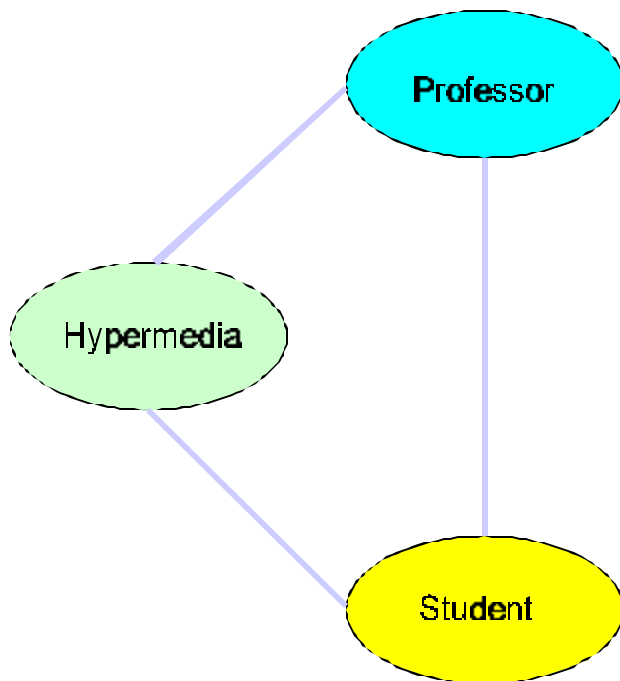


FIGURE 1.

THE CONNECTION BETWEEN THE LECTURER, THE STUDENT AND HYPERMEDIA TECHNOLOGY

We have been preparing the lectures in the form of presentations in Power Point for quite a long time now. It is a dynamic combination between text, picture, animation and video. In order to better explain the theory to the students, a series of practical examples have been set which are simulated on Matlab [6], [15]. These lectures have been adapted to distance lecturing. Lectures are also held in Osijek, a town at 270 km from Zagreb, every week by means of videoconference [7], [16]. The lectures are held in a modern classroom for distance lecturing. [17], [18]. All the lectures have been recorded so as to assemble the material for a compilation of a multimedia review on CD ROM. So far we have managed to digitalize part of those lectures and to form them into a multimedia review. It is a combination of lectures accompanied by the picture of the lecturer and his accompanying report. The multimedia was prepared by means of the Asymetrix Multimedia Toolbook program [19]. The hierarchical connection has been established on three levels as follows:

- introduction
- 15 topics
- hot words, key words and explanations, viewers, animations etc.

We have presently adapted only part of the lectures to multimedia form, and the rest was given to the students in

the form of classical presentations in Power Point. Apart from these materials, mimeographed professor's notes are available to the students [20]. In order to check how well they have learnt the "Signals and Systems", students can find tests consisting of approximately 100 questions on the Internet.

Auditory drills sessions have also been prepared in Power Point. The speech was recorded, then digitalized to be finally inserted into auditory drill sessions. Qool Edit was used for the adaptation. Sound files are made in WAV format, but the principal problem is that they take up a lot of memory space. Students can find auditory drills on Internet in html format.

Those students who have opted for ADL have to pass three examinations which consist of questions done on auditory drill sessions. In case they fail one of the examinations, the students have to return to the standard, classical method of learning, using ICT. In order to practice, the students can find quizzes which accompany auditory drills. These involve problems where the solution is only partially given to them. They can thus practice solving these problems and prepare for the examinations.

The laboratory sessions form an extremely important part of our subject where the students work either individually or in groups. Every week during the semester, the students are given one exercise which they have to simulate in Matlab [21]. The exercise is accompanied by a test which the students have to fill in and return to the lecturer. Based on these results from the laboratory, it can be decided whether or not a student has understood a certain problem. If there are any mistakes, we notify him by e-mail, he makes the necessary corrections and returns the paper to us. The communication and interaction between the lecturer and the students is of great importance and this is best achieved in laboratory sessions.

RESULTS

In order to be certain of the results, only the oral part of the examination is being organized following the standard procedure. As the ADL students have been forced to learn regularly during the semester, 92.3% students passed in the first two examination periods, whereas 53.8% of those from the first group who attended lectures in the classical method combined with ICT, passed in the same examination period. Diagram 2 shows the marking disposition for the first group: 39.6% of the students passed the examination with the highest grade (5), 20.69% with a very good grade (4), 17.4% with a good grade (3) and 22.4% with a satisfactory grade (2). With the application of ICT, the results have improved from year to year and almost 40% of the students passed their examinations with the highest grade (5).

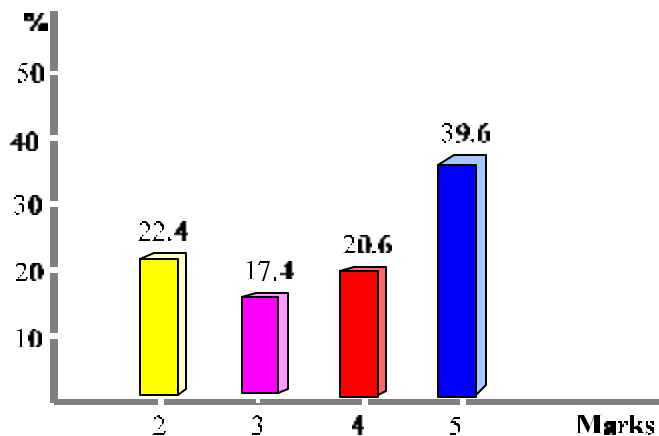


FIGURE 2.
THE MARKING DISPOSITION FOR THE FIRST GROUP

Figure 3 shows the examination results for the 2nd group, that is the students who follow the lectures by means of videoconference in Osijek: 13 % of the students passed the examination with the highest grade (5), 21.8% of them with a very good grade (4), 47.8% with a good grade (3) and 17.4% with a satisfactory grade (2). The results are definitely worse when compared with the previous group since this is not the same university and the students have a different fore knowledge.

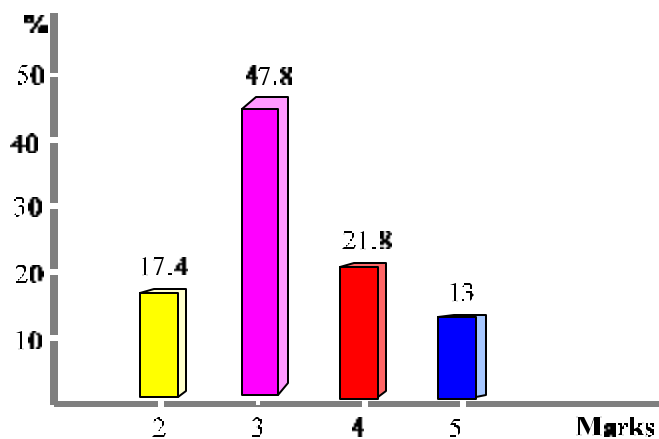


FIGURE 3.
THE MARKING DISPOSITION FOR THE 2ND GROUP – STUDENTS WHO FOLLOW THE LECTURES BY MEANS OF VIDEOCONFERENCE

What are the results of the ADL group? 18.75% of the students had to withdraw from the ADL after having failed the three examinations from the auditory drill. Part of them worked their way through the laboratory drills in ADL form, whereas the others have given up altogether. Out of the group of students who took the examination, 83.3% of them passed with the highest grade (5) and 16.7% with a very good grade (4) (see Figure 4).

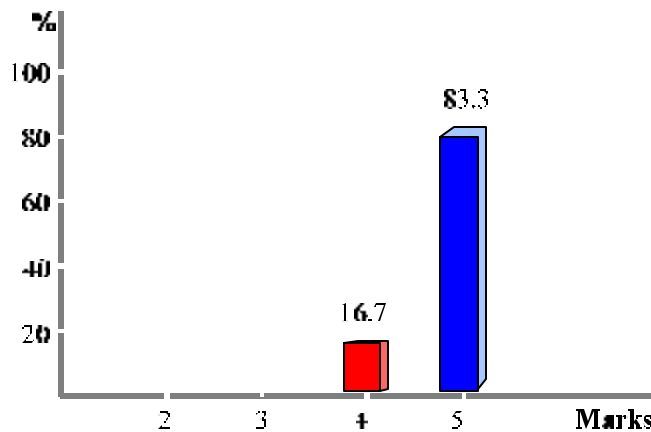


FIGURE 4.
THE MARKING DISPOSITION FOR THE 3RD GROUP – ADL GROUP

Such good results of the ADL method have been expected. The students did not have to come in for lectures at a fixed time and place, choosing the conditions to study on their own. They were, besides, also forced to study regularly because of the laboratory and compulsory exams. The sample is however not representative since it has been obtained through a multiple selection, and not through a random sample. These results are nevertheless satisfactory for the initiation of ADL. At the moment the most important thing is that with a good preparation ADL can be applied as effectively as the classical method.

ADVANTAGES AND DISADVANTAGES

The student is no longer tied to a fixed place and time and can flexibly choose his own learning conditions. The time gained by not attending lectures can be spent on learning. If he comes across a problem of any sort, the student can quickly solve it by contacting the professor through the Internet.

Our main problem is that this is only the beginning of a huge project and it is therefore impossible to adequately prepare all the material. We have done our best this year so that the students obtain all the necessary material in any form possible, and we are further going to develop and give the finishing touches to this material. In distance learning the “mental condition” is of the utmost importance. We have tried to amend this defect in such a way as to make the lectures as varied and as interesting as possible in order to attract the student. These are lectures with numerous practical examples and explanations, with an accompanying animation and video recordings. When the students pass the examination, they have to fill in a “Questionnaire” with their observations, appraisal and comments and send it to us. In this way we have a return information and we can amend all the draw backs. Most students like distance learning which is not tied to a fixed time and place and they are sorry that the university does not have more subjects which have

been organized in this way. The results show that our experiment has been successful, and that our next task is to transfer the remaining lectures into multimedia form and to finish the existing material.

Regardless the initial good results, the whole of the subject cannot be transferred into ADL in the near future because not all the students own a computer, so the interactive connection between professor and students could not be effected.

CONCLUSION

Since erudition is very quickly made obsolete with the rapid development of science and technology, the student should be motivated to learn continuously as well as to follow the trends in the new technology. Distance education plays a very important part in lifelong education. We have all become potential distance learners due Internet and multimedia [7].

In this paper we described Asynchronous Distance Learning Model (ADL) which is used in study "Signals and Systems". It is important that with a good preparation, ADL can be applied as effectively as the classical method. This kind of teaching organization enables both the students and the professors not to be tied to a fixed place and time, while being in contact by Internet at any time.

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