Tele-education as Method of Medical Education

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REVIEW
SUMMARY
Development of computer networks and introduction and application of new technologies in all aspects of human activity needs to be followed by universities in their transformation on how to approach scientific, research, and education teaching curricula. Development and increased use of distance learning (DL) over the past decade have clearly shown the potential and efficiency of information technology applied in education. Use of information technology in medical education is where medical informatics takes its place as important scientific discipline which ensures benefit from IT in teaching and learning process involved. Definition of telemedicine as „use of technologies based on health care delivered on distance" covers areas such as electronic health, telehealth (eHealth), telematics, but also tele-education. Web based medical education today is offered in different forms – from online lectures, online exams, web based continuous education programs, use of electronic libraries, online medical and scientific databases etc. Department of Medical Informatics of Medical Faculty of University of Sarajevo has taken many steps to introduce distance learning in medical curricula – from organising professional – scientific events (congresses, workshop etc), organizing first tele-exam at the faculty and among first at the university, to offering online lectures and online education material at the Department's website (www.unsa-medinfo.org). Distance learning in medical education, as well as telemedicine, significantly influence health care in general and are shaping the future model of medical practice. Basic computer and networks skills must be a part of all future medical curricula. The impact of technical equipment on patient-doctor relationship must be taken into account, and doctors have to be trained and prepared for diagnosing or consulting patients by use of IT. Telemedicine requires special approach in certain medical fields – tele-consultation, tele-surgery, tele-radiology and other specific telemedicine applications should be introduced to the curricula. Telemedicine and distance learning are best suited for medical education and doctor-to-doctor consultation - first contact between doctor and a patient should stay face-to-face when possible. In this paper, we present the results of the project Introduction and Implementation of Distance Learning at the Medical Faculty of University of Sarajevo and compare it with the following expected outcomes: development and integration of information technology in medical education; creation of flexible infrastructure which will enable access to e-learning to all students and teaching staff; improvement of digital literacy of academic population; ensuring high educational standards to students and teaching staff; helping medical staff to develop „life-long learning" approach in work and education.

Keywords: medical education, distance learning, medical informatics, e-learning

1. DISTANCE LEARNING– DEFINITION AND DESCRIPTION

Distance learning is conventionally defined as: any educational or learning process or system in which the teacher and instructor are separated geographically or in time from his or her students; or in which students are separated from other students or educational resources (1, 2, 3). The most important factor which influences the changes occurring in education has been the installation and development of the Internet and electronic multimedia techniques. Distance learning does not preclude traditional learning processes; frequently it is used in conjunction with in-person classroom or professional training procedures and practices.

Pedagogical and organizational improvements have fundamental importance. It is in use both interaction teacher-student and interaction student-student. Phases of synchronized and synchronized learning are combined. Individual and group works are also combined. If all these forms are involved in educational process, they mutually supplement each other, as a last resort. Traditional education as well as contemporary education is supported by informatics technologies in unique system of flexible education. In order to use advantages of flexible education, it is necessary to combine different forms of learning, during the preparation phase and development of every educational course in appropriate way.

Distance learning is not simply a set infrastructure, but rather a concept of learning that incorporates different technologies and learning media. Within the province, different video, audio and computer tele-conferencing systems, along with Computer Based Training, Computer Managed Instructional systems and other media are being integrated technologically, instructionally and organizationally. The tele-education concept crosses all jurisdictions among institutions both within and outside the province, public and private, at any level of education, to anywhere including institutions, workplaces and the home. Tele-education, tele-teaching, tele-training, tele-mentoring, and tele-accreditation have been clearly demonstrated and are now common practice.

2. ADVANTAGES AND DISADVANTAGES OF DISTANCE LEARNING

Distance learning compared to traditional way of learning had many its advantages as well as disadvantages. Some of the main advantages of distance learning are:

- the economical factor,
- student has 24 hour access to needed information,
- he/she is given the opportunity to learn the subject in his/hers own time and speed,
- he/she can access learning material independently of place or time,
- he/she is given the opportunity to learn how to work independently,
- using e-mail or chat rooms he/she is able to contact professor or his/hers assistant if there are any questions or confusions regarding lectures; etc. (2,3).
- Fundamental advantages of flexible education in terms of classical education are:

more efficiency;

- increase capacities of educational institutions;
- education can be easily adopted to the needs of education on-the-job;
- costs of educational process are smaller;
- it is possible to distribute the education uniformly, thus the new educational programs are available for fields outside of educational and economic centres;
- it enables the possibility of access to the foreign educational resources to the various institutions;
- superior quality of the knowledge gained.

Many critics consider that using e-mail or chat rooms to obtain contact with the professor is actually the main disadvantage of this system of learning. Question arises whether this way of professor-student communication is helpful to students because face-to-face contact is missing as well as the

opportunity of student-professor relationship building.

3. DISTANCE LEARNING IN MEDICAL CURRICULUM AT MEDICAL FACULTY, UNIVERSITY OF SARAJEVO

In October 2003, University of Sarajevo began with Distance learning education, opening University Distance Learning Centre. Opening the University Distance Learning Centre, as coordination body and leader in all activities in connection to Distance learning, has provided opportunity for development and growth of this kind of lifelong education.

In relation to above project conducted by the University Tele-information Centre (UTIC) and as continuation of two-year project Possibilities of introduction of Distance learning in Medical curriculum, the Cantonal Ministry approved and supported a new project; Introduction and implementation of Distance learning in medicine. Platform for the course of distance learning is achieved in collaboration with UTIC. University Tele-information Centre, established as part of University of Sarajevo and first ISP in BiH in 1996 (UTIC). It is scientific-organizational unit of the University of Sarajevo for improvement of scientific-research work and through UTIC members of the University can be gathered in the unique computer-communication structure. Objectives of UTIC are:

- to connect members of the University of Sarajevo with similar institution in the country and abroad due to more efficient use of scientific, research and educational resources,
- use of educational data bases and other information for the needs of the University and its members,
- development an integration of informatics computer technologies in education,
- creation of flexible infrastructure which will enable e-Learning to be accessible to all students and University staff,
- improvement of general digital literacy of academic population,
- development of top quality educational content which could be integrated in the actual European processes of e-Learning revolution.

With their help centre for distance learning, "LUCIS CENTRUM", is created (Figure 1). We hope that this is just a beginning step towards improvements of the BiH education system and that this project will serve as an indicator towards that future.

On UTIC web site, seven students enrolled from Medical faculty, for the subject Medical Informatics are able to learn from the distance location. So far, teaching staff uploaded eleven lectures at the web site:

- Hardware and software,
- Medical documentations,
- Medical informatics,
- Methods of data manipulation,
- Nomenclatures and classification systems,
- Data organization,
- Data, information and knowledge,
- Lectures 1,
- System and communication,
- Structure and data organization, and
- Expert systems.

Beside the materials it is possible to upload and download the following:

- practical works,
- seminar work,
- information,
- recommended links,
- plan and programs,
- quiz,
- schedule,
- recommended readings,
- examination schedule, and
- examination results.

Basically software application has two interfaces: teacher and student interface. Access from any of these is very simple and fast (1, 2, 3).

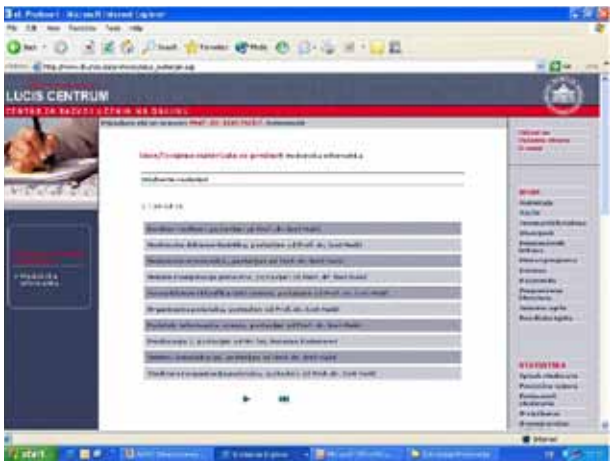

FIGURE 1. Uploaded materials for subject Medical Informatics at the web page of Lucis Centrum of University of Sarajevo.

FIGURE 2. Content of Medical Informatics page at at the web page of Lucis Centrum of University of Sarajevo.

4. EDUCATION CONTENT OF DISTANCE LEARNING

Lecture contents will be presented in our virtual classroom. In our case, learning material from the subject of medical informatics, and later, hopefully from other medical subjects, will be available on web site, www.e-learning.ba (Figure 2).

In this "classroom," learning materials, power point lecture presentations as well as practice exercises with step-by-step instructions, are easily accessible to students. Moreover, on this web site, students will be able to find subject relating literature as well as English version of the presentations. To access this information requires only one click on a download option as well as one second patience depending on student's internet speed connection. In short, our virtual classroom gives students the opportunity to access needed information, at any time, and in any place without having to be bound to the classroom.

Using these simple navigations, maximal efficiency and fast access to needed material is possible.

As we can see on the Figure 3, all links are in chronological order according to the plan and program of the lecture as well as practice (materials, practical works, seminar work, information, recommended links, plan and pro-

grams, quiz, schedule, recommended readings, registration to examination, and examination results).

Special attention is given to the link "kvizovi" (quiz). In order for the student to check his/hers progress (to test his/hers knowledge of the lecture he/she studied), every lecture is followed by quizzes. Quiz questions are multiple choice questions and they are based on the lecture content. After every quiz, student receives "feedback" regarding his/hers progress. Results are given in terms percentages (one needs 51% right answers to pass the quiz). On this way student has absolutely control over his/her work.

The creation of the resources that should be available to the student is very complex job that many university professors cannot accept easily. Some of them will eventually place the power point presentation that can be downloaded without additional resources. Some of them are unfamiliar with e-mail communication and chat rooms. Generally speaking, the younger people that are involved in education are more prone to adopt advantages of e-learning.

There is hierarchy according to the authorizations of user of e-learning. The administrators can do everything, teacher can access their courses and modified them, students can use and download resources, take quizzes and lecture and guests can only see limited contents of course.

The teacher is person that is responsible for course creation. The creation of the courses starts with making of schedule that includes planed curriculum. During the course the teacher can add presentation, lectures or quizzes according to the current topic.

Quiz can be use in purpose of education. It is possible to provide any question included in quiz with references that explain the solution. Student can repeat questions till correct answer is given. Student can also see all questions in quiz and give answers in order he wants. Submitting of the answer immediately returns correct and incorrect choices. There are several type of questions that can be automatically answered by system such as multiple choice questions, matching, short answers, filling up of gaps etc… There is possibility to create questions that can be answered by student in form of essay and manually graded by teacher.

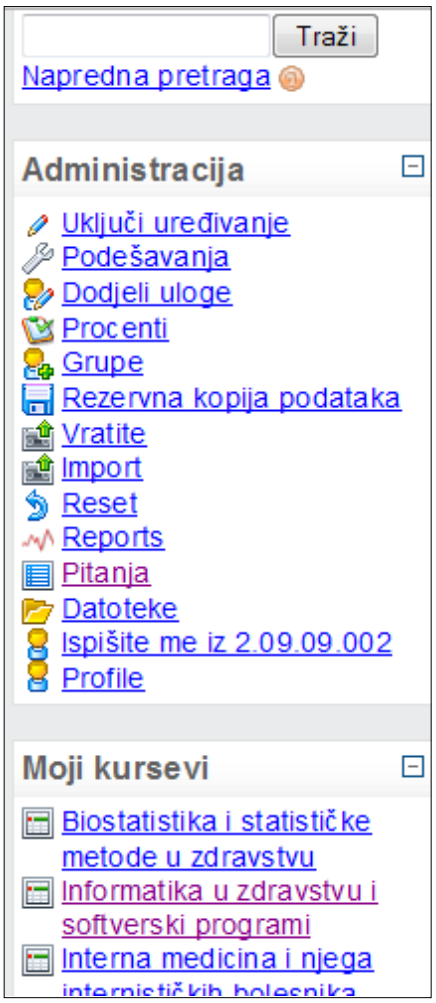

FIGURE 3. The program of education with topics and downloadable resources are available for students. On the left side the menu that is available for teachers is shown. Some of this options are not available for students

The quiz can be used as a tool for official examination under controlled circumstences

Important step is making of question database that is used for creation of quizzes (Figure 4). The answers can be added or modified by teacher according to his privileges (4, 5, 6, 7, 8).

5. OUR EXPERIENCES OF ADVANTAGES AND DISADVANTAGES OF DISTANCE LEARNING IN MEDICAL EDUCATION PROCESS

In many universities across BiH students' contact with professors are almost impossible (unless one needs to orally take the exam), due to many professors other jobs or responsibilities; students are mainly able to communicate with professor's assistants. Moreover, thru traditional way of teaching, during the lectures, students from their professors obtain mostly the information which they can find in the literature or on the internet. Rarely, there is student-professor interaction or lecture discussion during the class. From this one can conclude that an ambitious student using tele-education will experience minimum lose.

We live in "Age of Information". These technologies are changing the way we perceive the world, how wee think and communicate with another. Established cultures are being transformed and new cultures are forming. New virtual environment affects the way we build our sense of who we are. Some characteristics of the Internet with which are people in BiH know a little are (2, 4, 9):

- large volume of users and potential users,
- lack of physical boundaries which allows for the manipulation of time and space,
- information can be accessed in a concurrent fashion using different media,
- concept of redundancy.

In the virtual environment we are applying for information in a way that is expanding our senses and one must to take into account that experience is occurring in the context of the virtual environment. Information without a context has no meaning.

According to our experience we can conclude that some students prefer e-learning and some of them use e-earning instead of social networks such as facebook, exchange information with teachers and other students. Some of students use e-learning only to only to see results of tests and these students are generally speaking less successful in learning of new skills (10, 11).

The greatest progress was made in the area of tele-education and distance learning in BiH. Distance learning does not preclude traditional learning processes; frequently it is used in conjunction with in-person classroom or professional training procedures and practices. Distance learning is used for self-education, tests, services and for the examinations in medicine, i.e. in terms of self-education and individual examination services. The possibility to work in the exercise mode will image files and questions is an attractive way for self-education (12, 13, 14, 15).

FIGURE 4. Question database created for quizzes and examinations at Chair for Medical Informatics at Medical faculty of University of Sarajevo.

Very first serious initiative was generated by World University Service of Austria (WUS Austria) in BiH. During 2002 and 2003 WUS Austria, through its programs, Distance learning 2002 and Distance learning 2003 year, supported the development of the educational processes at BiH universities. At Medical faculty of University of Sarajevo at Chair for Medical informatics since 2002 is in progress realization of the project named: "Possibilities of introducing of distance learning in medical curriculum", approved by the Federal and the Cantonal ministry of science and education. The purpose of the project is to facilitate improvement of educational process at biomedical faculties, applying contemporary educational methods, methodologies and information technologies in accordance with strategy and goals proclaimed by Bologna declaration. Pilot project was realized during school years 2003-2005, theoretical and practical education of subject Medical informatics are adapted to the new concepts of education using world trends of education from the distance. One group of students was included in the project finalized by electronic exam registration and electronic exam on 20 June 2005, at Medical faculty in Sarajevo.

Distance learning in medicine has impact on telemedicine and practicing medicine as well. Basic skills of the use of computers and networks must be a part of all future medical curricula. The impact of technical equipment between patient and the doctor must be understood, and the situation where the diagnosis based on live voice or picture is different from a normal doctor-patient contact. In some areas telemedicine requires unique techniques. Tele-robotically discipline guaranties differ from what surgeons normally learn. Telemedicine, and distance learning as a prerequisite for it, is lest suited for doctor-to-doctor consultation, and the first contact to a doctor should always be a face-to-face consultation (15).

FIGURE 5. Web sites of Cathedra for Medical Informatics and Family Medicine and University Tele-informatics Centre - where DL is realized

6. CONCLUSIONS

Distance learning in medicine has impact on telemedicine and practicing medicine as well. Basic skills of the use of computers and networks must be a part of all future medical curricula. The impact of technical equipment between patient and the doctor must be understood, and the situation where the diagnosis based on live voice or picture is different from a normal doctor-patient contact (10). In some areas telemedicine requires unique techniques. Tele-robotical guaranties differ from what surgeons normally learn. Telemedicine, and distance learning as a prerequisite for it, is lest suited for doctor-to-doctor consultation, and the first contact to a doctor should always be a face-to-face consultation.

Expected outcomes of the project Introduction and Implementation of Distance learning in medicine are:

- development and integration of informatics-computer technologies in medical education,
- creation of flexible infrastructure which will enable access to e-Learning by all students and teaching staff,
- improvement of digital literacy of academic population,
- ensure high educational standards to students and teaching staff, and
- to help medical staff to develop "Lifelong learning way of life".

The health sector is one of the most evident potential beneficiaries of the Internet revolution and World Wide Web resource in the present and in the future, when the tools now available and the system's reliability and efficacy as a whole will be further developed and improved.

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