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Medical Informatics Education in Bosnia and Herzegovina

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Abstract

Introduction: Medical informatics focuses on the acquisition, storage and use of information in health and biomedicine. Education of health workers and standardization of education process are essential for all stakeholders in healthcare systems and medical staff to know how to control healthcare costs, patient safety and utilization of information technology. Very complex political structure in Bosnia and Herzegovina caused big difference in curriculums, teaching methods and quality of knowledge gained among medical faculties in the country. Also, on the example of teaching process at Medical Faculty, University of Sarajevo, authors proposed future united and integrated work in this area. Work method: Method of the study is descriptive, compared education in medical informatics at five B&H medical faculties. Over 800 students answered questionnaires created at medical faculties in Sarajevo and Tuzla. Also, authors compared curricula for Medical informatics in Medical faculties in B&H and web sites. Work results: Subject of Medical informatics is being taught on various ways in different B&H Universities. Some Universities in B&H are under huge influence of neighboring countries, and University of Tuzla has its own way as well as Medical faculty in Sarajevo. Conclusion: Medical informatics education at Medical Faculty, University of Sarajevo is based on the same concept as is it on prestige universities all over the world and in accordance with recommendations of the working groups on education of EFMI and IMIA. Teaching staff should provide excellence in medical informatics in the areas of teaching, research and development, and community service. It should be serving as a focal point for industry, government, academia and the various disciplines of medicine seeking to integrate technology with health care.

1. Introduction

Medical informatics focuses on the acquisition, storage and use of information in health and biomedicine. Education of health workers and standardization of education process are essential for all stakeholders in healthcare systems and medical staff to know how to control healthcare costs, patient safety and utilization of information technology. Very complex political structure in Bosnia and Herzegovina caused big difference in curriculums, teaching methods and quality of knowledge gained among medical faculties in the country what is a consequent of the war (1992-1995). Dayton Agreement signed in November 1995 by all parties involved in Bosnian war and representatives from international communities, was the document that stopped killing in Bosnia. But, Dayton Agreement also, created very strange and bizarre environment in which is very difficult to enable progress and improvement in almost all areas including education and health system. Since 1995, Bosnia and Herzegovina is consisted of two entities, Federation of Bosnia and Herzegovina and Republic of Srpska. Federation of Bosnia and Herzegovina is divided on ten cantons and each canton has separate government with ministry for education and health, among others, and unique politics in those areas. It created diversity of laws and very controversy situation in education and health system. In other hand Republic of Srpska is entity with very centralized government which inhibits progress and local autonomy. Having in mind that Bosnia and Herzegovina is country with less then 3.5 million citizens,

it is clear that something should be changed. Every 70th citizen of Bosnia and Herzegovina uses Internet (50.000 citizens of 3.5 million in Bosnia and Herzegovina). Comparison with western world and European Union is horrifying. The aim of this paper is to point out different education from Medical informatics at Bosnia and Herzegovina Medical faculties. Leading role of the Cathedra for Medical informatics at Medical faculty of University of Sarajevo is reflected in areas as: Distance learning, tele-exam, final exam, publishing activities, organization of various events – workshops, conferences, congresses etc (1,2,4,5,6,7).

2. Research of students' knowledge

Cathedra for Medical informatics was established before the war1, at three Medical faculties in Bosnia and Herzegovina, Sarajevo, Tuzla, Banja Luka, with adoption of common curricula in 1990. As obligatory subject Medical informatics was introduced in 1992 in above medical faculties and in additional two, in Mostar and Foca/Srbinje, as soon as the faculties were established after the war.

One of the greatest challenges for teaching staff at Medical faculties in B&H is student' knowledge they bring with them. On beginning and on the end of each school year at Cathedra for Medical informatics at Medical faculty of University of Sarajevo teaching staff conduct survey on students knowledge before and after the semester assessment of the level of medical informatics education, and so far over 800 students were examined.

If we compare students enrolled in current school year 2004/2005 with "war and post-war generations" we can notice significant improvement. Students come from secondary schools with higher level of knowledge comparing with period ten years ago.

Obvious example for that is the fact that 4.1% students do not know how many enter buttons are on keyboard versus 15.4% in period 1994-1997. Length of informatics education in secondary schools extended, so that we have more of 50% students who had 2 and more year's education from this subject (1,2,3,4). It has influence on how students assess their knowledge, which is higher then in previous school years and general attitude to curriculum (figure 1). Standard of students also increased and now we have 76.6% of students who have personal computer and 47.5% have connection to Internet in comparison with year 1997 when 55.8% of students had personal computer and 21% had connection to Internet.

These are some results from last school year: Theoretical part of curriculum (15 units) on medical informatics is difficult (43.9%), medium difficult (33.4%) and very difficult (22.7%). The curriculum is complex for 16.2% students asked. It is useful for 67.4% and for 21.6% is extremely useful. Practical part of the curriculum is difficult for 42.8%, very difficult for 21.2%, curriculum is not clear for 37.5%, 67.2 think that curriculum is good and 14% consider it very good. Satisfied with the theoretical lectures were 47.2%, very satisfied 23.4% and highly satisfied 14.6%. Very satisfied with practical lectures were 72.3% students and 17.6% of they were satisfied. Students would like to have more lectures and practical training on internet applications, Telematics, electronic media and communications information systems (1).

3. Good teachers and curriculum can improve general knowledge on informatics of medical student to the certain level, but academics are not able to influence on: non common curricula in entire Bosnia and Herzegovina, very bad economic situation and overall political environment

4. Medical informatics in Bosnia and Herzegovina

In the following chapter we compared comparable parameters in all 5 Medical faculties in Bosnia and Herzegovina. Parameters are: number of classes, faculty website and website of cathedra for Medical informatics, teaching staff, distance learning etc.

Medical Faculty Mostar: Medical faculty of Croatian University of Mostar is educational institution established after the Bosnian war and the subject Medical Informatics is

[1] Bosnian war commenced in March 1992 and ended in November1995.

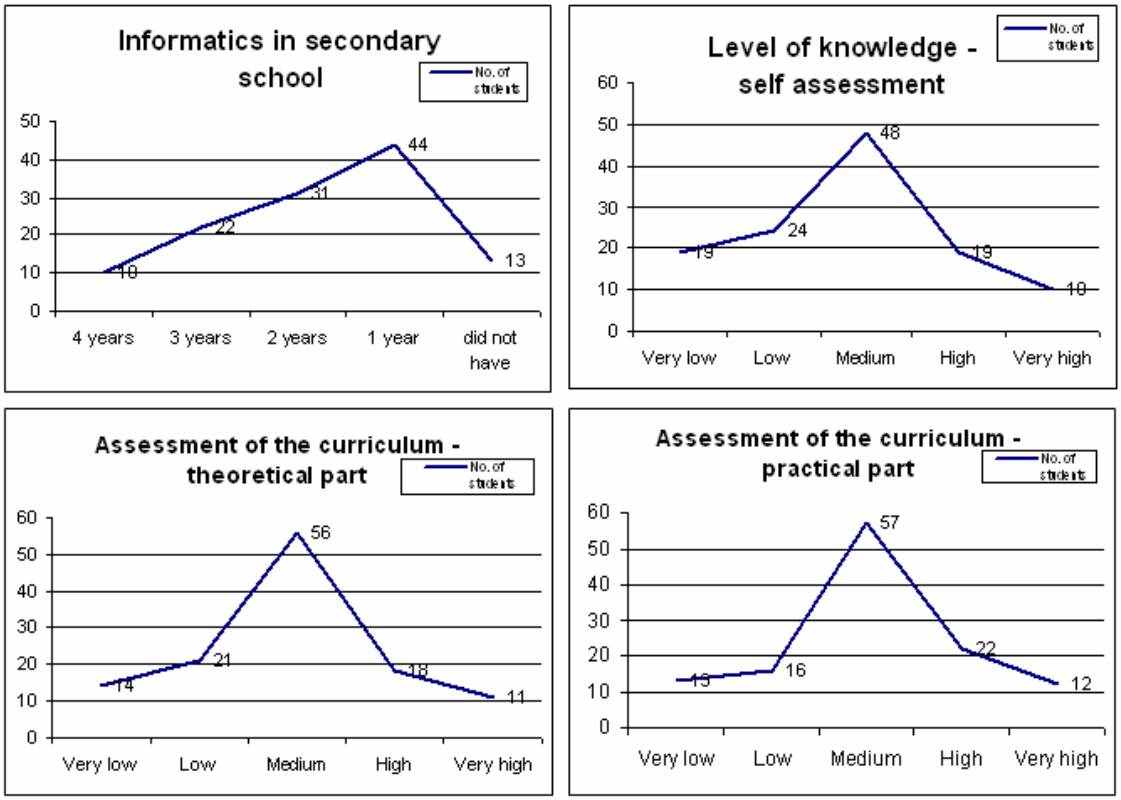

Figure 1 - Survey graphs – school year 2004/2005

introduced from the beginning. Since the Medical faculty does not have teaching staff to provide suitable education thay use visiting professors from Croatia, Universities of Split and Zagreb. Website of Medical faculty is not created yet and niether for Cathedra for Medical Informatics.

Medical Faculty Banja Luka: is leading medical school in smaller B&H entity (Republic of Srpska). It is established in 1978, and number of graduated student is 1107 so far. There is no cathedra for medical informatics as such and this subject is been taught under subject Statistics and informatics in medicine. Subject Statistics and informatics in medicine is being taught in second semester and students are obliged to have 30 hours of theoretical and 30 hours of practical work. There is faculty website (fig. 2), but there is no cathedra's one.

Medical Faculty Foca/Srbinje, University of East Sarajevo is the "youngest" leading medical school in B&H. It is established in 1994 and they have 3 generation of graduate students. There is no cathedra for medical informatics and this subject is been taught under subject Medical statistics and informatics as well as in Banja Luka and with the same curricula, 30 hours of theoretical and 30 hours of practical work. There is faculty website (figure 3), but there is no cathedra's one. Since school year 2000/2001 there is subject Medical statistics and informatics at postgraduate studies.

Medical faculty in Tuzla is established in 1976. There is no cathedra for medical informatics as such and this subject is been taught under subject Basic computing and informatics. Subject Statistics and informatics in medicine is being taught in third and fourth semester and students are obliged to have 30 hours of theoretical and 30 hours of practical work. There is faculty website (figure 2), but there is no cathedra's one since there is no cathedra for medical informatics. It is specific of University of Tuzla that they have same university cathedra for subject informatics to be taught at all faculties.

Medical faculty in Sarajevo is the oldest medical school in Bosnia and Herzegovina established in 1944 (12). As obligatory subject medical informatics is introduced in school year 1992/1993. Currently medical informatics is being taught in second semester (30 hours of theoretical and 30 hours of practical work) as Basic medical informatics and in eleventh semester as Applicative medical informatics from 2006. Since school year 1993/1994 there is subject Medical statistics and informatics at four semester postgraduate studies for all three courses.

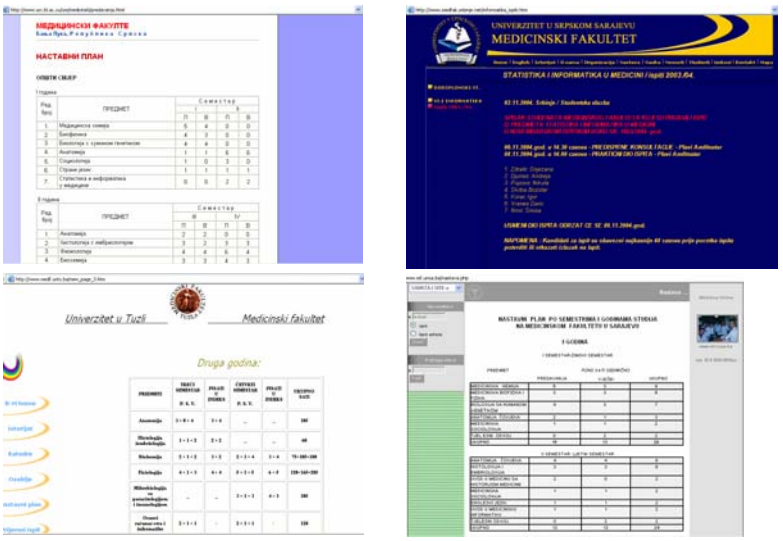

Figure2 . - Web sites of Medical faculties in B&H

are leaders in the Medical informatics education at Medical faculties. In cooperation with UTIC (University Tele-information Centre) teaching staff from Cathedra for Medical Informatics have organized first course in distance learning; also they have organized fist tele-exam in history of Medical faculty, prof Masic MD PhD is Editor-in-Chief of two professional-scientific magazines Medicinski arhiv (Medical archive) and Acta Informatica Medica (AIM) and chair person of B&H Society for Medical Informatics and teaching assistant Ahmed Novo MD is secretary of B&H Society for Medical Informatics and member of editorial board of Acta Informatica Medica. Also, numbers of various events – workshops, conferences, congresses etc. have been organized in support of Cathedra for Medical Informatics. Teaching staff is actively involved in preparation and organization of MIE 2009 to be held in Sarajevo from 31 August to 3 September 2009.

Distance learning and website : 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.

The project is conducted by the University Tele-information Centre (UTIC) and four faculties from University of Sarajevo are involved: Electro-technical, Business and economy, and Medical faculty.

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, professor Masic and his assistants uploaded eleven lectures at the 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.

In year 2004, Cathedra for Medical informatics at Medical faculty of University of Sarajevo got a web site with very broad and interesting content. By the end of the school year 2004/2005 we expect to have the following completely functioning at the cathedra's web site and student will be able to:

- Check terms for exams
- Register for exam
- Check results of the exams

- Attend medical informatics education via MI web (distance learning).

Other operational stuffs on the web are: content and news from Cathedra for Medical informatics, organization, teaching process, projects, publications, scientific events, visits and useful links.

First tele-exam in history of Sarajevo University was held at Medical faculty in 2002. Realization of the tele-exam was composed of examination commission in Sarajevo, of three members – three teachers and on the other part, at the distance; in this case, the candidate was placed in Podgorica, Serbia and Montenegro with the presence of the special commission of Ministry of Education FB&H. Internet-web based communication system was established with the help of three small programs for the Internet Web communication: MSN Messenger, Net Meeting and IP watcher and on the same time the candidate was asked to answer on the few questions in the front of web camera. The exam was successfully made. Taking into consideration that this kind of examination had been made for the first time in the history of University of Sarajevo and generally in Bosnia and Herzegovina we have been faced with positive as well as negative reactions on this kind of examination. We believe that this is valuable contribution to student-teacher communication for the future and abundant world experience of the Internet – Web based communications are the real proof for it.

Events: Presents of Distance learning is still modest, but in December, 2002 was made first big step forward. As first phase of the project: Possibilities of introduction of Distance learning in Medical curriculum, as part of the celebration of Ten years of Cathedra for Medical Informatics, was held workshop the project approved by the Federal Ministry of Education, BiH. Participants of the workshop, eminent experts from Sarajevo, Tuzla and Zagreb, Croatia, shared experience in application of distance learning. As a part of workshop we made direct communication with UTIC (University Tele-information Centre) in real time, speed 512Kbps (5).

University Tele-information Centre, established as part of University of Sarajevo and first ISP in Bosnia and Herzegovina in 1996 (www.utic.net.ba). 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 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. Also: 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.

Second congress of Medical Informatics of Bosnia and Herzegovina with international participation, New trends of Health Informatics, was held in Sarajevo in the period 16-18 April 2004. The congress was opened by prof Masic and first presenter was chairman of the European Federation of Medical Informatics (EFMI), Assa Reichert. Among seventy four papers presented and over 150 participants were members of EFMI; Baud R, Bryden J, Engelbrecht R, Weber P, Rudel D and Hofdijk J. Venue of Second congress were Rectorat of University of Sarajevo and the congress was held under the auspices of prof Boris Tihi, Rector of University of Sarajevo.

5. Conclusions

The rise of IT as an artefact of everyday life in the modern world has brought with it the dawn of a new era, often dubbed the “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:

- 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.

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 incremented and improved.

- Low level of education in secondary schools is improving, but it is still low;
- Shortage of modern equipment;
- Lack of LAN, connection to Internet, organized web design;
- Problem of the maintenance;
- Free access to computer rooms;
- Students are not informed about functioning of educations and health system in whole, especially at universities;
- All new measures and decisions must be formalized through legislation;
- In our system power of knowledge should be prevailing, instead of power of authorities.

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