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EDITORIAL

Information Technologies in Education of Medical Students at the University of Sarajevo

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ABSTRACT
Introduction: Information and communication technology have brought about many changes in medical education and practice, especially in the field of diagnostics. During the academic year 2013/2014, at Faculty of Medicine, University of Sarajevo, students in the final year of the study were subjected to examination which aim was to determine how medical students in Bosnia and Herzegovina subjectively assessing their skills for using computers, have gained insight into the nature of Information Technology's (IT) education and possessive knowledge. **Material and methods:** The survey was conducted voluntary by anonymous questionnaire consisting of 27 questions, divided into five categories, which are collecting facts about student's: sex, age, year of entry, computer skills, possessing the same, the use of the Internet, the method of obtaining currently knowledge and recommendations of students in order to improve their IT training. **Results of the study:** According to the given parameters, indicate an obvious difference in the level of knowledge, use and practical application of Information Technology's knowledge among students of the Bologna process to the students educated under the old system in favor of the first ones. Based on a comparison of similar studies conducted in Croatia, Sri Lanka, Pakistan and Denmark, it was observed that the level of knowledge of students of the Medical Faculty in Sarajevo was of equal height or greater than in these countries.
Key words: Medical faculty in Sarajevo, medical students, IT.

1. INTRODUCTION

The twentieth century was a revolutionary period in the field of computer science. Today, in the 21st century information technology and computers represent an essential part of every sphere of human life, especially in the process of education and doing bussing. Information and communication technology have brought about many changes in medical education and practice, especially in the field of diagnostics. To catch up with the IT revolution, developing countries need to explore their options, to design and implement major changes in adapting to new computer technologies (1-5).

The aim of this research is to determine how medical students in Bosnia and Herzegovina subjectively assessed their skills of using computers, and have gained insight into the nature of IT education and knowledge possessed in consideration of the fact that Bosnia and Herzegovina is one of the countries in transition.

2. MATERIALS AND METHODS

During the academic year 2013/2014, Faculty of Medicine, University of Sarajevo it was conducted an observational, analytical study. The study included 154 students of the final year of study, 85 of those studying at the Bologna process, and 69 of them attending the old system of education. The survey was conducted voluntary by anonymous questionnaire consisting of 27 questions, divided into five categories, which are collecting facts about student's: sex, age, year of entry, computer skills, possessing the same, the use of the Internet, the method of obtaining currently knowledge and recommendations of students in order to improve their IT training. Students have self-evaluated their knowledge from 1-4 grades, where 1 is the lowest and 4 the highest review. The difference between the existing knowledge about the poles, ages and system studies was examined too considering the fact that students who study at the Bologna process does not study the subject of Medical informatics.

3. RESULTS

Including in the group of the 154 students covered by this investigation 44.8% of them studied under the old system and 55.2% studied at Bologna process. A female part of the study population makes 64.9% and the male part of the population performs 35.1% of students. The average age of all tested students is 29.8, studying at Bologna process 24.18, and students under the old system it is 36.47. Apparent difference in using of computers by students of two educational systems is shown in charts 1 and 2.

All respondents confirmed that they own a computer and there is a possibility of using it at the col-

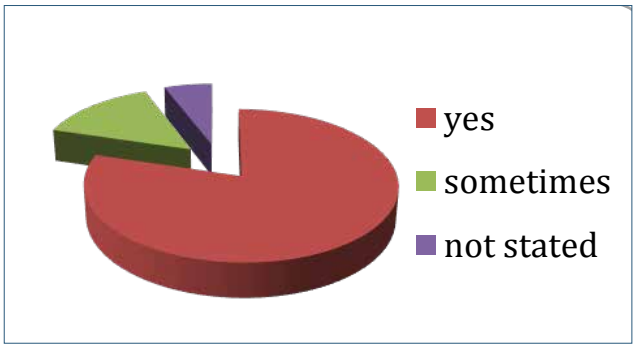

Chart 1. *Frequency of using computers by students of old system*

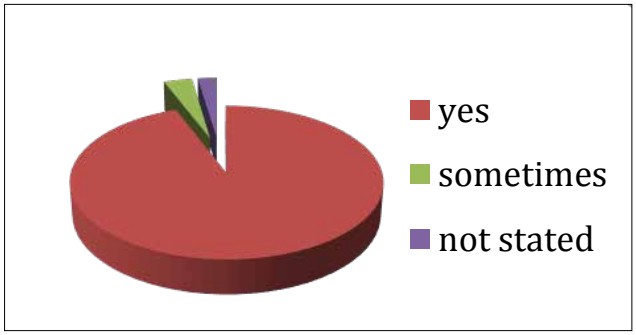

Chart 2. *Frequency of using computers by students of Bologna*

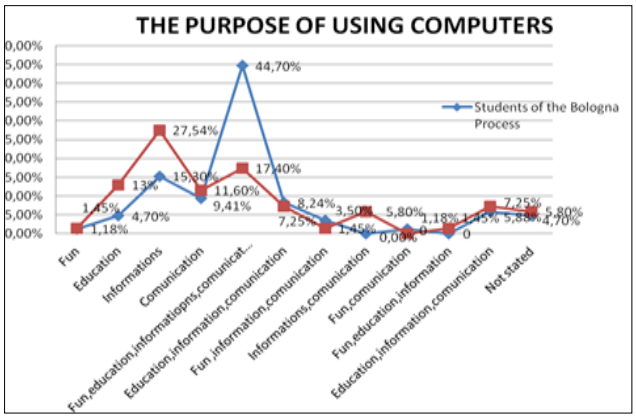

Chart 3. *The difference in the purpose of using computers by students of the Bologna Process and the old system ones*

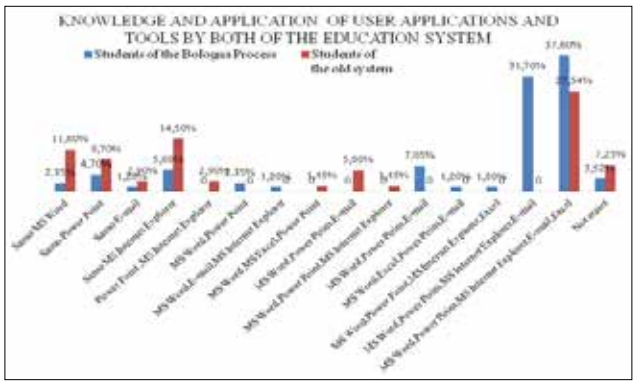

Chart 4. *Knowledge and application of user applications and tools by both of the education system*

lege. Differences were observed for the purpose of using computers as can be seen in the chart 3.

The study showed a better understanding and application of user applications and tools by students

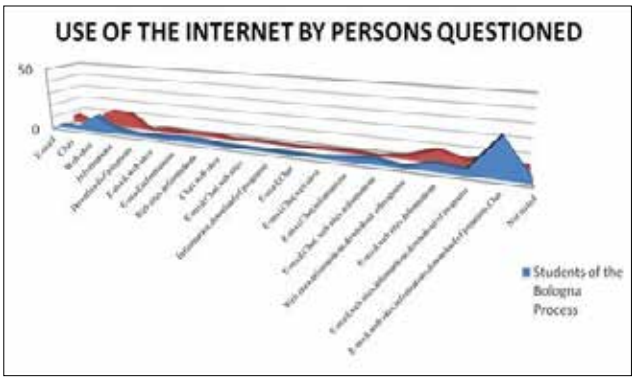

Chart 5. *Use of the Internet by persons questioned*

Some suggestions about improving education in the field of computer science in order to improve working in primary health care	Students who are studying under the old system		Students who are studying at the Bologna process	
Nothing	8	12%	11	13%
More work on the PC	18	26%	13	15%
More education via the Internet	21	30%	20	24%
Distance Learning	8	12%	14	16%
More work on the PC, the more education via the Internet	4	6%	3	4%
More education via the Internet, distance learning	3	4%	4	5%
More work on the PC, more education via the Internet, distance learning	3	4%	3	4%
Not stated	4	6%	17	20%
Total	69		85	

Table 1. *Students' opinion about improving primary health care work*

of the Bologna process which is presented in chart 4.

Chart 5 shows the most commonly used capabilities of the Internet and the difference between the systems of study.

Total of 13.6% of students in both systems said they had achieved knowledge through a formal education, 3.2% by attending courses, 38.9% by themselves, 2.5% that they were taught by someone else, 18,9 % a combination of regular education and independent learning, a full-time education by attending courses and 5.2% and 17.7% a combination of all the previously mentioned features.

From total of 43.5% of respondents said they had attended IT courses, 16.8% that they are useful, and 3.2% that they are expensive. 36.7% said that, in their opinion, the information technology will be based in the future on greater use of the Internet, 18.18% on use of databases, 18.18% on use of multimedia, and the rest will a combination of the previously mentioned. Table 1 shows suggestions about improving education in IT.

The average score of students of the old system of knowledge of computer components is 2.73, 3.55 using of Word, Excel 2.3, 3.56 Power Point, Internet 3.5, knowledge of basic computer concepts 2.4, and overall knowledge 3.00. The average score of students in Bologna system of education of knowledge of computer components is 3.07, the use of Word 3.69, 2.53 Excel, Power Point, 3.68, 3.78, and Internet knowl-

edge of basic IT concepts 2.68, and 3.24 overall knowledge . An average of acquired knowledge of all subjects was 3.12. As the students of the old system, as a part of its study tracked object Medical Informatics, found all of its classes as follows: 13% said that the teaching is "satisfactory", 59% evaluated it as " good", 22% as the "excellent" and 6% are not stated.

I GENERAL INFORMATION ON THE RESPONDENT		
Faculty	1. Medical 2.Dental 3.Pharmaceutics 4. School of Health Studies	☐ 1
Year of study	1. First 2. Second 3. Third 4. Fourth 5. Fifth 6. Sixth	☐ 2
Year of birth		☐☐☐☐ 6
Gender	1.Male 2. Female	☐ 7
Year of enrollment		☐☐☐☐☐/☐ 14
II GENERAL KNOWLEDGE OF INFORMATION TECHNOLOGY AND COMPUTER USE		
1. Do you use a computer in your work?	1. Yes 2. No 3. Periodically	☐ 15
2. Do you have a computer?	1. At the faculty 2. At home 3. Both at the faculty and at home 4. Neither at the college nor at home	☐ 16
3. Do you have the ability to use computers at the faculty to work alone?	1. No 2. Do not know 3. I have, but I do not use it 4. I have, but I use it rarely 5. I have and I use it almost daily	☐ 17
4. If you use a computer for which purpose are you using it?	1. For fun 2. For education 3. For information (by the Internet) 4. To communicate (e-mail, chat ...)	☐ 18
5. If you use a computer, which user applications or tools do you use?	1. Word processing (MS Word) 2. Spreadsheet (MS Excel) 3. To create a presentation (Power Point) 4. Electronic mail (E-mail) 5. To use the Internet (MS Internet Explorer)	☐ 19
6. If you use the Internet, which opportunities that this medium provides you mostly use?	1. E-mail 2. Chat and/or forum 3. Browse the web 4. Finding Information 5. Download software	☐ 20
7. If you do not use a computer, what is the reason?	1. I do not need 2. I do not know how 3. I do not know English 4. I do not have opportunity	☐ 21
8. If you do not use the Internet, which is the reason for this?	1. I do not have a computer 2. I do not have a modem and/or Internet connection 3. Too expensive 4. I do not need and do not know how 5. I do not know English 6. I feel the fear of new technology	☐ 22
III LEVEL OF KNOWLEDGE ABOUT INFORMATION TECHNOLOGY BEFORE STUDY AT THE FACULTY		
9. How did you acquire the knowledge to work on the computer?	1. Has no knowledge of working at computer 2. Regular education in the school, faculty... 3. Attending IT courses 4. Independent work on the computer 5. Someone else taught me	☐23
10. If you attended IT courses, what do you think about them?	1. I attended IT courses 2. You cannot learn much 3. They are too expensive 4. They are useful 5. No opinion	☐24
11. If you have not attended IT courses the reason for that is:	1. Insufficient information about courses 2. Price of the courses 3. The lack of need to learn the use of computers 4. Lack of equipment (computers on which the knowledge gained will apply) 5. The knowledge I have adopted in other ways	☐25

IV EXISTING KNOWLEDGE ON INFORMATION TECHNOLOGIES USE

Evaluate your knowledge in following area on a scale from 1 to 4 with following meanings:

1 I do not know almost anything of listed
2 I know/ use part of the listed
3 I know/use almost all of the listed
4 I excellently know/use all of the listed

12. How much do you know about the computer components, such as processor, hard drive, mouse, CD-ROM, DVD, video units, projector, scanner, etc.	**1 2 3 4**	☐26
13. How much in your work you use Word (open document, save a document, view a document, editing, deleting, copying, use and modify the toolbar, formatting the text, fonts, preview text, preview and print text)	**1 2 3 4**	☐27
14. How familiar are you with terms such as files, databases, operating systems, programming, software	**1 2 3 4**	☐28
15. How much in your work you use Excel (start Excel, open the workbook and save, select cells, rows, columns, data, work with formulas and functions, format cells, working with charts)	**1 2 3 4**	☐29
16. Do you know and use computer presentations - PowerPoint (slide show creation and presentation, delete, copy and insert the slide's, entering text, graphics and other objects, creating a background, change format of text and images, change colors)	**1 2 3 4**	☐30
17. Do you and use the Internet (connection to the Internet and use the menus in Internet Explorer, knowledge of concepts: server, browser, web pages, URL, link, search, www, download)	**1 2 3 4**	☐31
V FUTURE EDUCATION IN THE FIELD OF INFORMATION TECHNOLOGIES		
18. What do you think should be added in teaching at the Faculty of Medicine in the field of information technology, to make you better prepared to work in primary health care?	1. Nothing 2. More work on the PC (MS Office) 3. More education through internet 4. Distance learning	☐32
19. From which areas you should improve your knowledge, to be more prepared to work in primary health care?	1. Working in MS Office 2. Internet 3. Databases 4. Multimedia	☐33
20. Which of information technology in your opinion, in the future will have the greatest importance?	1. Internet 2. MS Office 3. Databases 4. Multimedia	☐34
21. What would be your assessment of the quality of teaching at the Department of Medical Informatics	1. Poor 2. Satisfactory 3. Good 4. Excellent	☐35

22. What would be your suggestion to improve teaching at your university, specifically what should be changed (add) in the curriculum?

Figure 1. *Questionnaire for students of biomedical faculties on use and knowledge of information technology*

4. DISCUSSION

It is revealed by the result of the conductive study that all students have access to a computer and the Internet, and that they have a relatively good knowledge about it. Students of Bologna educational system spend more time by computer than students of the old system (1-4). The results of self-assessment go in favor of students who study at the Bologna process, as a possible reason for this is the average age of life. Students subjectively estimated their knowledge of using Word, Power Point and Internet as the best ones. Using of Excel is minor. The most numbers of respondents acquired their knowledge independently during the regular education, while a small number of them attended IT courses. The largest number of students considered that the improving in IT education that will later be used for a medical professional purposes, will be achieved by greater using of computers, databases and Internet (5, 6).

A similar study was conducted at the Medical University of Rijeka in Croatia in 2005. Average self-assessment carried out by the principle Lickret charts with five degrees was 3.39 for skills, 2.69 for knowledge, and IT concepts 3.76. According to these data a relative comparison of the results of these studies can be done, and noted that there was no significant difference in the level of knowledge (1).

The results of similar study in Sri Lanka in 2008 showed that only 77.3 % of respondents own a computer, by contrast to our respondents. The highest level of knowledge students have achieved by one goal formal training, mostly using a computer that represents again the difference with result gained in this. The results of self evaluation knowledge of certain computer programs are identical to the results of these studies (2).

In 2010 the Avicenna Medical College in Lahore, Pakistan also conducted studies of similar character. The study involved assistants, full time and part-time professors. 94 % of respondents possessed knowledge of basic computer concepts. 69 % of respondents said they would like to be able to use word processing programs. Only 47 % of respondents know how to use Excel, 72% of the Internet, and 59 % power point which is a significantly inferior results compared to those obtained by our study (3) .

In year 2006 and 2008 professor Izet Masic made a trial at the Medical Faculty of the University of Sarajevo. The answers to the question about using of literature during medical education have indicated that the Internet is of great importance because 36 % of the students in 2006 and 52 % in 2008 had used the Internet for this purpose.

The marks for Medical Informatics obtained by examining are different from those obtained by examining the use of the last (4).

Comparing this study with the similar one implemented in Denmark in the period from 1998 to 2002 with the students in the first year of medical study it is declared that 90 % of students regularly use e-mail

, 80 % use the Internet regularly , and 60 % have Internet access at home , there are large deviations considering to the time of the study (5, 6).

5. CONCLUSION

Results of the study according to the given parameters have indicated an obvious difference in the level of knowledge, use and practical application of IT knowledge among students studying at the Bologna process in relation to the students who are educated under the old system in favor of the first ones. At the same time, by comparison with the available studies, despite of the lack of complete coinciding parameter of estimation, we can see approximately the same level of knowledge of information technology and the application as those show in the results of the study at the Medical University of Rijeka in Croatia, and a significantly higher level of that kind of knowledge of students of the Medical Faculty of the University of Sarajevo in relation to the results of studies conducted in Pakistan. The level of acquired IT knowledge and application of the students from Sri Lanka is as approximate results as those of this study, despite of the fact that it is same acquired mainly through the formal education.

CONFLICT OF INTEREST: NONE DECLARED

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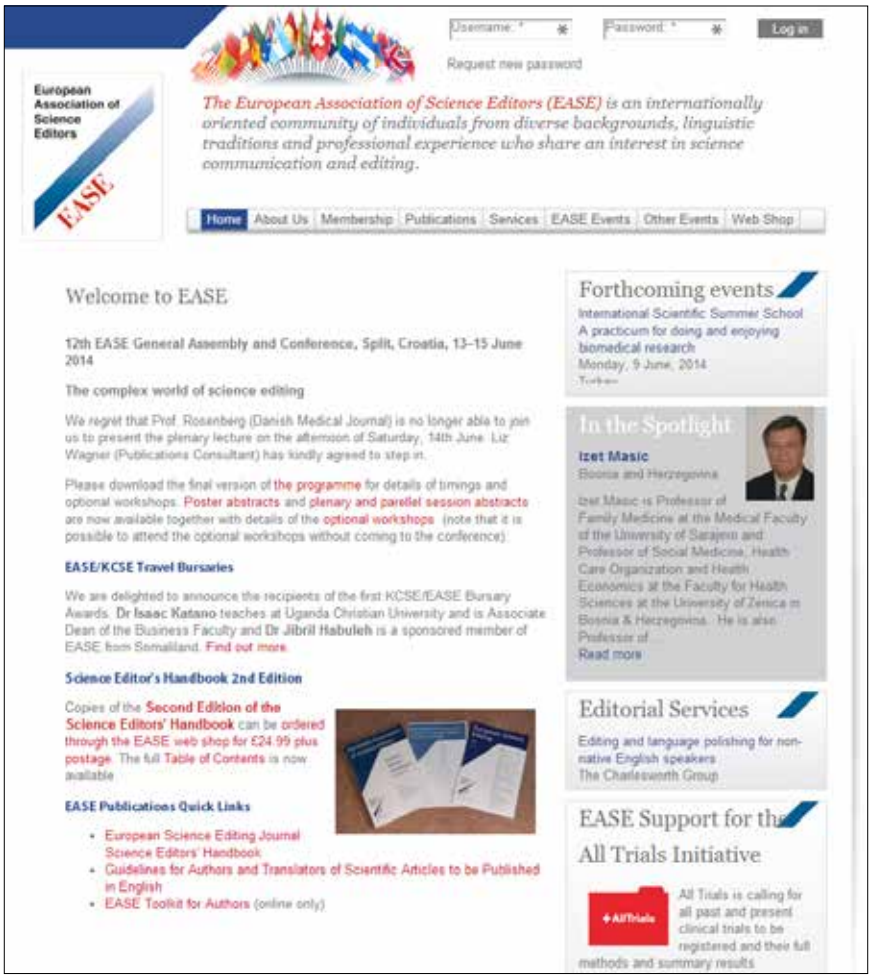
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