Computer Laboratory in Medical Education for Medical Students

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Abstract. Five generations of second year students at the Zagreb University School of Medicine were interviewed through an anonymous questionnaire on their use of personal computers, Internet, computer laboratories and computer-assisted education in general. Results show an advance in students' usage of information and communication technology during the period from 1998/99 to 2002/03. However, their positive opinion about computer laboratory depends on installed capacities: the better the computer laboratory technology, the better the students' acceptance and use of it.

Keywords. medical students, computer laboratory, computer-assisted education

1. Introduction

One of education goals of the Zagreb University School of Medicine (ZUSM) is to train medical students to become skilful in using information and communication technologies (ICT) during their study and in their professional carrier [1, 2].

How to reach that goal? Our opinion is that a well-organized computer laboratory could be the main prerequisite. In 1996 the first computer laboratory was established at the ZUSM, and since then students got the opportunity to use it for learning and/or for any other purposes according to their personal preference [3]. So far eight computer laboratories have been established at ZUSM's different locations. In order to develop the best ICT environment for the students, the first thing we took under consideration was their existing skills and interests in ICT, as well as their attitudes to it. The first e-learning materials at ZUSM were made for the purpose of learning the Physiology. Therefore all second year students had opportunity and obligation to use the ICT in the computer laboratory (networked PCs linked to Internet). That was the reason for asking the second year students to fill a questionnaire based on some general information, some interests and experience in ICT and expectation in their future professional carrier.

The aim of this work was to gather and analyze information on medical students attitudes to ICT, the use of ICT (how frequently and for what) and to check if there are changes in both during a period of five consecutive years.

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2. Material and Methods

The participants in this study were second year students at ZUSM. The printed questionnaires were distributed in computer laboratories at ZUSM after one of the lectures.

Out of 537 interviewed students, 212 were male (39.5%) and 325 female (60.5%).

In this work we analyzed results of five successive academic years. Table 1 shows analyzed questions from questionnaire.

Table 1. Analyzed questions

	Question	Offered answer
1.	Sex	M, F
2.	Did you use PC before starting your studies in ZUSM:	YES, NO
3.	Do you use PC:	a) YES, at home b) YES, at ZUSM c) YES, both – at home and at ZUSM d) NO, as I have no access to PC e) NO, as I don't know how to use PC f) NO, as I don't want to use PC
4.	How often do you use Internet:	a) several times a day b) once a day c) few times a week d) few times a month e) less than once a month f) never
5.	For work and fun I use the following programs on PC:	/free text format/
6.	Opinion on the computer laboratory:	/free text format/
7.	Do you use the PC to help you in your study?	YES, NO
8.	Do you have an e-mail account?	a) NO b) YES, one c) YES, several

Two answers (5 and 6) in the questionnaire were provided in free text format. Such format enables us to get more thorough and deep answers [4]. Data processing was performed by French software Le Sphinx 2000 a specialized package for statistical analysis of questionnaires, especially with open-ended questions. This program enables lexicometric analysis and allows us to combine textual data with other data examinees provided [5, 6].

3. Results and Discussion

Table 2 shows the number of students by academic year and by gender. It can be easily distinguished that there were about 20% more female than male. Considering the fact

that there have been more female than male students at ZUSM, it was an expected result.

Table 2. Examinees by academic years and gender

|		Academic years					
		1998/99	1999/00	2000/01	2001/02	2002/03	
Gender	male	33	44	51	35	49	**212**
	female	59	57	93	60	56	**325**
		92	101	144	95	105	**537**

Answers for the second question are shown on Figure 1.
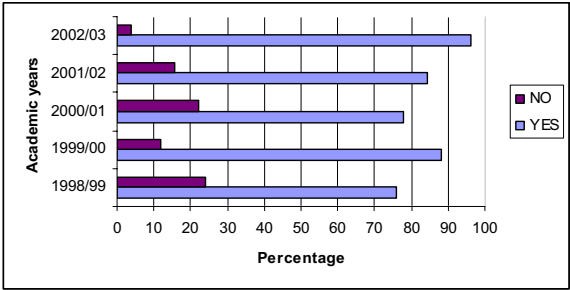
Figure 1. Using of PC before studying at ZUSM (in percentage)

The answers to the third question informed us that 82.6% of surveyed students used PC, mostly (36.4%) at home and at ZUSM. However, it was interesting to notice that in the study period there were some students (2.6%) who did not want to use a PC.

Frequency (in percentage) of using the Internet is presented in Figure 2.
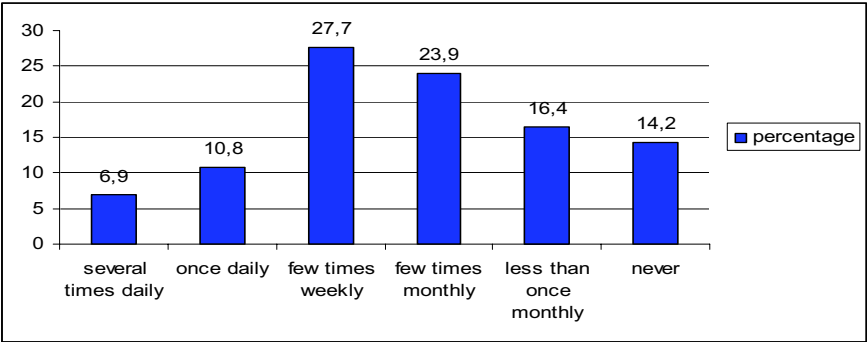
Figure 2. Using of Internet

Answers to the seventh question showed that 61% of all examined students used the PC for their studies.

The analysis of answers to the eighth question regarding e-mail use shows very high rate of 32.3% of students without an e-mail account [7].

For the open-ended questions (no. 5 and no. 6) the answers were expected in free text format. The reason for it was to retain richness of information, and to notice all the programs packages used by students. The answers were neither coded nor modified (in order not to loose information and characteristics of the vocabulary).

In Table 3 the most frequent words are shown. The most frequent words describing software students used showed us that students mostly used word processing and playing games.

Table 3. The most frequent words describing the most frequent software used by students

The most frequent words:		
WORD	92	14.6%
GAMES	71	11.3%
WINDOWS	40	6.4%
INTERNET_EXPLORER	37	5.9%
WINAMP	25	4.0%
EXCEL	24	3.8%
INTERNET	24	3.8%
OFFICE	17	2.7%
EXPLORER	16	2.5%
NETSCAPE	16	2.5%
POWERPOINT	14	2.2%
YAHOO	14	2.2%
ICQ	13	2.1%
MEDIA_PLAYER	13	2.1%
SMALL_GAMES	12	1.9%
MS_OFFICE	9	1.4%
OUTLOOK_EXPRESS	9	1.4%
CORELDRAW	7	1.1%
DIFFERENT	7	1.1%
PHOTOSHOP	6	1.0%

The results of the correspondence analysis of the answers to the question "opinion on the computer laboratory" and generations of students (from 1998/99 to 2002/03) are shown in Figure 3. Both axes in Figure 3 on their positive sides describe the students' positive opinion to computer laboratory (words used to describe it: *good, well, useful, OK, perfect …*) and negative opinion on their negative sides (used words: *relatively, too slow, more, not enough, I don't know, too short time …*). It is very interesting that the students from the first two (1998/99, 1999/00) generations expressed negative opinions regarding the computer laboratory, while those from the year 2000/01 had a very positive opinion. The reason for such results might be the fact that laboratory was renewed at the beginning of that academic year. It is interesting to notice that the students of the generation 2002/03 had divided their opinion on the computer laboratory. Some of them were satisfied with ICT environment offered by computer laboratory, but others were not. The proof of that fact is the position of generation 2002/03 on the positive side of the first axis and on the negative side of the second one.
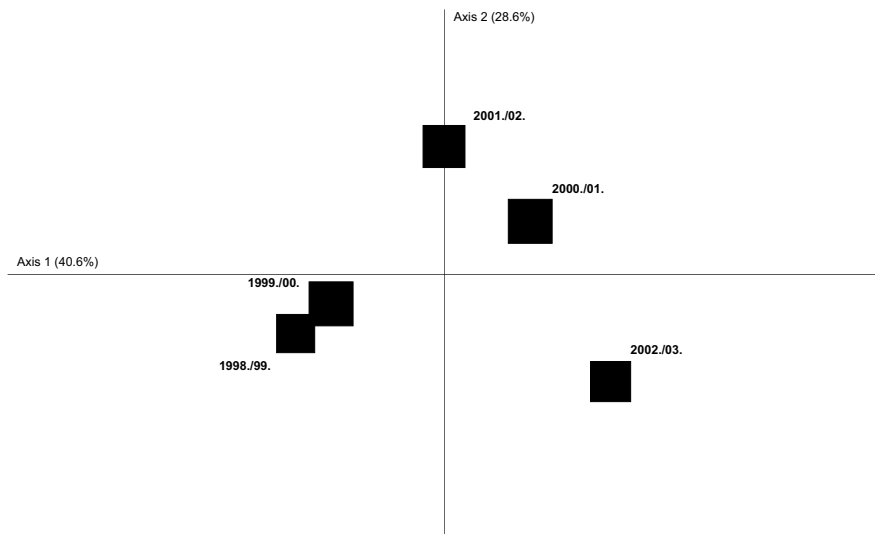
Figure 3. Results of correspondence analysis of the questions "opinion on computer laboratory" and "generations"

4. Conclusion

Results show that during the period of five consecutive years medical students have improved their acceptance and use of ICT (for different purposes) [8]. However, their positive opinion regarding the computer laboratory depends on installed capacities – the better the technology in the computer laboratory, the better acceptance and the use of the ICT.

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