

The Level of Computer Use and the Degree of the Acceptance of Informatics Applied in Medical Research

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Abstract: Young medical graduates are bound to become researchers, as medical science implies constant studying. Documenting, collecting and processing medical data involve a certain degree of computer literacy. The development of computer-assisted tools and their implementation in all medical fields imposes an evaluation of the level of computer use in research. A number of 85 PhD students at the University of Medicine and Pharmacy from Tg. Mureș were presented with a questionnaire in order to evaluate their knowledge of computer use. The results were quantified by devising evaluation scores. Correspondence between answers was tested using Friedman's correspondence test. After the initial questionnaire, the subjects attended a course in which computer-aided solutions were presented, followed by a new evaluation questionnaire. The conception and application of a questionnaire-based qualitative study to assess the level of knowledge regarding the use of information technologies applied in medical research has proved that there are researchers who do not use computers to aid them in their research. Testing the researchers by means of a questionnaire for evaluating the level of acceptance of information technologies in computer-assisted medical (epidemiological and clinical) research has shown that resistance to computer use in research is not significant.

Keywords: Medical study; Questionnaire based qualitative study.

Introduction

In present days, given the nearly ubiquitous presence of computers in everyday life, their use in medical research and practice is becoming indispensable.

The needs for computer-assisted work arises in all stages of scientific research are [1]:

- Documenting – medical databases – papers, presentations, guides etc.
- Developing financed projects in order to carry on studies.
- Collecting and managing medical data.
- Data processing and statistical analysis.
- Writing scientific papers to report results.

An overview, without a methodological guided study, shows that there are a significant number of physicians who do not use any computer assisted technology in their research among young

researchers, who should be the first to use such methods. Thus, the authors think that a quantification of the aspects observed in the medical world would be of interest.

Material and Method

The aim of the paper is to assess the level of knowledge and acceptance with regards to the use of computer-aided solutions in medical research.

The objectives of our study are the following:

1. Assessing prior researchers' knowledge in using information technologies, as well as their expectations regarding the use of such instruments in medical research.
2. Training in using computer programs by means of practical applications.
3. Evaluation of the satisfaction degree and acceptance of computer use in research.

The target population subjected to the questionnaire included young medical graduates enrolled in the Doctoral School, undergraduate students involved in research and also PhD students who did not attend mandatory courses in Methodology of Medical Scientific Research and Medical Informatics and Biostatistics.

The questionnaire was conceived using answer control techniques[2] consisting in asking successive questions in order to evaluate a single issue. Through processing the questionnaire, answers regarding the level of computer literacy were sought.

The questionnaire is shown in the following table (Table 1).

Table 1. Questionnaire for assessing computer use in research

1. Do you use the computer on a daily basis? a. Yes b. No
2. Are you satisfied by the way the computer is assisting you in your research? a. Yes b. No
3. What is the main task you use the computer for? a. E-mail b. Text processing c. Documenting d. Data collection e. Data processing

The questionnaire contains three questions ranging from simple to complex ones and it allows collecting data that concern the need to develop and implement computer-aided solutions in medical research.

The questions were formulated so that the questionnaire could be assessed following a score that allowed to:

- Include the researchers in groups for evaluating computer-aided solutions
- Establish the level of researchers' computer literacy prior to the presentation of research-assisting applications.

The data collected with the help of the questionnaire was used as follows: Two groups were defined, based upon the questions asked: one group of researchers who do not use computers, labeled “**non-users**”, and one group that habitually uses the benefits of computer science in research, labeled “**users**”. The score threshold that we imposed in order to differentiate between the two groups was 7, a value which was considered to pertain in the group of “computer-friendly” users.

The proposed intervention consisted of:

- The presentation of medical data storage systems (Medline [3]), including the demonstration of searching techniques
- The presentation of an “Online Methodological Guide”

- The presentation of data collection, storage and management systems (Microsoft Excel [4] etc.)
- The presentation of statistical data analysis software (Microsoft Excel [4], EpiInfo [5])

After the intervention described above was completed, a second evaluation questionnaire was introduced.

We assessed computer-aided solutions for remote medical education in fundamental sciences through a questionnaire written in Microsoft Word [6]. The questionnaire included four questions which allowed the evaluation of the satisfaction degree and of the acceptance of computer use for epidemiological and clinical studies in medical research (Table 2).

Table 2. Questionnaire for evaluating the degree of acceptance regarding computer use in research

Question number	Question	Score awarded 1 (lowest) – 5 (highest)
1	Using the computer was a friendly experience	
2	Using the computer was easy	
3	The presentation of these applications has convinced me to use them	
4	Computer assistance in medical research is necessary	

The results of the questionnaire were analysed using EpiInfo 2000 [5].

Results

Questions 1 and 2: „Do you use the computer on a daily basis?“, and „Are you satisfied by the way the computer is assisting you in your research?“, respectively (Table 3).

Table 3. Results for questions 1 and 2

Do you use the computer on a daily basis?		Are you satisfied by the way the computer is assisting you in your research?	
Yes	No	Yes	No
60 (70.6%)	25 (29.4%)	47 (55.3%)	(44.7%)

Question 3: What is the main task you use the computer for? (Table 4).

Table 4. Results for question 3

Question 3	Frequency	Percent (%)
E-mail	25	29.4
Text processing	10	11.8
Documenting	28	32.9
Data collection	14	16.5
Data processing	8	9.4
Total	85	100

The answers to the questions were mostly congruent with the assessment groups. Surprisingly, a relatively high number of researchers (25, 29.34%) do not use the computer daily (Table 5).

A score was calculated, using 7 as the threshold value between the “users” and the “non-users”, in order to define the two categories (Table 5). The average score was 8.424 ± 3.886 .

Table 5. Frequency of computer use in research

Groups	Frequency	Percent (%)
Non-users	25	29.4
Users	60	70.6
Total	85	100

The questionnaire used to assess the degree of satisfaction yielded results reflecting the satisfaction with regards to the use of computer-assisted applications in medical scientific research. The scores awarded ranged between 2 and 5 (highest). The results are presented in the following table (Table 6).

Table 6. Results of the satisfaction evaluation questionnaire

	Average	Lowest value	CI 95%
Question 1	4.388	2	(4.225 - 4.552)
Question 2	3.918	2	(3.720 - 4.115)
Question 3	4.518	2	(4.353 - 4.683)
Question 4	4.882	4	(4.812 - 4.952)

Interviewed subjects were divided into two groups (“satisfied” and “unsatisfied”), after adding up the scores awarded for each question. The threshold was established by calculating the average value of the total scores awarded (17.71). Its value was considered to be 18, included in the “satisfied” group. The correspondence between answers was established using the Friedman test ($p < 0.0001$).

The group which includes researchers who accept the use of computers and consider it to be necessary comprised 56 persons (65.9%), and the reticent group consisted of 29 researchers (34.1%). Comparison between the answers to the initial questionnaire and those in the evaluation questionnaire showed that 13 of the “non-users” (52%) graded the use of computers in research in a positive manner, and 43 (71.7%) of the persons belonging to the same group were not convinced by its importance ($p = 0.046$).

Discussion

We consider that a particular importance should be awarded to discussing the grades awarded in the answers to our questionnaire.

Question 1 (“Using the computer was a friendly experience”) was graded between 2 and 5 (highest). The applications presented were evaluated as a whole, a fact that induces a bias in the evaluation reference. Whereas the use of online guides involves basic Internet browsing, statistical analysis implies prior knowledge of working procedures, therefore its “friendly” aspect is more difficult to assess.

Question 2 (“Using the computer was easy”) was the worst graded one. The average of only 3,918 might suggest there is a need to use the presented applications (statistical analysis) on a higher level. However, this has to be supported through better training in computer use.

Both question 3 and question 4 (“The presentation of these applications has convinced me to use them” and “Computer assistance in medical research is necessary”) address the issue of acceptance of the proposed applications, as the correlation coefficient $r = 0.5116$ ($p < 0.0001$) demonstrates. The lack of statistical significance of the difference in medians ($p = 0.0767$) also indicates the coherence in grading these questions. In addition, question 4 undoubtedly shows the necessity of using computers in medical research, by obtaining an average score of 4,882 with a tight confidence interval (4.821 – 4.952).

The results of the final assessment test performed in the groups defined through the first questionnaire need also to be discussed.

Within the group of “users”, 43 subjects (71.7%) were contented with the presentation and practicability of the programs presented to them. The high number of “non-users” (13, 52%) who scored this test positively is also not surprising. These results yield confidence that the first steps taken by means of this paper will lead to an increasing number of researchers who use the computer in their work.

Conclusions

The rate of general computer use in medical research is generally good, without any pretence of excellence. The relatively high rate of “non-users” (29,4%) reveals the need to increase the awareness and the input of information regarding medical informatics.

High average scores obtained in the evaluation questionnaire indicate the acceptance of computer-aided solutions in the field of research.

The need for computer-aided medical research is almost unanimously accepted.

The conception and application of a questionnaire-based qualitative study to assess the level of knowledge regarding the use of information technologies applied in medical research has proved that there are researchers who do not use computers to aid them in their research.

Testing the researchers by means of a questionnaire for evaluating the level of acceptance of information technologies in computer-assisted medical (epidemiological and clinical) research has shown that resistance to computer use in research is not significant.

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