THE IMPACT OF COMPUTER AND INFORMATION COMMUNICATION TECHNOLOGY LITERACY ON THE ACADEMIC ACHIEVEMENT OF MEDICAL AND DENTAL STUDENTS AT SHIRAZ UNIVERSITY OF MEDICAL SCIENCES

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Abstract
        The internet, since its advent, has been well embraced and broadly used by students, faculty members and researchers as an information source, and as a tool for collaboration, learning and also a tool for the dissemination of research results. As such the internet is assumed to have a great effect on both the quality and quantity of research and education worldwide. In this regard, many studies have been conducted to know more about the applications and outcomes of the internet in educational fields. This article, in line with previous studies, was an attempt to investigate the impact of students' computer and information communication technology (ICT) literacy on their academic achievement.
According to the results, the Pearson correlation coefficient between students computer grades as a measure of their ICT skill and their grade point averages was (R=0.367, P<=0.01) which shows a positive and significant relationship between these two variables. Adopting a self-evaluation

procedure, the students scored themselves low to average, regarding the application of numerous information services available to them on the campus. They additionally self-evaluated their skills in using Microsoft Office products as good. Their knowledge and skill with regard to internet and email services was ranked as very good. The students spent nearly 3 hours a day on different internet activities as follows: internet search (60 minutes), social networks (45 minutes) and electronic mails (30 minutes).

Keywords: ICT literacy; information literacy; computer literacy; academic achievement;

Introduction

The rapid development of information technology in all countries has changed the individual and social life of everybody. The rapid expansion of borders of knowledge has forced students to abandon the traditional methods of obtaining their needed information and rather use the opportunities provided for them by the advancement of information and computer technologies. As a result of the changes in the last few decades, nowadays a great amount of information in the field of health and medicine, in the electronic form, is available. In some of the developed countries, electronically based education is rapidly growing, and most of their students have an appropriate level of ability in the use of computers or ICT. Since lack of students' ability in computer skills or application of ICT can have a direct impact on access of their needed information, one can assume that this situation can also impact their academic success.

Review of Literature

Traditionally, literacy meant the ability to read, write and do arithmetic. These skills were considered necessary and vital for everyone to function in society, to achieve one's goals, and to develop one's potentials. As technologies advanced and computers and information became more widely available, the skills needed to function successfully have gone beyond the mere basic skills of reading, writing and doing arithmetic since they had to broaden to include new skills such as technology literacy, information literacy and information and communication technology (ICT) literacy. In addition, because governments and businesses increasingly rely on the internet as a means to communicate, disseminate information and conduct business, the skills required from citizens for full participation in such activities have changed.

The concept of computer literacy was introduced in the early 70's (Perez & Murray, 2010). Computer literacy has been used to denote ones' knowledge about and ability to use computer and technology effectively. An

agreement on its definition does not exist and computer literacy's exact meaning can be different from one group to another. Computer scientists believe that it is the ability to program a computer, while others think of it as the ability to use a computer for a practical purpose (Paprzycki, Mitchell & Ducket, 1994). In the 90's, literacy was defined as one's ability to read, write and use computers to solve problems in his life, job, and society in order to reach personal goals and to develop his knowledge and potential. Moreover, use of computer and other new technologies are the primary basic requirements of the technology era (Lamanauskas & Vilkonis, 2007). In 1996 the U. S. Department of Education defined technology literacy (computer literacy) as the "ability to use computers and other technology to improve learning, productivity and performance" (p. 5) (U. S. Department of Education, 2010).

All educational systems emphasize the importance of computer literacy in the 21st century (Saade & Kira, 2009). Computer (information) literacy goes beyond reading, writing and doing arithmetic and includes understanding how to work with computers, and use computer software and hardware to process information. It involves that people realize when they need information and have the ability to locate, evaluate and use that information effectively (Bakhtiarzadeh, 1381).

Information literacy can no longer be defined without considering technology literacy in order for individuals to function in an information, and technology rich world. ICT also plays an important role in the economic advancement of the developed and developing countries (International ICT Literacy Panel 2002). As a result student should acquire skills that include ICT for understanding and evaluation of information, solving problem and being creative. With ICT students' analytical skills and understanding will increase (Bakhtiarzadeh, 1381).

In this regard, the National Higher Education Information and Communication Technology (ICT) Initiative has provided a comprehensive definition of ICT literacy, which includes all the technical skills, as follows.

ICT proficiency is the ability to use digital technology, communication tools, and/or networks to define an information need, access, manage, integrate and evaluate information, create new information or knowledge and be able to communicate this information to others (International ICT Literacy Panel, 2002).

In developed countries technology literacy is part of the educational curriculum of every student for higher education (Spence & Smith, 2010). A study conducted in 2009 found that 98% of students in US and Canada who responded to the survey use their own personal computers. Amongst them, nine out of ten (90%) have asserted that they use social sites with fairly high frequency. About half of them, however reported that the IT skills they

learned in their courses had adequately prepared for the workplace (Smith, Salaway, & Caruso, 2009). Another study by Dednam (2009) found that 83% of students who took a basic computer literacy assessment test upon university entrance did not pass the test at the threshold score of 65%.

A recognition of the need for ICT literacy reaches across the globe. Information and communication technologies are drivers for economic growth in both developed and developing countries. ICT has also been cited as a contributor to social and political transformation and an enabler of innovation (Spence et al., 2010).

As the studies above indicate, more knowledge of computer use and ICT application could help students to have access to the vast electronic information resources available. Lack of knowledge in these areas, would limit the students to library resources only; which would cause other limitations. With such issues in mind, the authors in this study evaluated the student's skills in using information and communication technology to acquire the intended information. They examined the relationship between the presence of such skills on the one hand and students' academic success on the other. The authors also used a questionnaire to get more insight about students' skill level and familiarity with these resources and their actual use.

Bearing in mind that the study is a descriptive and analytical piece of research, the authors adopted the relevant statistical methods to test the following research question.

Research question:

Is there a relationship between ICT literacy and academic achievement of medical and dental students?

Sampling:

This research was conducted in Shiraz University of Medical Sciences. All the second year medical and dental students enrolling in computer classes, for the second semester of 2011-2012 academic year, formed the participants of this study. Since the participants were limited in number, all of them were asked to take part in the study. As a result the sample size and the population size turned out to be equal in number.

Procedure:

As mentioned earlier, the purpose of this study was to find out the relationship between students' computer (ICT) proficiency and their academic achievements. The averages for the participants' sum of scores were used as measure of their academic success. And the scores received in their computer course was the measure of their computer proficiency. The scores were obtained from the registrar office of their affiliate university. In order to gain more insight into students' knowledge of the resources

available to them and their skills to use these resources, a questionnaire containing 26 items was used. The first 7 items were demographic questions. The next nine questions were about the proficiency and the knowledge of the students about different available e-resources. Via these nine questions students were asked to self asses their abilities and skills on ICT literacy using a five point Likert scale, ranging from 1 (very little) to 5 (very much). Self-assessments have been used both for academic and workplace competencies as an alternative to objective testing (e.g., (Paprzycki et al., 1994)). These last nine questions were aimed at determining students' actual use of available electronic services and resources. Students were asked to respond to the statements again using a five point Likert scale, ranging from 1 (very seldom) to 5 (very often). The last question, collected data about the daily time spent with a computer and its breakdown to different activities such as web searching, emailing and gaming.

The questionnaire was developed by the author based on other questionnaires used in similar studies; the completed questionnaire was reviewed by academic colleagues and the necessary modifications were made. The questionnaire's Cronbach's alpha coefficient was 0.82 indicating a high correlation between the items.

Results:

The questionnaire was distributed amongst all the medical and dental students enrolled in the computer courses. Out of a total of 187 questionnaires distributed among the students, 150 (80%) booklets were completed and returned back to the researchers. A number of descriptive analyses were used to determine the characteristics of the sample and returns. Tables 1, 2 and 3 below show the demographic and academic characteristics of the participants. The respondents were 82 women (54.7%) and 68 men (45.3%) (Table 1). Of them 103 were medical students (68.7%) and 47 (31.3%) were dental students (Table 2).

A large percentage of the students (92%) owned a personal computer or a laptop. The average scores on the computer course were 18.27 and 18.36 out of 20 for female and male students respectively (Table 3). Regarding the participants' field of study, the scores for medical and dental students were 18.81 and 17.35 in order. The averages were then compared using the independent sample t-test. The difference of averages for male and female students were not statistically significant (T=2.77, P=0.53). However, the difference of averages for medical and dental students were statistically significant (T=4.49, P<=0.01). The Pearson correlation coefficient for computer scores and total averages was (R=0.367, P<=0.01) which shows a statistically significant positive relationship between these two variables.

Self assessment measures evaluated students knowledge and skills related to ICT literacy. These measures are averaged for each item and reported in Figure 1, which depicts the averages for 1) knowledge about computer aided reference management, 2) knowledge about available Farsi e-journals and, 3) knowledge about English e-journals available in the students' respective fields of study, with a value of less than 2 (out of a possible 5). The minimum score belongs to knowledge of e-journals in English with 1.7 in average. Participants' knowledge on other issues like computer assisted library search, available e-books and related data-bases was shown to be 2.5 in average. Their knowledge on Microsoft's office products, the internet and e-mail was reported as good and very well, with the highest average (i.e. 3.8) belonging to the internet.

The actual usage of the services and resources, as reported by the students, is as follows. The usage of computer assisted search for library resources was most often marked as very seldom or seldom. E-books usage, English e-journals, and Farsi e-Journals were ranked as very seldom, seldom, or often respectively. Use of E-books was ranked by only 6.6%, as often and very often. Only 4.6% of students marked usage of Farsi e-Journals as often and very often. Database usage was marked as very seldom by 17.6%, as seldom by 43.8% and as average by 28.1% of students. 8.7% of students marked their usage of internet as seldom, or very seldom, and a maximum of 40.5% ranked their usage as average.

These students spent about 3 hours a day with their computers, with nearly one hour (the most) for doing searches, a little less than half an hour working with different Microsoft's Office products, and about 45 minutes on the social networks. They spend nearly 30 minutes to play games.

Table 1: College and Sex Tabulation

College	Sex		Total
	Female	Male	
Medicine	53 (51.5%)	50 (48.5%)	103 (100%)
Dentistry	29 (61.7%)	18 (38.3%)	47 (100%)
Total	82 (54.7%)	68 (45.3%)	150 (100%)

Table 2: Sex and College Tabulation

sex	College		Total
	Medicine	Dentistry	
Female	53 (64.6%)	50 (73.5%)	103 (68.7%)
Male	29 (35.4%)	18 (26.5%)	47 (31.3%)
Total	82 (100%)	68 (100%)	150 (100%)

Table 3: Mean of Computer Grades

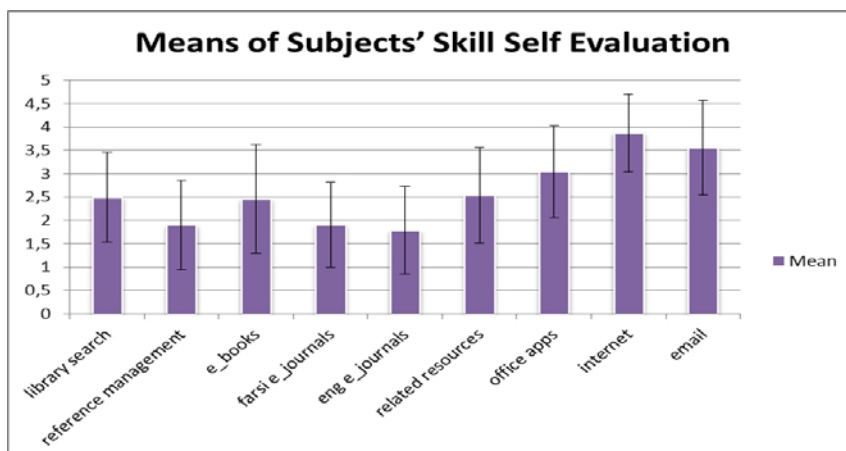|		Mean	N	Std. Deviation
sex	f	18.2709	91	1.91274
	m	18.3649	74	1.31586
college	Dentistry	17.3473	56	2.01477
	Medicine	18.8092	109	1.19300
	Total	18.3130	165	1.66753

Figure 1: Bar Graph of Means of Subjects' Skill Self Evaluation

Discussion:

In this study the effect of ICT literacy on students' academic success was evaluated. According to the results, the correlation coefficient of these two variables (i.e. ICT literacy and success) was directly related and statistically significant. The analysis of responses to self evaluation questionnaire showed that students rate their knowledge about different resources such as computerized library search, E-books, E-Journals–made available to them, as low to medium. The level of their usage of these resources is also similar to their level of knowledge.

Students work 3 hours a day with the computer mostly for searching the internet.

Since most of these students have rated their knowledge of these resources as low to medium which has a direct and similar effect on their usage, it is recommended that appropriate measure to improve students' knowledge and skill in using these resources should be implemented.

This study had some limitations. For example, lack of a standard ICT literacy test initially posed a challenge, but was overcome by developing a test to measure the skills under study. Also, the population under study came from only two colleges belonging to the same university. Further studies, under different conditions, to overcome these limitations are recommended.

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