Original Article

Digital Divide among the Faculty Members of Dental Prosthetics Departments in Dental Schools of Medical Universities in Tehran in 2014

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Abstract

Background and Aim: Advances in information and communication technology (ICT) have had a great impact on people's lives. Beside all the benefits, they have caused some problems such as digital divide. This study aimed to assess digital divide among the faculty members of dental prosthetics departments in dental schools of medical universities in Tehran in 2014.

Materials and Methods: This applied research had a descriptive analytical design and was conducted through a survey analysis. The statistical population of this study consisted of all the faculty members of dental prosthetics departments in dental schools of medical universities in Tehran (n=100). Data were collected using a researcher-designed questionnaire; its validity was confirmed by an expert panel and its reliability (α=0.978) was confirmed using Cronbach's alpha test. The data were analyzed using SPSS version 16and t-test, ANOVA, Chi-square test and the Pearson's correlation test.

Results: A total of 82 questionnaires were filled out and returned by the faculty members. The results showed that 97.5% of the study population had access to computers at home and at work; 96.3% had Internet access at home and 97.5% had access to Internet at work; 51.9% (n=42) of the faculty members used these technologies several times a day; 29.6% (highest frequency) reported average daily use of these technologies to be half an hour to an hour. Marital status and academic ranking had significant effects on the skills of using ICT. Age and years of instruction were also effective on ICT literacy, the ability and skills to use ICT and the requirements to use ICT.

Conclusion: Based on the results, marital status, academic ranking, age and years of instruction are effective in use of ICT by the faculty members.

Key Words: Technology, Computer Systems, Technology Literacy, Technology utilization, Faculty, Dental

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Introduction

In the recent years, advances in the ICT have had a great impact on people's lives and the performance of organizations and institutions worldwide. Meanwhile, universities, as custodians of the higher educational system, have been affected by the rapid growth of technology, significantly impacting on their educational and research quality.

Despite the advances in this area, not all members

of a community equally benefit from ICT. This situation causes a gap between demographics and regions in terms of access to modern technology, which is referred to as digital divide. The term digital divide was introduced after the spread of the Internet in the mid-1990s [1]. Several definitions have been proposed to conceptualize "digital divide". In the current study, the definition of the American Library Association's Office for Information Technology Policy was used as the preferred definition. According to this definition, digital divide refers to "differences in access to information through the Internet, and other information technologies and services and also differences in the skills, knowledge, and abilities to use information, the Internet and other technologies due to geography, race, economic status, gender and physical ability".

As stated by this definition, two levels can be considered for the concept of digital divide. The first level is the accessibility of these technologies and the gap between those who have access to these technologies and those who do not. The second level is the ability and the knowledge to use the technology. According to the second level, the gap is between people who have access to technology along with the literacy and skills to use these technologies and those who have access to these technologies but for some reasons such as illiteracy are unable to use these technologies to meet their demands and targets [2].

Digital divide is considered a major obstacle against progression and development of countries. This has led to a need for a new approach for governments to reduce and eliminate digital divide [3]. Another important point in relation to digital divide is the differences in accessibility and ability to use technologies, which cause some people to take advantage of these technologies wholesome others cannot; this affects all aspects of people's lives [4]. Based on all the above, this study was carried out to determine the status of digital divide among the faculty members of prosthodontics departments in dental schools of universities of medical sciences in Tehran in 2014.

Materials and Methods

An applied research was conducted through a descriptive-analytical method. Research area included dental schools of universities of medical sciences in Tehran, which comprised of Tehran University of Medical Sciences, Tehran University of Medical Sciences International Campus, Shahid Beheshti University of Medical Sciences, International Branch of Shahid Beheshti University of Medical Sciences, AJA University of Medical Sciences, Shahed University of Medical Sciences and Islamic Azad University, Tehran Medical Branch. It should be noted that educational groups in this study included fixed prosthetics and removable prosthetics. All faculty members in the departments of prosthodontics in 2014, which comprised 100 individuals were considered as the study population. A researcher-made questionnaire was used to collect data. Validity of the questionnaire was verified by consulting professors and experts in relevant fields and the questionnaire was modified according to their expert opinions. The Cronbach's alpha coefficient was calculated to verify the reliability of the questionnaire. Cronbach's alpha was calculated to be 0.978, which confirmed the reliability of the data collection tool. The final version of the questionnaire consisted of 75 questions and was designed in five parts. The questionnaire included the following five parts:

The first part had seven questions for demographic information.

The second part had eight questions to determine access and usage of technologies.

The third part consisted of eight questions to identify the status of ICT literacy.

The fourth section had four questions to determine the status of technological skills and abilities, and

The fifth section had12 questions to determine the status of the requirements of faculty members to use ICT.

In the next step, after data collection, SPSS software version 16 was used to analyze the data. After collecting descriptive results, t-test was used to analyze the correlation between qualitative dichotomous variables (such as sex and marital status) and three main study components (namely ICT literacy, ability and skills to use these technologies, and the requirements of faculty members to use ICT), the normality of which had been previously tested and confirmed ($P> 0.05$). The ANOVA was used to analyze the association

of multimode variables (such as scientific degree) with the three main components of the study. The Pearson's correlation test was used to analyze the relationship between quantitative variables (such as age and teaching experience) and the three main components of the study. In order to examine the relationship between the qualitative variables and the use of ICT (qualitative), Chi-square test was used.

Results

After distribution of the questionnaires among the study population, 82 questionnaires were completed and returned (response rate 82%). Of a total of 82 people who responded to the questionnaires, 51 (62.2%) were males and30 (36.6%) were females. It should be noted that one member of the study population did not answer to this question. The age group of 28-39 years had the highest frequency with 26.8% (22 people); 8.5% (7 people) did not answer to this question. Faculty members with scientific degree of assistant professor (72%, n=59) had the highest frequency. One person did not respond to this question.

The findings regarding the status of access to ICT among the faculty members showed that of 81 people, 79 (97.5%) had access to computers at home and at work; 78 people (96.3%) had access to the Internet at home and 79 (97.5%) at work. Of 82 people, 72 (87.8%) had cellphones, 56 (68.3%) had smart phones, 71 (86.6%) had laptops, and 33 (40.2%) had tablets orI-pads; 25 people (30.5%) had access to fax machines, 46 (56.1%) had access to scanners and 65 (79.3%) had access to printers.

Table 1 shows the frequency of responses to questions with regard to ICT literacy status among the faculty members. Eight parameters were used to measure literacy. The ability and skills for the use of ICT among the faculty members is shown in Table 2. Forty items were used to assess the ability and skills required to use ICT.

Of 81 faculty members, 42 (51.9%) reported the use of ICT "several times a day", which had the highest frequency. In terms of duration of use of ICT, "half an hour to an hour" had the highest frequency (n=24, 29.6%).

To assess the requirements of faculty members to use ICT, 12 items were questioned as presented in Table 3. In assessment of significant correlations between each of the demographic variables, including sex, marital status, scientific degree, age and years of teaching with ICT literacy, ability and skills to use ICT, the requirements of faculty member's for use of ICT and the extent of use of technology, the following findings were obtained:

The results of t-test to determine the relationship between sex and the three components namely the ICT literacy, the ability and skills to use ICT, and the requirements of faculty members for use of ICT showed that the p-value for all three components was greater than 0.05. Therefore, there was no significant relationship between sex and the three components. The results oft-test to identify the relationship between marital status and these components showed that marital status had a significant relationship only with the ability and skills to use ICT (P=0.029). In fact, single people acquired higher average scores for the ability and skills for using ICT than married individuals.

The ANOVA was used in order to determine the relationship between the academic degree and three components namely the ICT literacy, the ability and skills to use ICT, and the requirements of faculty members to use ICT. The results indicated that the academic degree only affected the ability and skills for the use of technology (P= 0.028).The difference in this regard between the instructors and professors as well as associate professors and professors was significant. This means that instructor's gained higher scores than the professors and associate professors acquired higher scores than professors.

The results of the Pearson's correlation test for the relationship between age and years of teaching with the three components showed that these two variables had a significant relationship with all three components. Also, the correlation coefficient for all the tests was negative, indicating that with an increase in the age or years of teaching the rate of three components decreased.

The Chi-square test was used to determine the relationship between gender, marital status, academic degree, age (age group) and years of teaching (grouped) separately with the use of ICT.

The results indicated that there was no significant relationship between these variables and the use of technology (P> 0.05)

Table 1. Frequency distribution of ICT literacy among the faculty members

Row	ICT Literacy	Poor N(%)	A little N(%)	Average N(%)	High N(%)	Excellent N(%)	Total N(%)
1	Access to the required information through the media and various types of digital resources	1 (1.2)	7 (8.5)	33 (40.2)	28 (34.1)	11 (13.4)	80 (97.6)
2	The ability to organize personal information on a computer to retrieve and reuse	--	8 (9.8)	37 (45.1)	28 (34.1)	9 (11)	82 (100)
3	The ability to store personal data on a computer to retrieve and reuse	2 (2.4)	3 (3.7)	24 (29.3)	42 (51.2)	11 (13.4)	82 (100)
4	The ability to evaluate the usefulness and relevance of the retrieved digital information	1 (1.2)	12 (14/6)	27 (32.9)	33 (40.2)	9 (11)	82 (100)
5	The ability to generate new knowledge using retrieved digital information	4 (4.9)	16 (19.5)	35 (42.7)	20 (24.4)	7 (8.5)	82 (100)
6	The ability to share knowledge and exchange digital information in social networks	16 (19.5)	18 (22)	23 (28)	17 (20.7)	7 (8.5)	81 (98.8)
7	Compliance with copyright laws and respecting the intellectual property in the digital environment	12 (14/6)	25 (30.5)	15 (18.3)	23 (28)	6 (7.3)	81 (98.8)
8	Understanding the concepts and terminology of ICT	2 (2.4)	24 (29.3)	39 (47.6)	12 (14/6)	4 (4.9)	81 (98.8)

Table 2. Distribution of ability and skills forthe use of ICT among the faculty members

Row	Ability and skills for use of ICT	Poor N(%)	A little N(%)	Average N(%)	High N(%)	Excellent N(%)	Total N(%)
1	Create a Microsoft Word document	8 (9.8)	9 (11)	18 (22)	31 (37.8)	15 (18.3)	81 (98.8)
2	Edit a Microsoft Word document	8 (9.8)	11 (13.4)	17 (20.7)	30 (36.6)	15 (18.3)	81 (98.8)
3	Formatting text and paragraphs in Microsoft Word document	7 (8.5)	16 (19.5)	14 (17.1)	27 (32.9)	16 (19.5)	80 (97.6)
4	Drawing table in a Microsoft Word document	12 (14.6)	15 (18.3)	14 (17.1)	26 (31.7)	14 (17.1)	81 (98.8)
5	Page numbering in a Microsoft Word document	10 (12.2)	13 (15.9)	16 (19.5)	27 (32.9)	15 (18.3)	81 (98.8)
6	Print a Microsoft Word document	7 (8.5)	5 (6.1)	18 (22)	33 (40.2)	18 (22)	81 (98.8)
7	Create a PowerPoint file	1 (1.2)	2 (2.4)	9 (11)	41 (50)	29 (35.4)	82 (100)
8	Moving the PowerPoint slides	1 (1.2)	2 (2.4)	8 (9.8)	38 (46.3)	33 (40.2)	82 (100)
9	Add images to PowerPoint slides	1 (1.2)	1 (1.2)	12 (14.6)	33 (40.2)	35 (42.7)	82 (100)
10	Change templates in PowerPoint slides	1 (1.2)	3 (3.7)	12 (14.6)	37 (45.1)	29 (35.4)	82 (100)
11	Animation notes and PowerPoint slides	3 (3.7)	6 (7.3)	17 (20.7)	33 (40.2)	23 (28)	82 (100)
12	Create an Excel spreadsheet	29 (35.4)	22 (26.8)	21 (25.6)	7 (8.5)	3 (3.7)	82 (100)
13	Editing cells in Excel	32 (39)	21 (25.6)	19 (23.2)	6 (7.3)	4 (4.9)	82 (100)

14	Drawing charts in Excel	35 (42.7)	21 (25.6)	19 (23.2)	5 (6.1)	2 (2.4)	82 (100)
15	Formulain Excel	41 (50)	22 (26.8)	12 (14.6)	5 (6.1)	2 (2.4)	82 (100)
16	Using functions in Excel	48 (58.5)	18 (22)	11 (13.4)	4 (4.9)	1 (1.2)	82 (100)
17	Create an Access database	52 (63.4)	20 (24.4)	7 (8.5)	2 (2.4)	1 (1.2)	82 (100)
18	Design form in Access	53 (64.6)	19 (23.2)	7 (8.5)	2 (2.4)	1 (1.2)	82 (100)
19	The use of queries in Access	53 (64.6)	16 (19.5)	9 (11)	2 (2.4)	1 (1.2)	82 (100)
20	Working with Reports in Microsoft Access	55 (67.1)	11 (13.4)	13 (15.9)	1 (1.2)	1 (1.2)	81 (98.8)
21	The relationship between tables in Access	53 (64.6)	11 (13.4)	12 (14.6)	3 (3.7)	1 (1.2)	80 (97.6)
22	Connect devices to the Internet	9 (11)	13 (15.9)	25 (30.5)	24 (29.3)	10 (12.2)	81 (98.8)
23	Using Internet Explorer	5 (6.1)	4 (4.9)	22 (26.8)	28 (34.1)	23 (28)	82 (100)
24	Using Google Chrome	4 (4.9)	8 (9.8)	20 (24.4)	24 (29.3)	26 (31.7)	82 (100)
25	Bookmarking web pages in brows-ers	24 (29.3)	14 (17.1)	19 (23.2)	12 (14.6)	12 (14.6)	81 (98.8)
26	Install a browser plug-in	39 (47.6)	12 (14.6)	10 (12.2)	9 (11)	8 (9.8)	78 (95.1)
27	Sending e-mails	1 (1.2)	2 (2.4)	11 (13.4)	35 (42.7)	33 (40.2)	82 (100)
28	Download afile from the Internet	1 (1.2)	3 (3.7)	13 (15.9)	37 (45.1)	28 (34.1)	82 (100)
29	Uploading files to the Internet	5 (6.1)	13 (15.9)	17 (20.7)	27 (32.9)	20 (24.4)	82 (100)

30	Using social networks such as Facebook, Viber, Line	8 (9.8)	16 (19.5)	17 (20.7)	25 (30.5)	15 (18.3)	81 (98.8)
31	Chat	32 (39)	16 (19.5)	11 (13.4)	14 (17.1)	7 (8.5)	80 (97.6)
32	Design ablog	64 (78)	8 (9.8)	7 (8.5)	2 (2.4)	--	81 (98.8)
33	Using a digital camera to create an image on acomputer	3 (3.7)	14 (17.1)	25 (30.5)	28 (34.1)	12 (14.6)	82 (100)
34	Using a scanner to create a digital image	8 (9.8)	17 (20.7)	21 (25.6)	24 (29.3)	12 (14.6)	82 (100)
35	Ability and skills to install the required applications and software	10 (12.2)	17 (20.7)	28 (34.1)	18 (22)	9 (11)	82 (100)
36	Compressing files	14 (17.1)	24 (29.3)	16 (19.5)	19 (23.2)	9 (11)	82 (100)
37	Backing up data	18 (22)	16 (19.5)	17 (20.7)	21 (25.6)	10 (12.2)	82 (100)
38	Using antivirus software	8 (9.8)	11 (13.4)	22 (26.8)	32 (39)	9 (11)	82 (100)
39	Copying files from a CD to a computer	3 (3.7)	6 (7.3)	18 (22)	33 (40.2)	21 (25.6)	81 (98.8)
40	Burning files onto a CD	5 (6.1)	7 (8.5)	20 (24.4)	31 (37.8)	19 (23.2)	82 (100)

Table 3: Frequency distribution of the faculty members' requirements to use ICT

Row	The requirements of faculty members	Poor N(%)	A little N(%)	Average N(%)	High N(%)	Excellent N(%)	Total N(%)
1	Ability to work with university educational system	10 (12.2)	23 (28)	20 (24.4)	21 (25.6)	4 (4.9)	78 (95.1)
2	Ability to register research projects in the university system	8 (9.8)	18 (22)	20 (24.4)	30 (26.6)	2 (2.4)	78 (95.1)
3	Using university office automation system	9 (11)	20 (24.4)	18 (22)	24 (29.3)	7 (8.5)	78 (95.1)
4	Using the system of comprehensive quantitative assessment activities of faculty members	21 (25.6)	18 (22)	13 (15.9)	15 (18.3)	6 (7.3)	73 (89)
5	Using the integrated system of continuous medical education	13 (15.9)	21 (25.6)	19 (23.2)	20 (24.4)	5 (6.1)	78 (95.1)
6	Membership and use of university libraries' portal	8 (9.8)	17 (20.7)	26 (31.7)	23 (28)	5 (6.1)	79 (96.3)
7	Submitting an article to a journal	4 (4.9)	19 (23.2)	21 (25.6)	24 (29.3)	11 (13.4)	79 (96.3)
8	Searching the databases such as PubMed and Science Direct	5 (6.1)	8 (9.8)	23 (28)	23 (28)	21 (25.6)	80 (97.6)
9	Searching the citation databases such as Google Scholar and Scopus	5 (6.1)	10 (12.2)	21 (25.6)	27 (32.9)	17 (20.7)	80 (97.6)
10	Ability to work with Dental CAD CAM 5 Axis CNC system for dental prostheses	21 (28)	20 (24.4)	17 (20.7)	11 (13.4)	8 (9.8)	77 (93.9)
11	Ability to work with three-dimensional scans of dental impressions	23 (28)	22 (26.8)	16 (19.5)	9 (11)	8 (9.8)	78 (95.1)
12	Ability to work with electronic patient record systems and automation of routine activities of clinics	18 (22)	18 (22)	25 (30.5)	10 (12.2)	7 (8.5)	78 (95.1)

Discussion

This study was conducted to assess the status of digital divide among the faculty members of dental prosthodontics departments of dental schools of universities of medical sciences in Tehran in 2014. The results showed that79 (97.5%) of the studied faculty members had access to computers at home and at work; 78 (96.3%) had access to the Internet at home and 79 (97.5%) at work. Access to cell phones, laptops and printers had the highest frequency among the ICTs.

Mc Naught et al, in 2009 did a study on digital divide between university students and teachers in Hong Kong and concluded that a high percentage of the study population had personal computers, high speed Internet and cellphones and digital divide was not found in terms of access to technologies [5]. The findings of their study were consistent with those of the current study.

Khalid in his study in 2011 on digital divide between teachers and students in urban Bangladesh used a questionnaire consisting of 41 questions to collect data in the field. He concluded that there was no digital divide in terms of access to ICT in the sample population and access to personal computers was 85% for students and 65% for teachers. Access to cellphones by students and teachers had a frequency of63% and 49%, respectively [6]. These results were consistent with those of the current study.

But in the study by Loan in 2011 on digital divide among the college students of Kashmir, India, it was concluded that less than half the study population (302 people, 44.67%) used the Internet [4]. This result was inconsistent with the findings of the current study.

In our study, the faculty members gained an average score of 3.22 out of five for ICT literacy. Tien and Fuin 2008 carried out a national survey to determine the correlation between digital divide and its effect on students' performance. They concluded that computer literacy was moderate among their understudy community [7]. Their results were similar to ours. Siddiqui in his study in 2013 on the usage of ICT products and services by the faculty members and research scholars of Shobhit University in Meerut, India came to the conclusion that lack of computer knowledge was the main reason for the low use of ICT by the studied population [8], this finding was contrary to our findings.

In our study, the faculty members gained a score of 2.96 out of five for the ability and skills for the use of ICT. Malaga in 2009surveyeddigital divide among the faculty members in an educational institution. He also assessed the skill level of faculty members in terms of the use of ICT and reported it to be average [9]; this result was similar to our findings. Al-Senaidi in 2009 assessed the factors affecting Omani faculty members' adoption of information and computing technology and found that the skill level of faculty members was average, which confirmed the results of the current study [10].

Parycek et al, in 2011 evaluated digital divide among youth and came to the conclusion that there was a significant relationship between gender and digital divide [11]; their results were in contrast to ours. Alqattan in 2009 evaluated digital divide between male and female freshmen students in the College of Health Sciences in Kuwait and concluded that female students used the Internet more than male students [12]. The findings of his study were in contrast to ours.

Conclusion

According to the results of this study, the following conclusions can be drawn: first, the majority of the studied population had access to technology and second, more than half the studied population had above average status in terms of ICT literacy. The ability to use ICT and the requirements of faculty members to use ICT were average. Additionally, marital status, academic degree, age and years of teaching were effective in use of ICT by the faculty members.

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