Comparison of E-learning and Traditional Classroom Instruction of Dental Public Health for Dental Students of Shahid Beheshti Dental School during 2010-2011

1Azin Nourian 2Ali Nourian 3Arezoo Ebnahmadi 4Alireza Akbarzadeh 5Mohammad Hossein Khoshnevisan

1Postgraduate Student, Dept. of Orthodontics, Dental School, Tabriz University of Medical Sciences, Tabriz- Iran.
2General Practitioner
3Assistant Professor, Dept. of Community Oral Health, Dental School, Shahid Beheshti University of Medical Sciences, Tehran- Iran.
4Assistant Professor, Dept. of Biostatistics, Paramedical School, Shahid Beheshti University of Medical Sciences, Tehran- Iran.
5Corresponding Author: Assistant Professor, Dept. of Community Oral Health, Dental School, Shahid Beheshti University of Medical Sciences, Tehran- Iran. E-mail: khosh@umich.edu

Abstract

Objective: Considering the growing trend of information at the current era and development of educational patterns, transforming traditional education into e-learning is becoming increasingly popular. The present study was conducted to compare dental public health course offered through traditional training and e-learning.

Methods: In this semi-experimental study, 70 senior(11th and 12th terms) dental students in Shahid Beheshti Dental School who took dental public health course in the first semester of 2010-2011 educational year were selected by census sampling method and assigned to the intervention or control group based on their term. Data were collected using the standard translated version of Distance Learning Attitude Survey (DLAS) questionnaire that was used after determining its validity and reliability. This questionnaire measured the success criteria of e-learning in students. The course was offered online to the intervention and as traditional classroom teaching to the control group for one semester. At the end of the course, a written examination was held for the students in both groups to evaluate their educational progress. Also, students’ satisfaction about the educational method was assessed using the translated version of Individual Development and Educational Assessment (IDEA) questionnaire after determination of its validity and reliability. SPSS software was used for data analysis.

Results: 36 students, were assigned to the e-learning instruction group (36.1%) were males and 23 (63.9%) were females. Thirty four subjects were assigned to the traditional classroom instruction group out of which 10 (29.4%) were males and 24 (70.6%) were females. In terms of demographic characteristics, the only difference between the two groups was in the daily computer usage. The mean ± SD of the final examination score was similar in the two groups of e-learning and traditional classroom teaching and no significant difference was detected in this respect. Students’ satisfaction in the two groups was compared in five domains. The first 4 domains were the instructor’s teaching, the educational content, attitude towards the educational course, and difficulty of the course and no significant difference was detected between the two groups in the mentioned domains. The only significant difference between the two groups was observed in the fifth domain namely the final perception and judgment of students (P<0.0001, 2.93 versus 3.85).

Conclusion: All students successfully passed the course. No statistically significant difference was found between the two groups in terms of the knowledge gained about dental public health. E-learning method successfully achieved its objectives which were the development of positive attitude in students towards online education and obtaining their satisfaction. Given the necessary equipment and under certain conditions, e-learning can be successfully used as a substitute for traditional education in national dental universities.

Key words: Dentistry, Educational method, E-learning, Dental public health

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Introduction:

Dentists’ attitude towards dental public health is of great importance. Considering the social and financial status of patients and lack of adequate dental insurance, prevention of oral and dental
Some diseases seem necessary. Along with clinical trainings, dentists should be well aware of the latest public health requirements and its alterations in their community (1). Dental students should know how to relate with people from all walks of life to ensure their dental and oral health (2). Thus, developing competence to improve public health was defined as a major goal of dental education by the General Assembly of the Association for Dental Education in Europe (3). Also, social responsibility and capability to improve oral and dental health status of patients through employing preventive measures have been mentioned in the definition of required competencies for dental profession in the US and Canada (4, 5). Therefore, it has been emphasized that clinical training should be tailored to specific community needs and focus on the general health of patients. Oral and dental health is part of the general health. Thus, a dentist should be familiar with patients’ needs and be able to cooperate with other parts of the community to restore oral and dental health in the target population (6). Proper education of dental public health can change the attitude, experience, expertise and knowledge of dentists and dental students and affect their actions (7).

At present, dental public health course in the dental education curriculum is offered through the traditional classroom instruction. Traditional dental education is mainly instructor-led and does not pay attention to the learning pace of students. There are always some fast learners that get the subject right away along with some students that need more time to fully comprehend the subjects. In the traditional learning system, both groups incur a loss. Additionally, the traditional education system puts more emphasis on memorizing the subjects and is less concerned with actual learning (8, 9).

Considering the growing trend of information in the current era, progresses were made in educational systems and they were changed from behaviorism to constructivism during the recent decades. This conversion has been internationally confirmed to improve the educational process (9) as Alvin Toffler says “The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn” (10). It somehow means that college and university students should personally seek knowledge and thus, contemporary educational systems and switching to on-line education and e-learning seem necessary.

E-learning was developed following the innovations in information technology and can greatly decrease educational expenses. Education would be possible from every location as long as a computer with an internet access is available. This educational system can provide services to many students at once and the learning process is repeatable. This system is student- and not instructor- led and students can freely participate in the learning process and know their peers’ points of view under the supervision of an instructor. The mentioned characteristics are among the most attractive properties of this learning system that have resulted in its acceptance and implementation in many accredited universities worldwide during the recent years (9).

During the two recent decades, universities affiliated to the Ministry of Science, Research and Technology in Iran have started to use this educational system. National medical universities should also follow this trend and start the online education system. The present study shows that this educational system can be implemented using the available infrastructures in Shahid Beheshti Medical University (11). The majority of studies comparing e-learning and traditional education system worldwide and also in Iran have not found a statistically significant difference in learning of students between the two groups of traditional and e-learning. Hannay et al, in their study on perceptions of distance learning in Troy University in Florida in 2006 compared online and traditional learning and evaluated the reasons why students choose distance learning and their perception of the content of courses. They also assessed the quality and difficulties of online education and compared it with traditional classroom teaching. They noticed that the majority of students preferred distance learning because this way they could better manage all the factors that prevented them from attending classes such as limited time, work and family issues. Also, they showed that the students believe the quality of distance learning to be higher than classroom
teaching and indicated the positive attitude of students towards online education (12).
In another study by Rosenfeld et al, in 2005 entitled “a comparison of the outcomes of distance learning students versus traditional classroom students in the community college” the outcome of students’ learning was evaluated based on their final score for each course. The results showed no significant difference between the two educational systems. Rosenfeld (2005) believed that the rate of completion of the course was higher in the traditional education system which shows the negative attitude of students towards e-learning in the community college (13). On the other hand, positive attitude of students towards online education has been reported in several studies. For instance, Vandeweerd et al, in 2007 compared teaching veterinary radiography by e-learning versus structured tutorial and assessed the attitude of students towards online education using a 7-point Likert scale. Statistical analyses showed significant differences in positive attitude of students towards e-learning (14). Also, ZarifSanaiey et al, in 2012 compared knowledge and skills of physicians before and after participation in traditional and electronic continuous medical education diabetes course and showed that a significant association existed between the method of access of participants to the computer and their attitude and satisfaction from online education (15).
Since dental public health course had never been offered on-line and also the high number of applicants for this course among dental students and dentists, the present study was conducted aiming at implementation of the online course of dental public health and comparing it with the traditional classroom teaching. The similarities, differences and superiorities of one system over the other were also evaluated. The present study results can help in making the right decision for proper implementation of contemporary educational methods.

Methods:

The target population of this study was the Shahid Beheshti Medical University students. In this semi-experimental study, 70 dental students who took the dental public health course in the first semester of 2010-2011 educational year were selected using the census sampling method and were asked to participate in the study if they are willing to do so. All students were interested to participate and signed a written informed consent. A questionnaire was used for data collection and the two groups were compared in 3 domains of demographic characteristics, achieving educational objectives and students’ attitude towards successful learning and their satisfaction from the course. Demographic characteristics included age, sex, marital status, occupational status, residential status, access to computer and rate of computer usage.
Evaluation of achieving educational objectives at the end of the course was done using a questionnaire specifically designed for this purpose. The obtained scores were in a scale of 0 to 20 and the final test score was compared between the two groups of e-learning and traditional education. A standard Distance Learning Attitudes Survey (DLAS) questionnaire was used to evaluate the students’ attitude towards their success in learning and their readiness for online education system. The questionnaire contained 12 three-choice questions about the need for taking the course, being part of a class, self-discipline, usefulness of class discussion, individual learning, instructor’s time, duration of learning time, attitude towards technology, needing help for understanding the subjects, regular class attendance, the need for asking a question from the instructor, and computer skills. Each answer choice was allocated a score from 1 to 3. The overall score was the sum of all obtained scores which was evaluated as follows: The minimum and maximum scores were 12 and 36, respectively. Based on the previous studies, a score of 17 or lower is indicative of the students’ failure in e-learning. Such students should not use this educational system and would better benefit from the traditional education. A score of 18-26 shows students’ success in online education. However, such students need to make changes to their study plans and habits compared to students who gained a score of 27 or higher. Obtaining a score of 27 or higher indicates highest level of success in e-learning. In the present study the mean score obtained by students was 18 which shows students’ success
in both online and traditional education systems. Students were divided into two groups of intervention and control based on their term. For the control group, the course was offered through traditional classroom teaching while for the intervention group the course was provided online. The educational content was the same in both groups and same instructors were chosen. First, an informational session was held for the intervention group students to teach them how to use the computer and access the course online. Students’ questions were thoroughly answered and all the ambiguities were cleared. All students were given a username and a password. By signing in, the students were able to access the educational content including the read-only and audio-video files. Also, students were able to communicate with each other through chat rooms or could email their peers or the instructors and discuss their problems or ask questions about the course. Additionally, they could visit the relevant websites to get the latest information on the subject. In the traditional classroom teaching system, 17 sessions were held on the same subject with the same content. At the end of each session, a practice test was taken from the students. The final exam was held at the end of the semester.

In order to evaluate students’ satisfaction, the standard Individual Development and Educational Assessment (IDEA) questionnaire with a 5 point Likert scale was used. This questionnaire included 5 domains. There were 20 questions about the instructor’s teaching with the answer choices of rarely, occasionally, sometimes, repeatedly, almost always, 12 questions about the educational content and progress with the choices of none, very small, moderate, high, very high, 3 questions about the difficulty of the course with the choices of much less, less, moderate, more and much more, 7 questions about the attitude and reaction of students towards the entire course and 5 final questions about the perception and judgment of students about the education with the choices of completely disagree, disagree, no comment, agree, and completely agree. The obtained results were reported as mean±SD and percentage separately for each domain.

In order to determine the validity of questionnaires the content validation method was used. First, IDEA and DLAS questionnaires were translated and 5 experts were asked to evaluate the translated questionnaires. Based on their recommendations, the translated questionnaires were revised (0.95 content analysis). In order to determine the reliability, the questionnaire was administered to 10 understudy subjects (using the alternative method) and by calculating the Cronbach’s alpha, the reliability of the questionnaire was determined (Cronbach’s alpha=0.97).

After data collection, descriptive statistics like mean and standard deviation and descriptive tables were used and chi square and t-tests were employed for comparison of means in SPSS version 18 software. P<0.05 was considered statistically significant.

**Results:**

This study was conducted on 70 students who took dental public health course in the first semester of 2010-2011 educational year and were willing to participate in the study. No significant differences existed between the two groups of e-learning and traditional education in terms of demographic characteristics like age, sex, marital status, occupational status, residential status and access to computer. However, daily computer usage was significantly different between the two groups. Achieving educational objectives at the end of the course was evaluated according to the obtained scores in a scale of 0 to 20. Table 1 shows the status of the two groups of e-learning and traditional education. As observed in Table 1, the mean, SD, minimum, maximum and median of final scores of the two groups are almost the same (mean score of intervention group:15.694, mean score of control group:15.809).

Paired t-test was used for the comparison of final scores of students in the two groups. No significant difference was detected in the final score between the two groups (P=0.819). Table 2 shows the attitude of students towards e-learning using the mean± SD score obtained in DLAS standard questionnaire in the two groups.
Table 1- Comparison of the final score of students in dental public health course between the two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean ± SD</th>
<th>Min</th>
<th>Max</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-learning</td>
<td>36</td>
<td>15.694 ± 2.1323</td>
<td>12</td>
<td>19</td>
<td>15.5</td>
</tr>
<tr>
<td>traditional</td>
<td>34</td>
<td>15.809 ± 2.0339</td>
<td>12</td>
<td>19.5</td>
<td>15.25</td>
</tr>
</tbody>
</table>

Table 2- Comparison of the learning success of students in the two groups

<table>
<thead>
<tr>
<th></th>
<th>e-learning (%)</th>
<th>Traditional (%)</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>26.4 ± 3.4</td>
<td>26.1 ± 3.4</td>
<td></td>
<td>0.74</td>
</tr>
<tr>
<td>Max &amp; Min</td>
<td>20-35</td>
<td>18-34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>students who gained a score of 27 or higher</td>
<td>8 (22.2%)</td>
<td>15 (44.1%)</td>
<td>23 (32.9%)</td>
<td>0.51</td>
</tr>
<tr>
<td>students who gained a score of 18-26</td>
<td>28 (77.8%)</td>
<td>19 (55.9%)</td>
<td>47 (67.1%)</td>
<td></td>
</tr>
<tr>
<td>students who gained a score of 17 or lower</td>
<td>0.0 (0.0%)</td>
<td>0.0 (0.0%)</td>
<td>0.0 (0.0%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>36 (100%)</td>
<td>34 (100%)</td>
<td>70 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Based on these findings, none of the students gained a score of 17 or lower which were indicative of student’s failure in passing the online course. In general, 47 (67%) students gained a score of 18-26 which indicated the students’ success in passing the course. However, these students had to make some changes to their study plan and habits. Also, 23 subjects (33%) gained a score of 27 or higher which was the greatest score for success in e-learning. The results show that the students are ready to benefit from online education.

IDEA standard questionnaire was used to evaluate the students’ satisfaction using a 5-point Likert scale. This questionnaire included 5 domains of instructor’s teaching, educational content, difficulty of the course, attitude towards the course and perception and final judgment of students. Table 3 and Figure 1 show the overall result of satisfaction domains.

Table 3- Comparison of mean± SD value of students’ satisfaction domains of dental public health course in the two groups

<table>
<thead>
<tr>
<th>Satisfaction domains</th>
<th>Group</th>
<th>Number</th>
<th>Mean±SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor’s teaching</td>
<td>e-learning</td>
<td>33</td>
<td>3.89±0.87</td>
<td>0.343</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>34</td>
<td>3.71±0.68</td>
<td></td>
</tr>
<tr>
<td>Educational Content</td>
<td>e-learning</td>
<td>36</td>
<td>3.59±0.90</td>
<td>0.254</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>34</td>
<td>3.35±0.81</td>
<td></td>
</tr>
<tr>
<td>Difficulty of the course</td>
<td>e-learning</td>
<td>36</td>
<td>2.76±0.55</td>
<td>0.389</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>34</td>
<td>2.91±0.80</td>
<td></td>
</tr>
<tr>
<td>Attitude towards the educational course</td>
<td>e-learning</td>
<td>36</td>
<td>3.54±0.67</td>
<td>0.780</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>33</td>
<td>3.50±0.54</td>
<td></td>
</tr>
<tr>
<td>Final Judgment of students</td>
<td>e-learning</td>
<td>36</td>
<td>3.85±0.98</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>34</td>
<td>2.93±0.53</td>
<td></td>
</tr>
</tbody>
</table>

For the domain of instructor’s teaching, the mean±SD for the two groups of e-learning and traditional learning was 3.89±0.87 and 3.71±0.68, respectively. The scores of the two groups were 3.59±0.90 and 3.35±0.81 for the educational content, 2.76±0.55 and 2.91±0.80 for the difficulty of the course, 3.54±0.67 and 3.50±0.54 for the attitude towards the educational course and 3.85±0.98 and 2.93±0.53 for the perception and final judgment of students, respectively. The only significant difference was detected in the perception and
final judgment of students between the two groups (P<0.001).

Figure 1- Comparison of mean± SD value of students’ satisfaction domains of dental public health course in the two groups

Discussion:
This study compared the outcome of learning and students’ satisfaction of the two methods of e-learning and traditional education for the dental public health course. Demographic variables were similar in the two groups and no significant difference was detected in this respect. However, Reime (2008) and Rosenfeld (2005) found a significant difference in age and sex between the two groups (13, 16). Considering the date of mentioned studies, there is a possibility that improvement of financial and social status in time may have increased the accessibility of both sexes at different ages to the computer.

In the present study, the only significant difference between the two groups was in the daily usage of computer which is obvious considering the fact that the course was offered online to the intervention group and they had easy access to the computer in the university. Students in both groups completed the course and participated in the final exam. This finding was in accord with the result of Hale et al, in 2009 (17). However, it was in contrast to the finding of Rosenfeld in 2005 who reported the rate of completion of the course to be significantly higher among students participating in the traditional education system (13). This difference may be attributed to the students’ interest in the understudy course.

No significant difference was detected in the final score of educational progress exam between the two groups. There are some studies that show the superiority of e-learning over traditional education. For instance, Noohi and colleagues in their study in 2009 compared nursing education offered online with traditional education and demonstrated that e-learning can replace traditional education for nursing students (18). Similar results were reported by Abutarbush (2006), Garland (2010) and Thomas (2006)(19-21). Results of the questionnaire for assessment of students’ attitude towards e-learning revealed that the students were prepared for online education. This finding was in accord with those of studies believing that students who are interested in online education are organized and motivated, have specific study habits and personal learning skills and have more computer science (17).

In the present study, the satisfaction of students in the two groups was compared in 5 domains. For each domain, students answered several questions. In the first 4 domains, instructor’s
teaching, educational content, attitude towards the course and difficulty of the course were evaluated and the mean scores obtained in these domains were high and similar in both groups. No significant difference was detected in this respect between the two groups.

This finding was in accord with that of Hale et al, study in 2009 who evaluated the mean satisfaction rate in the two groups with questions similar to ours and could not find a significant difference between the two groups. Our finding in this respect was also in agreement with the results of Reime et al, in 2008 who reported the satisfaction rate of students to be similar in the two groups of online and traditional education and mentioned that the students were satisfied with both systems (16, 17).

Zolfaghari et al, in their study in 2007 showed that online education is appropriate for students as long as the service is user friendly and that the attractiveness of the virtual classroom environment will encourage the students to study harder (22).

In the present study, a significant difference was detected between the intervention and the control groups in terms of perception and final judgment. This finding was in accord with the result of Maureen et al, study in 2006 entitled “Perceptions of distance learning: a comparison of online and traditional learning” (12). The quality of online education was evaluated and compared with that of traditional education by asking students questions like why students choose distance learning and what is their perception and judgment about the conduction of courses. Results showed that students mostly prefer distance learning. The online offered course was designed in a way that students were able to communicate with each other and with the instructors and thus students preferred the communicational skills of distance learning. Our study results were in accord with those of Browne et al, in 2004. They believed that use of communication services between the instructors and students in the online education service plays an important role in improving the capabilities of the course (23).

In the current study, students preferred classroom teaching by an instructor over the online education. Ryan et al, in 2007 reported similar results on designing an efficient online education environment (24). Ludlow et al, in their study in 2000 revealed that the study subjects preferred the web-based education system because of its easy accessibility and high quality of images and radiographs (25).

Also, participation of students in the process of education was significantly higher in the e-learning system which according to experts indicates that this education system is student-led. Greater success is achieved when the instructor and students both participate in the process of education (9, 26). This outcome can be achieved by observing the qualitative standards of education, supporting the students and designing and presenting high quality educational content (11). Use of communication tools, participation of students in the process of teaching and their communication with each other are factors affecting the satisfaction rate and success of online education. Thus, this new method can be successfully used just like the traditional system. Aside from the aforementioned advantages of online education, it should be noted that this system requires more facilities and equipment. The present study results showed that no significant difference exists between the two education systems in terms of knowledge of students about dental public health. This finding was similar to the results of studies that reported similar rate of learning in the two systems (22, 24, 25-27, 30).

Conclusion:

Considering the similarities between the two systems, online education of dental public health can be a perfect substitute for classroom teaching. Online education was successful in developing a positive attitude in students towards e-learning and achieving students’ satisfaction. If the equipment is available, online education can yield results similar to those of traditional education.

Suggestions:

Since the dental curricula are the same all over the country, similar studies have to be performed in several national universities to confirm the
superiority and higher advantages of e-learning and encourage the university authorities to use this new system and benefit from its advantages like saving time, money, educational space and instructor’ time. Cost-effectiveness is another benefit of online education.

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References: