

## Effects of epidemiology learning software on nursing and midwifery students

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### Abstract

**Background:** Being informed of new methods of teaching and comparing their outcome help teachers use more effective and efficient methods in developing and implementing new training courses. The aim of this study was to examine the efficacy of epidemiology learning software on learning epidemiology courses.

**Methods:** This quasi-experimental study included 101 nursing and midwifery students taking epidemiology course in two separate classes. One of the classes was selected as intervention group (taught via software) and another one as the control group. At the end of the semester, scores of the courses were analyzed using covariance analysis.

**Results:** After adjusting the effect of grade point average, covariance analysis indicated a significant difference in epidemiology scores between the two groups ( $p < 0.001$ ). The students taught through the software obtained significantly higher scores compared to the students in traditional group.

**Conclusion:** By means of this training software, teachers can use several strategies for presenting lessons and increasing training efficacy, leading to active learning in students.

**Keywords:** Software, Learning, Nursing students, Education.

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### Introduction

Currently, teaching is recognized as a basic human right and an agent of change and social progress (1). Introducing the teaching standards in medical sciences to the faculties, Medical Federation in 2003 recommended that teaching methods should be selected in a way that students become responsible for their own learning and are prepared for self-learning and lifelong learning (2). Learning sciences is difficult for students, requires repetition of complex concepts and beliefs, and is not necessarily guaranteed by traditional teaching strategies (3).

It is argued that the amount of students' satisfaction affects the teaching output and efficacy of academic centers (4). The suc-

cess of a teaching program is not possible without considering individuals' attitudes towards it (5) and acceptance or rejection of computers, would have deep impact on their teaching and learning (6). Attitudes of individuals towards a teaching methodology can be affected by learning styles. The learning style is the preferred and intrinsic approach or strategy of an individual to deal with information and feelings (7).

In educational programs teaching methodology is mainly in the form of lectures (8). Nowadays students face many external pressures which make following lecturers more difficult (9).

Traditional teaching methodologies encourage passive learning, ignore individual differences and needs, and do not pay atten-

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tion to other higher level cognitive skills (10). Therefore, many experts emphasize the necessity of change or complement of traditional teaching methodology (11).

E-learning is considered as one type of individual teaching. Research has indicated that if training content and evaluations are appropriate, e-learning will be successful. E-learning has also been recommended in Iran's educational system (1). For this, appropriate utilization of the software that are comprehensible for students and are developed based on teaching experiences can reduce teaching problems of professors and teachers to some extent and facilitate the learning accompanied with insight for students.

In this research, the software under study is Studying Population. It is a training software developed at the University of Dundee, UK. This software includes a complete and compact course of epidemiology. The content of an epidemiology course is taught attractively in Education Modules framework. At the end of each discussion, there are drills to be run through by the learners themselves and then are automatically self-evaluated. Demographics, statistics, ecology, sociology, and medical geography are hyperlinks that the learners can study if needed. These hyperlinks end with a glossary to help learners find and learn the technical terms of epidemiology.

Having implemented the subjects, we introduced this software during a session at the end of the course and the students were familiarized with its instruction. One of the positive aspects of this study is that the students are exposed to the topics of epidemiology before the software is introduced. This preparation facilitates software application. This study was conducted to examine the efficacy of software application on epidemiology learning in Shahrekord University of Medical Sciences in educational year 2012-2013.

### Methods

The present study was a quasi-experimental one. Considering the general

aim of the research and existence of two groups of control and intervention with independent intervention variable (software for the intervention group), we adopted t test to compare the results.

No training software for epidemiology course has been yet developed in Iran. In this software, each subject is designated as one section to address relevant theories and works. By this way, the learner can follow the steps through the main page consecutively after completing each step's drills and/or he/she may only go through a particular step based on his/her professor's opinion. In each page, it was possible to easily navigate through training section, drills, or main page via the icons.

In this research, a quasi-experimental method was adopted to avoid the limitations of genuinely experimental methods. Consequently, the population was divided into two intervention (taught through the software) and control (traditional) groups; intervention group included the students that were taught through the software for 17 two-hour sessions and control group included the students that were taught via traditional method for 17 two-hour sessions. At the end of the course the mean score of the epidemiology course were compared between the two classes.

At the end of the educational semester a researcher-developed questionnaire, whose validity and reliability had already been approved by test-retest, was distributed among the students of both classes to evaluate their attitude and learning based on the Likert scale. This study was carried out in accordance with the Declaration of Helsinki, the anonymity of participants was guaranteed, and the informed consent was obtained from the participants. The study was conducted with coordination of Education Deputy of Shahrekord University of Medical Sciences after the approval of Ethics Committee was obtained.

For continuous quantitative variables, data were presented as means  $\pm$  SD and for categorical ones, as number with frequency. Comparisons between age and sex of

the two groups were made by the independent t-test and chi-square test, respectively. The analysis of covariance was used to compare the epidemiology score while adjusting the grade point average (GPA) factor. Statistical analysis was performed by SPSS and  $p < 0.05$  was considered statistically significant.

## Results

One hundred and two students (49 in the group taught through the software and 53 in the traditional group) with an age range of 17-29 (mean age of  $19.07 \pm 1.73$ ) years old were enrolled. The mean age of the group taught through the software was  $19.38 \pm 1.65$  years old and that of the traditional group was  $18.97 \pm 1.77$  years, with no significant difference ( $p = 0.08$ ). Eighteen (34%) individuals in the traditional group and 19 (38.8%) in the software group were male. The two groups were not significantly different in gender ( $p = 0.61$ ).

Mean GPA and mean epidemiology score of the two groups are shown in Table 1. Pearson correlation indicated a positive, significant correlation between the epidemiology scores and GPAs ( $p < 0.001$ ,  $r = 0.667$ ); the students with higher GPAs obtained higher epidemiology scores. Therefore, it could be assumed that the difference in epidemiology score between the two groups was due to the difference in GPA and scientific ability. To adjust the effect of GPA, the covariance analysis was

used (Table 2). In addition to the difference in the GPA, the covariance analysis showed a significant difference in epidemiology scores between the two groups ( $p < 0.001$ ); the students taught through the software obtained significantly higher scores compared to the students in traditional group.

In addition, the questionnaire items on satisfaction with the software are shown in Table 3. Moreover, 52.5% of the students were highly satisfied and 22.5% were lowly satisfied; this shows a relative satisfaction of the students taught through the software with the software.

Forty students taught through the software were satisfied with the software (Table 3). A large proportion (85%) of the respondents completely agreed or agreed with the usefulness of the software.

## Discussion

The results of this study indicated that there was a statistically significant difference in scores and GPAs between the two groups and the group taught through the software obtained higher scores compared to the traditional group.

This study's results are consistent with the findings of a study by Abdelaziz et al. Their study indicated that, based on the scores of knowledge post-test, there was a significant difference between the intervention group and the control group. That study also confirmed that e-learning was one of the effective teaching methods for

Table 1. Mean  $\pm$  SD of GPA\* and epidemiology score in the two groups

Variable	Traditional	Software
	Mean $\pm$ SD	Mean $\pm$ SD
Semester GPA	14.64 $\pm$ 1.44	15.44 $\pm$ 1.22
Epidemiology Score	12.75 $\pm$ 1.78	15.97 $\pm$ 1.81

\*Grade point average

Table 2. The result of covariance analysis for the factors effective on epidemiology score

Source of Variation	Type III SS	df	Mean Square	F	Significance
Intercept	0.400	1	0.400	0.203	0.654
Semester GPA*	133.700	1	133.700	69.38	< 0.001
Group	134.300	1	134.300	69.72	< 0.001
Error	169.500	88	1.900	4	9
Total	19390.80	91			

\* Grade point average

Table 3. The questionnaire items on satisfaction with the training software Studying Population

Title	Totally agree	Agree	Neutral	Disagree	Totally disagree
	Number (Percent)	Number (Percent)	Number (Percent)	Number (Percent)	Number (Percent)
1. The software is comprehensive and clear.	11 (27.5)	21 (52.5)	6 (15)	2 (5)	
2. The objective of the software is clear.	9 (22.5)	22 (55)	9 (22.5)		
3. Its design, format, and color are in a way that facilitates learning.	9 (22.5)	19 (47.5)	11 (27.5)	1 (2.5)	
4. The drills of software help comprehension.	13 (32.5)	19 (47.5)	8 (20)		
5. Because of familiarity with epidemiology topics, comprehension of the software was easier.	8 (20)	17 (42.5)	12 (30)	2 (5)	1 (2.5)
6. The time for presentation of software (one session) is enough.	5 (12.5)	16 (40)	10 (25)	8 (20)	1 (2.5)
7. The software can be used in the form of self-study.	10 (25)	17 (42.5)	11 (27.5)	2 (5)	
8. It was better to develop the software in Persian.	19 (47.5)	13 (32.5)	6 (15)	2(5)	
9. In total, it is a useful software.	11 (27.5)	23 (57.5)	6 (15)		
	Total 40 (100)				

the students (12). Another study by Jenkins et al. indicated that there was a significant difference between the two groups; e-learning group obtained better scores compared to the traditional training group (13). In contrast, the study carried out by Reime et al. in the Netherlands reported that lecture group obtained better total scores in multiple-choice tests compared to e-learning group (14).

Besides, our results showed that students were satisfied with the software. In a study by Green et al., 79% of participants evaluated the course as excellent and had positive attitude towards the course (15). Another study by Hart et al. indicated that knowledge, attitude, and skills of nurses in relation to the use of evidence-based care increased after training. Based on the findings, the researchers of that study stated that computer-based learning was an effective learning approach that can be used by nursing managers to train nurses and get them involved in the learning process in different fields (16).

The findings derived from this study indicated that in spite of students' satisfaction with the software and their attitude towards helpful impact of software on learning epidemiology course, their tendency towards reuse of software in future was 17.5%. A study carried out by Zolfaghari et al. ob-

tained similar results, concluding that the students of traditional method preferred e-learning (1).

Considering the above-mentioned results, in e-learning in which learning itself is strategic learners take the responsibility of their own learning. Some experts believe that in learning, learners' independence is centralized. Computer-assisted learning in which students are active and involved in their own leaning is more effective in terms of deeper comprehension of scientific subjects and knowledge promotion. Besides, learning in the form of attending a class or workshop could result in fatigue and requiring the learner to learn a lesson in a pre-specified time may limit his/her learning (1).

### Conclusion

Since the students taught through the software obtained significantly higher scores compared to the students in traditional group, e-learning methods, alongside traditional ones, could be used to improve the quality of learning in students.

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### *Conflict of interest*

Authors of the present work declare no conflict of interest.

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