

ARTICLE

A COMPARISON OF MOBILE -BASED LEARNING AND LECTURE-BASED LEARNING IN AN ADULT HEALTH CARE WORKERS COURSE

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ABSTRACT

Background: Development of science and technology has necessitated the development in the process of educational activities. One of these communication practices is learning via mobile electronic devices like mobile phones or tablets that are mentioned for mobile learning. The aim of this study is to compare the effect of mobile learning-based education and lecture on the knowledge of health workers in Shiraz University of Medical Sciences in the field of backache. **Materials and Methods:** The research was semi-experimentally carried out on 142 Healthcare workers in Shiraz University of Medical Sciences, who were selected via census in 2014. The samples of the study were randomly divided into control (70 subjects) and the experimental group (72 subjects). After the pre-test, the experimental group and the control group were educated by mobile learning and lecture, respectively. After 4 to 6 weeks, the students' knowledge in the field of backache was determined. Data collection tool was a questionnaire designed by the country's professional health board and approved by 5 experts. The reliability of the questionnaire was confirmed by Cronbach's alpha coefficient $\alpha = 0.92$. Data were analyzed employing SPSS version 18 and independent and paired t-test. The level of statistical significance was set at $P < 0.05$. **Results:** The results demonstrated that there is a significant difference between the scores of pre-test and post-test, and post-test scores in the mobile learning group was significantly higher than the lecture group ($p = 0.02$). The results also demonstrated that there is a positive and significant relationship between age and satisfaction in e-learning group ($p < 0.001$). **Conclusion:** Due to the effectiveness of mobile learning, such method can be employed as one of the modern teaching methods.

INTRODUCTION

Man of the third millennium is trying to avoid the traditional model by accelerating the process of development and IT application in different parts of his life and create a new paradigm based on the requirements of the information age [1]. With the development of e-learning system, the concept of mobile learning in education systems is considered more seriously. Mobile learning involves the application of information technologies and wireless electronic devices such as mobile and laptop to create a learning process and experience independent of time and place [3 2]. This type of learning lays the ground for learning in a living, and dynamic process and decreases the cost of traditional education. Today, with the increasing number of users of mobile and portable computers and technical advances in the equipment and network expansion internet infrastructure, public reception of the electronic equipment has significantly increased [4]. A study was carried out by Kumar et al. in 2007 on the Mobile-based learning (mobile learning) in India. Their study suggests that 69% of people believe that mobile phone is an effective and instant tool in their learning. Seventy two percent (72%) of them believe that mobile learning is a new opportunity and that it has a quick feedback. Kummer et al. believed that learning method with the help of mobile has temporal and spatial flexibility and is more learner centered. Therefore, we can say that the learning path is expanding from distance learning to e-learning and from e-learning to mobile learning [5]. The changing needs of the healthcare sector and medical advances, attention to the education and continuous education of graduates has made Medical Sciences more serious. On the contrary, the issue of enhancing the quality of learning in medical science has always been considered, and is becoming more important day by day. Regarding the fact that medical education around the world today strongly need to employ ICT to provide learning conditions for learners [6], in the meantime, the importance, position, and use of mobile phone has become one of the new areas of theory and research in medical education due to the accessibility and ease of its use. On the contrary, providing in-service education for staff of healthcare systems in the current era is an essential issue that needs careful planning and precision in doing so. The utilization of such education can in addition to using up administrative and personnel power, impose high costs into the system [7]. Advantages of mobile learning-based education like mobility and easy handling, flexibility, accessibility, ease of use, distance accessibility and usefulness are the things that has raised this method of education as one of the suitable solutions for in-service education. So, the use of this method in continuous education and in-service education, especially in health issues can be very effective, due to the fact that such educations play the role of health forefront in the field of health for prevention of diseases, and therefore the use of this method can be very effective in health [8-9]. Despite all the benefits mentioned-learning and mobile learning have their own limitations. According to critics, these educational methods may not be substituted with the teacher, human and emotional interactions and face-to-face relations created in the classroom, [10]. Moreover, in some studies, its efficacy has been reported less than lecture, and its application is disapproved by the

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critics, who believe that teaching by professors are among affective factors on the quality of academic teaching [11-13].

Regarding the need to empower employees concerning the problems of the spine and backache that occur nowadays because of lack of awareness on how to correctly walk and sit at the table, and work with computers and carried out routine affairs, it's known as a global problem and many people have been affected [14]. Moreover, regarding the need to update teaching methods and achieve simpler but more effective techniques in relation to the technologies in the world as well as the limitations and challenges of traditional teaching methods and also taking into consideration the novelty of mobile learning and existence of unknown dimensions and features and factors affecting its quality and performance and lack of evidence suggesting the conduction of a similar study to the present project, we decided to carry out this study to evaluate the effect of mobile learning education and lecture in Shiraz University of Medical Sciences on the rate of knowledge of healthcare workers in the field of backache and spinal disorders.

MATERIALS AND METHODS

This study is applied in terms of purpose and it is a quasi-experimental research with two experimental and control groups with non-equivalent group pretest posttest design (NEGD) in terms of methodology and data collection method. The present study is carried out so as to compare the mobile learning-based education and lecture on the knowledge level of healthcare workers in Shiraz University of Medical Sciences in the field of backache in the year 2015.

The study sample included all healthcare workers in Shiraz University of Medical Sciences in Year 2015 (n = 114) who were selected by census method. All samples were divided based on age, gender, work experience and education into two similar groups. Thereafter, they were randomly selected as the experimental group (n = 72) and the control (n = 71).

Inclusion criteria included all those who during the research, have been working for one year as employees in Health Deputy Headquarters in the Shiraz University of Medical Sciences, and were willing to participate in the study and haven't participated in the backache curriculum during the past year. Exclusion criteria were those who didn't want to cooperate and had participated in similar educational program.

In this study, for comparison of mobile learning-based and lecture education, subjects in the sample were divided under the same conditions into experimental and control groups. Thereafter, the knowledge level of both groups in the field of backache was evaluated before education. Regarding the list of employee names, each person was given a number, and by employing the table of random numbers, subjects were divided into two groups. One group was taught through lecture and the other was taught with mobile learning. Educational content was the same in both groups and it was prepared based on the book written by a group of the professional health board and finally a post test was administered to both groups after 4 to 6 weeks of education.

The experimental group was trained with mobile content. Learning content was designed based the standards of mobile learning. The educational content was first segmented; thereafter it was designed as multimedia (voice, images and related animations, clinical samples). All the steps were carried out with the cooperation of educational design experts and e-learning in e-learning pole. After the evaluation steps, amendments and approval of the related responsible, the mobile content were provided to the research samples. In the control group, lessons were taught with lectures and PowerPoint presentation, in addition to questions and answers in a 4-hour course.

The tool for data collection was a questionnaire comprising two parts. The first part included demographic characteristics (sex, age, work experience and job), the second part contains the content taught about the backache discomfort (27 items) which was prepared according to the five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). The above questionnaire was designed by the professional board of Health in the country, while the content validity was employed to confirm the reliability and validity of the questionnaire. For this reason, comments of 5 members of faculty and professionals were received and applied. The reliability of the questionnaire was approved via Cronbach's alpha of $\alpha = 0.92$

For data analysis and to infer the existence of significant relationships between independent and dependent variables, independent t-test and paired t-test was employed. Statistical analysis of the research data were analyzed using SPSS version 18.

The following ethical issues were considered in the research: After obtaining permission from the authorities, the educational program began at the Department of Shiraz University of Medical Sciences. At the start of the educational program, after introduction, the researcher explained the research purposes and the need for its implementation to participants and obtained informed written consent from them. The participants were assured that all information collected will remain confidential. Moreover, considering ethical issues and security, the samples were asked to refrain from writing their name and surname in the questionnaire. They were also assured that the information will only be investigated by the researcher, and only the coding method was utilized for questionnaires to track questionnaires before and after education. Also, the participants were assured that their mobile phone numbers (in some cases it was necessary) will

remain strictly confidential, and the software employed would not cause any damage to the machine and it does not cause security problems.

RESULTS

The aim of this study is to compare the effect of mobile learning and lecture-based education on knowledge rate of healthcare workers in Shiraz University of Medical Sciences in the field of backache. Among the total of 142 health department employees participating in the study, 86 subjects (60.6%) were female while 56 (39.4%) were male. Demographic features of the study samples were presented in [Table 1].

Table 1: Demographic features of the study sample

Variable		Experimental group		Control group	
		Number	percent	Number	percent
Sex	Woman	42	60%	44	61.1%
	Man (number percent)	28	40%	28	38.9%
Age	20 to 30 years	8	11.4%	7	9.7%
	31 to 40 years	35	50%	31	43.1%
	41 to 50 years	22	31.4%	30	41.7%
	More than 50 years	5	7.1%	4	5.6%
Education	Diploma	6	8.6%	5	6.9%
	Associate Degree	8	11.4%	22	30.6%
	Bachelors	28	40%	31	43.1%
	MA	22	31.4%	11	15.3%
	Ph.D.	6	8.6%	3	4.2%
Work experience	1 to 5 years	9	12.9%	5	6.9%
	6 to 10 years	20	28.6%	25	34.7%
	11 to 20 years	36	51.4%	29	40.3%
	21 to 30 years	5	7.1%	13	18.1%

Statistical analysis did not demonstrate any significant difference between the two groups in terms of age, gender, education level and work experience. Therefore, it can be argued that both departments were homogenous with each other and the effect of other variables in the intervention is minimized. The first specific objective of the research was to compare the mean and standard deviation of knowledge in the field of backache of subjects in the control and the experimental group before and after the intervention [Table 1].

Table 1: Comparison between the mean and standard deviation of knowledge in the field of backache of the research samples before and after intervention in experimental and control groups

Score of Knowledge	Mean and SD		t	Degrees of freedom	The level of significance
	Before intervention	After intervention			
The control group	96.69 ± 3.47	111.54 ± 3.15	206.0	38	0.001
The experimental group	97.37 ± 2.56	116.18 ± 3.27	206.0	36.08	

As shown in [Table 1], the mean scores of knowledge of the study subjects in the field of backache in the lecture group and mobile learning were significantly increased after intervention (P <0.001).

In order to determine the exact effect of the intervention, the mean and standard deviation of the pre-test and post-test were compared in both groups [Tables 2 and 3].

Table 2: The mean and standard deviation, effect of education in the experimental group and control group on the knowledge

Score	Mean	Standard deviation	T-test	Degrees of freedom	Significance Level
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Pre-test and post-test score in lecture (The control group)	84.14	12.8	42.15	70	0.001
Pre-test and post-test scores in mobile learning (The experimental group)	45.18	65.14	61.10	70	0.001

Table 3: Comparison of the mean and standard deviation of the learning level between the two teaching methods after intervention

Score	Mean	Standard deviation	T-test	Degrees of freedom	Significance Level
post-test in the lecture and post-test in mobile learning	64.4	18.8	63.2	70	0.000

As shown in [Tables 2 and 3], there was a significant relationship between education and the learning level of the research samples ($P < 0.001$). In addition, the mean score of knowledge in the experimental group (mobile learning) after intervention was more than control group (lecture), and this difference is statistically significant ($P < 0.001$).

The relationship between demographic variables and level of learning of samples were also examined [Table 4].

Table 4: The relationship between demographic variables and level of learning of research samples in groups of mobile learning and lecture

Effect	The significance level of experimental group (Mobile learning)	The significance level of control group (lecture)	Test
Age	0.602	0.023	Pearson's correlation coefficient
Sex	0.632	0.157	Pearson's correlation coefficient
Level of Education	0.065	0.001	Kendall's correlation coefficient
Work experience	0.128	0.004	Kendall's correlation coefficient

As can be seen, there was no significant relationship between demographic variables and learning level of the subjects in the experimental group (mobile learning), however, there was a significant positive relationship between the level of education ($p = 0.001$) and work experience ($p = 0.004$) and age ($p = 0.023$) with their learning rate in the control group (lecture education methods).

DISCUSSION

The results of this study revealed that the level of knowledge of healthcare workers in the field of backache in mobile learning was more than the lecture group ($P < 0.001$). In other words, this educational method fully improves the learning level of the study samples. Based on the present results, the learning level of the two groups had an upward trend after the intervention but no significant difference was observed between the two groups, which demonstrates that mobile learning was more effective. This finding is in line with the results of Papzan and Soleimani [15] and McConatha et al. [16], Wang [17] which state that education via mobile learning is more effective than lecture. Chojecki [18] believes that the utilization of mobile learning in health is important. He mentioned the reduction of potential errors in the process of transferring teachings as the result of his research. Learning method with the help of mobile phone has more flexibility in terms of time and space when compared to other teaching methods such as lecture and is more learner-centered. Experts believe that learning is not just acquiring an experience of knowledge, but rather a continuous process [19-20]. Using the mobile phone, which is now available to all students has provided opportunities for educational planners, teachers and students to continue, expand and deepen the teaching-learning processes, share information, create equal educational opportunities. Mobile technology has provided opportunities for educational planners and students within the university to prepare a summary or detailed clinical content and laboratory instruction in combination with images, animations, audio, and educational clips in an interactive manner and in the form of a book as educational resources to the students [21]. This educational device could cause widespread satisfaction for features such as audio and video capabilities for more attraction and its suitability with the talents and abilities of learners, and that it can be effective in their retention. Zamani et al. believe that technical capabilities in the mobile phone are an effective factor in encouraging students to employ these tools for learning. Mobile

learning is very flexible and it's appropriate for teaching adults [22-24]. The results of this research demonstrated that there was no significant relationship between demographic variables such as age, sex, education level, and work experience with learning level in mobile learning group. These results may to some extent indicate the properness of mobile learning with the characteristics of adults. Mobile learning can readily provide the learner with flexibility in time, place, quick learning and independent learning, which is in harmony with the autonomous characteristics of adults and people with any demographic characteristics can easily use it and carry out learning activities.

CONCLUSION

Education via mobile phone can enhance students' learning. The utilization of mobile technology (mobile learning) allowed its users to learn in any environment, and experience mobility, flexibility, and transportation and access learning in non-constant environments.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

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