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Original Article

The Effective Components in the Implementation of M-learning among Student Teachers

Ahmad Malekipour[1], PhD; Seyyed Mohammad Ali Mirjalili[2*], PhD

[1]Department of Educational Management, Farhangian University, Rasoul Akram Campus, Ahvaz, Iran
[2]Department of Education, Farhangian University, Shahid Paknejad Campus, Yazd, Iran

ABSTRACT

Background: Given the advent of information and communication technology, a new approach, called mobile learning (m-learning), has been introduced in the higher education system. The present study aimed to investigate the effective components in the implementation of m-learning among student teachers.

Methods: The current work is a cross-sectional study. The data collection tool was a researcher-made questionnaire whose validity and reliability were confirmed. The statistical population consisted of all the male and female student teachers at the Farhangian University of Yazd in 2020, who were selected using the random sampling method. The questions were analyzed with the t-test and independent t-test.

Results: The mean±SD of the effective components in the implementation of m-learning, including hardware component status (2.44±1.498), software component status (2.48±1.544), content component status (2.39±1.451), manpower component status (2.35±1.041), and financial resources component status (2.38±1.459), were not sufficient among student teachers from the point of view of the male and female students. Furthermore, there was no difference among the student teachers based on gender in terms of effective components in the implementation of m-learning (P>0.05).

Conclusion: According to the obtained results, policymakers and educational planners of Farhangian University need to provide a necessary basis for the implementation of m-learning according to the components in the present study.

Keywords: Learning, Education, M-learning, University

*Corresponding author:
Seyyed Mohammad Ali Mirjalili, PhD;
Department of Education, Farhangian University, Shahid Paknejad Campus, Yazd, Iran
Tel: +98 9185503411
Email: miryazdi20@gmail.com

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Introduction

Information and communication technology has affected all aspects of human life in the 21st century (1-3). In other words, education does not emerge in a static space (4), and traditional teaching methods are no longer effective on account of the changes and development in today's world (5-8). Using mobile phones in learning is a method that has been put in use following the changes in information and communication technology. Mobile learning (m-learning) is e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone (9, 10).

Evidence has indicated that the use of m-learning has received a great deal of attention in higher education (11). This

method is of particular importance since it provides basic support in all aspects of learning (12-14). M-learning is a new and very precise concept through which the quality of learning increases, resulting in satisfaction and effective communication activities in learners (15). It is also closely associated with e-learning and distance learning in a way that it can be considered as a combination of e-learning and distance learning; that is because, like distance learning, there is a distance between learners and professors, and like e-learning, it is performed via advanced technology and mobile electronic tools (16).

Using mobile phones, as movable technology tools, can be highly conducive to the learning process because not only students are free to use technology, but also professors can focus on the learning process. Technology can always be utilized by teachers to increase access to valid teaching materials at any time and place, especially for preparing a lesson plan (17). Learning in fixed environments or at fixed times is no longer necessary owing to m-learning tools. Therefore, m-learning will be an integral part of the educational process in the future. Additionally, it is more enjoyable than traditional textbooks or instructions, thereby increasing learners' motivation and interest in learning and education (18). Studies in the same field have been conducted inside and outside Iran:

Karimi et al. conducted a study titled "Feasibility of m-learning education at universities". They concluded that it would be possible to establish an educational system based on m-learning at Payame Noor University (PNU) in terms of hardware and software infrastructure, funds, and support; however, it would be impossible to establish an educational system based on m-learning concerning the content and skilled manpower at PNU (19). In another study, Mahmoudi et al. found that the perceived usefulness, perceived ease of use, and system application affected students' attitudes toward m-learning whereas support, self-efficacy, and trust did not affect their attitudes toward m-learning (20). Asadian et al. conducted a study titled "Feasibility and pathology of tablet entry into the teaching and learning process". They reported that it would be impossible to use tablets and smartphones in the teaching and learning process of students at technical vocational schools from socio-cultural, educational, and organizational aspects. Nonetheless, technical-technological, legal-administrative, and economic dimensions were in a favorable position to enter the teaching and learning process (21).

Rezaei-Rad et al. conducted a study titled "Identification and prioritization of effective factors in using m-learning in higher education" and concluded that technical and technological, and attitude-related factors, personal facilities, knowledge, skill, and self-discipline abilities, were effective in using m-learning in higher education (22). Baya and Dehler found that students were interested in mobile phones in the learning process, and an increase in the levels of knowledge, skills, and particularly their attitude, were the basis of the effectiveness of such a learning method (23).

In another study, L. Gerz. examined the information system based on mobile gadgets. According to their findings, tools, such as mobile phones, have facilitated learning owing to their light weights, movability, and flexibility (24). Dernalia et al. (2008) examined the feasibility of using the mobile phone technology in health evaluation and social care education of nurses and reported that despite learners' tendency towards using mobile phones, the use of mobile technology needs education and support (25).

In a study titled "Teachers and the perception of m-learning: using a conceptual model of mobile-based learning", Yousri et al. (2015) reported a positive perception of mobile-based learning concerning the participation of teachers, and showed that financial issues and mobile hardware problems were not barriers for teachers (26).

Al-Rashedi et al. (2013) conducted a meta-analysis of the factors affecting the success of m-learning and concluded that learners considered the possibility of learning at any time and place as a benefit of m-learning.

Further, good content presented in a user friendly way is a primary expectation from an m-Learning application (27).

The educational systems around the world is in dire need of the use of information and communication technology for improving learning conditions for students (28). Meanwhile, it must provide the necessary conditions and context for the implementation of m-learning. Therefore, the present study aimed to analyze the status of the effective components in implementing m-learning among student teachers at the Farhangian University of Yazd.

Methods

Study Design

This research is a cross-sectional study and survey research. This research was applied in terms of purpose and in terms of data collection, it is a descriptive survey. The research was conducted from April to September 2021.

Sample Size and Randomization

The statistical population consisted of all the male and female students at Yazd Farhangian University in 2021. According to the statistics announced by the university, there were 838 people in the male campus (Shahid Pakenjad of Yazd) and 887 in the female campus (Fatemeh Al-Zahra of Yazd) with a total of 1725 individuals. The sample size was obtained to be 314 using Cochran's formula.

Stratified random sampling method was used in this research. Stratified random sampling is a method through which a population is divided into smaller sub-groups, known as strata. Accordingly, for females and males, the questionnaires were randomly distributed among the student teachers, and 314 questionnaires were received.

Data Collection Tool

The data required for the study were collected via a researcher-made questionnaire. The questionnaire aimed to investigate the effective components in the implementation of m-learning among student teachers. It consisted of five components and 18 items. In addition to personal characteristics, the questionnaire covered the following dimensions: hardware issues for m-learning (four items), mobile software issues (three items), financial issues related to mobile content (four items), issues related to manpower for m-learning (three items), and issues related to financial resources for m-learning (four items). Likert scale (0=very high, 1=high, 2=medium, 3=low, 4=never) was also designed. The questionnaires were conducted using Google Drive (the online form), and were distributed among the respondents on Telegram and WhatsApp applications (online) due to the coronavirus pandemic. Finally, all the questionnaires were received in 20 days. The process was implemented in a way that the necessary permission was initially obtained from the university and the necessary administrative correspondence was then performed.

The qualitative method was used to determine construct, face, and content validity. The construct validity of the questionnaires was established with confirmatory factor analysis, which showed an appropriate correlation coefficient between the variables. The structural validity of each of the questionnaires was previously confirmed with multiple sources and related studies (29-34). To determine the face validity, the questionnaires were given to six student teachers at the university (two primary education students, two theology students, one Arabic student, and one geography student), and four specialists (two curriculum planning specialists, one educational management specialist, and one education specialist). They were asked to comment on the levels of difficulty, the degree of inconsistency, and ambiguity of the questions. In the content validity review, six experts and researchers, including two curriculum planning specialists, one educational management specialist, and three experts in the field of statistics and research, were asked to use appropriate words after

reviewing the questionnaire based on their relevance to the objective of the research and provide their feedback on the necessity and importance, and the placement of each term in its place. In addition, determination of content validity was done using Content Validity Ratio (CVR) and Content Validity Index (CVI). According to six experts, CVR was 0/99 and CVI was 0/82.

The reliability of the questionnaire was calculated at a Cronbach's alpha of 0.83 (Hardware issues 0.85, software issues 0.81, Content issues 0.83, financial issues 0.82, issues related to manpower 0.84).

Statistical Methods

We utilized SPSS 23 for analyzing the data. Moreover, the table of frequency distribution, percentage, mean, and standard deviation in the descriptive statistics phase, and Kolmogorov-Smirnov test, t-test, and independent t-test were used in the inferential statistics phase.

Ethical Declarations

The ethical considerations, research purpose, and confidentiality were observed in distributing the questionnaires among the respondents, who were informed about the research purpose and the information confidentiality.

Results

A total of 314 eligible students were enrolled in the study, among whom 48% were female and 52% male. Regarding the years of studies, 23.34 had studied less than two semesters, 51.26 between two and four semesters, 17.25 four to six semesters, and 8.12 six to eight semesters. Married subjects accounted for 9% of the participants while 91% were single.

Table 1 indicates that the significance levels of all the data were higher than 0.05; hence, they were normal in terms of all the components of m-learning, and the parametric tests were used.

According to Table 2, there is a significant difference between the true mean of the hardware component of m-learning (2.44±1.498) and the theoretical mean of the Likert scale (3). Since the true mean is less than the theoretical mean of the Likert scale, it can be concluded that the status of the hardware component is less than the average in terms of m-learning from the perspective of students. The table also indicates a significant difference between the true mean±SD of the software component of the m-learning method (2.48±1.544) and the theoretical mean of the Likert scale (3). Since the true mean is higher than the theoretical mean of the Likert scale, the status of the software component of the student teachers' m-learning method could be lower than average. The table on the content component of m-learning represents a significant difference between the true mean (2.39±1.451) and the theoretical mean of the

Table 1: Kolmogorov-Smirnov test results

Research variables	Kolmogorov-Smirnov	P value
Hardware issues of m-learning	0.478	0.191
Software issues of m-learning	0.781	0.966
Content issues of m-learning	0.849	0.529
Human issues of m-learning	0.795	0.823
Financial resources of m-learning	0.243	0.661

Table 2: T-test results of the effective components in the implementation of m-learning

Variable name	Theoretical mean	mean±SD	df	T	P value
Hardware component of m-learning	3	2.44±1.498	313	-6.61	<0.001
Software component of m-learning	3	2.48±1.544	313	-5.91	<0.001
Content component of m-learning	3	2.39±1.451	313	-7.33	<0.001
Manpower component of m-learning	3	2.35±1.041	313	-8.02	<0.001
Funding component of m-learning	3	2.38±1.4591	313	-7.44	<0.001

Table 3: Gender differences in terms of the effective components in the implementation of m-learning

Variable	Number	Groups	Mean	Mean difference	Degree of freedom	T	P value
Gender	151	Female	2.44	0.193	312	0.86	0.40
	163	Male	2.24				

Likert scale (3). As the true mean is higher than the theoretical mean of the Likert scale, it can be concluded that the content component of m-learning is below average from the student teachers' perspective. In terms of the manpower component of m-learning, the table shows a significant difference between the true mean (2.35±1.041) and the theoretical mean of the Likert scale (3). Since the true mean obtained is lower than the theoretical mean of the Likert scale, it can be concluded that the manpower component of m-learning is not favorable from the students' perspective. The table reveals a significant difference between the true mean of funds of m-learning (2.38±1.4591) and the theoretical mean of the Likert scale (3). The true mean is lower than the theoretical mean of the Likert scale; thus, the funding component for m-learning is below average from the student teachers' perspective.

According to Table 3, there is a question about the difference between student teachers based on gender and in terms of the effective components in the implementation of m-learning. The mean of female student teachers' opinions was 2.44, and the mean of male student teachers' opinions was 2.24 with a degree of freedom of 127, according to which they were not significantly different. T-value was lower than its critical level of 1.96, and thus, the significance level was high according to a P-value>0.05; hence, there was no difference between the male and female student teachers' views concerning the effective components in the implementation of m-learning.

Discussion

Owing to the accessibility and ease of use of mobile phones, they play an important role in improving education and acquiring the necessary skills for learning among students. The present study aimed to analyze the status of the components affecting the implementation of m-learning among student teachers. The research results for each component are discussed below.

The obtained results about hardware indicated that the hardware component of m-learning did not have a favorable status. The findings of the research by Dernalia et al. (200) are consistent with ours, but the results reported by Karimi et al. (2014) and Asadian et al. (2018) were inconsistent with ours. Therefore, it is necessary to pay attention to certain issues, such as the possibility of using high-speed Internet, creating a computer network, having the right number of computers, and creating a computer site to improve the hardware component.

According to the results about software, software component for implementing m-learning was below average from the student teachers' views. The findings of Karimi et al. (2014) are consistent with our results. Rezaei-Rad et al. (2013) found that the software component was crucial in m-learning. Accordingly, it is necessary to pay attention to some factors, including the possibility of creating or having software for teaching lessons, installing security software in the educational system, and the possibility of virtual educational system software to improve the status of the software component.

The findings of this research indicated that the status of the content component for the implementation of m-learning was unfavorable from the students' views. Karimi et al. (2014), Asadian et al. (2018), and Al-Rashedi et al. (2013) reported similar results. Since this component plays a significant role in improving learning and practical use of mobile phones for learning, paying attention to the improvement of the content component is of great necessity.

Manpower-associated results implied that the status of the manpower component for implementing m-learning was below average from the students' point of view. Karimi et al. (2014) found that the manpower component status was not favorable, and Asadian et al. (2018) found results about the undesirable manpower component. Accordingly, instructors need to be familiar with the production of electronic content and information and communication technology. Additionally, the presence of personnel familiar with information and communication technology, and specialists familiar with virtual educational system is highly important.

Our findings revealed that the financial component for implementing m-learning had an unfavorable status from the students' point of view. However, the findings of Karimi et al. (2014) and Asadian et al. (2018) are inconsistent with the results of the present study, which necessitates further attention to the possibility of credit to pay wages of support and technical forces, to purchase equipment for the virtual education system, to purchase high-speed Internet, the possibility of credit for students' education in a virtual educational system, and the students' proper use of mobile phones and internet at home. Therefore, all the components can be used for male and female campuses. Therefore, higher education policy-makers must take the necessary measures regarding the use of mobile phones for teaching students and accelerating their learning.

Limitations and Suggestions

The research limitations included the respondents' carelessness, the bias of some respondents, as well as the incompleteness of a number of questionnaires. The research suggestions are as follows:

- Designing a mobile-based learning model
- Pathology of m-learning system
- Students' attitudes towards m-learning in the university

Conclusion

According to the results of the present study, we could highlight the followings: facilitating access to high-speed Internet for professors and student teachers, providing hardware and software equipment and facilities, Standardized of educational content, holding courses to familiarize professors and student teachers with e-learning, and inviting experts and experienced individuals to cooperate in the process of designing, producing, implementing, and evaluating the content of mobile e-learning courses.

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Authors' Contribution

A.M. conducted the study concept, acquired the data, and performed the statistical analysis. S.M.A.M. interpreted the findings, designed the study, and prepared the manuscript.

Conflict of Interest: None declared.

Ethical Considerations

In this research, all the ethical issues were considered, such as introducing ourselves, a clear explanation of the purpose of the research, and the confidentiality of personal information. The study was approved by the university.

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