Investigating the effect of using the mobile educational app as a proper method of study and learning on students' educational achievement

Background: Students' educational success depends on various factors, one of the most important factors is applying appropriate study methods to achieve this, a mobile educational application called: "Appropriate study and learning practices for students" was designed by the researchers to investigate the effect of using educational mobile application on study habits for students' educational success.

Methods: In this quasi-experimental study, 2 groups consisting of 20 and 21 undergraduate students of Radiology at Ahvaz Jundishapur University of Medical Sciences, in the Southwest of Iran were selected as statistical samples which then they were divided into two groups of intervention group (20 persons) and the control group (21 persons). At the beginning of the first half of the academic year of 2017-2018, this application was given to the intervention group. As the step, at the end of the second semester of the same academic year, the mean of the students final term score of intervention group (Who used this app) was compared with the control group (who did not use this app). Descriptive and inferential statistics were run via SPSS version 22.

Results: The results of the study showed that this application had a positive impact on students' educational improvement. Accordingly, the mean and standard deviation of the average final score of the students' academic term were 14.65 ± 1.70 for the control group and 16.95 ± 1.36 for the intervention group. These results showed a significant difference between the control group and the intervention group (P < 0.001). Also, the results of the study showed that gender had no effect on increasing the mean of students' final term score in both groups (P > 0.005).

Conclusion: Using the educational application of appropriate methods of study and learning had a positive impact on students' academic achievement, since it increased their final scores. Learning these proper methods of study and learning for students in the form of a curriculum or holding workshops and, of course, with regard to the popularity of smartphones among students, one benefit of mobile education apps can be students' academic achievement.

Keywords: App, Mobile learning, Study habits, Educational achievement, Students, Iran

ORIGINAL ARTICLE

The effect of using the mobile educational app on students' educational achievement

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Purpose: To study the impact of using educational mobile applications on students' academic achievement.

Methods: A quasi-experimental study was conducted on 41 students of the second semester of a radiology program at the Ahvaz Jundishapur University of Medical Sciences. The students were randomly divided into two groups: the intervention group (n = 20) and the control group (n = 21). The intervention group used an educational mobile application, while the control group did not. The academic achievements of the students were assessed at the beginning and end of the semester using a standardized test.

Results: The results showed that the intervention group had higher academic achievements compared to the control group (P < 0.05). The mean academic achievement of the intervention group was 16.95 ± 1.36, while the control group was 14.65 ± 1.70. The difference was statistically significant (t = 3.33, df = 38, p = 0.001).

Conclusion: The use of educational mobile applications can be effective in improving students' academic achievement.

Keywords: Educational mobile application, Students, Academic achievement.
INTRODUCTION

Students’ success depends on a variety of factors, among which there are the universities, educational equipment and teaching aids, faculty members, appropriate books and, most importantly, proper habits and skills (1). In the educational and research departments of universities, academic progress of students is considered as the most important criterion for determining their academic success, and also the average of their final term score is usually considered as another important criterion (2). Most students often feel their academic failure is due to some factors such as university of education, low intelligence, lack of facilities, etc. But they do not pay attention to learning the habits and proper study skills that can play an effective role in their academic achievement. Accordingly, students with specific talents may also suffer from poor academic skills due to the lack of proper study skills (3). Over the past few years, various studies have been carried out on the status of habits and skills of Iranian medical students, and sometimes these habits were considered to be moderate or inappropriate (3-14). Gilavand also confirmed this result in a study recently has been conducted (1). Other studies have shown that successful students, in contrast to unsuccessful students, are trying to find more effective ways for studying and learning. (12) Today, new communication styles and new spaces are available to make the learning process be effective out of the classroom as well. Students are driven by self-learning using ICT, to make their learning be generally improved (15). One of the communication methods which is popular among the researchers in the field of learning is smartphone learning and apps installed on them (16). It is a type of distant learning that takes place in many situations with social interaction and content via individual electronic devices. These learning tools can move along with learners. In other words, the various capabilities of smartphones reduce the flexibility of learning environment and make it more flexible (17-18). Today’s educational systems around the world have a strong need to use ICT to provide students with learning conditions (19). Due to its availability and its ease of use in the process of learning, the importance of using smartphones have become one of the new theoretical and research fields in education (20-21). The effective learning of techniques makes learners find better habits and attitudes, also more motivation and interest, so in this way the effective learning will help them improve their study skills (3). Sometimes students may spend a lot of time studying, they are unaware of knowing the reading skills and understanding what they are reading. Students’ benefit from appropriate study habits plays an important role in their educational performance and academic achievement. The researchers of this study, reviewing previous research and knowledge of the status of students’ study habits in Iranian medical universities, has designed a program entitled "Appropriate Methods of Studying Students and Studying Their Habits" in Persian language. Therefore, this study was conducted to investigate the effect of using mobile educational application on study habits in student’s academic achievement.

METHODS

In this semi experimental study, 2 groups consisting of 20 and 21 undergraduate radiology students from Ahvaz Jundishapur University of Medical Sciences, in the Southwest of Iran were selected as the statistical sample. They were divided into two groups: the intervention (22 participants) and the control group (21 participants). The increase in the mean score at the end of the students’ first semester was considered as the criterion of their academic achievement. This research is in line with the research project No. 960437 of the National Center for Medical Education Research, Ministry of Health and Medical Education, Tehran, Iran. (NASR). The researcher, by reviewing previous research and knowledge of the status of students’ study habits of Iran's medical sciences universities, designed a training application entitled "Appropriate study and learning methods for students according to the status of their study habits" in Persian. This application included 9 sections: the introduction, the standard method and standard for measuring students’ habits, the study status of study habits among students of Iranian medical universities, the 8-step process of learning without forgetting Harvard University (abstract), the process of 8-step learning without forgetting Harvard University (Descriptive), Time Management Skills and Golden Notes How to study at night test, study health, supplementary recommendations are effective ways to study and learn, and resources. This app is free of charge in Iran and is accessible by the cafe markets as “Iran Epps and Magnet” (A portion of the internal images of this application are displayed). The statistical population of this study included all undergraduate students working in radiology at Jundishapur University of Medical Sciences in Southwest of Iran. The sampling method was based on simple random. To conduct this research, in the beginning of the first semester of the 2017-2018 academic year, the groups consisting of 20 and 21 radiology students divided into two groups of intervention (20 persons) and control (21 persons). The intervention group was asked to use the app for four free through Internet cafes market, Iran Epps and Mint. And the control group did not use the app and they normally chose their own study. In order to prevent the students from communicating with each other, the intervention group and the control group were selected from the students of two different academic years. So, the students that were selected as the control group were in the first semester of year 2018, while the intervention group were the students entering the second semester of the year 2017. A series of incentives was also considered for student to encourage them to use the educational content of the application. In the next stage and at the end of the second half of the year, the average score of the intervention group (who used the application) was compared to the control group (who did not use the application). Descriptive statistics (mean and standard deviation) and inferential statistics (independent t-test) were used for data analysis and SPSS version 22 was used.
RESULTS

The study showed that this app had a positive effect on students' academic achievement, and the average scores of the graduated students in the intervention group (considered as their index of academic achievement) have increased. According to Table 1, the mean and standard deviation of the scores at the end of the semester in control group was 14.65 ± 1.7, and the mean and standard deviation of the scores at the end of the semester in the intervention group was 16.95 ± 1.36. There was a significant difference between the control group and the intervention group (P <0.001).

Also, according to Table 2, the gender factor had no effect on increasing the mean score of the students' end-term in both the control and intervention groups (P>0.005).

DISCUSSION

Studying and learning styles are factors that can affect academic achievement of students, hence, it is considered as one of the differences between successful and unsuccessful students in university. Over the past few years, several studies have been done to examine the status of students' study habits in Iran's medical science universities, all of whom have assessed this situation as modest or somewhat "inappropriate" (3-14). The results of this study are worth examining from 2 perspectives. From the first point of view, the comparison of students using the content of this application, which includes a series of teaching materials and recommendations on the appropriate methods of study and learning, has been used by those students who have the educational content. The mean score of the end of the semester was compared with a clear and significant difference in the benefit of the students who used the app as successful students. From this perspective, our research results are consistent with Aminian and Qomizadeh's (13), Ali Mohammadi et al. (14), Mahmoudzadeh et al (22), Vofouri (23) and Otaghi (24). In Aminian and Qomizadeh research which was conducted at the Yazd University of Medical Sciences in central Iran, it was found that in addition to using more effective methods of study and learning, successful students have better academic habits in comparison to unsuccessful students. (13). Also, in the research of Ali Mohammadi et al., there was a significant and positive correlation between the scores of academic habits and the academic performance of nursing students in Hamedan University of Medical Sciences (14).

Mahmodzadeh et al.'s work in the relationship between study approaches and academic performance in students of Birjand University of Medical Sciences in northeastern Iran, showed that there was a significant relationship between level approach and academic performance of students (22). Vofouri's research in Tajikistan showed that the training method of concentration and memory, affects the academic achievement and motivation, so leads to students' progress (23). Otaghi in a research study showed that teaching of academic skills affects the academic achievement of students in the emergency medicine department of Ilam University of Medical Sciences (24).

But the results of this study can also be analyzed from a different point of view. This view shows that students are welcome to learn by using the smartphones and apps installed on them. A recent intervention study conducted at the Faculty of Dentistry of Jundishapur University of Medical Sciences in southwestern Iran among students and researchers in the field of popularity learning Gilavand et al. showed that textbook education improves student awareness by utilizing mobile apps (16). Also, Bahazadeh Kamangar and his colleagues from Babol University of Medical Sciences in northern Iran concluded that lessons learned using smartphone mobile apps are more effective than traditional ones (25). The results of Khazaee

<table>
<thead>
<tr>
<th>Group</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Difference of average</th>
<th>95% confidence interval</th>
<th>P_value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>14.65</td>
<td>1.7</td>
<td>11.84</td>
<td>18.7</td>
<td>2.29</td>
<td>(1.39, 3.287)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Intervention</td>
<td>16.95</td>
<td>1.36</td>
<td>14.31</td>
<td>19.37</td>
<td>2.29</td>
<td>(1.308, 3.288)</td>
<td></td>
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<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>P_value</th>
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<tbody>
<tr>
<td>Control</td>
<td>Woman</td>
<td>14.92</td>
<td>2.14</td>
<td>11.84</td>
<td>18.70</td>
<td>0.503</td>
</tr>
<tr>
<td></td>
<td>Man</td>
<td>14.39</td>
<td>1.19</td>
<td>12.29</td>
<td>15.66</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>Woman</td>
<td>16.86</td>
<td>1.46</td>
<td>14.31</td>
<td>18.96</td>
<td>0.743</td>
</tr>
<tr>
<td></td>
<td>Man</td>
<td>17.07</td>
<td>1.33</td>
<td>15.23</td>
<td>19.37</td>
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</tr>
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</table>
Jalil’s research and Jalil et al. showed that the use of educational along with the effective operation of the students in the operating room of Shahroud University of Medical Sciences, also significantly increased their practical test scores (26). Salmani et al.’s also conducted a study to investigate the effect of using computer-based conceptual design software in the mobile environment on the level of learning of nursing students of Yazd University of Medical Sciences in Yazd. The result of their study showed a significant relationship between computer-based conceptual design software and students' learning improvement (27). The result of Montrieux et al.’s research showed that changing educational styles using smart tablets in educational environments can be considered by educational systems because of its many potential, excitement and variability (28). In a study by German-born Albrecht et al, medical education using smartphones was more attractive to students than traditional ones (29).

This study showed that the application used in this study has had a positive impact on students' educational improvement. Accordingly, using the educational app of appropriate methods of study and learning had a positive impact on the students' academic achievement by increasing their final scores. Nowadays, in setting educational goals and educational processes, new approaches have been developed in order to focus on primary educational goals as reading and writing to more important goals such as creative thinking, problem solving, lifelong learning, information literacy and familiarity with information and communication technology. Therefore, taking advantage of the correct ways of study and learning makes using the technology of the world more enjoyable, smartphones and apps installed on them can be very useful in this regard. In order to achieve this goal, it seems necessary to teach students how to study and learn at the beginning of university entrance in form of a curriculum or, at least, by holding workshops, in this way, the popularity of smartphones among students, can be useful to achieve this goal.

As the limitations of this study, the restricted number of samples and the impossibility of conducting this research among all fields of study at university, it is suggested that more different samples to be used in future studies.

**Ethical considerations**
Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.
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