

Effects of Mobile Learning on Paramedical Students' Academic Achievement and Self-regulation

Background: Mobile learning affects learners through motivation, cooperation, information sharing, and availability. It provides opportunities for learners, learning providers and universities. This study aimed to examine the role of mobile learning on the academic achievement and self-regulation of paramedical sciences in Birjand University of Medical Sciences.

Methods: This survey is a quasi-experimental study. The research population included operating room technology students in Ghaen and Ferdows faculties as satellite faculties. Samples included 43 persons. Initially a relevant microbiology mobile book was installed on students' mobile phones in test group (22 students). In this group, during the semester, the microbiology contents delivered through the mobile books and SMS, in addition to face-to-face teaching. The control group received only conventional face-to-face training. The data collection tool included Pintrich's self-regulation questionnaire and a teacher-made microbiology quiz.

Findings: The results showed that using this method has quite significant impact on both students' academic achievement and their self-regulation learning ($p < 0.05$).

Conclusion: With regards to positive effect of mobile learning on academic achievement and self-regulation, it is necessary for curriculum planners to design and implement appropriate mobile learning methods to enhance learning, self-learning and self-regulation.

Key words: Mobile learning, Academic achievement, Self-regulation, Microbiology

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تأثیر آبلوب التعلیم عبرالریافت النقال علی رفع المستوى الدراسي عند الطلاب

التمهید و الهدف: إن التعلیم عبرالریافت النقال یزید فی التماون و اشراك المعلومات و سهوله الوصول و التماول مع المتعلم و یوجد فرص للمتعلیم و المعلم و الجامعه ایضاً. إن هدف هذه الدراره هو تحلیل مستوى تأثیر أسلوب التعلیم عبرالریافت و اوجباراه اضرى استخدام الریافت النقال فی الامور الدراریه عند طلاب جامعه بیرجند الطبیه .

أسلوب العمل: إن هذه الدراره البنیه علی نموذج الشبه اختیاری اجریت علی 43 طالب بحيث تم اعطاء 22 طالب برنامج لدرس المیکروب یوضع علی الریافت النقال الذکی و يتم استخدامه لخللال الفصل الدراسي و يتم اضافه الی التدریس داخل قاعات المحاضره النقاش عبر الرسائل عبرالریافت النقال و فی المجموعه الثانيه فقط استخدام أسلوب المحاضره. و تم تجسیع المعلومات عبر استمارات تحتوی علی اسئله علی نمط پینتریج و تم اعطاء الاعتبار بواسطه أسلوب Cronbach's alpha ($P < 0.0005$)

النتائج: اشارت النتائج الی أن استخدام الریافت النقال كان له تأثیر واضح جداً علی النمو العلمی عند الطلاب و الأختلاف كان ذو قیمة کبیره ($p < 0.05$)

الاستنتاج: تغییر نتائج هذه الدراره الی إن استخدام الریافت النقاله الذکیه لربما دور کبیر فی النمو العلمی مع البقارنه مع الذین لم یستخدموا الریافت النقاله الذکیه فی مجال الترسیم العلمیه لذا یجب علی من یرتتم بوضع برامج دراریه و تعلیمیة ان یرتتموا برینا السان.
الكلمات الرئيسية: النمو الدراسي، علم المیکروب، برمجہ ذاتیه.

تأثیر روش آموزش از طریق تلفن همراه بر پیشرفت تحصیلی و خودتنظیمی دانشجویان پیراپزشکی

زمینه و هدف: یادگیری از طریق تلفن همراه بر انگیزه، همکاری، اشتراک اطلاعات، در دسترس بودن و تعامل یادگیرنده تأثیر می‌گذارد و فرصت‌هایی را برای یادگیرنده، یاددهنده و دانشگاه فراهم می‌کند، از این‌رو، این مطالعه با هدف بررسی پیشرفت تحصیلی و خودتنظیمی با روش یادگیری از طریق تلفن همراه توسط دانشجویان پیراپزشکی (اتاق عمل) دانشگاه علوم پزشکی بیرجند انجام شده است.

روش: این پژوهش از نوع شبه آزمایشی است، جامعه پژوهش را دانشجویان اتاق عمل دانشکده‌های اقماری (فردوس و قانن) تشکیل دادند که نمونه (43 نفر) کل جامعه را در بر می‌گرفت. ابتدا کتاب الکترونیکی درس میکروب شناسی بر روی تلفن‌های همراه دانشجویان گروه آزمایش (22 نفر) نصب گردید و در طول ترم علاوه بر آموزش چهره به چهره، محتوای یادگیری به شکل مذکور و نیز از طریق پیامک توسط آنان مورد استفاده قرار گرفت. در حالی که گروه دیگر صرفاً با روش معمول چهره به چهره آموزش دیدند. ابزار گردآوری اطلاعات پرسشنامه بود که شامل پرسشنامه خودتنظیمی پینتریج و آزمون معلم ساخته در درس میکروب شناسی بود. پینتریج، روایی و پایایی بالایی برای پرسشنامه فوق ذکر کرده است و در مطالعات داخل با روش اعتبار محتوا و پایایی آن با روش Cronbach's alpha تعیین شد.

یافته‌ها: نتایج پژوهش نشان داد که استفاده از همراه تأثیر کاملاً معنی‌داری ($p < .0005$) بر پیشرفت تحصیلی و خودتنظیمی دانشجویان نسبت به یادگیری از طریق تلفن همراه داشته است. ($P < 0.05$)

نتیجه‌گیری: نتایج پژوهش نشان داد که آموزش از طریق تلفن همراه تأثیر مثبتی بر پیشرفت تحصیلی و خودتنظیمی گروه آزمایش داشته است؛ بنابراین لازم است؛ برنامه-ریزان درسی به طراحی و به کارگیری روش‌های تدریس مناسب در جهت افزایش یادگیری و خودیادگیری و خودتنظیمی فراگیران اقدام کنند.

واژه‌های کلیدی: تلفن همراه، پیشرفت تحصیلی، خودتنظیمی، میکروب شناسی

پیرامیدیکل استوڈنٹس کی تعلیم اور نظم و ضبط پر موبائل فون کے ذریعے تعلیم کی روش کے اثرات کا جائزہ .

بیک گراؤنڈ: موبائل فون کے ذریعے تعلیم میں مدد لینا، تعلیم میں دلچسپی، باہمی تعاون اور ایک دوسرے کے ساتھ معلومات کے تبادلے اور مل کر پڑھائی کرنے میں موثر ثابت ہوا ہے۔ اس سے طلباء، اساتذہ اور یونیورسٹی کو آسانی ہوتی ہے۔ یہ تحقیق بیرجند یونیورسٹی میں پیرامیدیکل طلباء (آپریشن روم) کی تعلیم اور ان کے نظم و ضبط پر موبائل فون سے مدد لینے کے اثرات کا جائزہ لیا گیا ہے۔

روش: یہ ایک طرح سے امتحان نما تحقیق ہے۔ تحقیق میں بیرجند کے قریبی شہروں فردوس اور قانن کے طلباء کو شریک کیا گیا کل ملا کر تینتالیس طلباء نے شرکت کی۔ ان طلباء کو دو گروہوں میں تقسیم کیا گیا۔ پہلے گروہ کے موبائل فونوں میں بیکیترالوجی کے نصابی دروس کو ڈاؤنلوڈ کیا گیا اور اسکے ساتھ ساتھ وہ معمول کے مطابق کلاسوں میں بھی شریک ہوتے رہے اور ایس ایم ایس کے ذریعے اس پر تبادلہ خیال کرتا رہا۔ دوسرے گروہ کو یہ سہولت نہیں دی گئی تھی وہ صرف کلاسوں میں شریک ہوتا تھا۔ تحقیق میں شامل طلباء کو سوالنامے دئے گئے جنہیں کرونیباخ آلفا کے ذریعے معتبر بنایا گیا تھا۔

نتیجے: اس تحقیق سے معلوم ہوتا ہے کہ موبائل فون میں ڈاؤنلوڈ کئے گئے درسی مواد سے طلباء کو کافی فائدہ پہنچا ہے اور انہوں نے اس سے استفادہ کیا ہے۔

سفارشات: اس مثبت نتیجے کے پیش نظر یہ سفارش کی جاتی ہے کہ نصابی منصوبے بنانے والوں کو چاہیے کہ وہ طلباء کے لئے ایسے مفید پروگرام بنائیں جن سے خود سے پڑھائی کرنے اور پڑھائی میں بہتری لانے میں انہیں مدد مل سکے۔

کلیدی الفاظ: موبائل فون، بہتر پڑھائی، بیکیترالوجی۔

INTRODUCTION

Nowadays the traditional methods of teaching and learning have lost their effectiveness with emerging technology and new methods. Therefore, to keep pace with the changing environment around us, we have to look for new ways and methods of knowledge transfer and learning (1). New educational technologies (such as Web and mobile phone) can provide large volumes of information and knowledge to learners and overcome the limitations of time and space. If the technology is richer, teaching and learning occurs more easily and in a shorter time. This creates a situation where learning occurs faster, easier, better and more sustainable (1, 2).

The world of technology creates a structure that promotes the quality of education and enables learners and learning providers to use their vast resources in order to achieve learning, not only to increase their learning and motivation, but also to develop various forms of collaborative learning (3, 4). Through the use of information and communication technology, collaborative learning and self-learning will facilitate (5, 6). However, nowadays, new methods and spaces have been provided to make the learning process outside the classroom possible. Using information technology, students are encouraged to self-learning, and this generally improves learning (9). Mobile learning is defined as a form of learning that occurs through mobile devices. These devices have the ability to move along with the learner. Therefore, their shipping flexibility decreases limitation of space for learning. This provides access to learning materials (7, 8, 9, and 10).

Learners' success in today's world requires not only academic skills, but also social skills and cooperative learning and self-regulation skills (11, 12). Therefore, the current era requires people who have the ability to guide and direct their learning. Some research has shown that the use of mobile technology in a multimedia way beyond time and space increases the enthusiasm of students to learn. It also offers tremendous learning opportunities to them at dead time and in motion (13, 14).

Conducting a study titled "The impact of mobile learning on academic performance in high school and college levels", Marcus et al. reached the conclusion that this device has a great impact on learning performance of both (15). Shaw et al. in their study titled "Measuring self-regulated learning in mobile learning environment", came to this conclusion that Self-Regulated Learning (SRL) model of mobile learning can assess three aspects of learners, including self-assessment of Psychological processes, online learning behavior patterns in mobile environment and academic achievement. This type of learning for students has increased their cognitive and meta-cognitive behaviors which are components of self-regulation; moreover, students could achieve greater academic achievement with their self-regulation (16). Zare Bidaki et al. publishing their study called "Design and production of electronic books, as a new model of learning content in the Medical Sciences" showed that mobile books (M-books) have a significant effect on changing the attitude and enthusiasm of student

to learn via mobile phone and increasing their motivation to study at dead time and in motion (17).

Ayati & Sarani in their survey titled as "The impact of mobile phones on the motivation and attitudes of students in teaching English" found that Education through mobile phone have a positive effect on intensity of motivation, interest and attitude towards the English language students (18).

This study aimed to examine the impact of mobile learning on students' achievement and self-regulation in the course of Microbiology, operating room technology in Ghaen and Ferdows faculties, Birjand University of medical sciences during the first semester of academic year 2012-2013.

METHODS

This survey is a quasi-experimental study. The research population was included the total of operating room technology student in academic year 2012-2013 at Birjand university of medical sciences. The number of samples in this study was a total of 43 individuals. The experimental and control groups consisted of 22 and 21 people respectively. According to standard methods, a minimum sample size in a quasi-experimental study is 15 individuals.

Groups were initially homogenized based on the rank of students in university entrance exam and also their GPA in Pre-University College. Moreover, both groups were similar regarding their academic disciplines and from faculties with similar weight.

The microbiology course content converted into a mobile book format through special Java program, installed and came available to students in test group. In addition, the test group also received learning content through SMS over the semester. For each session, an SMS including a summary of the lesson was initially sent to the students, one day before face-to-face delivery of relevant lesson in the class. With a 3-days interval of each face-to-face course delivery session, some questions of the taught content were sent to the students by SMS. This trend continued for all sessions throughout the semester.

The teacher used the model "Attention Relationship Confidence Satisfaction" (ARCS) introduced by Keller (20) to motivate learners during the learning process in the classroom. The model consists of four steps: attention, relevance, confidence and satisfaction. In control group, the teacher delivered the course only by lectures and slide show.

Data collection tools included a questionnaire for finding self-regulated learning strategies and a microbiology final exam for finding students' learning achievement. Self-regulated learning strategies questionnaire that symbol MSQ (Motivated Strategies Questionnaire Learning) were made by Pintrich et al in the Center of American studies in 1986 (21). A 31-item questionnaire was designed with two subtests measuring meta-cognitive and resource management strategies. This two subtests consist of five sub-scales: Meta-cognitive, self-regulation (12 items), time and study environment (8 items), effort regulation (4 items), cooperative learning (3 items) and seek help in learning (4 items).

Using Cronbach's alpha, Pintrich et al estimated reliability coefficient of the components as 0.52, 0.76, 0.69, 0.76, and 0.79 accordingly. This also was estimated to be 0.90 and 0.89 for the two subscales and 0.95 for overall alpha.

To test the validity, they used confirmatory factor analysis (CFA) and clearly showed the validity of the test. This scale has also been considered in national investigations studies (22). In current study, Cronbach's alpha was equal 0.80 considered as validity coefficient. Another tool that was used to collect data was a teacher-made exam. This exam included 16 questions. For grading, the exam was scored from 1 to 20. Using Cronbach's alpha, the exam reliability was calculated equal 78%.

The data of this study obtained from students in both experimental and control groups by filling out the questionnaire of self-regulated learning strategies and answering to the teacher-made exam questions before and after intervention of the independent variable. In this study, the distribution parameters (mean and standard deviation) were used to describe the data.

To examine the hypotheses: "Mobile phone use in teaching microbiology has positive impact both on academic achievement and on self-regulation", totally T-test and covariance analysis were applied. For testing the latter hypothesis, it was not possible to use covariance analysis. Because the two required assumptions for covariance analysis (homogeneity of regression slopes and linear correlation between the auxiliary random variable and the dependent variable) data was not applicable. To analyze raw data, draw charts, tables and test the hypotheses through SPSS, v.21 and EXCEL software were used.

RESULTS

Descriptive results of educational achievement based on the pretest and post-test scores, and standard deviation in the

intervention group (using mobile phones) and control group (non-mobile users) described in Table 1.

Table1. Comparison of pre-test and post-test microbiology exam scores in non-intervention and intervention groups. (Inside the parentheses show standard deviation)		
Intervention group mean (SD)	Non-intervention Group mean (SD)	
12.4 (2.6)	12.3 (2)	Pre-test
15.1 (2)	13.8 (2.3)	Post-test

Comparison of findings in these two groups showed that the mean of educational achievement scores in non-intervention group increased from 12 to 13.8 and in interventional group increased from 12.4 to 15.1 ($p < 0.005$). The results of covariance analysis showed that this difference was statistically significant ($F: 10.14, df: 1, P= 0.003$).

Descriptive findings of Self-regulation scores in the pre-test and post-test in the intervention group (using mobile phones) and control group (non-mobile users) are summarized in Table 2.

To test this hypothesis, T-test was used to analysis differences between pre-test and post-test scores. Comparing the results of the two groups showed that the mean scores of self-regulation in non- intervention group increased from 131 to 137 and in intervention group increased from 130 to 150 ($p < 0.05$). T-test analysis revealed a statistically significant difference ($T: 2.28, df: 41, P= 0.014$).

Also some other findings of data analysis in this research are as follow: two of the five subscales in self-regulation

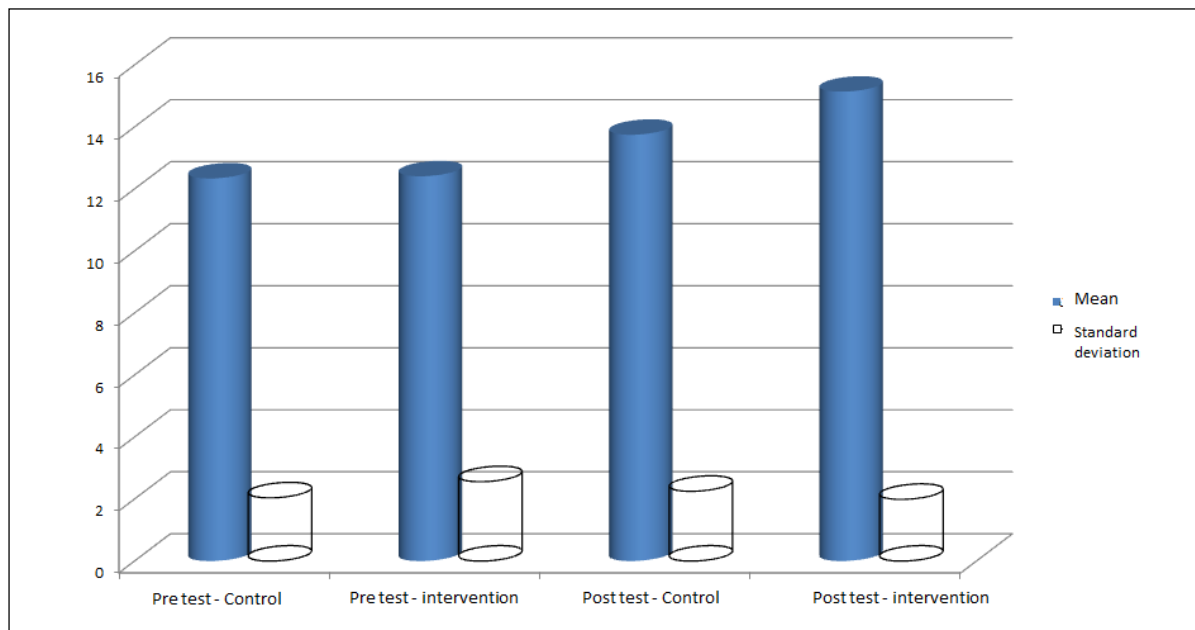


Figure1. Comparing intervention and control groups based on mean and standard deviation of educational achievement scores

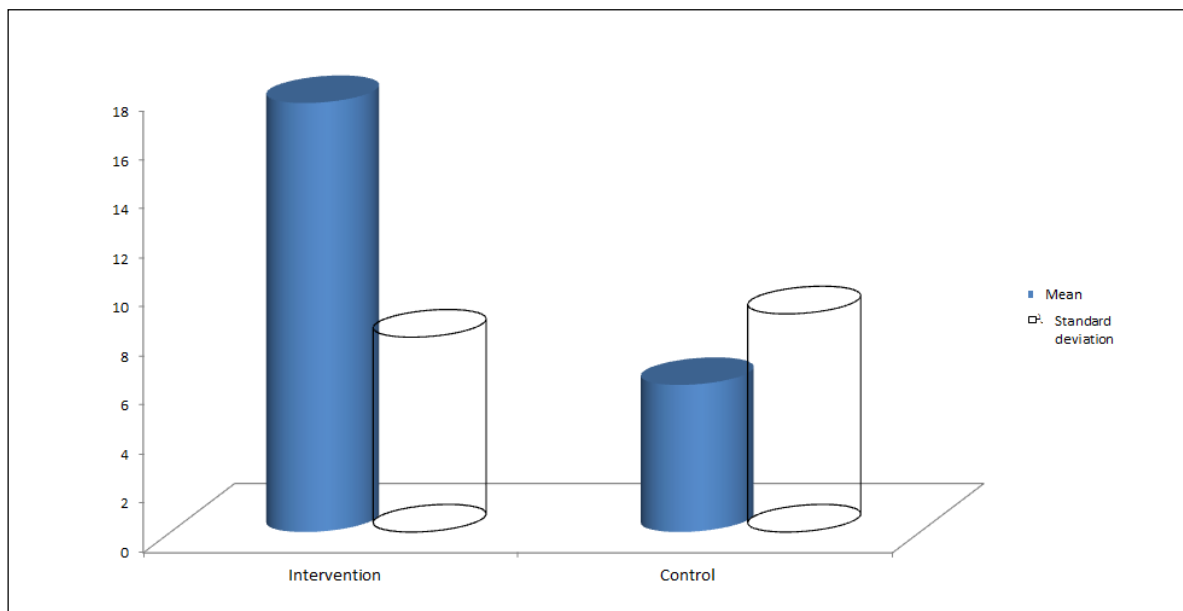


Figure2. Comparing intervention and control groups based on mean and standard deviation of self-regulation scores

Table2. Comparing self-regulation scores in pre-test and post-test for non-intervention and intervention groups. (Inside the parentheses show standard deviation)

Intervention group mean (SD)	Non-intervention mean (SD) Group	
130 (9.9)	131 (10.4)	Pre-test
150 (6.5)	137 (13.4)	Post-test

and time/ place of study were at a significant level of 0.0005. But, the three other subscales, including effort regulation, learning assistance and help seeking in learning showed no significant difference.

DISCUSSION

The findings show that the mobile learning has a positive effect on educational achievement and self-regulation. The present results express that mobile learning has a positive impact on academic performance. This is in support of Solomon et al (10), Adelina et al (23), Power & Shrestha (24), Douglas & Matt (25) findings. In the field of self-regulation, our findings are aligned with Sha et al findings (16).

Some possible reasons for increased academic achievement and self-regulation in the experimental group than the control group may include: delivery contents in small pieces, rehearsing and repeating with time intervals, timely feedback, employing multiple inclusive senses, availability of this device without restrictions of time and place, multimedia capabilities of new mobile cell phones, employing multiple inclusive sense, providing easier communication between the learner and the learning facilitator in comparison with traditional environment, better use of time, connecting formal or informal learning

environment, flexibility of this approach compared to traditional learning, more comfortable and finally stress-free relationship with the teacher.

Student's activities and involvement with the problem which are important issues for stable and optimal learning approaches is considered in this type of training. In this type of teaching, students received appropriate feedback and in a satisfactory manner they used their time to learn microbiology lessons. On the other hand, due to the use of various mobile phone capabilities, this was made possible for students to get learning material more interesting and varied.

This consequently increased their motivation and thus learning more. It appears that the use of self-regulation strategies in mobile apps improves information processing. Use these strategies during the time causes development of cognitive processes, accelerates the transfer of cognitive skills and facilitates problem solving process, motivation, self-sufficiency, acquisition of cognitive processes, generalization and increased attention, and finally self-regulation during the learning process. This kind of learning effects is almost constant over time and forgetting resistant (16).

Looking at the results of this study reveals that by entry of new technologies in the field of educational systems, such as distance education system, teaching-learning process has changed (5). In remote environments, mobile technology has changed the role of remote trainers and teachers in education and instead has transformed learners to active and dynamic elements involved in learning process. This can be a new horizon in national instructional design. Continuous expansion of educational systems based on mobile learning is an undeniable necessity in the face of new developments today. This may be used in strategic planning which accordingly guide the society in a knowledge-based direction (10).

As a conclusion, the use of mobile technology can enhance the quality of education in the younger generation, reduce social costs, develop inclusive education in all parts of the country, and enforce educational justice. Finally, the optimal use of time can be brought with this technology.

With regard to the emergence and rapid development of mobile learning and its entry into the field of medical education, it is suggested to consider mobile learning at least as a complementary method to other course delivery methods.

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