Res Dev Med Educ, 2022, 11, 26
doi: 10.34172/rdme.2022.026
https://rdme.tbzmed.ac.ir

Original Research

The effect of the software of the principles of setting up surgical tables on the knowledge and practical skills of the students of operating room technology

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Article info

Article History:
Received: September, 30, 2022
Accepted: October, 26, 2022
epublished: December 31, 2022

Keywords:
Operating room students, Educational software, Surgery instruments, Learning

Abstract

Background: Traditional teaching and learning methods are losing their effectiveness due to the advancement of communication technology and science in the new century. Therefore, educational software development can improve medical and paramedical students' learning in modern medical education. The current study was conducted to investigate the effect of software on the principles of surgical table setting on the learning and practical skills of the students of operating room technology.

Methods: A semi-experimental study was conducted using a census method among 57 operating room students who met the inclusion criteria. The students were divided into two groups, intervention, and control. The two groups were pre-tested before the intervention to assess their knowledge and practical skills. Additionally, the control group was regularly trained, and the intervention group was provided with educational software simultaneously with routine training. A post-test was given to both groups at the end of the semester. The data were analyzed by SPSS 22 using the descriptive and inferential statistical indicators of paired *t* test and Mann-Whitney test.

Results: The results of this study showed that the intervention group and the control group did not differ significantly in any of the demographic parameters ($P<0.05$). Considering the normality of the data, comparing the level of knowledge and practical skills of the operating room technology students before and after the intervention in both groups using paired t-test showed that the level of knowledge and practical skills in the intervention group increased significantly ($P>0.001$).

Conclusion: According to the results of this study, educational methods in conjunction with the appropriate software can effectively increase students' awareness of operating room technology and help improve their practical skills. Therefore, educational aid software is a useful tool to be used during internship courses as an effective method of training operating room students.

Introduction

Traditional teaching and learning methods are losing their effectiveness due to the advancement of communication technology and science in the new century. In the 21st century, one of the most significant social challenges is the unceasing development of technology, which has negatively affected traditional teaching methods.[1] In addition, due to the development of technology and the Internet, social media has become an increasingly-used and robust tool for educational purposes, and its use has increased among students.[2] Today, educational websites and other educational media are often used as supplements to train doctors and students. Smartphones are one of these technologies that have gained widespread popularity in education due to their simple design and portability.[3] This popularity can be attributed primarily to the ability to install smartphone applications across various fields, such as marketing, entertainment, news, and education.[1] As a result of the variety of educational software programs, learners can study materials and learn anywhere and at any

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time.[3] Moreover, providing access to information reduces the cost, simplifies the process, enables continuous learning, and provides a more incredible opportunity for interaction between students and teachers. Therefore, mobile phones and software should be encouraged to be used effectively and practically.[2,4]

In the health and treatment system, implementing applicable software plays an influential role in medical sciences education; as a result, there has been a substantial evolution in knowledge in medical sciences. Today, various games, films, and animations train students using this emerging technology.[5-7] In clinical education, their use has become unavoidable due to convenience, easy access, flexibility, and low cost. Mobile phones have been widely used to supplement traditional education among medical professionals in the last decade. Some experts have confirmed that mobile phone use has significantly improved the learning process of treatment personnel.[8] Mobile phones also facilitate lifelong learning.[1] Mobile software and smartphones are expected to be one method by which to meet the significant educational needs of the medical sciences over time and may increasingly replace conventional methods.[9] Furthermore, mobile phones and software provide a unique opportunity to gain access to specialized information; as a result, these become a vital component of medical sciences education.[1] Undoubtedly, in the field of surgery, software plays a crucial and valuable role in providing training and services.[10,11] One of the most critical issues in the field of surgery is familiarity with surgical instruments due to their variety and appearance. The learner must thoroughly understand an instrument's name, type, and application.[12] In addition to the theoretical learning of a surgical tool, surgical technologists in scrub roles must be able to place a tool on the operating table during an operation to provide the tool to the surgeon quickly and accurately. Achieving these educational goals in the stressful environment of the operating room, such as admitting emergency and critical patients, and maintaining and safeguarding patient health, is a significant challenge for this educational group.[12-14] Therefore, finding an effective educational method under these conditions is essential.

The study results indicate that using software that can be accessed at any time and from any place and used repeatedly is a complementary and effective method to achieve educational goals.[12,15] Thus, this study was conducted to investigate the effect of using surgical table setting-up software on the level of knowledge and practical skills of surgical technology students.

Methods

A semi-experimental study was conducted using a census method among 57 operating room students who met the inclusion criteria. The students were divided into two groups, intervention, and control. The two groups were pre-tested before the intervention to assess their knowledge and practical skills at the faculty and skill lab of the paramedical faculty of the Iran University of Medical Sciences. Data regarding students' basic knowledge were collected utilizing a researcher-developed test with 20 multiple-choice questions (four options), practical tools, and equipment based on course-approved references.

To confirm the validity of the test in the knowledge section, a board of experts considered the content of the test as well as the number and appropriateness of the questions based on the main objectives of the lesson. Validity was determined by calculating CVR = 0.86. The instrument's reliability was also confirmed through a Cronbach's alpha of 0.84 (results above 0.7 are considered appropriate). In the practical skill section, a researcher-developed checklist was used. The validity of the checklist was determined by a consensus of twelve experts in the field. In addition, reliability was determined by a coefficient of evaluators' agreement as well as simultaneous evaluation.

During the academic semester, each student was trained using traditional methods based on the specific objectives of the course, surgical instruments, and equipment for both intervention and control groups. In addition, educational software was provided to students in the intervention group during the academic semester. Intervention group students were taught how to use the software in an explanatory session. This software taught general surgery tools in two categories: major surgery set (25 types of surgical instruments) and laparoscopic surgery set (20 types of surgical instruments). Thus the students become familiar with the appearance and features of surgical tools, and once they complete the training steps, they are asked to arrange the tools on the surgical table in the sequence in which they will be used during a specific surgical procedure. To access the software, students logged in with a unique username and password (their student numbers). This acted to track intervention group access and to restrict control group access to the software. A post-test was given to assess participants' knowledge and practical skills in both groups at the end of the academic semester to determine the effectiveness of the educational software. Practical testing involved selecting and arranging surgical tables in the clinical skill lab. In each group and between the two groups, the results were compared between pre- and post-test. Data were analyzed using SPSS 22 and reported as descriptive and inferential statistical indicators of paired *t* test and Mann-Whitney test.

Results

In total, this study involved 57 students studying operating room technology. The two groups consisted of 27 participants (37% women, 63% men) in the control group and 30 participants (26.7% women, 73.3% men) in the intervention group.

Both a Mann-Whitney test and a t-test showed that the intervention and control groups did not significantly

differ in any demographic parameters ($P<0.05$).

Based on the normality of the data, a paired *t* test was used to compare operating room technology students' knowledge levels before and after the intervention. The results showed that students in the intervention group had a higher level of knowledge than those in the control group ($P<0.001$; Table 1).

When comparing students' practical skills in the intervention group with those in the control group using paired *t* tests, a significant difference in practical skills was found between the two study groups. ($P<0.001$, Table 2).

Discussion

The current study was conducted to evaluate the effect of educational software for a surgical table setting on students' clinical knowledge and skills. The findings of this study showed that the use of educational software on the principles of setting up the surgical table could improve operating room technology students' knowledge and practical skills. These results are in line with the studies of Sadati et al,[12] Fesharakinia et al,[16] Moradi and Didehban,[5] and Koohestani et al.[17]

Sadati and colleagues' study, conducted among 42 operating room students at Alborz University of Medical Sciences, found that using educational surgical instrument software significantly improved the knowledge and awareness of students in a course on surgical instruments.[12] Fesharakinia et al, who conducted a study with 40 students in their last semester of a pharmacology degree, found students' knowledge increased significantly after using pharmacology software in the field of expertise and use of drugs.[16] Koohestani et al proposed that using the software can create a remarkable evolution and progress in transferring and improving knowledge in medical sciences.[17] Snashall and Hindocha showed that medical education software as an educational supplement was a helpful tool in learning for 93% of users.[1] Chandran et al also found that educational software as an educational supplement was valuable in increasing the healthcare team's knowledge and providing education without border limitations for all.[8] In this regard, Bonabi et al showed that the knowledge of doctors increased significantly after four months of using educational software [18,19] Ameri et al found that the use of educational software revealed a significant increase in pharmacy students' knowledge,[20] which is in line with the results of the present study.

Another outcome studied was students' practical skills. The results of this study showed a positive effect of this educational intervention on improving the clinical skills of students, which is in line with Sadati et al, Nason et al,[11] and O'Connor et al.[10] Sadati et al compared the effect of using flashcards on mobile-based education and found that mobile-based education (application) was more effective than the paper flash-card method on students' learning. Students spent more time studying due to easy and constant access to programs installed on their mobile phones. Therefore, researchers suggested using applications to teach operating room students about surgical tools.[12] In the current study, a mobile-based training app and a routine traditional teaching method also sought the same result, which showed the effectiveness of using such software compared to other methods. Nason et al also found an increase in the clinical skills of urology residents after using mobile-based educational software.[11]

Furthermore, O'Connor et al, after examining 250 medical interns, concluded that the use of medical software improved the functions assigned to them.[10] In line with the above studies, Nadir et al studied 58 residents and found that educational software was a helpful supplement for in-flight medical emergency training.[21] Mamtora et al also confirmed that the use of mobile software improved the quality of the accuracy of ophthalmology examinations and the practical skills of residents.[22] The results of the above studies emphasize the value of using a mobile-based education method, such as this study, in which its positive effects were demonstrated.

Limitations of the study

There are several limitations to the study, including a small statistical population, the possibility of accessing the training software using the ID of a classmate, and the variety of surgical instruments that students encounter in different operating rooms during their internship that may contribute to their learning.

Table 1. Comparison of students' knowledge between two groups

Group	Pre-intervention Mean + SD	Post-intervention Mean + SD	*P* value
Intervention	2.4 ± 4.9	15.96 ± 2.02	<0.001
Control	5.7 ± 2.22	10.72 ± 1.48	0.063
P value	0.26	<0.011	

*P is significant at $P<0.05$.

Table 2. Comparison of students' clinical skills between two groups

Group	Pre-intervention Mean + SD	Post-intervention Mean + SD	*P* value
Intervention	11.30 ± 3.23	17.55 ± 2.23	<0.001
Control	10.88 ± 2.87	13.63 ± 2.96	0.170
P value	0.61	<0.001	

*P is significant at $P<0.05$

Conclusion

The results of the current study affirm that educational aid software is an effective method that increases the level of awareness and improves the practical skills of operating room technology students; Therefore, the use of educational aid software as an effective method is recommended for training operating room students while pursuing their internship courses.

Acknowledgments

The researchers extend their appreciation and gratitude to the Research Vice-Chancellor at the Iran University of Medical

Sciences for the project's financial support and to all the operating room students at the Iran University of Medical Sciences for their participation in the implementation of the project.

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Funding

The Research Vice-Chancellor at the Iran University of Medical Sciences funded the project.

Ethical Approval

Ethics Committee approval was obtained from the Iran University of Medical Sciences (IR.JUMS.REC.1398.040) under the Ethical code IR.IUMS.IREC.1397.1020. The participants signed the written consent.

Competing Interests

The authors declare no conflict of interests.

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