Designing Multi-media Learning Software (MLS): effects on surgical technology students' knowledge, attitude and practice

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Abstract: Multimedia is an educational method in medical training. There is little evidence which instructional techniques and media are of advantage to impart knowledge more effectively and lead to better application of knowledge in the operation room. **Objective**: 1- The designing Multi-media Learning Software (MLS**)** 2- The effects of Multi-media Learning Software on knowledge, attitude and practice in surgical technology students in Kashan University of Medical Sciences. **Method:** This was a quasi -experimental study. At the first stage the information was collected for designing the software and then the software was made. After that the students filled the demographic data and pre-test questionnaire out. The software was trained to 60 surgical technology students who were sophomore and senior by second researcher at eight two-hour sessions. At the end of each session the researcher answered to questions of the students about learning in that session. One week after the last session, post-test with the same questions was given. Data were analyzed by statistical t-test and ANOVA. **Results:** The results showed, there are significant differences in practice (p=0.03), knowledge (p=0.01) and attitude (p=0.04) ranges after educating the software. Tukey-test showed, the significant difference in knowledge range is p=0.012.**Conclusion:** Multi-media Learning Software can improve knowledge, attitude and practice levels about techniques and instruments surgery.

Introduction

There are the varieties of teaching methods (1). Teaching by lecturing is one of the methods that has a long history in the training systems. Nowadays, this method is dominant in teaching. (2) Benner et al. described a gap between medical education and practice. Their recommendations included integration of classroom and clinical teaching techniques, moving from an emphasis on critical thinking to an emphasis on clinical reasoning, and to develop teaching methods that are focused on patient care. (3)Mikol described her successful use of small-group classroom discussions instead of lecturing in the classroom.(4) Garity discussed and promoted the use of case studies, debate, and discussion questions when teaching ethics, legal, and health policy to nursing students.(5) Newton & etal summarized and promoted several active learning and assessment techniques that she had successfully used when teaching baccalaureate nursing students. She discussed the lack of knowledge retention when learning relies only on memorization of facts. She went on to report that when information is made more interesting students are more likely to

remember it. (6) One of the basic goals of all educational systems is enhancing the quality of lectures and that may be done by applying the new teaching technologies. The new technologies should improve students' learning process as well as teaching process in college education. The later one should be completely adapted to students' needs and attitudes. (7) There are new methods for training that including: problem solving method, discussing, asking and replying, dramatic methods and multi-media software.(3) Multimedia is the pattern which led to infinite applications of computer technologies. The concept of this technology came into being with the appearance of sound cards, then compact disks, then came the use of digital camera, then the video which made computer an essential educational tool. Nowadays, multimedia expanded to become a field on its own. (4) Some of the advantages of these programs are:

1. They make the reading process a dynamic one instead of the written presentation of the texts printed in the book (8).

2. Presenting different drawings & pictures supports the clarification of ideas & communication of information.(9)

3. Moving easily from a presented subject to another provides a good chance for questions & discussions.(9)

4. Using different presentations like video clips along with maps or other kinds of presentations help to get the information closer to reality. Adding music makes the idea clearer and it attracts the attention of the learners (9).

5. They raise the attention & interaction between students & the educational subject (10).

6. They are graded according to the learner's abilities from easy to difficult ones 10).

7. They provide teachers with a new educational style & encourage curiosity (8).

8. They help teachers & learners look into topics from a broader perspective as each topic comprises enormous information (8).

9. They guide learners to peer learning (11).

10. They are concerned with providing simultaneous feedback (9).

11. They help learners remember & transfer their knowledge (11).

12. They support the user's work & innovation, which makes the possession of a computer a necessity for both the student & the teacher. (11)

Kaveevivitchai et al showed that educating by multi-media software in nursing students increased their knowledge and practice in vital signs assessment (12). But result of the study by Papastergiou etal Showed that using the multi-media software in surgical students learning did not increases their knowledge level. (13) Efendiog lu showed that educating by multi-media software effected on attitudes and skill medical students.(14) Liu have also reported that educating by multi-media software effected on practicing in surgical students but it don't effected on their attitude. (15) Due to lack of agreement on the effects of multimedia in surgical student's education, there was a question that is there any difference between the effects of multimedia software on knowledge, practice and attitude in surgical technology students.

Objectives

This study has two aims: the primary aim is to designing Multi-media Learning Software (MLS) and secondary aim is the effects of Multi-media Learning Software on knowledge, attitude and practice in surgical technology students in Kashan University of Medical Sciences.

Method
Design of multimedia

This performance program is auto-run .It needs the minimum facilities of the soft and hard wares in a
 personal computer. At the first, students' educational

needing evaluated by the questionnaire. This questionnaire consisted of questions about the procedures in the surgical field. Then, the obtained data entered in the software. The data including photographs of surgical instrument, surgical sets, educating in scrubbing, the types of surgical films in animation formations, educating in stitching, surgical knots, surgical positions, prepping and draping, sterilizing instruments, Catheters, Drains, Scalpel Blades, Gauze and Bandages. This information collected from reference books, articles and valid scientific websites and then verified by two general surgeons. They have commented about it. So the researchers placed them in related software with the help of a computer engineer. They make pages, and this information changed to executive file and then changed to the applicative file. After installing this software, its menu was displayed automatically. The menu of this software included 13 items:

1- Introduction, including introducing the operating room.

2- A brief history of surgery and surgical instruments.

3- The necessary instruments in operating room.

4- The equipment of operating room.

5- Performing shaves, prepping and draping, scrubbing and correcting method of hands' drying.

6- Putting surgical gloves on.

7- Surgical positions.

8- Types of the sutures and surgical knots.

9- Surgical films (animated and non-animated films).

10- About software

12- Guide

13- Exit

After designing the software, it changed to an educational multi-media DVD ROM.

Sampling

This is a quasi -experimental study which was performed on 60 surgical technology students in Kashan University of medical sciences in 2013. Sampling was purposive. The sample size formula to estimate the proportion was used (14). Inclusion criteria were 18-30 year-old students, studying in fourth & fifth semester, passed the surgical instrument- and surgical technologies in different surgeries examinations and also suture workshop. The exclusion criteria were absence of more than two sessions.

Ethical Considerations

In addition to the above mentioned ethical consideration, this study was approved by Deputy of Research, Kashan University of Medical Sciences (grant No: 9184). The research was also approved by the Research Ethics Committee of Kashan University of Medical Sciences. All students signed consent form before attending in research.

Questionnaire

At the first, students filled the demographic questionnaire out including age, sex, educational and marital status. Then they have been evaluated by self-evaluation questionnaire. The questionnaire was prepared after a vast literature review (15) and had three parts. The first part consisted of 20 items about knowledge in two domains of recognition (10 items), applying of operating room instruments and also surgical instruments (10 items). The second part included 20 items about practice in two domains of using instrument in surgery (10 items) and surgical techniques (10 items). The Third part consisted of 10 items about attitude in two domains of satisfaction about educational software (5 items), advantages and its disadvantages (5 items).The students answered them in a three choice Likert scale, with options ranging from 'never = 1' to 'always = 3' . The questionnaires were distributed by the researcher before- and after educating the software.

The questions designed based on the scientific information of the students. The validity was confirmed by ten experts of scientific members of Kashan- and Isfahan Universities of Medical Sciences. In process of content validity, two questions were added to questionnaire and two questions were excluded. Reliability confirmed by Cronbach's Alpha %87 in this research.

Procedures

After filling the pre-test questionnaire out by students, second researcher educated software in eight two-hour sessions during one month. Educating was step by step. At the end of each session, researchers answered to the students' questions about software and presented topics in that session. So their problems recognized and solved. The educational sessions were composed on Monday and Wednesday every week in the amphitheater of Nursing and Midwifery college in Kashan University of Medical Sciences from 14 to 16 p.m. The reason of selecting this time was that all the students had a free time in that moment and they could attend in the educating sessions. The multi-media software was in a DVD ROM form. One week after the last session, a post-test was taken with the same previous questions from research society.

Data Analysis

Data analyzed with SPSS software version16. Descriptive and analytic statistics was used to data analysis. Paired t-test used to compare students' knowledge, attitude and practice levels before- and after intervening. ANOVA test was performed to compare the three domains (knowledge, attitude and practice scopes) before- and after the intervention, as well. Tukey-test was performed to assess which domain is more effective. P value less than 0.05 were selected to be significant.

Results

Results showed that 65 percent of students who attended in this research were female and 35 percent of them were male, in the aspect of sex. 85 percent of them were single and 35 percent of them were married, in the aspect of marital status. The mean age of them was 21 ± 2.1 and 56 percent of them were in the fourth semester and 44 percent of them were in the fifth semester, in the aspect of educational status. The results showed that the mean number of the students' knowledge before- and after educating the software were 9.1 ± 1.5 and14.4 ± 2.4, respectively. Paired T- test showed significant difference in students' knowledge (p=0.01). The results showed significant difference in students' practice- (p=0.03) and attitude (p=0.041) levels before and after educating the software. (Table 1)After educating the software, significant differences in knowledge, attitude- and practice have been reported (P=0.01), in accordance with ANOVA test's analysis. Also Tukey-test showed that there is a significant difference in knowledge level (p=0.012) (Table 1).

Table 1: the mean knowledge, attitude and practice levels before and after educating the software

Scope	Before intervention	After intervention	Paired T- test
Knowledge	9.1±1.5	* 14.4±2.4	P=0.01
Attitude	5.4±0.3	9.2±0.5	P=0.04
Practice	8.3±2.4	12.9±1.6	p=0.03
ANOVA	F= 6.04 P=0.4	F=8.04 P=0.01	-----------

* Tukey test showed that there is significant difference in knowledge. (p=0.012)

Discussion

The significant differences in the mean knowledge-, attitude- and practice levels were reported, before- and after educating the software. These findings consisted with Nikolarizi et al study. He showed that education as educational package of software increasing the knowledge level (16). This means if education trained by the software, the students' knowledge and awareness would be increase. These findings consisted with Mladenovski and Kieser study who showed educating by multi-media influence on students' awareness which will be increased (17) Also Issa et al. showed that educating by the internet and computer effect on the students' knowledge level but does not on practice (18). The reason of these differences is owing to educating-method, time and education content. The significant

difference in the mean students' attitude has been appeared, this study results showed. Pape-Koehler and et al showed that the medical students' knowledge, attitude and practice levels have been increased by the software's educational surgery films (19). Also medical students' knowledge, attitude and practice levels have been increased by the educational software, in accordance with Teasdale et al, Abutarbush et al and Garland et al studies' results.(20,21,22). The mentioned studies' results are consistent with current research, owing to its similarity in educational content, number of educating sessions, scrubbing technique and putting the gown and surgical gloves on. The attitude questionnaires' results about learning the software showed that students have been ready for educating. These findings are adapted with views believed that students have ready and tending to educating, they have more primary information about the internet and educational software (23) but does not compatible with Rosenfeld et al study. They believed the routine education is better than educating software increasing the students' attitude and awareness (24). This study showed the significant difference in the mean practice level in students trained by the software. This result is compatible with Mata study. He found that educating with the internet makes the significant difference in knowledge-, attitude- and practice levels (25). Joe et al study performed with the aim of surveying the educating effects before surgery on practice, knowledge level and patients' skills after surgery by multimedia software showed that using this educational method increasing the patients' practice and knowledge level (26). Joe's study results are compatible with current study. It considers that functional education by surgical films and pictures can increase the practice and knowledge level. Perhaps its reason is that visual education has more effects on individual memory.A research conducted by Avci et al showed that education by computer and training compact discs had significant differences in awareness and practice levels but it did not have effect on person's attitude (27). These results are consistent with current research but the results from attitude analysis are not. The reason of this increased attitude in surgical technology students was owing to their more motivation in learning surgical- films and techniques trained by the educational software.

Conclusion

If the place- and time conditions and existence of helping educational tools to be optimal, the education with software package can effect on surgical technology students' knowledge-, attitude- and practice levels.

Suggestion

Because of the shortage of expert personnel in educating and so wasting of the time in educating by giving presentation, recommended that educating with multi-media software must be provided for surgical technology students.

Limitation

Study limitations included restrict sample size and other educational sources.

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