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Comparing the Effects of Education by Using Screencast vs. Conventional Educational Method on Learning, Skills and Satisfaction of Students in Bachelor's Degree in Anesthesiology, 2015

Abdolhamid Zokaei and Naser Hemati
School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran

Abstract: One of the effective educational tools is learning via e-technology. Screencast is a branch of e-learning. Although, screencast is extensively used in educational environments, presenting anesthesiology courses in Iranian university by this tool is a new approach. The present research aimed at comparing the effect of screencast in comparison with conventional education method (i.e., lecture) on learning, skill and satisfaction of anesthesiology students enrolled in bachelor's degree in anesthesiology. The present research used pre-and post-test method with control group. The subject of "Invasive monitoring of systemic blood pressure and central venous pressure" was selected for this research due to its frequent use in cardiac surgery anesthesia. The sample included 47 students in senior years of bachelor's degree in anesthesiology. They were divided randomly into two groups (screencast, N = 23 subjects) and control group (N = 24 subjects). The data collection tool consisted of a questionnaire of satisfaction as well as learning and skill tests. First, the learning pre-test was taken from both groups; the test group then received education during the semester by using screencast (independent variable) while control group was educated only in conventional form (professor lecture by using Power Point files). At the end, the data was collected by using learning test, skill and satisfaction on screen cast in pre- and post-test situations. The findings showed no significant statistical difference in students' learning in both groups; however, significant difference was seen in the practical skills level and students' satisfaction in test group in comparison with the control group. There was superiority of practical skills and satisfaction of students who had been under the effect of screen cast education based on Mayer principles. The lecturers and education policymakers are able to use the results of this research to select the modern teaching methods and merging them with educational modern technologies as per the case.

Key words: Mayer's multimedia principles, screencast, conventional education, learning, skill, satisfaction

INTRODUCTION

Teaching theoretical and practical skills in bachelor's degree program in anesthesiology in connection with subjects such as "invasive monitoring of blood pressure and central venous pressure" have been facing several challenges. The short time of education and limited contact with patients might reduce students' self-confidence in clinical actions. The professors of medicine education can use various educational methods in enhancing learning and clinical skills of students. One of the useful methods is to use screen cast as a branch of e-learning by using multimedia and the characteristics of effective educational designs.

Although, screencast tools such as Adobe Captivate and Camtasia Studio are extensively used in educational environments they are considered as a new tool in presenting anesthesia-related courses at Iranian medical universities. Moreover, in most studies performed in medical education field, it has been recommended to conduct more research studies in designing contents of the education, e-learning and blended learning in the cognitive overload subjects instead of working merely on the learning results and multimedia's effectiveness (participation central system and preventive solution for better head, Australia). In producing short screen casts with single subjects, in order to differentiate them with repetitive contents of lectures, one must emphasize on their pedagogical design (Brady *et al*., 2009).

Multimedia based learning and cognitive theory of multimedia learning were proposed by Mayer and they could be used in designing educational materials to optimize learning by blending the visual and audio elements, text and image to minimize the cognitive load and maximizing learning in terms of saving and sharing

Corresponding Author: Naser Hemati, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran

knowledge with new situations, reducing cognitive load and reinforcing significant and deep learning (Mayer and Morno, 2003; Parlakkilic and Karslioglu, 2013).

The term "screencast" means taking images from monitor and sound recording at the same time. Screencast is mainly used for recording Power Point files with software such as Camtasia Studio. These programs also have the ability of recording image and professor's sound by using webcam that are associated with simultaneous record of slides and include diagrams, tables, animation and videos; this provides a rich source of visual data for better understanding of educational subjects.

The university environments have anticipated and looked forward to screencast technology in various educational majors. Most research studies have shown that using screencast has been associated with positive and different learning results which include enhancing learning of concepts and procedures, improving satisfaction, motivation and engagement and has positive effect on the views on the period and reducing anxiety (Kelly *et al*., 2009; Thompson and Lee, 2012; Morris and Chikova, 2014; Esgi, 2014).

On the other hand, by using screencast and sharing their lectures beyond classroom, professors have opportunities in extending relationship and interaction and lowering focus on lecture methods in conventional education (Grabe and Christoperson, 2008; Grover and Millunchick, 2008). With respect to the mentioned items, the purpose of the present research was to compare the effect of using screencast vs. conventional educational method on the learning, skills and satisfaction of senior undergraduate students in BS program in anesthesiology in 2015 in our university.

MATERIALS AND METHODS

The present research used pre- and post-test plan. The statistical population of present research included all students of 4th year of bachelor's degree in anesthesiology at Kermanshah University of Medical Sciences, Kermanshah, Iran. Due to restriction in research implementation, sampling was performed by using those who were in access. The research sample included 47 students divided randomly into two groups (screencast group, N = 23) and control group (conventional method such as lectures presented by Power Point files, N = 24).

As independent variable in screencast-based method group, "invasive monitoring of blood pressure and central venous pressure" which was designed based on Mayer's multimedia principles was selected to be presented to the students in both groups. The students in both groups took the author-developed learning test for calculating the reliability and creditability. After taking the pretest, screencast group students were presented with screencast designed based on Mayer principles by e-mail to have independent study during the semester. The control group appeared as learners in the classroom of the university professor who taught the subject of "invasive monitoring of blood pressure and central venous pressure" in four hours using Power Point. The contents of the subjects in both classrooms were equal and the difference in groups was in the implementation method. Ultimately, on the declared and settled time, at the end of education semester, the learning, practical skills and satisfaction tests were performed on both test and control groups.

Description of screencast: The professor's lecture was recorded before the course started by using Power Point software and the trial version of Camtasia Studio 7.1, H6 Handy Recorder and desktop webcam. Based on the researches performed, 10-20 min time was suggested as a suitable time for each screencast, the course "invasive monitoring of blood pressure and central venous pressure" was divided into two sections, 10 min each (Mullamphy *et al*., 2010). The constituent elements of each screen included these items: clear descriptive topics, expression of learning goals, introduction, different stages "invasive monitoring of blood pressure and central venous pressure" step by step along with the theoretical issues and practical monitoring of each stages that include:

- Preparation of equipment and tools
- Suitable position of the patient for catheter implant
- Method of implanting catheter by the physician and expert's assistant in implanting catheter
- Connection of catheter to monitor
- Method of monitor adjustment
- Registry of observations and findings

Ultimately, a brief conclusion and learning sources were put in access of students. In addition, for encouraging thought and better process information with significant methods, creating mental challenge and active learning, the professor tried to discuss examples, non-subjects and usual questions in connection with the subject and provide their answers. It should be noted that the picture of university professor was shown in the

beginning of screencast. Two video films of 10 and 14 min length in MP4 format were produced for maintaining the quality and suitable volume of output file and were sent to the students in test group via email in the beginning of course semester.

Data collection tools: Data was collected through a checklist for demographic information, the pre and post-test questionnaires, the checklist of standard practical skills and a satisfaction questionnaire. The demographic information included age, gender and marital status. At the beginning of the semester, all students took the pretest in same conditions in person and once more at the end of the study. All students took post-test for measuring their learning level. The questions of both groups were the same and were developed by the course professor based on published papers, reference books and academic experiences of the professor. Each test included 16 multiple choice questions for studying the information level with 5 scores value and two matching questions for examining the amount of skill learning theoretically with 10 scores for each question. The passing mark was 60 out of total 100. The difference in pre and post test scores was considered as the results of students' learning. The practical skills of students were studied in 87% reliability coefficient based on standard practical skills checklist and different stages of "invasive monitoring of blood pressure and central venous pressure" in operation room by personal attendance. The reliability of learning and skills test was calculated by using Kuder Richardson method which yielded 0.73 reliability in learning test and 66% in skill test. The t test and Bauman Whitney test were used for determining the difference between the scores of the two groups. The $p<0.05$ value was considered as significant.

A questionnaire consisting 12 questions with Likert's 4th scale (completely agree, agree, disagree, completely disagree) was used for measuring students' satisfaction. The questionnaire was presented to the test group students at the end of post-test for measuring the effectiveness and satisfactions of learning via screencast. Some of the items were taken from the questionnaire of students' perception on Brady *et al.* (2009) and some of the items were developed by the researcher. The students' satisfaction score in each area was set as maximum 48, the acceptable satisfaction in this study was =+30 scores and score <30 was regarded as <30. At the end of the questionnaire, an open answer question was given that enabled students to express their personal opinion on the course if as such was not asked in the questionnaire. Cronbach alpha was used for calculating the reliability of the satisfaction questionnaire and the reliability value of 0.87 was obtained.

Statistical analysis: The SPSS Software (Ver. 16.0) was used for data analysis. The descriptive indices including mean, Standard Deviation (SD) and frequency were used to report the results. For analyses, the t-test and Mann-Whitney U test were used.

RESULTS

Background variables: Most students in both screencast and control groups were single (94.1%). Mean age of the students was 21.4±3.6 years and most of them were in the age range of 21-26 years with no significant difference between the two groups in terms of age (Table 1).

Analysis of pre and post-test scores: As seen in Table 2, in the pre-test learning, mean I(SD) score in control group was 22.4±11.8 and in screencast group thiswas 25.2±12.4 ($p = 0.236$). Mean (SD) difference between pre and post-test scores in control group (54.6±14.2) and screencast group (58.2±13.6) was not statistically significant.

Table 1: Demographic characteristics of 47 students in bachelor's degree in anesthesiology

Age (mean SD) year	Control (N = 23)	Screencast (N = 24)	t	p values
Gender	21.3 (3.6)	21.4 (3.6)	0.55	0.57
Female	13 (56.5%)	15 (62.5%)	0.76	0.43
Male	10 (43.4%)	9 (37.5%)		

Table 2:Comparison of mean (±SD) learning and clinical skillsscoresin the two studied groups

Score	Control (N = 23)	Screencast (N = 24)	p value
Pre-test	22.4 (±11.8)	25.2 (±12.4)	0.64
Post-test	76.8 (±13.4)	82.2 (±12.6)	0.236
Pre and post-test	54.6 (±14.2)	58.2 (±13.6)	0.35
Clinical skill	81.2 (±4.6)	94.3 (±4.8)	0.02

Table 3: Students' satisfaction toward screencast

Students' satisfaction	Agree/completely agree (%)
Screencast increased my enthusiasm in learning	100
Screencast causes enhancement and improvement in my learning	99.24
Screencast helped me in being actively engaged in learning process	97.96
I like screencast because I can learn with my own speed	97.72
Screencast is a suitable method for learning	98
Using screencast reduces learning time	96.21
Screencast of programs (sound, image, video, etc.,) have sufficient quality.	96.18
Screencast is an effective method for reviewing the contents of the course and/or some of the complicated subjects	97.72
By using screencast, I could learn the skills related to the course in step by step form	98.2
During the course, the professor raised useful questions that made me think deeply	93.82
The course professor talked sincerely and in dialogue from which increased my enthusiasm in learning	92.24
Screencast is better than conventional education	96.07
I will use screencast in the future for learning purposes	92.27

However, in clinical skills tests, the statistical difference between control group (81.2±4.6) and test group (94.3±4.8) was significant ($p<0.05$).

Analysis of students' satisfaction: As shown in Table 3, the students were satisfied with this method and described this information template useful and effective. None of the students chose the options "disagree" or "completely disagree". In fact, 100% of the students marked "fully agree" for the item "screencast increases my enthusiasm to learn" which reflects satisfaction of the course. In addition, most criteria which covered pedagogic approaches and education design in the questionnaire were ranked with an average of 93.82% or higher in connection with learning enhancement.

DISCUSSION

Screencast was an effective tool in teaching clinical skills in "invasive monitoring of blood pressure and central venous pressure" when compared to traditional/conventional method. These findings are in agreement with the findings of previous studies. Razik *et al.* (2011) study, the preferences and views of Ophthalmology Residents in Ontario, Canada on the potentials of screencast applications in constant medical education as an educational tool were studied. The pre-recorded screencasts were sent to the participants online. More than 95% of the participants expressed positive views on screencasts application in future programs in achieving educational goals. Evans, (2011) studied the reaction of Briton and Sussex College students towards a series of screens which contained lectures on embryology. Most students had positive views towards screencast, especially at the end of the semester and in preparation for final exams. The test results showed screencast had positive effects on the learning results of students. From the viewpoint of present researchers this shows today students anticipate learning education contents by screencast than conventional education. It should be mentioned that although in some studies, the students admitted the usefulness of screencasts, they were more inclined in using them as supplementary sources in their learning (Grover *et al.*, 2008). In addition, the results of the research of Mullamphy *et al.* (2010) showed most students suggested using this tool as supplementary contents; only half of the students assumed screencasts could replace face to face education which is in disagreement with the findings of the present research in proposing it as education supplementary.

In the present research, the authors tried to use the Mayer's principles for the purpose of improving education quality. For example, in designing educational contents by using the principle of adjacency, instead of text based education, the animation and speech were used for recording the film from screen. In addition, for establishing communication with the contents, the relevant graphics in good quality along with narration were used. Most students stated that screencast had sufficient quality in sounds, image and video (96.18%). In the research literature, effective learning with multimedia has been suggested (Arulsamy, 2012) that could be facilitated with the specifications of display control, stop, etc. The importance of using screencasts for reviewing information by biomedicine students who participated in Brittain *et al.* (2006) research has been specified as well. In addition, the principle of personalization (Clark and Mayer, 2011) was studied in the students' satisfaction questionnaire. As Table 3 shows, 99.24% of the students admitted that "the professor talked in a conversational and sincere tone that increased my interest in learning".When the lecturer talks in a conversational and sincere tone with human voice rather than machine-produced voice studentswill learn better. This is due to the experience of social presence (The Principles of Sound and Personalization). Besides this in the present research, the professor's sound and picture were used in the beginning of the narration which was also interesting for the students.

One of the other items which should be emphasized in designing educational contents was to break the concepts and presenting work procedures step by step in order to improve learning and performance of students in connection with unfamiliar subjects and more focus on educational contents. Most students agreed with the item "By using screencast, I could learn skills associated with the course in step by step education method" (98.2%). Lee *et al*. (2007), in studying the effectiveness of clinical skills education, used DVD-based education for medicine and nursing students. The results showed that video application for education in comparison with conventional educational procedures led to improvement of clinical skills of education and was statistically more effective. However, no significant difference was found between the two groups in terms of satisfaction level, anxiety, orself-confidence. The result they achieved regarding clinical skills improvement is in agreement with ours. However, it is inconsistent in terms of satisfaction towards education.

Ultimately, the findings of the present research showed learning with screencast could reduce the required time for learning. In conventional education environment, the professor should teach the theoretical and practical subjects in four hours while in the present research, the students could learn the subject in 20 min with their own personal pace. This finding shows educational short screencasts could be useful tools in supporting learning with personal pace.

CONCLUSION

Teaching with screencasts could improve educational performance of students by suitable education design. In addition, it helps in presenting curriculum and producing education courses. Screencasts, as a template in presenting educational contents not only could be used in remote learning programs but also it can be used in lieu of conventional educational methods. This template of presence helps the faculty members to focus on receiving students' attention to important subjects and provide changes in their teaching plan.

REFERENCES

Arulsamy, S., 2012. Multimedia in medical education. J. Med. Sci., 1: 7-12.

Brady, C.S., K.M. Scott, L. Taylor, G. Carabetta and S. Clark, 2009. The value of using short-format podcasts to enhance learning and teaching. Res. Learn. Technol., 17: 219-232.

Brittan, S. and P. Glowacki, 2006. Podcasting lectures: Formative evaluation strategies helped identify a solution to a learning dilemma. Educause Q., 29: 24-31.

Clark, R.C. and R.E. Mayer, 2016. E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning. John Wiley & Sons, Hoboken, New Jersey, Pages: 252.

Esgi, N., 2014. Comparisons of effects of student and teacher prepared screencasts on student achievement. Eur. Sci. J., 10: 1-6.

Evans, D.J., 2011. Using embryology screencasts: A useful addition to the student learning experience?. Anat. Sci. Edu., 4: 57-63.

Grabe, M. and K. Christopherson, 2008. Optional student use of online lecture resources: resource preferences, performance and lecture attendance. J. Comput. Assisted Learn., 24: 1-10.

Grover, T.P., J.M. Millunchick and C. Bierwert, 2008. Work in progress-using screencasts to enhance student learning in a large lecture material science and engineering course. Proceeding of the 38th Annual Conference on Frontiers in Education, October 22-25, 2008, IEEE, Saratoga Springs, New York, ISBN:978-1-4244-1969-2, pp: 1-13.

Kelly, M., C. Lyng, M. McGrath and G. Cannon, 2009. A multi-method study to determine the effectiveness of, and student attitudes to, online instructional videos for teaching clinical nursing skills. Nurse Edu. Today, 29: 292-300.

Lee, J.C., R. Boyd and P. Stuart, 2007. Randomized controlled trial of an instructional DVD for clinical skills teaching. Emergency Med. Australasia, 19: 241-245.

Mayer, R.E. and R. Moreno, 2003. Nine ways to reduce cognitive load in multimedia learning. Edu. Psychol., 38: 43-52.

Morris, C. and G. Chikwa, 2014. Screencasts: How effective are they and how do students engage with them?. Active Learn. Higher Edu., 15: 25-37.

Mullamphy, D.F., P.J. Higgins, S.R. Belward and L.M. Ward, 2010. To screencast or not to screencast. Anziam J., 51: 446-460.

Parlakkilic, A. and Y. Karslioglu, 2013. Rapid multimedia content development in medical education. J. Contemp. Med. Edu., 1: 245-251.

Razik, R., Z. Mammo, H.S. Gill and W.C. Lam, 2011. Academic screencasting: internet-based dissemination of ophthalmology grand rounds. Can. J. Ophthalmology, 46: 72-76.

Thompson, R. and M.J. Lee, 2012. Talking with students through screencasting: Experimentations with video feedback to improve student learning. J. Interactive Technol. Pedagogy, Vol. 1.