Views of Nursing Students Conducting the Virtual Reality Application of Tracheostomy Care Based Gaming

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Abstract

Introduction: Game-based virtual reality application is a simulation method in which a real life situation is gamified after being transferred to a computer environment.

Aim: The aim of this study is to find out the opinions of nursing students who used the game-based virtual reality application for tracheostomy care.

Method: The study consisted of 43 students that were enrolled in the Fundamentals of Nursing course in the spring term of the 2016–2017 academic year. First of all, a video file was made according to the steps of tracheostomy care and a scenario for the game-based virtual reality application was written. The game was installed on the mobile phones of students who participated in the theoretical course of tracheostomy care, completed the practice and agreed to participate in the study. Students were instructed on how to play the game and were told to play the game for a week. At the end of the week, students were told to share their opinions on the game. Numbers, percentages, means and standard deviation were used as descriptive statistical methods while evaluating the data.

Results: The three positive statements about the use of the application were that "the information in the application was legible" (4.37 ± 0.78), "the game could be completed without any problems", (4.86 ± 0.63), and "the steps of the process were able to be carried out" (4.72 ± 0.70).

Conclusion: It is proposed that the game-based virtual reality application can be used for the teaching of tracheostomy care, which requires the implementation of the principles of surgical asepsis, it is complex, hard to visualize and to be learned by students and less likely to be encountered in clinics, in nursing education.

Keywords: game based virtual reality, nursing student, tracheostomy care

Introduction

In order to reach the aims of nursing education, the use of simulations is becoming increasingly widespread as it allows students to gain experience, without risking safety of patients, in an environment that recreates a real hospital environment (Cant & Cooper, 2009; Oermann & Gaberson, 2014). There are various simulation methods that have an important place in nursing education. One of these methods is virtual reality application (Boz Yüksekdağ, 2015; Smith & Hamilton, 2015). Virtual reality is a three-dimensional computer-based simulation that provides a feeling of being in any place by providing data to our sensory organs (Durmaz Edeer & Sarıkaya, 2015; Jenson & Forsyth, 2012). The virtual reality application allows students to repeat the process as many times as possible as they observe their mistakes in a safe and non-threatening virtual

laboratory environment (Boz Yüksekdağ, 2015; Göriş, Bilgi, & Bayındır, 2014). The game-based virtual reality application is the gamification of a real life situation that is later transferred to the computer environment. It can be played on computers, tablets and mobile phones. Playing the application on mobile phones makes it easier for students to access information, and allows them to use it as supportive material for formal education at any time and place (Ma, Jain, & Anderson, 2014). It is stated that the game-based virtual reality application developed the knowledge and skills of nursing students, increased their motivation and self-confidence, made the learning process fun and ensured them to take part in the process actively by giving them feedback (Chia, 2013; Koivisto, Niemi, Multisilta, & Eriksson, 2017; Lancaster, 2014; Smith et al., 2016).

Tracheostomy care, one of the subjects of the course within the Fundamentals of Nursing, is an application in which the steps for the principles of surgical asepsis and process must be followed in order. In addition, the strict rules that must be followed during the process make it harder to comprehend the process. Taking into consideration the importance and difficulties of applying psychomotor skills and the changes in learning methods and technological developments in nursing, it is believed that students could improve their knowledge and skills by repeating the procedure for tracheostomy care many times at any time and place, without being present in a laboratory as they enjoy the game-based virtual reality application, as a support to formal education. Therefore, we attach great importance to the opinions of students who played it.

Aim

The aim of this study is to find out the opinions of nursing students who are using the game-based virtual reality application for tracheostomy care.

Method

This study is a usability study in which the opinions of students about this application were sought in order to determine the usability of the game-based virtual reality application. The study consists of 43 students who were taking the course of the Fundamentals of Nursing II in the spring term of the 2016–2017 academic year in the Faculty of Health Sciences at Gazi University. The requirements to be included in the study were: taking part in the theoretical course, demonstration and small group work concerning tracheostomy care, having an android mobile phone, having internet access and willing to participate in the study.

The data were obtained from the "Game-based Virtual Reality Application Evaluation Form", prepared by the researchers in accordance with the literature (Farra et al., 2016; Verkuyl, Atack, Mastrilli, & Romaniuk, 2016). This form consists of two parts. The first part consists of two open-ended questions that include the opinions of students on the application and the second part consists of 16 questions that include 5 Likert-type scale, in which the opinions on the application are evaluated.

The steps for tracheostomy care were prepared and the opinions of three faculty members in the field of the Fundamentals of Nursing were taken before the software of the game-based virtual reality application was created. The final version of the steps was created according to the opinions of the experts and the video was made in accordance with these steps. Then, a researcher prepared the game scenario, which includes images suitable for video content. The scenario was presented to three faculty members, who are experts in the field of the Fundamentals of Nursing, and a faculty member who is an expert in Computer Technologies and Teaching, and it was finalized in line with

the suggestions received from them. The software started to be written after the scenario and video were prepared. A faculty member from the Department of Computer Technologies and Teaching at Karadeniz Technical University guided the writing process of the software.

The game-based virtual reality application that includes tracheostomy care was designed by using Adobe Flash Professional CC and Adobe Flash CS6. Action Script 3.0 was used as the coding language. The objects were drawn through examination of real objects on Adobe Flash Professional CC. The application consists of the following six stages and the duration of the game is 10 minutes. The game starts after the name and surname of the student is saved (Fig. 1). The student can use the game anywhere without internet connection. However, there has to be an internet connection to send the playtime to the e-mail address of the researcher when the game is completed.

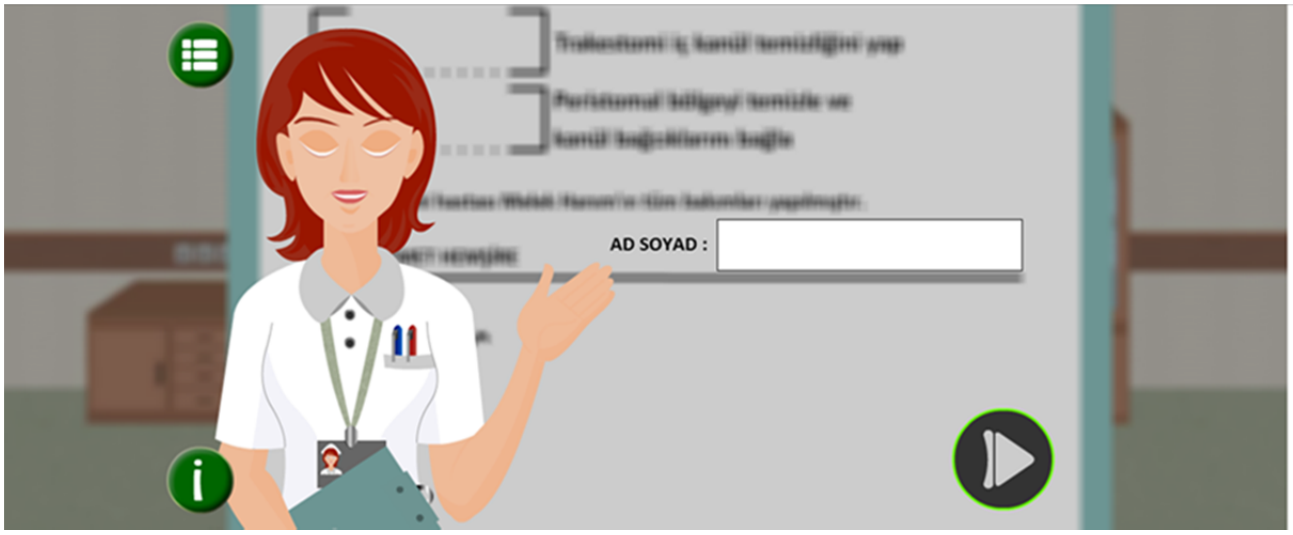

Fig. 1 **Registration screen while entering the game**

The aim of the game is to ensure that Nurse Demet follows and saves the steps of the procedure for tracheostomy care that is applied to Ms. Melek. The game begins with Nurse Demet giving a brief introduction about the condition of Ms. Melek. It is played in three stages: tracheostomy aspiration, cannula cleaning and peristomal skin cleaning. Nurse Demet guides the student throughout the whole steps.

The study was carried out between 17 April 2017 and 24 April 2017. The game-based virtual reality application was installed on the mobile phones of the students. They were told that they could play the game anywhere, anytime and as long as they wanted. Students were given seven days to play the game as the game was automatically encrypted at the end of the seventh day.

The data obtained from the study was analysed using SPSS (Statistical Package for Social Sciences) for Windows 22.0. Number (n), percentage (%), mean ($\bar{x}$) and standard deviation (SD) were used as descriptive statistical methods while evaluating the data.

Results

88.4% of the students who participated in the study were female graduates from science high schools and 81.4% of them preferred to study nursing; 90.7% of them stated that they were glad that they preferred to study nursing, and 86% of them stated that they used digital tools in their studies.

Out of the digital tools, 58.1% of the students noted that they used cell phones the most in their studies, and 67.4% of them stated they played virtual games on mobile phones.

Tab. 1 **Distribution of the students' views about game based virtual reality**

Views of the students	Positive	Application of Game Based Virtual Reality	n (43)	%
		The game was fun and realistic	17	39.5
		The game was practical and theoretically sufficient	12	27.9
		It allowed them to reinforce what they have learnt	8	18.8
		The steps allowed them to remember the procedure better	6	13.9
	Negative		n (33)*	%
		The game was progressing slowly	31	93.3
		They did not get any warnings when they made a wrong move	1	3.2
		The game lacked information in terms of guidance	1	3.2

* Percentages are calculated through n.

Overall, 39.5% of them said that the game was fun and realistic, 27.9% of them said the game was practical and theoretically sufficient, 18.8% of them said that it allowed them to reinforce what they had learnt and 13.9% of them said that the steps allowed them to remember the procedure better. Next, 93.3% of them stated that the game was progressing slowly, 3.2% of them said that they did not get any warnings when they had made a wrong move and 3.2% of them stated that the game lacked information in terms of guidance (Tab. 1).

Tab. 2 **Distribution of the means of students' views about the application of game based virtual reality**

Students' statements	$\bar{x} \pm SD$*
1. Easy to progress	4.02 ± 1.03
2. Text information on the screen was clear	4.37 ± 0.78
3. Easy to read the information on the screen	4.86 ± 0.41
4. I understand what to do in each level	4.00 ± 1.19
5. I did not encounter any technical problem while playing	2.93 ± 1.37
6. Visual quality was good	4.53 ± 0.73
7. Its use was entertaining	4.14 ± 1.03
8. Fast enough	2.34 ± 1.13
9. It prepares the student for clinic	4.48 ± 0.70
10. I want to play frequently	3.55 ± 1.24
11. I find it rather useless and complicated	1.51 ± 1.03
12. It can be played without any need for technical terms	4.23 ± 1.23
13. The scene was visually authentic	4.20 ± 0.86
14. I was able to accomplish the steps of tracheostomy care	4.72 ± 0.70
15. I was able to complete tracheostomy care	4.86 ± 0.63
16. The instructions were guiding enough	4.09 ± 1.15

*Min: 1; Max: 5; SD = standard deviation; $\bar{x}$ = mean

Students gave 4.86 ± 0.49 points to “I was able to read the information on the screen easily”, 4.86 ± 0.63 points to “I was able to complete the tracheostomy care” and 4.72 ± 0.70 points to “I was able to follow the steps for tracheostomy care”, and these three statements became statements with the highest scores given by the students. The students gave the lowest scores for the following statements: “I find it quite unnecessary and complicated” (1.51 ± 1.03), “I did not have any technical problems while playing the game” (2.93 ± 1.37) and “It was fast enough” 2.34 ± 1.13) (Tab. 2).

Discussion

The use of game-based virtual reality applications in teaching increases the interest and motivation of the new generation students to the subject (Oermann & Gaberson, 2014; Verkuyl et al., 2016). Such applications enable students to put theoretical knowledge into practice and allow them to repeat the procedure as many times as possible without risking the lives of patients (Cant & Cooper, 2009; Nehring & Lashley, 2009).

Many of the students who played the virtual game on the management of chronic obstructive pulmonary disease prepared by Chia (2013) stated that they did not have any problems while completing the game, the game met the learning needs of the students, it was interesting and that it could be used for training. Similarly, the students in our study stated that the game was educational, fun and realistic, stuck in the mind and was practical, reinforced what they have learned, the steps of the process stuck in the mind and that it was both theoretically and practically sufficient. However, a large part of the students stated that the game progressed slowly. The reason for this is thought to be the insufficiency of the technical equipment of the game. It was also determined that the students gave low scores to “It was fast enough” and “I did not have any technical problems during game play”.

In the study conducted by Foronda et al. (2016), most of the students stated that the virtual reality application was easy to use and appropriate for nursing activities. The students also provided feedback such as “I really like it!”, “I think it’s informative and very useful”, “More intuitive”, “We can control the application”, and “The application looks professional”.

Similar to the result of our study, the students who played the virtual game on cardiopulmonary resuscitation prepared by Boada et al. (2015) noted that the game was easy to play. Unlike the results of our study, specialists who tried intravenous catheter application with virtual reality in the study conducted by Reznek et al. (2002) gave lower scores for the ease of use of the application.

In a study conducted by Lancaster (2014), the students who played the game where a virtual patient was treated with postoperative morphine gave high scores to “The content is suitable for the purpose”, “It improved the problem-solving skills of students”, “It supports students during the learning process”, “It gives feedback” and “The game was realistic”. In support of these findings, students also gave high scores to “It prepares students for clinical practice” and “The visual environment looked realistic” in our study.

Similar to the results of our study, nurses and students gave the highest score to “The game was fun”, whereas they gave the lowest score to “Students knew exactly what they had to do in each step” for the game-based virtual reality application that Verkuyl et al. (2016) developed to improve the paediatric skills of students. In our study, the students gave the highest scores to “The visual quality of the game was good” and “The visual environment looked realistic” whereas they gave the lowest scores to “I did not have any technical problems during game play”.

Conclusion

In this study, it was found out that the use of a game-based virtual reality application was effective for students' learning as a support to nursing education in the teaching of psychomotor skills such as tracheostomy care, which was important in terms of the steps, required the implementation of the principles of surgical asepsis, was complex, hard to visualize and which was to be learned by students and less likely to be encountered in clinics. Students should be informed about the use and importance of game-based virtual reality applications as a supplementary tool in formal education.

Ethical Aspects and Conflict of Interest

The ethics permission and institution permission were obtained from the Ethics Commission of Gazi university (Number: 10 and Date: 11.07.2016). Before the implementation, the students who were included in the research were informed about the purpose of the study and the research plan and their written approval was taken. There is no conflict of interest.

The article is composed of the project titled "The Impact of the Application Game Based Virtual Reality on the Nursing Students' Learning of Tracheostomy Care" with the code 47-2017-11, supported and financed by Gazi University Scientific Researches Projects. Purchase of service was pursued for the software of the application game based virtual reality.

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