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Innovative approaches in nursing education[1]

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Abstract

In the entire world, higher education programs are trying to broaden their educational capacity by applying innovative strategies to meet their future needs of labor. Educators in the field of nursing also state that there is a need for deep improvements in the current curriculum for innovation. The use of innovative practices in education allows educators to prepare nursing students for current clinical settings. The use of simulations in nursing training has become increasingly prevalent and important in order to achieve adaptation to clinical practices and overcome difficulties that may be encountered in clinics. With increased educational technologies, in order to meet the changing expectations of the generation x that has grown up in a digital era, "simulations that do not contain high technology" are increasingly being replaced by "simulations that contain advanced technology". In this context, augmented reality, virtual reality, games and haptic systems are becoming prevalent in training nurses. While the effectiveness of technological education practices has been determined by some studies, in this study, it was planned to explain current innovative examples of this in line with types of simulations.

Key words: "nursing education and simulation", "augmented reality", "virtual reality", "serious game", "mobile application"

Introduction

The use of innovative practices in education is important because nursing is a profession that requires cognitive, psychomotor, and attitudinal behavior (Terzioğlu et al., 2012, 16). While these practices increase the attention of the students, it saves education from monotony and ensures the retention of instruction by providing active participation of the learner (Şendir & Doğan, 2015,49). Because of today is technology era, the use and development of new learning tools have increased at every stage of nursing education. (Edeer & Sarıkaya, 2015, 121; Göriş et al., 2014,9). These developments in technology and education has brought together the coexistence of these two fields and has gave the opportunity to spread the simulation applications and tools which are widely used in increasing technical and non-technical skills in nursing education (Karadağ et al, 2015, 36; Terzioğlu et al., 2012,16).

Simulation is defined as a method in which a student gains artificial or virtual experience without taking the risks of a real situation in an activity that reflects the real-life conditions (Terzioğlu et al., 2012,16). Simulation training for nursing students increases self-learning and critical thinking skills, improves the skill of using technology, integrates theoretical knowledge in an integrated manner, and corrects the difficulties experienced by students in clinical settings. Simulations used in nursing education and education is categorized as low-tech simulations and high-tech simulations (Table 1)

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Table 1: Simulation applications used in teaching nursing principles

SIMULATION APPLICATIONS	
Low-tech simulations	**High-tech simulations**
Three-dimensional organ models	Screen-based simulations
Basic plastic mannequins	Realistic, high-fidelity procedural simulators
Animal models	Realistic high-tech interactive human simulator
Simulated / standardized patients with human cadavers	Augment reality, virtual reality and haptic systems

In this article, examples of existing innovative practices in the teaching of nursing principles are planned to be explained in the direction of simulation types.

Simulation types and innovative applications examples in nursing education

Traditional learning methods and environments are thought to be inadequate to respond to the divergent expectations of the z-generation that was born and grown in a digital age. For this reason, it has become imperative for educational institutions to support their curricula with innovations and advanced technology "(Somyürek, 2014,63; Jöud et al., 2010,70). In nursing education, there have been developments such as the fact that the applications are based on the evidence in recent years, the training of the students with the aim of transforming knowledge into a skill, the standardization in patient care and the increase in accreditation studies. Young et al. (2012) reported that the experimental group receiving training based on simulation showed significantly higher communication skills and clinical competence scores at a significantly higher level than the control group. Leonard et al. (2010) demonstrate that simulation-based inter-professional learning experiences provide rich learning opportunities for junior and senior nursing students. Cordeau (2010) noted that this teaching / learning strategy would better meet student needs and learning outcomes by understanding the implications and implications of clinical simulations while designing, implementing, and evaluating individual clinical simulations of students. Malarvizhi et al. (2017) studied the effect of clinical simulation on neonatal resuscitation skills training in nursing students, the mean knowledge score in the pre-test was 8.83 ± 2.80, and the post-test score was 21.7 ± 2.68. The comparison of pre-test and post-test knowledge scores in NRP was 12.89 ± 3.92. This finding has shown that clinical simulation transforms the pedagogy of nursing education from theory and clinical learning to theory to simulation and clinical practice. Each of these studies can facilitate nursing innovation studies by increasing nurses' critical thinking and decision-making skills (ICN, 2009). Innovation has a vital importance in the development and maintenance of quality in nursing care (Berndt et al., 2015,401).

Today, because of the change in nursing education requirements, the decrease in clinical applications, the increase in number of students and inadequate number of educators, "low-tech simulations" gradually left their place to "high-tech simulations". In this context, augment reality, virtual reality, serious game, and haptic systems are spreading in nursing education. These

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simulators, offering virtual objects or environments that simulate natural-real environments, include computer-based high-level technology. However, nowadays, with the progress of technology, examples of mobile applications carried out via telephone or tablet are also found in the literature because of the multiplicity of applications of such applications (Özel Erkan, 2016,21; Berndt et al., 2015,401; Johansson et al., 2012,54).

Augmented reality

The concept of AR in education comes to the forefront in terms of providing advantage according to the traditional methods and technologies to attract attention to the new generation called digital generation and responding to the search for effective methods and environments to support and enrich education (Garrett et al., 2015,298; Carlson & Gagnon, 2016,123; Somyürek, 2014,63). Augmented reality technology is the environment in which people interact with virtual objects placed on the real-world environment through various applications (Çetinkaya &Akçay,2013,23; Demirer & Erbaş, 2015,802; Ferguson et al., 2015,10).

AR has great potential effects on learning and teaching, and research shows that AR has many benefits in education. AG teaching environments encourage students to use their imagination and creativity by creating more in-depth learning, by providing students with different aspects of the objects that are difficult to learn, and by drawing their attention to the subject to be learned. It also helps students to create objects that cannot be obtained from the real world by transforming them into three-dimensional objects by providing a learning environment suitable for their own learning speeds and their learning styles (İbili & Şahin, 2013,10; Vaughn et al., 2016,402; Young et al., 2012,312).

In Aebersold et al.'s (2018) study, nasogastric tube placement skill, an important skill in nursing teaching, was tried to be gained by a simulation training through iPad. Within the scope of this study, nursing students caught the opportunity to apply Nasogastric tube placement skills with the augmented reality in which their anatomy was visualized. As a result of the study, students in experimental group when compared to the students in the control group, indicated that they were satisfied with the training because they could mark the skill-specific basic areas, visualize the internal organs, the program is easy to use and makes the learning permanent. In a study by Garret et al. (2015), augmented reality technology was used to enhance the acquisition of nursing skills in clinical skills laboratories. Applications such as oxygenation, handwashing, infection control applications, tracheostomy and catheter care for freshman nursing students was visualized with mobile tools through the materials such as drainage equipment, injector, container placed on the writing board by instructors. Ferrer-Torregrosa et al. (2015) conducted an anatomy training by book practices with augmented reality. For all students studying in the medical field, the importance of teaching anatomy is indisputable. In this context, the transformation of the anatomical structures in the book into a living structure with increased reality will lead to permanent learning in the students.

Virtual reality

Virtual Reality is a three-dimensional simulation model that allows participants to interact with a dynamic environment created by computers and that gives the participants a sense of reality (Tsai et al., 2018,10; Bayraktar & Kaleli, 2007,6). Virtual simulations used in the teaching of complex and difficult functions in the field of health education; are defined as electronic systems in which the applied interventions are perceived by the sensors in the simulation system and the mechanical effect that occurs in response to the haptic response and the physiological response is simulated (Dressmann, 2018,3; Tsai et al., 2018,10; Gündoğdu & Dikmen, 2017,173) The use of virtual reality in nursing skill application teaching has an utmost importance in terms of quality of education. Thanks to VR, students cannot only learn scientific fact faster and better but also gain real experience by trying it at the same time (Fairén González ve ark., 2017,51; Bayraktar ve Kaleli,

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2007,1). It includes virtual representations (eg patient, doctor, student, trainer, other hospital personnel, etc.) that animate real-life individuals in three dimensions in a virtual hospital setting. These representations can be customized according to the person by changing face expressions, skin, shape, size, hair and clothing. In virtual patient representations, symptoms of the disease such as swelling, bruising, bleeding in the defined skin are visually indicated. Virtual reality applications, thanks to all these technological features, contribute to reducing student anxiety and improving self-confidence by allowing unlimited implementation of clinical scenarios in a risk-free environment. These practices also help students to improve their clinical decision-making skills and to learn the correct technique by giving feedback at the end of the student's application, which in turn contributes to the motivation and success of the student (Vidal et al.,2013,349; Dreesmann, 2018,4). It aims to make insulin education more permanent by conducting a study that presents an example of the use of virtual simulation in patient education. Smith & Hamilton (2015) aimed to equip nursing students with virtual reality and foley catheter placement skills. Findings from this study support the use of virtual reality simulation as an additional tool to teach critical steps in clinical skills, such as the placement of a Foley catheter by students. Vidal et al. (2013) found that students studying with virtual reality simulator performed better in the "pain factor, hematoma formation and resettlement count" measures in their studies of comparing virtual reality and traditional method for phlebotomy education. Cook et al. (2012) indicated that virtual world simulations have the potential to provide students with a safe environment for clinical decision-making applications in pediatric patients in their study in which they used Second Life technique. In addition, they indicated that it is very important for the learner to receive technology integrated education to provide a quality educational experience. Jung et al. (2012) has confirmed the effectiveness of training conducted using intravenous simulators involving virtual reality and haptics (based on touch) device technologies. The intravenous skill application using the haptic system was superior to the conventional method.

Games

The use of simulation and interactive gaming technology in higher education has begun to receive an increasing attention in recent years. The game is defined as "a competition activity that is a prescribed and limited by set of rules and regulations" (Fairen et al., 2017; Fonseca et al., 2014). It has been reported that games used in education contribute to the development of cognitive processes such as decision making, problem solving and critical thinking, as well as help to develop skills (Tsai et al.,2018,10; Buttussi et al., 2013,798; Cook et al., 2012,714). By providing fun learning environment, games increase the retention rate in education and besides it eliminates the anxious classroom environment created by the educator. In several studies, the effect of such practices on student achievement compared to effects of traditional teaching methods is mentioned (Chiang et al., 2017,25; Koivisto, 2017,343; Fonseca et al., 2014,214; Buttussi, 2013,798; LeFlore ark.,2012,10). Johnsena et al. (2018) aimed to teach clinical judgment and decision-making skills to nursing students who give care to patients with chronic obstructive pulmonary disease, through the game method used by nursing students to measure perceptions about the value of video-based serious game education. 76.4% of the participants found the educational game method as valuable and easy to use as an educator. Mick (2016) 's study shows that games can be a successful strategy to encourage and motivate learning. The majority of participants (81.4%) stated that gaming practice is a practical method of improving evidence assessment skills and is useful for learning. Ebrahimpour and colleagues (2014) stated that the computer game they designed and developed on Insulin Injection lead a better control of blood sugar of children by improving their adherence to insulin treatment and by providing them to transfer and apply the knowledge and skills in the virtual world to the real-world situations of physical and psychological problems. In the study of Buttussi et al. (2013), the advanced life support application was developed as a game. Students were tested with 38 multiple choice questions before and after the game by playing two cardiac arrest scenarios with the game application called EMSAVE. After using EMSAVE, the correct answer

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per participant increased by 4.8. It is stated that the game application increases the educational effectiveness.

Mobile application

After interactive video, simulations, virtual reality, online training, teleconferencing systems, now the concept of modernizatio has begun to take its place as one of the new methods in our education system. It is often defined as a learning environment in which students and instructors can access the learning system over the wireless network at everywhere and anytime through using mobile devices. Y generation creates a unique group that is technically literate, educated and has different qualities from the past to the present day. For this reason, curricula in nursing education for the generation with high technology knowledge, should be organized in a way in which mobile devices can be used. Nurse educators must understand the learning needs of the new generation and encourage them to learn by facilitating their interests and abilities. This training model has many advantages at all times, everywhere, such as increasing equal opportunity in education, enabling uninterrupted learning in formal, informal and non-formal learning environments, and facilitating individualized learning. In the studies conducted with nursing students; it has been found that the motivation, self-confidence and satisfaction of students are high in the education given through mobile devices. In this context, its use in the teaching of nursing principles is increasing day by day. In the qualitative study of mobile technology in clinical education conducted by Mackay et al. (2017), it has been concluded that the use of mobile device may have a positive effect on teaching practices. The study of Hay et al. (2017) conducted with undergraduate nursing students, showed that students use mobile technology and social media to learn and are willing to continue this in their undergraduate program. In the study of Alvarez, Sasso and Iyegar (2015) conducted with nursing students in which the students were evaluated acute pain with mobile learning, this study shows that mobile devices have a positive impact on learning. Pimmer et al. (2014) found that nursing students use mobile learning as an effective problem-solving method in the course of patient care in their study. According to Mann, Medves and Vandenkerkohf (2015) study, it is appropriate to use mobile devices for advanced learning methods such as verbal, visual and tactile. Juric & Zalik (2014), in their study using a standard mobile device and clinical application in real-time visualization of peripheral ve; in the developed application when compared to traditional methods, nursing students were 35.2% more successful in visualizing and positioning vessels (n = 500 trials). In the clinical trial, 1.6 additional vessels per patient were defined compared to traditional visualization methods. Nevertheless, in studies carried out, students are found to use mobile devices beneficial to access the information regardless of their learning style (Özel Erkan, 2016,10; Berndt et al., 2015,401; Johansson et al., 2012,50).

Conclusion

In today's educational settings, different instructional technologies are used at every stage of the teaching process. Many training methods and strategies have been tried to develop knowledge and skills in nursing education. High-tech simulation applications that are used to provide proficiency and competence to learn are a technique or tool that is attempted to create real world features. Simulation facilitates skills training without exposing patients to specific risks, allowing students to gain experience without experiencing anxiety and provide a safe environment for learning. In this context, augmented reality, virtual reality, games (virtual reality, serious game, haptic systems) have become widespread in nursing education, training activities of these applications have been proven with studies (Özel Erkan, 2016,10; Berndt et al., 2015,401; Johansson et al., 2012,50). It is suggested that the use of these advanced training methods in nursing skills applications should be increased and new methods should be designed and developed with these technologies.

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