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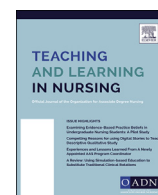


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Using Gaming as an Active Teaching Strategy in Nursing Education

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ABSTRACT

Gaming can be an effective active teaching strategy for nursing students. Using gaming, research has shown that nursing students can develop deeper learning of the content. Stress levels are subdued, critical thinking is promoted, nursing students become motivated, and enjoy participation in a nonthreatening environment. Attitudes, values, cultural sensitivity, and caring are just a few areas where gaming can be seen to promote a positive aspect to teaching for the currently technological savvy nursing students.

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Introduction

Capturing the attention of today's nursing student is a challenge for any nursing educator (Brown, 2018; Day-Black, Merrill, Konzelman, Williams & Hart, 2015). Nursing students, who are digitally connected, appreciate the use of innovative and active teaching strategies such as gaming to enhance their satisfaction and even enjoyment in their educational endeavors. In addition, the need to enhance traditional learning facilitates their motivation and promotes effective learning. Nursing educators who incorporate the use of gaming into active learning teaching strategies in the classroom and/or clinical setting can effectively provide positive change to the learning process (Sharma, 2017; Xu, 2016). Learning can be seen to be exciting, may increase how the nursing student engages and retains the information, assists with problem-solving, increases the nursing students' monitoring of their own abilities to learn, and most importantly, enables critical thinking skills (Verkuy, Attack, Mastrilli, & Romaniuk, 2016). Gaming may also have the potential to assist nursing students in changing health-care behaviors leading to improved client outcomes in multiple health-care settings (Brown, 2018; Johnsen, Fossum, Vivekananda-Schmidt, Fruhling, & Slettebø, 2018).

What are Games and Gaming Strategies?

For many years, traditional teaching methods have been the mainstay for both the nursing classroom and nursing clinical setting. Today, as technology and social media have engrossed the nursing

student, newer methods must be incorporated (Boctor, 2019; Kinder & Kurz, 2018; Sharma, 2017; Day-Black, et al., 2015; Ferguson, Davidson, Scotte, Jackson & Hickman, 2015). Ferguson et al. (2015) defines games as simply that of playing a game. These games can be in many forms such as puzzles, role-play, clickers, computers, tabletop, or card games (Xu, 2016). The use of advanced technology in the form of phones, personal computers, and computer-based simulations are well accepted by nursing students (Johnsen et al., 2018). Games can be used not just on the campus but also off campus and in the clinical setting for promoting ease of nursing student access.

Gaming must adhere to strict rules set by the instructor and/or the intended activity that will evaluate the achievement of the intended developed objectives. To be effective, games must be in an active form, be creative, include emotions, provide pleasure, be engaging, promote interaction, focus on experiential knowledge and skills, be a motivator to stimulate participation, and the resulting overall feel of competition (Gomez-Urquiza et al., 2019; Brown, 2018; Xu, 2016). Instant feedback is additionally important (Fernandes, Martins, Gomes, Gomes, & Goncalves, 2016). Thus, games and gaming strategies can be a formative evaluation of what nursing students know or do not know. Gaming methods have been found to be especially helpful with learning in the health-care field for a number of conditions or scenarios, such as heart failure, chronic obstructive pulmonary disease, home health, and leadership (Brown, 2018; Johnsen, et al., 2018; Fernandes et al., 2016).

Why use Games and Gaming Strategies?

Today's nursing students need alternative, innovative ways to remain involved in the learning process. Gaming enhances and

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engages the process of active learning that provides more interaction in the classroom, effective retention of knowledge, and often stimulates the nursing student to think through problem-based learning and the development of critical thinking (Johnsen et al., 2018). The opportunity to incorporate the nursing curriculum content and concepts allows for nursing student and nursing faculty interaction. Collaboration and teamwork is practiced while working with problem solving and debriefing (Brown, 2018; Johnsen, et al., 2018; Xu, 2016). Use of gaming can be cost-effective and user-friendly.

Gaming can also be considered useful with different learning styles (Boctor, 2019; Murad, 2017; Sharma, 2017). Sharma (2017) identified areas such as innovation for positive insights, motivation, and empowerment to enhance the classroom and clinical setting. Once a nursing students' learning styles is identified, nursing faculty can develop specific activities to assist the various learners (Boctor, 2019; Strickland & Kaylor, 2016; Kroning, 2014). Through the enhancement of gaming using paper and pencil to the high technology of virtual reality, there are endless opportunities for the nursing faculty to innovate a wide range of key areas (Boctor, 2019). A summarization of some potential possibilities that games and gaming can bring to nursing as an adjunct to professional engagement as well as to patient care and nursing education is given. Increasing the use of game-based approaches in health-care interventions may lead to any positive points, with the most important one being improved patient outcomes (Boctor, 2019; Brown, 2018; Xu, 2016; Ferguson et al., 2015).

Advantages of Using Games and Gaming Strategy

There are many reasons that games and gaming strategies are advantageous in the education arena. Games enhance experiential learning (Murad, 2017; Strickland & Kaylor, 2016; Graham & Richardson, 2008), increase nursing students' involvement and motivation (Fernandes et al., 2016; Graham & Richardson, 2008; LeCroy, 2006), and allow individuals who may have different strengths/weaknesses to be involved (Kinder & Kuirz, 2018). It can provide content on a safe learning environment and risk management skills (Brown, 2019; LeCroy, 2006; Azriel, Erthal & Starr, 2005). Gaming also offers a good adjunct to traditional methods (Azriel, Erthal, & Starr, 2005) and promotes the concept of teamwork (Brown, 2019; LeCroy, 2006; Azriel, Erthal, & Starr, 2005). Koivisto et al. (2018) presented that gaming in the form of simulation can be repeated, can offer the same content to all nursing students, and depending on the game, can allow nursing students to progress at their own speed.

Even though the nursing students tend to have a positive perception of the games, nursing faculty must listen to the nursing student's post-game comments. Additional suggestions from nursing students can be helpful for future games. Wingo et al. (2019) used Kaizen gaming with Millennials finding that they preferred the use of a mobile application instead of using a link to access the game. The nursing students also suggested a competition with another nursing program in their community and were allowed to have questions available for future studying purposes (Wingo et al., 2019).

Disadvantages of using Games and Gaming Strategy

Games and gaming strategies also come with certain disadvantages. Games are much more difficult in larger class sizes needing additional space (Brown, 2018; Strickland & Kaylor, 2016; Graham & Richardson, 2008) and they may increase stress or embarrassment or unwillingness to speak up and answer questions (Boctor, 2019; Graham & Richardson, 2008). The feelings of competition could be seen as threatening (Blakely, Skirton, Cooper, Allum & Nelmes, 2008) and could hinder evaluative learning (Blakely, et al., 2008). Kinder and Kurz (2018) offered that gaming may be noisy, confusing,

and disruptive. The need for additional monies for supplies, time-consuming preparations by faculty and additional faculty presence (Kinder & Kurz, 2018; Strickland & Kaylor, 2016), possible time constraints (Boctor, 2019), and the volume of content to be covered (Boctor, 2019). Koivisto et al. (2018) worked on design and development of simulation games, finding that an additional difficulty may be with the actual user and equipment provided such as internet speeds and cell phones.

Where can Games and Gaming Strategies be used?

Gaming and gaming strategies can be used in the classroom, nursing laboratory, and clinical settings. Puzzles, role-playing, word searches, and games using the *Jeopardy*, *Monopoly*, *Wheel of Fortune*, and *Jenga* (trademark) formats can be used in the classroom and nursing laboratory (Brown, 2018; Xu, 2016). Games can be used in all levels and in such classes as pharmacology and medical/surgical nursing (See Table 1). Many of these gaming formats can be found readily on the internet. In the clinical setting, there are many ways to introduce the concept of gaming. Preconferences and postconferences are often the most common areas to use items such as board games. Games and gaming strategies can also be used for remediation of knowledge and skills (Kinder & Kurz, 2018; Murad, 2017; Xu, 2016).

Game Usage Literature Review

Nursing Classroom

Gaming should be used as an adjunct to traditional teaching methods by enhancing the nursing student's experience (Kinder & Kurz, 2018; Johnston et al., 2013). Cowen and Tesh (2005) compared lecture alone with the combination of lecturing and gaming. The focus was on junior baccalaureate nursing students in a pediatric course. This article was an experimental design plan with a pretest and posttest format. The results noted that nursing students who engaged in both lecturing and gaming had higher posttest scores. Xu (2016) also identified that gaming is useful for active learning and increasing motivation of the student. Kinder and Kurz (2018) support that not only do nursing students enjoy gaming but also increased their self-confidence and ability to retain the content.

Johnston et al. (2013) developed an international project related to interactive activities and games to support both nursing and social services students. The project was designed to implement games to teach research methods and statistics. The goal of the project was to enhance the learning outcomes of the students and promoting the concept of evidence-based practice (Johnston et al., 2013).

Strickland and Kaylor (2016) promoted an innovative game in a nursing fundamental course that contained ten distinct learner-centered activities. Some activities that were used included medication calculations, lab value interpretations, physical assessment jigsaw puzzle, and isolation precautions. Nursing students commented that the material was easier remembered during the test time, whereas faculty acknowledged a more student-centered learning environment (Strickland & Kaylor, 2016).

Fernandes et al. (2016) developed a board game with the intention to use education focused on family nursing. Based in Portugal, the game was developed, and validated by Jaffee (2011) using the stages of a game's conception. Overall, this game was successful in promoting enthusiasm, motivation, and retaining of the knowledge for nursing students working with families. (Fernandes et al., 2016).

The use of Jenga (trademark) was incorporated in learning about leadership and risk management specifically related to safety and performance improvement (Brown, 2018). This game was initiated

Table 1
Nursing Classroom Examples from Authors

Senior nursing classroom	Junior nursing classroom
<ul style="list-style-type: none"> Baccalaureate Nursing Degree (BSN) program Public University setting Regional campus (4,000 students) 	<ul style="list-style-type: none"> Associate Degree Nursing (ADN) program Public University setting Regional campus (2,600 students)
Growth and empowerment <ul style="list-style-type: none"> Class designed to assist with National Council Licensure Examination (NCLEX) preparation and prepare for the role of a new graduate. Training on the NCLEX test plan components. Reflection on student's previous knowledge of the NCLEX test plan from previous semesters. The goal was to use innovative and adjunct material with lectures and enhance student knowledge about the components of the NCLEX test plan. 	Different types of games <ul style="list-style-type: none"> Cardiac pharmacology jeopardy Electrolyte jeopardy What is my heart doing now? Electrocardiogram strip identification Bingo medical surgical games Bingo pharmacology games 25,000 pyramid disease Crossword puzzles Word searches
The Amazing Race <ul style="list-style-type: none"> Group used for NCLEX category Safety and Infection Control under Safe and Effective Care Environment. Groups of nursing students contacted several players around the campus where they were provided stickers and 2 questions that the group must answer. The winners were those with the most stickers and the team that finished first. (The team that finished first was not always the team that had the most stickers). Bonus the students got exercise by running between buildings. 	Medical-surgical nursing <ul style="list-style-type: none"> Used in junior medical surgical after clinical conference. Medical game called <i>The Thinking Nurse</i>. Uses questions related to classroom content and also related to floor assignment population (if on telemetry floor would use cardiac questions). Started with knowledge questions at the beginning of the semester and then to more application questions. Each student would have 1 question and provide rationales for the answer.
Are you smarter than a nursing instructor? <ul style="list-style-type: none"> Used to emphasize the NCLEX test plan of Management of Care under Safe and Effective Care Environment. Divided the game into sections that matched the components. Used white boards for students to write their answers. Instructor was required to participate. Four categories from simple to harder questions (LPN, ASN, BSN, Nursing Instructor). 	Wheel of Fortune <ul style="list-style-type: none"> Each student to take a 3 × 5 index card and write 4 questions with answers on them. Break out into groups of 8 students. Assign each student a number between 1 and 8. Use the Wheel of Fortune wheel and spin. The student with that number to state the question and someone from the group answers it. Continue until all questions are asked. Acts as a good review activity.
Let's Make a Deal <ul style="list-style-type: none"> Used for NCLEX category Physiology Integrity: Reduction of Risk Potential and Physiology Adaptation. Sent out e-mail to have students dress up in wild costumes just like the game show. Made 3 categories with bags and some bags contained some great items but some were funny prizes. The students rotated out by calling on a replacement. If they didn't answer their question correctly, they remained till they answered a question correct. 	
Pharmacology bingo <ul style="list-style-type: none"> Used template found on the Internet (Excel program). Students were demonstrating lower scores on Assessment Technologies Institute (ATI) pharmacology practice tests. No Pharmacology class in the curriculum as it is integrated throughout. 	

with case studies where a group of students needed to identify areas of patient risks before the patient was in danger. The patient was portrayed as the Jenga (trademark) blocks. Following the Jenga (trademark) per the instructions developed for the original game, nursing students answered the questions. Whether correct or incorrect, one student from the group would remove one block from the tower. The group whose tower did not collapse was the winner. Debriefing sessions were held after the scenarios focusing on the strengths and weaknesses of the activities. The evaluations of learning was verbalized as stimulating and fun, whereas assisting with replicating real-life situations by the nursing students (Brown, 2018).

Another gaming strategy used in the classroom includes clicker response systems (CRSs). Literature reviewed regarding CRS demonstrated that nursing students are comfortable using these for communication with instructors, the system highlights key points better than the readings, appeals to a variety of learning styles and learning characteristics, and enhances nursing learning allowing nursing students to engage in the classroom (Nawalaniec, 2015; Mastrian, McGonigle, Mahan, & Bixler, 2011; Berry, 2009). Overall, clickers

have been shown to enhance nursing student learning (Wingo et al., 2019; Billings & Halstead, 2016).

One such CRS site used by one of the authors is Socrative. This site located at www.socrative.com offers a free platform for nursing instructors to assess formative feedback. The tool uses the instructions to create simple true/false to more complex questions including short answer questions and select all that apply questions. The questions can be set in nursing student- or teacher-paced mode, are Internet accessible, and may be used with a laptop, tablet, or smartphone, and the tool is cost-effective compared with older clicker devices that are expensive to the institution or nursing student (Nawalaniec, 2015; Mendez-Coca, & Slisko, 2013).

Recently the concept of escape rooms has been incorporated into classroom activities. During these room sessions, nursing students are able to be dynamic and move around to find clues to the problem presented. Gomez-Urquiza et al. (2019) used puzzles and riddles to present both theoretical and practical information. The nursing students needed to solve these puzzles and riddles, find objects, complete skills such as putting on surgical gloves and removing sutures

and staples. Coming up with the correct answers or successful completion of the skill is required to proceed to the next stage of the game. Overall, the nursing students found the escape room a great way to help with learning the subject and requested that more games be a part of the nursing curriculum's activities (Gomez-Urquiza et al., 2019). Morell & Ball (2019) developed an escape room for the use of pharmacology content. The researchers were able to assess the knowledge scores of the subjects, finding improvement of scores in 39% and no changes in 46% (Morell & Ball, 2019). Connelly, Burbach, Kennedy, & Walters (2017) documented their use of escape rooms for nursing recruitment events. The attraction of this form of gaming was felt to be a promising strategy to provide those with who are considering a career in nursing (Connelly, et al., 2017).

Nursing Clinical

Strickland and Kaylor (2016) also used games to not only promote classroom active teaching strategies but also institute preparation and application into the nursing clinical arena. Open-ended worksheet questions regarding safety, nutrition, pain, elimination, hygiene, and vital signs were used to enhance nursing student learning. An interactive clinical station where nursing students used their smart phones to capture proper techniques on positioning and methods of transferring provided video evidence that nursing students mastered the point-assigned activity. Xu (2016) identified problem-based learning as an active strategy for the clinical setting where the instructor can provide discussion on a disease process such as heart failure and then enhance a conversation regarding the care needed for this patient while offering helpful feedback for student understanding.

Koivisto et al. (2018) focused on gaming for the use of learning clinical reasoning, as this is an area where nurses have difficulties in making correct decisions when providing patient care. This study elaborated on the need to have nurse educators to be a part of game design and development to meet the needs of the nursing student. By providing a more real life situation while providing education for the nursing students, this will better prepare them for the situation that they will encounter in the nursing profession (Koivisto et al., 2018).

With the use of various forms of technology, the availability to provide gaming almost anywhere including the clinical site needs to be included. Bauman (2016) discusses the different environments and easily supports the use of traditional didactic form of teaching and learning although incorporating the use of all forms of technology. With the goal of nursing education to provide the most up-to-date knowledge while engaging the nursing students, the need to facilitate the use of all digital teaching tools may be available for learning in all areas especially that of in the clinical setting. Real life equipment usage in the clinical area can provide equivalent forms of practice (Bauman, 2016).

Medication administration is a vital area for nursing where nurse educators can transfer the knowledge of this skill to the clinical setting. Avraham, Shor, Hurvitz, Shvartsur and Kimhi (2018) conducted a simulation focusing on this real experience that can be performed to enhance competence of the nursing student. The nursing students were given information about their patients' conditions, assessment information, and administered medications. By assessing each nursing student individually, the nursing faculty were able to provide an individualized evaluation of the performance. Through this study, the researchers were able to analyze the degree that the nursing students were prepared for the skill and their actual performance and critical thinking while assuring safety (Avraham et al., 2018).

Other Professions

Gaming strategies are a fairly new innovative teaching technique in nursing however, in other professions, the method is more common. Shiroma, Massa and Alarcon (2011) used gaming to assist medical students with psychopharmacology. The article demonstrated a combination of an academic game and the traditional lecture format. Results noted that the medical students learning experience was more enjoyable and motivating (Shiroma et al., 2011).

Azriel, Erthal and Starr (2005) used *Jeopardy* in a business education classroom. Results showed an increased activity in participation, improved teamwork, and facilitated the overall learning environment. In the area of military history and war gaming, Sabin (2015) used simulation and gaming to provide active learning activities relating to war strategies, tactics, and operational analysis associated with warfare. Sabin (2015) stresses the use of direct experiences with hands-on practice was the most effective manner in which to understand war.

In engineering, McConville, Rauch, Helgegren and Kain (2017) researched the perspectives of both the teacher and student perspectives. The game that was used, focused on the Swedish experts who work in the sanitation and water supply areas. In this game, the areas of communication along with creative problem solving were exemplified. This challenging game had components related to the water source, distribution, wastewater collection, and waste treatment aiming for the students to develop solutions for each component including stakeholders in the community. Overall, this game was evaluated as successful for the engineering curriculum in assisting the students to understand the technical knowledge needed for higher education levels (McConville, et al., 2017).

Summary

In conclusion, the use of gaming can be useful in any area or level of study by faculty and students to actively learn and remediate knowledge. By designing and developing games to focus on specific educational areas, especially nursing education, nursing faculty can use various teaching and learning strategies in the classroom, nursing laboratory, and clinical setting. With the prominent use of technology in the workplace, the need to incorporate technology, such as games, to assist with active teaching methods for the nursing student.

The review of the literature finds that there are many ways to include gaming into the nursing curriculum. Gaming not only has been successful in enhancing teaching and remediation of content but also has been proven to be fun and motivating and brings out the competitiveness of the individual. It is a way to present real-to-life situation such as with simulation, teach specific content such as a disease process and pharmacology, application and use of critical thinking and identification of safety concerns. Although there are negative aspects of the use of gaming, the advantages outweigh the disadvantages.

Student engagement with the current nursing student learners are key to keeping their attention and allowing learning to take place. As nursing faculty, we must replace the past learning methods and move into the future with our techniques. Nursing student involvement can be facilitated with the use of gaming and especially with the incorporation of technology. Whether nursing content is presented through a board game or a computerized method, finding the most optimal manner to augment the teaching and learning process is imperative for not only nursing students but also students in any discipline.

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