Gamification: An Innovative Teaching-Learning Strategy for the Digital Nursing Students in a Community Health Nursing Course

Abstract: Serious games have “re-emerged” as innovative teaching-learning strategies that researchers have shown to be effective in improving student learning outcomes. “Serious games” refer to games that are driven by educational goals, not entertainment. The use of serious games as part of the teaching-learning experience in nursing education fits into the philosophy and strategies of active learning. The “digital” nursing student needs engagement, stimulation, realism, and entertainment not more readings and PowerPoint supplements in the classroom to support learning. Nursing faculty at a mid-Atlantic Historical Black College and University introduced “serious gaming” technology into a Community Health Nursing course by using two web-based gamed simulations, Outbreak at WatersEdge: A Public Health Discovery Game, and EnviroRisk. This innovation proved to be effective in reinforcing learning and improving student learning outcomes.

Key Words: Gaming, Active Learning, Student Learning Outcomes, Digital Student, Innovation

Based on the authors’ observations, nursing students appear to memorize facts and attempt to apply them in problem-based situations. For many nursing students, practical “hands-on” learning experiences related to the “real world,” motivates learning and gives a reason to associate the new knowledge with prior experiences (Cantor, 1992). “Digital” nursing students, are those individuals born after 1983, and are familiar with visually engaging and fast-paced games that find traditional classroom methods of lecture and guided laboratory experiments limiting (Prensky, 2001). These contemporary students need engagement, stimulation, realism, and entertainment not more readings, memorization and PowerPoint supplements in the classroom to support learning (Tapscott, 1998, 2009, Kohn, 1997c). In a well-designed serious game, the realism, didactics and engagement factors are in balance to accomplish the purpose of the serious game: to learn in an informal engaging setting (Harteveld, Guimarães, Mayer & Bidarra, 2007). Serious games, as innovation teaching-learning strategies, are noted in the literature (Derryberry, 2007; Susi, Johannesson & Backlund, 2007; Giasolli, Giasolli, Giasolli, & Giasolli, 2006) as games and simulation, gamed simulation or educational gaming. All games are not simulation nor or all simulations games (Sauve, Renaud, Kaufman, & Marquis, 2007). According to deFornay & Thompson (1987, p. 27) simulation game is defined as “an activity that incorporates the characteristics of both a simulation and a game; a contest that also replicates some real life situations or process.” For the purpose of this article, “serious games” refer to games that are driven by educational goals, not entertainment (Milton, 2006).

Creating active, student-centered learning situations in nursing education is an ongoing challenge for nursing faculty. Serious games provide a good learning environment because the game creates a real life context in which nursing students can learn (Whitton, 2008). Gaming allows the student to learn through meaningful experiences in a time and place that is relevant to them (Thomas, 2006). Gaming technology in nursing education has emerged as a teaching methodology that meets the kinesthetic/tactile learning styles of “digital” nursing students (Merritt, 1983; Linares, 1989; Meehan-Andrews, 2009) seeking to make meaningful connections to complex nursing concepts. As an innovative teaching and learning strategy, serious games in nursing education supports concepts of active learning (Royce & Newton, 2007).

Active learning methods help students move away from being “spoon-fed” facts and figures to developing concepts, understanding principles and applying knowledge in practice (Rossignol, 2000). Kohn (1997c) believed that “to promote a deeper understanding of materials, students ought to be engaged with what they are doing. During the game, “students play first, understand after, and then generalizes” in order to apply this learning in a new situation (Saethang & Kee, 1998; Shaffer, Squire, Halverson & Gee, 2005). In this approach, the learner is the active doer. Research (Bransford & Schwartz, 1999; National Research Council, 2000; O’Donnell, Reeve & Smith, 2012) has shown that active learning increases the probability that the knowledge is actually absorbed or “transferred” to the student learning. It is experiential, focusing on student dialogue rather than the instructor’s lecture (Kolb, 1984).

This research describes the implementation and analysis of an innovative learning strategy within an undergraduate community health nursing course at a mid-Atlantic Historically Black College and University (HBCU) school of nursing.
This innovation learning strategy was designed to provide students with an opportunity to integrate complex public health concepts and their relationship to practice in a safe and controlled virtual environment. “Games offer a way to walk in the shoes of experts, and learn how they approach problems,” according to the Federation of American Scientists, 2006 (p. 21). Community health nursing is a required course offering for both the traditional and RN-BSN students in the final semester of the baccalaureate nursing program. This study provides the background of the course, a learning activity (use of gaming technology), and a summary of the learning strategies and questions for further study.

BACKGROUND
Nursing faculty members have noticed that undergraduate traditional (pre-licensure students) and RN-BSN (licensed registered nurse) nursing students, enrolled in a community health nursing course had difficulty grasping lectured content on complex public health concepts in two learning units of epidemiology and environmental health. Students expressed that they were having difficulty understanding and could not “relate” to the content. Course evaluations provided faculty insight, concerning student perceptions of the lecture. Using open-ended feedback, students described the content as “boring” and “too abstract.” Comments such as “instructors should find better teaching methods that will make the lecture content more understandable and effective,” were made. Low grades, student dissatisfaction and faculty frustration prompted faculty to seek innovative learning activities that support learning objectives and improving student learning outcomes. Two serious games were adopted by faculty, Outbreak at WatersEdge (University of Minnesota, 2007) and EnviroRisk (Frost & Ross, 1999). These games may support student learning through the concept of instructional scaffolding. Sawyer (2006) describes instructional scaffolding as the support given during the learning process which is tailored to the needs of students with the intention of helping students achieve their learning goals. Pedagogically, the games support student learning outcomes as stated in the course syllabus at the Mid-Atlantic HBCU School of Nursing. The learning outcomes were based on the first three levels of Bloom’s taxonomy: knowledge, comprehension and application. As a scaffolding teaching strategy, the games provided feedback in a form of learning material to enhance the students’ learning process (Fisch, 2005). The progression of learning that occurs over time during games is similar to the educational technique of “scaffolding,” which builds on the concept of the Zone of Proximal Development introduced by Soviet psychologist and constructivist, Lev Vygotsky. Vygotsky (1978, p.86), speaking of how children learn, stated that the Zone of Proximal Development “is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers.” To accomplish this goal, Kapp (2011) explained that “the child tries to solve problems given minimal experience space and lots of adult supervision, as the child becomes more adept at solving the problems, the adult provides less and less guidance until the child is independently solving problems.” In gaming, scaffolding is process of controlling the task elements that initially are beyond the learner’s capacity, so that the learner can concentrate on and complete elements within his or her immediate capability. Once that task is accomplished, the learner is then lead to accomplish another goal which builds upon the previous. Scaffolding provides support, functions as a learning tool, extends the range of the learner, and permits the accomplishment of tasks not otherwise possible. (http://www.ulqcl.com/kappnotes/index.php/2011/03/game-levels-and-scaffolding-theysre-related/).

REVIEW OF LITERATURE
The concepts of innovation in nursing education have been identified in the literature. Innovation has been defined as “using knowledge to create ways and services that are new (or perceived as new) in order to transform systems. The outcome of innovation in nursing education is excellence in nursing practice and the development of a culture that supports risk-taking, creativity and excellence” (Neuman, Pardue, Grady, Gray, Hobbins, Edelstein, & Herrman, 2009). In the 2003 position statement on innovation in nursing education, the National League of Nursing (NLN) indicated that while innovation has occurred in nursing education, it appears that it is based on shifting content within the curriculum, rather than using and promoting new ideas in teaching strategies. Early studies (Bays & Hermann, 1997; Blenner, 1991; Blooms & Trice, 1994; Henry, 1997; Ingram, Ray, Landeen & Kee, 1998; Ulione, 1983; Walljasper, 1982) examined transforming knowledge into action through simple games and gaming simulation. Nursing programs are continuing to struggle with the need to accommodate the changing needs of digital students, utilizing innovative strategies to teach various generations of nursing students, and making changes in how today’s nursing students learn and are taught.

Digital generation literature (Howe, Strauss, & Matson, 2000; Oblinger & Oblinger, 2005; Palfrey & Gasser, 2008; Presnky, 2001a, b, 2005; Tapscott, 1998, 2009) provide evidence of generational differences in behavioral and social characteristics, ways of using and making sense of information, ways of learning, and expectations about life and learning, all due to exposure to digital technology. According to Bonamici, Hutto, Smith & Ward (2005), students of the digital generation will have already spent 10,000 hours playing video games, The “gamer generation” has a cognitive style characterized by multitasking while learning, short attention span during learning and an exploratory and discovery approach to learning (Asakawa & Gilbert, 2003; Bain & Newton, 2003; Presnkey, 2005).

The use of games and simulations for educational purposes may be traced to the use of war games in the 1600s (Gredler, 2004). In higher education, diagnostic games and simulations were originally developed for medical education (Gredler, 2004; Lane, Slavin, & Ziv, 2001). Nurse educators first became interested in gaming as a teaching strategy in the early 1980’s (deTornyay & Thompson, 1987). Brief, simple board games (i.e., Jeopardy, Who wants to be a Millionaire?) and card games (Meterissian, Liberman, & McLeod, 2007; Cessario, 1987) were used in nursing education and health care to help with knowledge acquisition. The literature reveals that nurse educators were slow to assimilate games and simulation as a legitimate teaching method to affect knowledge retention among nursing students (Joos, 1984; Corbett & Lee, 1992; Morton & Tarvini, 2001; Henderson, 2005; Moran, 2005; Royce & Newton, 2007). The use of serious games in nursing education has now moved from pencil and paper.
and role playing to digital format (Skiba, 2008, Blakely, Skirton, Cooper, Ailum, & Nelmes, 2009; Derryberry, 2007; Meterissian et al., 2007; Milton, 2006). Games and simulations have enabled students to develop and practice skills such as communication, problem solving, leadership and decision making that they need for future roles as nurses, according to Sealover & Henderson (2005, p. 247). Klassen & Willoughby (2003) have shown game simulation in the teaching arena to be effective in improving student learning outcomes. Research illustrates that students are more likely to remember the educational materials learned from games than from a typical lecture as members in the community of practice for a discipline and, as novices, learn the knowledge, skills, and values of the profession (Skiba, 2008). Integration of games requires an understanding with the subject, instructional strategy, and student learning style and intended outcomes (Obfnger, 2006).

TEACHING AND LEARNING INNOVATION

The adoption and implementation of serious games, Outbreak at WatersEdge and EnviroRisk into the community health nursing content activity, occurred four weeks into the semester and after the face-to-face epidemiology and environment health lectures during two consecutive weeks. Class was an integration of both traditional and RN-BSN nursing students who had no previous exposure to epidemiology and environmental health nursing concepts. Written guidelines and instructions on how to access each website were posted in the Announcement page on the course Blackboard site. At the conclusion of each lecture, students viewed a short video demonstration of how to navigate the specific games. Faculty noted that the community health nursing students had anticipated high interest in using serious games as one of their learning activity.

DISCUSSION AND RECOMMENDATIONS

Students “played” the games outside of the face-to-face class period. The first game, Outbreak at WatersEdge: A Public Health Discovery Game was an interactive game that introduced students to the world of public health as the source of an outbreak on the small community WatersEdge. The objective of using this game was to assist students in stopping the identified outbreak before more residents of WatersEdge became sick. The overall goals of the game was to: (1) introduce students to various professional roles within the field of public health; (2) expose students to basic epidemiological principles and methods of investigation, data gathering, data interpretation, and point source contamination; and (3) provide students with resources to further explore the field of public health. By playing the game, students would be able to: (1) identify specific jobs within the career field of public health; and (2) locate resources for further exploration of public health as prospective area of study. There were specific public health roles introduced during the game as the participants were playing. For example, some roles explored were: (1) epidemiologist, (2) environmental health specialist, (3) health educator, (4) microbiologist, (5) public health nurse, (6) public health information officer, and (7) health planner. Once students were acquainted with the goals and objectives, roles in public health, and principles of epidemiology, they expressed that they were more comfortable with the use of epidemiological principles in community health nursing practice.

The second game, EnviroRisk was case-based and used a problem-solving approach in conducting environmental risk assessment in a virtual neighborhood. Risk communication was designed to develop students’ ability to investigate an environmental health problem, and serve as a resource and risk communicator in the community. During the game, students were expected to role play as the community health nurse with the goal of gaining or improving skills in: (1) gathering information about specific hazards; (2) gathering information about adverse health effects; (3) evaluating the health effects of a chemical toxin; (4) partnering with public health agencies in addressing community needs; and (5) applying principles of risk communication to inform and educate the community. At the end of the EnviroRisk game, it was expected that students would be able to: (1) apply the Seven Cardinal Rules of Risk Communication (Covello and Allen 1988); (2) explain basic elements of toxicology, epidemiology, and environmental medicine; (3) describe the role of the environment in cancer causation; (4) identify diverse resources to investigate health status and environmental hazards; (5) explain the components of a “qualitative” environmental risk assessment; (6) recognize agencies and health professionals that may assist in environmental risk assessment; and (7) describe a set of criteria for establishing causation of a given environmental agent.

To play these games, students were required to have broadband internet service, and at a minimum, Internet Explorer version 7 and Flash Player version 10.3 installed on their computer or mobile technology device (i.e., smartphone). Students were required to develop a username and password. Each website provided technical support. A Student reflective assessment form of metacognition, was used to provide faculty with feedback concerning the experience. The assessment, completed at the conclusion of each game, included students’ reflections on previous gaming habits, ease of operating the game, roles within the game, and the meaningfulness of the activity, and three “take away” points from the experience, were submitted in the Discussion Board of Blackboard Course Management System 9. The reflection was 2% of the course grade. These innovative strategies were implemented in only one Mid-Atlantic HBCU community health nursing class. The community health nursing course content was team taught by 3-4 faculty members who selected content areas, based on their expertise. A noted limitation was that most students enrolled in the community health nursing course were not members of the “digital” generation; but from a variety of generations. Results obtained were limited to the community health nursing class and no other digital generational nursing students. The course contained only four or five RN-BSN students, while traditional students (n= 42) were the largest group enrolled. Students’ perceptions concerning their understanding of complex public health concepts were gleaned from the unit examination scores, and the end of course student evaluations, where only 50% or less of students completed the evaluation.

Another limitation was that students were required to interact with the two games during a time other than the class period. This meant students were on their honor to complete both games, then independently complete the reflective assessments. An additional limitation may have been that two of the faculty implementing gaming simulation were nursing faculty of the Mid- Atlantic HBCU nursing program, where the innovative teaching strategy was used. The faculty who volunteered to teach...
RECOMMENDATIONS/FUTURE RESEARCH DIRECTION

Recommended were three directions for follow-up research that may further advance learning with serious games:

1. Design a brief segment of face-to-face class time to engage students in a preview and discussion of the serious games, including background, purpose - learning objectives, benefits, and methods for use.
2. Assign brief, in-class student group presentations, in which students describe their gaming experiences.
3. Utilize evidence-based methods for evaluation of serious gaming activities.

CONCLUSION

The use of “serious gaming” as a strategy for innovative teaching-learning experiences for “digital generation” nursing students, may be a viable alternative to traditional approaches to teaching (lecture, reading assignments, group projects). The faculty and student experiences described in this study support that serious gaming increases overall student motivation to learn, thereby, increasing the chances for effective transfer of learning. This should also stimulate nursing faculty interest in exploring options for use within their respective nursing curricula.

Serious gaming for nurse educators seeking interactive, engaging, and creative teaching methods, with the potential for improved student outcomes, are advised. Nursing faculty who are willing to invest time to effectively implement serious gaming learning activities, based upon identified course learning objectives, each could reap significant benefits. These benefits include enhanced student recall and ability to apply knowledge - critical thinking, increased student engagement in learning, and increased student monitoring of their own learning.

REFERENCES


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Crystal Day Black, MSN, RN, CNE, CDE, PMHCS-BC, is an Assistant Professor of Nursing at Coppin State University, Helene Fuld School of Nursing, Baltimore, Maryland. She is a certified distance educator, and a doctoral student at the University of Alabama, Tuscaloosa. Ms. Day-Black may be reached at cblack@coppin.edu. *Earlene B. Merrill, EdD, RN, PNP, CDE, CNE, Professor of Nursing at Coppin State University College of Health Professions, Helene Fuld School of Nursing, Baltimore, Maryland. Her expertise includes concepts of public and community health nursing and nursing research. She is a certified distance educator. Dr. Merrill may be reached at emerrill@coppin.edu. *Lois Konzelman, MSN, RN is an Instructor of Nursing at Prism Career Institute, Philadelphia, PA and Online Adjunct Professor at Chamberlain College of Nursing*. Mrs. Konzelman is a doctoral student at the University of Alabama in Tuscaloosa and can be reached at lkonzelman@prismcareerinstitute.edu. *Tammie Tallent-Williams, MSN, RN is a Nurse/Disability Consultant at Central Virginia Case Management Services*. She also serves as a Children’s Court Appointed Special Advocate, and a disability advocate for both children and adults. Mrs. Tallent-Williams is a doctoral student at The University of Alabama, Tuscaloosa and may be reached at twcentralvacm@comcast.net. *Natalie Hart, MS, RN, PMHNP-BC, is an Assistant Professor of Nursing at Coppin State University, College of Health Professions, Helene Fuld School of Nursing, Baltimore, Maryland. She is an Adult Psychiatric and Mental Health Nurse Practitioner, and may be reached at nhart@coppin.edu.*