

Using Technology to Engage the Millennial Nursing Student:

An Integrative Review of the Literature

by

Vanessa Sheane (V00793296)

BScN, University of Alberta, 2006

A Project Submitted in Partial Fulfillment of the Requirement for the Degree of

MASTER OF NURSING

in the School of Nursing, Faculty of Human and Social Development

© Vanessa Sheane, 2015

University of Victoria

All rights reserved. This project may not be reproduced in whole or in part, by photocopy

or other means, without the permission of the author.

Supervisory Committee

Using Technology to Engage the Millennial Nursing Student:

An Integrative Review of the Literature

by

Vanessa Sheane (V00793296)

BScN, University of Alberta, 2006

Supervisory Committee

Supervisor: Carol McDonald, RN, PhD, Associate Professor, School of Nursing, Faculty of Human and Social Development

Project Committee: Debra Sheets, PhD, MSN, RN-BC, CNE, School of Nursing, Faculty of Human and Social Development

Abstract

Supervisory Committee

Supervisor: Carol McDonald, RN, PhD, Associate Professor, School of Nursing, Faculty of Human and Social Development

Project Committee: Debra Sheets, PhD, MSN, RN-BC, CNE, School of Nursing, Faculty of Human and Social Development

Nursing education programs are heavily comprised of students from the technologically savvy millennial generation. Millennial learners want and expect the use of technology in their courses. This integrative literature review synthesizes and presents the findings from existing literature that inform the use of educational technology by nursing faculty to engage millennial learners. Six primary research articles were selected after a search of the CINAHL, ERIC, MEDLINE, and PubMed electronic databases with keywords and inclusion/exclusion criteria. Using thematic analysis three patterns were identified: technological tools, professional consumption versus personal creativity, and enhancing and supplementing content. This review suggests that nursing faculty should implement technology in nursing education that is congruent with the generational traits of millennial learners. Educators should seek recommendations and evaluation feedback about technology from the millennial learners. The use of educational technology captivates the interest of millennial nursing students. Nursing faculty working with millennial learners must stay on the educational technology wave to facilitate maximum student engagement. This review of the literature reveals the need for further research in this area of nursing education. However, a number of practical findings can be easily integrated into nursing faculty's teaching practice.

Table of Contents

Supervisory Committee.....	2
Abstract.....	3
Table of Contents.....	4
Introduction.....	6
Purpose.....	7
Significance.....	7
Operational definition.....	7
Theoretical underpinnings.....	8
Methods.....	9
Approach to the review.....	9
Inclusion and exclusion criteria.....	10
Data analysis.....	10
Studies reviewed.....	11
Results and Findings.....	12
Technological tools.....	12
Professional consumption versus personal creativity.....	17
Enhancing and supplementing content.....	19
Limitations.....	21
Discussion.....	22
Teaching philosophies and the millennial generation.....	22
Adopting educational technology.....	24
Millennial generation traits and technology for engagement.....	25

Recommendations.....26

Conclusion.....27

References.....30

Appendix A.....34

Appendix B.....35

Using Technology to Engage the Millennial Nursing Student:
An Integrative Review of the Literature

Introduction

In nursing education classrooms it is not uncommon for students to send text messages on a cell phone, use a tablet to take notes or take advantage of the wireless internet connection to look up relevant concepts. The technologically savvy and digitally connected millennial generation was raised in an era of technology expansion in which access to information is a mouse click or finger touch away. Difficulties arise however when students use technology during class time for non-academic reasons. It is often noted that the video games, MP3s, hand held devices, and social media platforms that engage millennials in their everyday lives are not well utilized in education (Prensky, 2005). Millennial nursing students expect to be engaged in nursing education (Russell et al., 2007) however, because many millennial learners find Facebook or Twitter engaging does that mean social media should have a central place in nursing education? The technologically savvy and digitally connected characteristics of millennial learners should challenge nursing faculty to examine and tailor their teaching practice for optimal learning (Earle & Myrick, 2009). Earle and Myrick (2009) pose an important question that nurse educators should ask themselves – are nurse educators “being responsive to students or, on the contrary, [are they] continuing to teach the way they were taught?” (p. 627).

As a member of the millennial generation and a nurse educator, questions arise for me about the seeming disconnection between the limited uses of technology in nursing education in the face of student engagement with information technology. With the obvious realization that millennial learners are engaged by technology in their lives, why do nursing faculty not utilize technology to engage the millennial nursing student in the classroom? Engaging nursing

students in their education is important in order to optimize learning and adequately prepare the practitioners of tomorrow for nursing practice.

Purpose

Nursing and educational research on the use of technology for engaging the millennial nursing student is scarce. The purpose of this literature review is to synthesize and present the findings from existing literature that informs the use of effective technology by nursing faculty working with millennial learners to captivate their attention in their nursing programs. The guiding question for this literature review is how do nursing faculty effectively use technology to engage the technologically savvy millennial learner?

Significance

The millennial generation includes people born from 1982-2000 (Chung & Fitzsimons, 2013; Mangold, 2007; Strang, Bagnardi, & Williams, 2010). This generation is commonly referred to as generation Y in the literature. The millennial generation is the largest generation worldwide and described as the most culturally diverse (Erlam, 2014; Walker et al., 2006) with expectations of being the most influential generation since those who fought in World War II (Chung & Fitzsimons, 2013). With eighty one million people worldwide in the millennial generation post-secondary education is filled with millennial learners (Chung & Fitzsimons, 2013; Walker et al., 2006). The average age of Canadian students graduating from nursing education is 26.5 years (Canadian Institute for Health Information, 2010) which indicates that current and incoming cohorts of nursing students are typically millennial learners, who are digitally connected, technologically savvy, collaborative, and experiential (Earle & Myrick, 2009; Erlam, 2014; Pardue & Morgan, 2008; Skiba, 2005; Strang, Bagnardi, & Williams, 2010;

Walker et al., 2006). Therefore, engaging the millennial learner is an important element of nursing faculty's teaching practice.

Operational Definition

Educational technology is a broad concept that encompasses different things to different generations and in this case millennial learners and nursing faculty. There is a commonality in the literature to distinguish educational technology into two subgroups: Web 1.0 and Web 2.0. Web 1.0 is the first version of educational technology (Craig, 2013), which incorporates traditional technology that is created by a small number of people for a large audience. Web 1.0 includes PowerPoint presentations, information heavy websites, and learning management software (Craig, 2013; Vance, 2012). It is interesting to note that millennial learners may not even consider Web 1.0 activities as technology (Harris & Rea, 2009). Traditional technologies classified as Web 1.0 are seen as a requirement that is present already – nothing new. Web 2.0 activities are the technologies that facilitate user generated content that can be shared with other users, used for pleasure and purpose, and facilitate collaboration (Craig, 2013). Web 2.0 technology encompasses more than one software and is the transformation of web based material that is not confined by boundaries (O'Reilly, 2009). The operational definition of educational technology in this review are Web 2.0 tools that capture an “increased emphasis on user-generated content, data and content sharing, collaborative effort, new ways of interacting with Web-based applications, and the use of the Web as a social platform for generating, repositioning and consuming content” (Harris & Rea, 2009, p. 137). Some examples of Web 2.0 tools are blogs, simulations, social networks, wikis, podcasts, YouTube videos, virtual worlds, and clickers (Craig, 2013; Vance, 2012).

Theoretical Underpinnings

This review is guided by the theory of andragogy on which models of adult education are based. Andragogy is “the art and science of helping adults learn” (Knowles, 1984, p. 6). As nursing education is comprised of adult learners, the use of educational technology by nursing faculty should be used to help the adult learners learn. Andragogy brings a set of principles and assumptions together which contribute to the learner’s success in education and provide guidance for faculty when designing and implementing courses (Draganov, Andrade, Neves, & Sanna, 2013; Taylor & Kroth, 2009). The assumptions stem from the realization that adults have more experience, preconceived beliefs, and learn differently than children (Knowles, 1984; Taylor & Kroth, 2009). Andragogy in undergraduate education and in particular nursing education is consistent with the relationship between the learner and the facilitator as well as the desired relationship between the graduate nurse and their clients upon completion of their education (Milligan, 1995). The millennial generation of learners brings their own challenges to the underlying assumptions of andragogy, which will be discussed in relation to the findings of this integrative review (Holyoke & Larson, 2009).

Methods

Approach to the Review

A literature search was conducted in four databases: the Cumulative Index of Nursing and Allied Health Literature (CINAHL), the Medical Literature Analysis and Retrieval System Online (MEDLINE), PubMed, and the Education Resources Information Center (ERIC). These databases were searched using the same terms. A Boolean search using the key terms generation y or millennial*, nursing education or teaching methods, and educational technology with limiting the year of publication to 2004 to present resulted in 73 results. Using limiters of

academic journals and English language the results without duplicates yielded 48 articles.

Abstracts were reviewed to determine if the article fit the purpose of this review, which narrowed the search to 26 articles for further review. From here six primary research articles met the inclusion criteria and were selected for review. An ancestry approach did not yield any additional articles. A detailed account of the search can be seen in Figure A1 (see Appendix A).

Inclusion and Exclusion Criteria

Inclusion criteria to select the articles for review included: a) a focus on the use of technology for engagement of the millennial learner, b) primary research involving the use of technology as a teaching tool to enhance learner engagement in undergraduate education with preference given to undergraduate nursing education, c) publication from 2004 to the present as this represents the timeframe that the millennial generation has been in undergraduate education, and d) setting of research is in an English-speaking Western Country (Canada, United States of America, Australia, New Zealand). Exclusion criteria included: a) secondary sources, b) articles about exam outcomes and innovative assessment strategies, c) articles addressing patient/client education, and d) articles that addressed generational differences between students.

Data Analysis

Analysis of the data followed the steps outlined by Whitemore and Knafl (2005) for integrative reviews. A critical appraisal framework (Kline & Singh, 2013) was utilized and the data were extracted from the six primary studies with the following criteria: objectives, design and sample, intervention, instruments and data collection, results, implications and recommendations (see Table B1, Appendix B). Categories were extracted from Table B1 in order to view the data from the six studies as a whole. The three categories included: 1) type of technology, 2) process of technology integration, and 3) student perspectives of technology as an

engaging teaching tool. A data display matrix was developed to display the compiled data by category. The extracted data and the displayed data were illustrated on a concept map for visualization of patterns and were repeatedly compared to the individual studies. Three main themes were identified through this process of data analysis. The primary sources were reread after the three themes were identified to ensure they were congruent and applicable to the original research. The results of the data analysis are presented to answer the guiding question of this review.

Studies Reviewed

Four of the six articles reviewed are quantitative research studies (Beebe, Gurenlian, & Rogo, 2014; Lynch-Sauer et al., 2011; Montenery et al., 2013; Vance, 2012) and two used mixed-method approaches (Evans & Hanes, 2014; Hunter Revell & McCurry, 2010). Three of the selected articles had a sample of nursing students (Hunter Revell & McCurry, 2010; Lynch-Sauer et al., 2011; Montenery et al., 2013), one article had a sample of dental students (Evans & Hanes, 2014), one article had a sample of dental hygiene students (Beebe, Gurenlian, & Rogo, 2014), and one article had a sample of freshman university students in a writing program (Vance, 2012). The different professions/disciplines have minimal impact on the applicability of this review to nursing education because dental education and dental hygiene education are similar to nursing education in that they are a combination of theoretical and practical learning that occurs in classroom, laboratory, and clinical settings. The study with freshman university students in the writing program aligns with freshman nursing students who in many programs complete only classroom course work in their freshman year of their undergraduate program.

Results and Findings

The results are summarized under the three identified themes: 1) technological tools, 2) professional consumption versus personal creativity, and 3) enhancing and supplementing content. All of the studies represented more than one theme, with only the first theme being inclusive of all six studies.

Technological Tools

All six studies in the review inform this theme, while focusing on different technological tools such as podcasts, clickers, simulations, social sharing sites, blogs, video games, and virtual learning environments. Although there was some overlap between studies that evaluated a variety of tools, each study contributed to this theme in a unique way. Beebe, Gurenlian, and Rogo's (2014) exploratory survey highlighted the use of many types of educational technology in undergraduate education and further reported which learning domain (knowledge, laboratory, clinical, and reflection) the technology was being used for. In this quantitative study, faculty and students rated each technology for perceived effectiveness as well as overall perceived advantages of technology use in undergraduate education. Content management systems, podcasts, videos, social sharing sites, electronic readings, games, simulations, blogs, and clickers were perceived effective educational technology tools by faculty and students (Beebe, Gurenlian, & Rogo, 2014). Although the use of clickers was perceived effective by both faculty and students there is a significant difference ($p = .012$) in level of effectiveness with faculty perceiving them more effective than the students (Beebe, Gurenlian, & Rogo, 2014). The use of wikis also had a significant difference ($p = .023$) in that they were perceived as effective by faculty and ineffective by students (Beebe, Gurenlian, & Rogo, 2014). Student engagement was addressed by Beebe, Gurenlian, and Rogo (2014) in regards to advantages of using technology

rather than in response to the effectiveness of a specific technological tool. The majority of faculty (78%) report increased student engagement whereas less than half of the students (45%) agreed with engagement as an advantage to technology use (Beebe, Gurenlian, & Rogo, 2014). This study falls short of linking the perceived effectiveness of the technological tools to student engagement in that engagement is studied with all of the technological tools together. The specific tools of content management systems, podcasts, videos, social sharing sites, electronic readings, games, simulations, blogs, and clickers were not individually evaluated in regards to student engagement. This study also does not address how the technological tools were utilized. The learning domains are mentioned but how the corresponding faculty implemented the content management systems, podcasts, videos, social sharing sites, electronic readings, games, simulations, blogs, and clickers is not apparent.

Similar to the Beebe, Gurenlian, and Rogo (2014), the study by Montenery et al. (2013) asked respondents to complete a survey regarding their perceptions of the effects of various educational technologies that they have been exposed to in their undergraduate program. In particular Montenery et al. (2013) evaluated the effect of the technology on the respondent's attentiveness, knowledge, critical thinking, and course satisfaction. The non-experimental approach evaluated four different technologies: audience response systems or clickers, virtual environments, podcasts, and human patient simulators, over two subsequent semesters (Montenery et al., 2013). The respondents reported on a five point Likert scale that podcasts (Mean = 3.3/3.6) had a neutral to moderate effect on their learning whereas virtual environments (Mean = 4.4) and simulators (Mean = 4.0/4.2) had a positive effect. The use of the audience response system was further broken down and had a positive effect on classroom participation (Mean = 4.2), enhanced learning (Mean = 4.3), increased attention (Mean = 4.5), and enhanced

satisfaction (Mean = 4.1). Similar to Beebe, Gurenlian, and Rogo (2014) this study does not link the respondent's perceived effectiveness to learner engagement clearly. Nor does this study demonstrate how the educational technologies were utilized by faculty within a nursing program.

The study by Hunter Revell and McCurry (2010) evaluated the effectiveness of clickers or personal response system (PRS) technology for student engagement. Faculty used the clickers in a junior level medical-surgical nursing course ($n = 116$) as well as in a nursing research course that had substantially fewer students ($n = 33$). The clickers were used by the students to answer NCLEX-RN style questions that related to content, case studies, and quizzes (Hunter Revell & McCurry, 2010). Using a six point Likert-type scale the students evaluated the effectiveness of the PRS technology on their learning. The results were overwhelmingly positive in that the students felt PRS technology was effective in clarifying key concepts (Mean = 4.71), providing instantaneous feedback (Mean = 4.89), and increasing participation (Mean = 5.14) (Hunter Revell & McCurry, 2010). An independent t test comparing the student's perceived effectiveness between the two courses was not statistically significant and as such Hunter Revell and McCurry (2010) concluded that class size does not contribute to the effectiveness of PRS technology for student engagement. The respondents in the study provided suggestions for further use of the PRS technology to include test preparation and review, attendance, polling questions, NCLEX-RN review questions, and discussion topic polls during a lecture (Hunter Revell & McCurry, 2010).

Similarly, the respondents in the Lynch-Sauer et al. (2011) study provided the researchers with recommendations for technology use in nursing education. The objective of the Lynch-Sauer et al. (2011) study was different from the other articles in that they were seeking to uncover attitudes and understand the role of video games and related technologies in nursing

education. Overwhelmingly the respondents (94%) thought nursing education should make better use of video games, simulation, and virtual environments (Lynch-Sauer et al., 2011). Based on the data collected from the respondents about their personal gaming experiences and their attitudes toward video games and new technology it is inferred that gaming, simulation, and virtual learning environments would increase student engagement in nursing education. This study provides evidence for faculty to experiment with gaming or create games for their teaching practice and provides topics/concepts where students feel gaming would be beneficial – patient safety, professional knowledge, and patient-provider communication skills (Lynch-Sauer et al., 2011). This study falls short on implementing the technology and evaluating its use. This study assumes that because students game in their personal lives they would be engaged in gaming in their education.

Evans and Hanes (2014) reported technological tools that were useful or helpful as student engagement techniques. This study utilized a pretest/post-test questionnaire to measure the usefulness of the educational technology specifically implemented for the millennial learner. The majority of the students found videos and web links very useful (51%) or useful (23%). Simulation was also very useful or useful for practicing communication (71%) and working with a translator (70%) (Evans and Hanes, 2014). Evans and Hanes (2014) found that discussion boards (53% found them slightly or not at all useful) and e-logs (43% found them slightly or not at all useful) as technological tools for student engagement were not useful or helpful as one would assume from the perceived effectiveness reported by Beebe, Gurenlian, and Rogo (2014). Although this study has a small sample and lacks a control group the use of technology by faculty is explicit. This study provides faculty with information on how to implement videos, web links, and simulation into an online course. Evans and Hanes (2014) acknowledge the

contradiction in the socially connected millennial to the low response of usefulness of the discussion boards. This finding is addressed in the subsequent theme.

The study by Vance (2012) examines blogs, podcasts, social networking sites, twitter, and videos as types of educational technology to engage the millennial learner. The students were in four different groups based on the course level in which they were enrolled. There were three course levels in the developmental writing program – beginner, intermediate, and advanced. The online laboratory component of the courses were the samples in the study. The intermediate course was further divided into two groups utilizing the enrollment in two online lab components for the course. The students provided their preference of technology that they felt were important to their learning. One way ANOVA was calculated between the four groups for all of the questions and they were all statistically insignificant illustrating the students had the same preferences. The students in this study suggested the use of blogs (45-50%) and discussion boards (57-66%) to improve the online lab course. The students preferred social networking sites (65-71%) and podcasts (45-51%) as instructional preferences. Instructor preferences were not measured. Similar to the study by Lynch-Sauer et al. (2011) the study by Vance (2012) provides nursing faculty with evidence to experiment with the different types of technology but it lacks the intervention of applying the tools into a teaching practice and evaluating its effect on learner engagement.

In summary, a look at the technological tools for engagement of the millennial learner shows a wide variety of options. Content management systems, podcasts, videos, discussion boards, electronic readings, web links, gaming, human patient simulators, virtual environments, blogs, and clickers all show some relevance for nursing faculty to consider in their teaching practice with millennial learners. The perceived effectiveness of the implementation of these

tools into nursing education is overwhelmingly positive. The next theme provides some insight into how a faculty member would integrate technology to engage the millennial learner.

Professional Consumption versus Personal Creativity

Technological savvy is a well-established generational trait of the millennial generation (Black, 2010; Chung & Fitzsimons, 2013; Earle & Myrick, 2009; Mangold, 2007; Pardue & Morgan, 2008; Skiba, 2005; Strang, Bagnardi, & Williams, 2010; Reilly, 2012). However, a common theme in three of the reviewed articles is that the acceptance of a technological application by millennials depends on the purpose or intention of the application. This means for example there is a difference between being engaged by technology in an academic setting and being engaged by technology for personal enjoyment. This difference is acknowledged by Evans and Hanes (2014) in regards to the low response of usefulness of the discussion board. Evans and Hanes (2014) acknowledge that conversing with peers on Facebook is not the same type of participation that is wanted or expected on discussion boards for scholarly discussion. Vance (2012) acknowledges the same sentiment based on demographic data that display the prominence of personal social networking among the millennial generation and the students desire to have social networking or discussion boards for peer exchange absent of instructor direction. The study by Evans and Hanes (2014) provides a solution for faculty to address the lack of engagement in scholarly discussion on the discussion boards. They suggest having smaller groups of students in a discussion forum to create a professional atmosphere whereby the students will be able to get to know one another professionally and personally (Evans & Hanes, 2014).

There are differences identified by Vance (2012), Beebe, Gurenlian, and Rogo (2014), and Evans and Hanes (2014) regarding the use of technology as a creative canvas and the use of

technology as a source of information. One intention leads to the outcome of active knowledge creation and the other leads to the outcome of passive knowledge consumption. These three studies provide evidence that faculty and students have different desired outcomes for the use of technology in undergraduate education. Vance (2012) acknowledges his assumption about millennial student's use of social media for academic purposes based on high levels of personal use that students would also want to use social networking sites for academic purposes. To critique his assumption Vance (2012) distinguishes the types of technology by Web 1.0 activities and Web 2.0 activities. The results indicate a desire for the students to be connected online with classmates socially but the students value Web 1.0 tools for instruction (Vance, 2012). Web 2.0 applications fit with the personal use of millennials rather than for academic use where Web 1.0 is preferred. This seems to contradict the operational definition of educational technology and that Web 1.0 tools are not considered technology by millennials. Millennials do not consider Web 1.0 tools as technology but prefer their use for instruction and faculty prefer using them to teach. As defined earlier, Web 1.0 technology is a requirement according to millennial learners.

Similarly, Beebe, Gurenlian, and Rogo (2014) discuss different desired outcomes seen in the perceived effectiveness of wikis from faculty and student perspectives. Faculty prefer technology which requires the user/student to create a posting, or an argument, or a discussion while students prefer technology that is passive consumption of knowledge like a video or an e-reading (Beebe, Gurenlian, Rogo, 2014). Aligning with the results from Vance's (2012) study the perceived advantages of technology from students according to Beebe, Gurenlian, and Rogo (2014) are the increased flexibility and the ease of student collaboration. In the study by Evans and Hanes (2014) the use of web links by the faculty was overwhelmingly popular with the students. Web links allow the students to be taken to a video, or an article online with one click

of the mouse. Web links support passive consumption by the learners because they do not even have to search for the information. It is there in front of them with one click. A student commented on the use of YouTube videos reporting that they learn everything from YouTube (Evans & Hanes, 2014). YouTube could be seen as a creative sharing site where students could create and upload their own videos, however, the students view YouTube as the provider of information and they prefer to watch existing videos on YouTube.

It can be seen within this theme that the purpose for technology use in undergraduate education cannot be assumed to be clear for faculty and for students. Faculty intentions and student expectations may not align. This brings up the notion of student input regarding the technology chosen and how it is implemented into undergraduate programs. The non-experimental studies sought to determine which technology the students preferred but failed at determining how the technology was being used and if the students could distinguish their preferences from finding the technology effective or finding the way the technology was used effective. This theme provides direction for nursing faculty when seeking to include educational technology in their courses. What do the students want?

Enhancing and Supplementing Content

The theme of enhancing and supplementing content with technology has resonance when considering undergraduate nursing education. Nursing curricula have outcomes and graduate competencies that are created with nursing regulatory bodies to ensure that the nursing graduates are safe to practice nursing. Therefore, technology cannot replace the content or concepts that are required in nursing education. Technology can however enhance the content to increase learner engagement. Five of the reviewed studies are relevant to this theme. In the study by Evans and Hanes (2014) the evaluation data revealed that the students ranked the content as a

strength in the course and rated it stronger than the technological tools. Along with the content the students also supported a strong course structure and clear guidelines about the implemented technology (Evans & Hanes, 2014). This study provides the details of how this was accomplished for a specific course. This study also provides suggestions for improvement based on the evaluation data received. Interestingly, the student suggestions for improvement were completely about technology use and how they align with the content (Evans & Hanes, 2014).

The results of the study by Vance (2012) indicate freshman millennial students want a course with a strong structure and organized content. The students welcome technology as a way to enhance the content (Vance, 2012). This study is limited by the students evaluating what technology was used rather than how the technology was used with the content or how technology was used to generate content. Beebe, Gurenlian, and Rogo (2014) illustrate that technology can be used in classroom, laboratory, and clinical settings. The diversity of the courses in which technology is integrated shows that it is the course structure that guides the technology use. Lynch-Sauer et al. (2011) speculates on enhancing content in the classroom and in clinical settings with the use of video games, virtual environments, and human patient simulators. This study acknowledges the importance of course content and the role of educational technology in supplementing the content but again does not provide a way for faculty to implement technology.

The study by Hunter Revell and McCurry (2010) involving the use of PRS technology illustrates a way in which faculty can incorporate technology to enhance content and maintain current competencies. The use of the clickers for understanding content and preparation for the NCLEX-RN was well received by students and faculty for increasing learner engagement by enhancing the course. Hunter Revell and McCurry (2010) imply that the effective use of clickers

provides the means for active learning to be facilitated and engaging. This study provides evidence that the size of the classroom does not affect the engagement with technological tools. If the tools are used to enhance the content they will engage the learner whether they are in a small seminar classroom or in a large lecture hall (Hunter Revell & McCurry, 2010).

In short, the title of this theme sums up the results from five of the reviewed articles in regards to the role of technological tools within a course. Course content, structure, guidelines, and organization are more important to the student than the use of technological tools. This still leaves the question of how do nursing faculty effectively use technology to engage the millennial learner? Implications for nursing faculty in their teaching practice will be discussed through the lens of andragogy. Recommendations for further research and how to effectively use technology will be presented.

Limitations

This review is limited by the inclusion of only six primary research articles of which only three report the findings of nursing research. The six articles were the most relevant for informing this literature review based on the purpose and guiding question. Limitations of the reviewed articles included small sample sizes and convenient sample methods that limit the generalizability and confidence of the findings. Although these limitations were found in a number of the articles their inclusion into the review was warranted due to the limited research addressing this area of nursing education. As a result of the small body of research literature available and the weaknesses identified the implications for practice are cautiously considered. However, further research is clearly needed to address the gap in this area and increase the body of knowledge supporting faculty use of educational technology for millennial learner

engagement. Also important to note is that millennial learners are a diverse age group and as individual learners they may not exhibit the common generational traits discussed here.

Discussion

The synthesis of knowledge generated from this review is presented based on current knowledge of the millennial generation in nursing education within the nursing literature. There is a prevalent notion in the literature that nursing faculty may need to change their teaching philosophy for the millennial generation. Also, a discussion of the seemingly resistance by some faculty to adopt educational technology tools is offered. As well, the benefits of technology for millennial learner engagement are built upon and lastly recommendations are made for faculty to effectively integrate technology into their practice to engage the millennial learner.

Teaching Philosophies and the Millennial Generation

In the millennial generation literature there is a commonality in the need for educational change at the institutional level and at the teaching level when working with millennial learners. It has been suggested that faculty may have to change their teaching philosophies and educational strategies for millennial learners (Black, 2010; Earle & Myrick, 2009; Montenery et al., 2013; Pardue & Morgan, 2008). This notion should be approached cautiously. This review does not support an upheaval of philosophical underpinnings in nursing undergraduate education. This review views the use of technology by nursing faculty as teaching tools not as a teaching philosophy. For those who argue otherwise that teaching philosophies must change to incorporate technology use I ask: What creates a stronger teaching practice? Using tools to strengthen one's philosophy? Or using tools as one's philosophy?

Even if nursing faculty have a traditional teacher-centered teaching philosophy, the use of technology to engage the millennial learner does not require a philosophical change. Other

preferences by millennial learners might warrant a change to a more student-centered approach but effective use of educational technology does not. For example, a traditional teacher-centered lecture of “sage on the stage” could be more engaging to students if teacher used animation software instead of the traditional computerized presentation software. A possible other suggestion for a traditional lecture is to embed the lecture with YouTube videos to provide a different stimulus for engagement.

For nursing faculty who already employ a student-centered teaching philosophy the question may arise of do I need to change my educational theory to captivate the millennial learners? Again it is important to note that technology is a tool not a theory and how the tool is utilized is a teaching strategy. Good teaching practice already encourages faculty to continually assess whether the learning outcomes are being achieved by the learners and determine if they need to adapt their teaching strategies. This should be no different for accommodation of millennial learners (Skiba & Barton, 2006). An example of this is provided by Holyoke and Larson (2009) in which the six assumptions of the adult learning theory were examined from a generational perspective and they determined that millennial learners do not automatically fit the assumptions of andragogy. Two of the assumptions of andragogy do not fit with millennial learners: readiness to learn and motivation to learn (Holyoke & Larson, 2009).

Andragogy assumes that adult learners have a readiness to learn because they need to know or need to do something that is relevant to their situation (Knowles, 1984; Taylor & Kroth, 2009). Unlike previous generations, millennial learners did not enter education with a readiness to learn. The millennial learners needed to be prompted into a readiness state. They lacked the curiosity for learning and sought specific answers (Holyoke & Larson, 2009). The millennial learners were not ready to make the connections between authors, experiences, and knowledge.

They wanted the connections to be told to them (Holyoke & Larson, 2009). Similarly, the millennial learner's motivation to learn did not come from internal factors (Holyoke & Larson, 2009). The millennial generation left the motivating up to the facilitator or their peers (Holyoke & Larson, 2009). Millennial learners may be seeking purpose and passion and they may look to nursing faculty to inspire them for learning nursing (Reilly, 2012). This contradiction between millennial generation traits and assumptions of andragogy is exciting for use of educational technology. Educational technology can be used as the external motivation to learn and to engage the millennial nursing student by providing a purpose for the learner to become a nurse and create a passion for nursing. Web 2.0 tools such as human patient simulators, blogs for nursing role models, virtual worlds of providing patient care, and video games are a few examples that could provide the external motivation that millennial learners often need. Motivating millennial learners provides faculty with the opportunity to be creative and try new technologies in their practice.

Adopting Educational Technology

The results of this review corroborate that millennial learners have a preference for technology use in education. This is not a new idea as it is well documented that the technologically savvy millennials want technology (Black, 2010; Pardue & Morgan, 2008; Skiba, 2005; Skiba & Barton, 2006). Why then is the research scarce on technology for engagement of the millennial nursing student? It is possible that research is not being conducted but educational technology is in fact being used? Other possible arguments for not using technology could be unfamiliarity with the technology, the time it takes to learn the technology and implement it into a course, and the cost of the technology. Web 2.0 technologies claim to be user friendly. As Web 2.0 activities focus on user generated content they are designed for the

user and have an easy to use interface for even the digitally illiterate. It is important to note that user friendly does not imply fast setup, or no experience required, or absence of technical difficulties. Faculty development and support is needed as the learning curve is steep (Griffin-Sobel et al., 2010). Although adoption of educational technology can be time intensive and frustrating for some faculty the increased learner engagement is worth the effort. It is important for nursing faculty to use technology in their teaching regularly because the speed that the millennial generation can adjust to technology exceeds the pace of faculty incorporating it into their courses (Mangold, 2007).

Millennial Generation Traits and Technology for Engagement

The technological tools discussed in the reviewed articles all align with the generational traits of millennial learners in one way or another. The experiential learning preferences of millennials can be accommodated with patient simulation using evidence-based scenarios or virtual learning environments where they learn in action and learn by doing (Skiba & Barton, 2006). Simulation replicates the clinical setting and engages the nursing students in active learning where they can bridge theory with practice as well as learn about interdisciplinary collaboration and communication (Erlam, 2014). The tendency for group work among millennial learners can be supported in nursing education with the intervention of blogs, discussion boards, and social sharing sites. All of these Web 2.0 activities encourage collaboration and the purpose of the blog, discussion board, or social networking site is flexible in that it can be whatever the faculty and the millennial learners want it to be. Millennial learners have a need for instantaneous feedback. PRS technology or clickers provides this to the learners. Clickers can be incorporated for a variety of reasons in a variety of nursing courses. Lastly, the generational trait of connected or accessible can be fulfilled with podcasts, blogs, and

social networks because they are available on hand held devices or tablets. The need for a computer or a wireless internet connection is not necessarily required for these technological tools and that satisfies the millennial learners need for immediate access.

Recommendations

As discussed above the importance of using technology in nursing education does not outweigh the importance of educational theories that guide and shape nursing faculty's teaching practice. The millennial generation may challenge some nursing faculty in their current teaching philosophy and demand change to satisfy their needs. Assumptions of common education theories may not be congruent with the generational traits of millennial learners with current teaching practice. Educational technology tools can be used effectively to mesh the two. Faculty incorporating technology into their teaching practice will be on par to stay current with the new educational technology as it becomes available. Strategies for effectively incorporating technology into nursing faculty's teaching practice include:

- Ask the technology experts. That is ask the millennial learners what types of technology engage them and how they can see it working in their education.
- Have a well-designed course and implement technology that will engage millennial learners and mesh the incongruent aspects between educational theories and generational theories.
- Be purposeful in the implementation of technology. What is the reason and desired outcome for the technological tool? Hyperlinks for example may be warranted in some cases and counterproductive in another.
- Re-evaluate and adjust teaching strategies and teaching tools as needed. Technology from ten years ago is not considered technology by millennials. PowerPoint slides could

be replaced by Prezi presentations or by PowToon animations. Handout notes could be replaced with podcasts. Group questioning could be replaced with PRS technology for content review. Nursing skills videos could be replaced with actively performing the skill on a human patient simulator.

- Implement technology that aligns with experiential learning, i.e. simulation, virtual learning, discussion forums.
- Implement Web 1.0 tools for passive consumption and Web 2.0 tools for active creation of knowledge. Set clear expectations of academic use of technology compared to personal use.
- Implement technology that supports group work and enables the millennial learners to collaborate with peers, i.e. discussion boards and wikis.
- Use technology for increased class participation such as clickers, human patient simulators, and gaming.
- Choose technological tools that are accessible on mobile devices, i.e. podcasts, blogs, YouTube videos.
- Be creative with technology and encourage learners to be creative with technology as well.

Further research is needed to strengthen the recommendations and generalizability of the findings in this review for effectively implementing technology in nursing education for engagement of the millennial learner. As the generation of nursing faculty starts to shift with millennial faculty entering into undergraduate education it will be interesting to see how the use of educational technology for learner engagement changes in nursing education.

Conclusion

The effective use of technology by nursing faculty for engagement of the millennial learner is complex and multifaceted. The importance of integrating technology into nursing education is snowballing as the millennial generation filling undergraduate nursing programs is expecting it. Engagement is key with the millennial generation in that they expect to be engaged in their education and one consistency across the generation is that technology is engaging to them. Technology from yesterday is not considered technology. Therefore, it is important for nursing faculty to become familiar with new educational technologies and implement them into their courses. Millennial learners are fast learners with technological software and as such they learn the software faster than faculty can use it. Nursing faculty working with millennial learners must stay on the educational technology wave to facilitate student engagement. A review of the literature revealed an insufficient body of research regarding how to effectively use technology in nursing education to engage the millennial learner. Although the overall quality of the reviewed studies was lacking, as discussed in the results and findings, there were a number of practical findings that can be easily integrated into nursing faculty's teaching practice.

It has been shown that the use of educational technology for engagement of the millennial learner has the potential to increase their motivation to learn, facilitate self-directed learning, incorporate their experiences, and provide relevance to their learning. The use of educational technology offers the opportunity for increased student engagement, flexibility, collaboration between students, information literacy, knowledge acquisition, and availability of the instructor within nursing programs. However, there is little generalizability of these findings directly relating to nursing students in a variety of nursing courses in various undergraduate nursing

curricula. The limited confidence in the discussion is acknowledged and provides an opportunity for further research and application to nursing education.

Key recommendations coming from this review include: a) the need for further research to inform the guiding question that is generalizable to a greater population of undergraduate nursing students, b) ask the millennial learners for their expertise in new technologies and how they envision using them in their education, c) implement technology that aligns with the experiential learning of millennial learners, d) set clear expectations of academic use of technology compared to personal use, and perhaps most importantly e) be creative with integrating technology into nursing courses.

References

- Beebe, C. R. R., Gurenlian, J. R., & Rogo, E. J. (2014). Education technology for millennial dental hygiene students; a survey of U.S. dental hygiene programs. *Journal of Dental Education, 78(6)*, 838-849.
- Black, A. (2010). Gen Y: Who are they and how they learn. *Educational HORIZONS, winter issue*, 92-101.
- Canadian Institute for Health Information (2010). *Regulated nurses: Canadian trends, 2005 to 2009*. Ottawa, ON: Author. Retrieved from http://publications.gc.ca/collections/collection_2011/icis-cihi/H115-48-2009-eng.pdf
- Chung, S. M. & Fitzsimons, V. (2013). Knowing generation Y: a new generation of nurses in practice. *British Journal of Nursing, 22(20)*, 1173-1179.
- Craig, D. V. (2013). Content creators and language learners: Exploring Web 2.0 and wikis. *Journal of Educators Online, 10(2)*. Retrieved from <http://files.eric.ed.gov/fulltext/EJ1020181.pdf>
- Draganov, P. B., Andrade, A. C., Neves, V. R., & Sanna, M. C. (2013). Andragogy in nursing: a literature review. *Investigación y Educación en Enfermería, 31(1)*, 86-94.
- Earle, V. & Myrick, F. (2009). Nursing pedagogy and the intergenerational discourse. *Journal of Nursing Education, 48(11)*, 624-630. doi: 10.3928/01484834-20090716-08
- Erlam, G. (2014). Simulation and 'millennials' – a great fit. *Kai Tiaki New Zealand, 20(1)*, 13.
- Evans, L. & Hanes, P. J. (2014). Online cultural competency education for millennial dental students. *Journal of Dental education, 78(6)*, 867-875.

- Griffin-Sobel, J. P., Acee, A., Sharoff, L., Cobus-Kuo, L., Woodstock-Wallace, A., & Dornbaum, M. (2010). A transdisciplinary approach to faculty development in nursing education technology. *Nursing Education Perspectives, 31(1)*, 41-43.
- Harris, A. L. & Rea, A. (2009). Web 2.0 and virtual world technologies: A growing impact on IS education. *Journal of Information Systems Education, 20(2)*, 137-144.
- Hunter Revell, S. M. & McCurry, M. K. (2010). Engaging millennial learners: Effectiveness of personal response system technology with nursing students in small and large classrooms. *Journal of Nursing Education, 49(5)*, 272-275. doi: 10.3928/01484834-20091217-07
- Holyoke, L. & Larson, E. (2009). Engaging the adult learner generational mix. *Journal of Adult Education, 38(1)*, 12-21.
- Kline, N. E., & Singh, M. D. (2013). Critiquing quantitative research. In G. LoBiondo-Wood & J. Haber (Eds.), *Nursing research in Canada: Methods, critical appraisal, and utilization* (3rd ed.) (pp. 434-473). Toronto, ON: Elsevier.
- Knowles, M. S. (1984). Introduction: the art and science of helping adults learn. In M. S. Knowles & Associates, *Andragogy in action* (pp. 1-21). San Francisco, CA: Jossey-Bass Publishers.
- Lynch-Sauer, J., VandenBosch, T. M., Kron, F., Livingston Gjerde, C., Araro, N., Sen, A., & Feters, M. D. (2011). Nursing students' attitudes toward video games and related new media technologies. *Journal of Nursing Education, 50(9)*, 513-523. doi: 10.3928/01484834-20110531-04
- Mangold, K. (2007). Educating a new generation: Teaching baby boomer faculty about millennial students. *Nurse Educator, 32(1)*, 21-23.
- Milligan, F. (1995). In defence of andragogy. *Nurse Education Today, 15*, 22-27.

- Montenery, S. M., Walker, M., Sorensen, E., Thompson, R., Kirklin, D., White, R., & Ross, C. (2013). Millennial generation student nurses' perceptions of the impact of multiple technologies on learning. *Nursing Education Perspectives, 34*(6), 405-409. doi: 10.5480/10-451
- O'Reilly, T. (2009). What is Web 2.0? Design patterns and business models for the next generation software. Retrieved from <http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html>
- Pardue, K. T. & Morgan, P. (2008). Millenials considered: a new generation, new approaches, and implications for nursing education. *Nursing Education Perspectives, 29*(2), 74-79.
- Prensky, M. (2005). Engage me or enrage me: what today's learners demand. *Educause Review, September/October*, 60-64. Retrieved from <http://marcprensky.com/articles-in-publications/>
- Reilly, P. (2012). Understanding and teaching generation y. *English Teaching Forum, 1*, 2-11.
- Russell, C. K., Murrell, V. S., Hartig, M. T., Care, W. D., Jacob, S., Lockhart, C., Mynatt, S., Pruet, J., Stegbauer, C., & Thompson, C. (2007). Models and strategies for teaching in distance education student-centered approaches. In L. E. Young & B. L. Paterson (Eds.), *Teaching nursing: Developing a student-centered learning environment* (pp.295-322). Philadelphia: Lippincott Williams & Wilkins.
- Skiba, D. J. (2005). The millennials: Have they arrived at your school of nursing? *Nursing Education Perspectives, 25*(6), 370-371.
- Skiba, D. J. & Barton, A. J. (2006). Adapting your teaching to accommodate the net generation of learners. *OJIN: The Online Journal of Issues in Nursing, 11*(2), manuscript 4. doi: 10.3912/OJIN.Vol11No02Man04

Strang, S. L., Bagnardi, M., & Williams, S. (2010). Tailoring a diabetes nursing elective course to millennial students. *Journal of Nursing Education, 49(12)*, 684-686. doi:

10.3928/01484834-20100831-05

Taylor, B. & Kroth, M. (2009). Andragogy's transition into the future: Meta-analysis of andragogy and its search for a measurable instrument. *Journal of Adult Education, 38(1)*, 1-11.

Vance, L. K. (2012). Do students want web 2.0? An investigation into student instructional preferences. *Journal of educational Computing Research, 47(4)*, 481-493. doi:

10.2190/EC.47.4.g

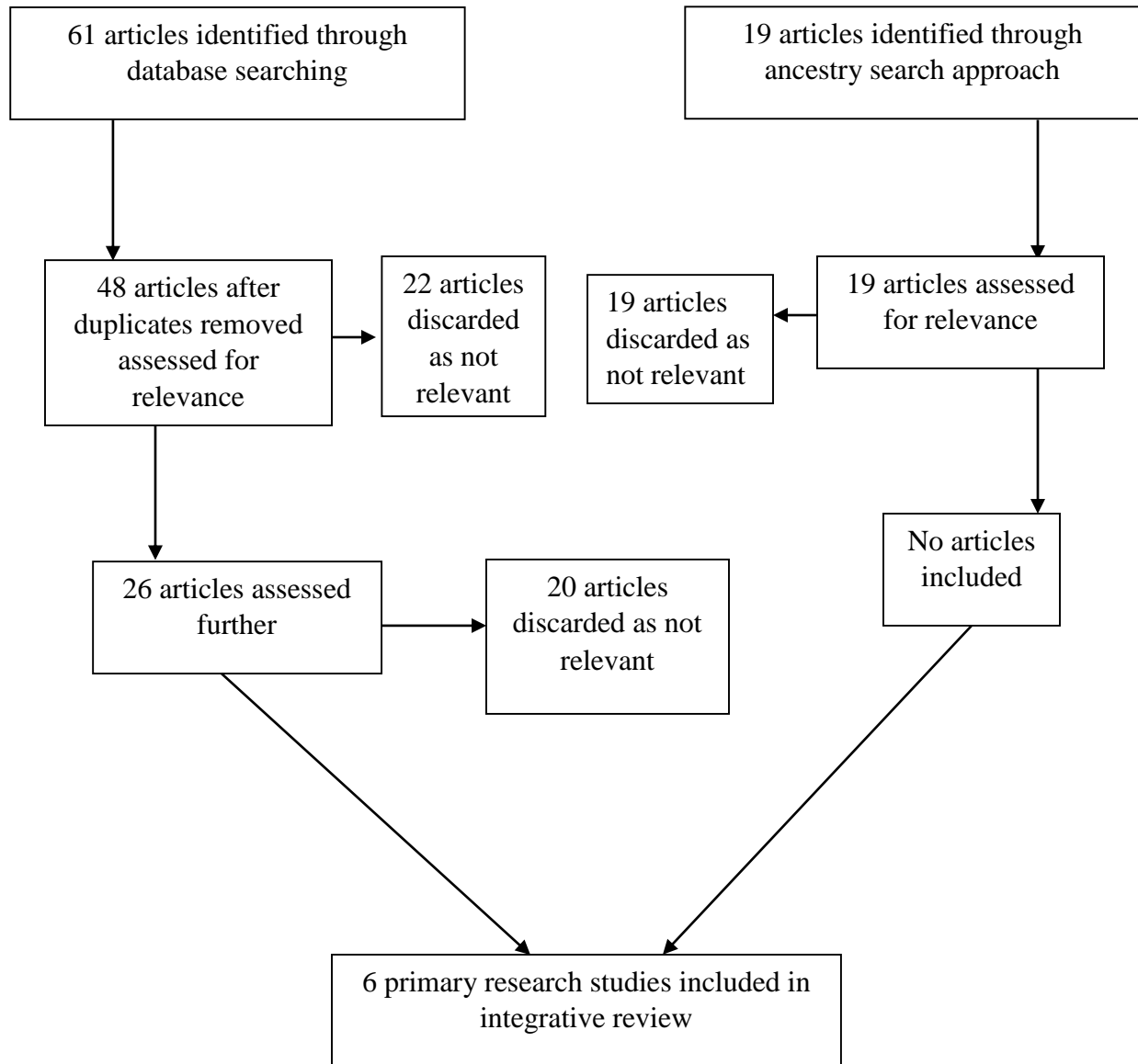
Walker, J. T., Martin, T., White, J., Elliott, R., Norwood, A., Mangum, C., & Haynie, L. (2006). Generational (age) differences in nursing students' preferences for teaching methods.

Journal of Nursing Education, 45(9), 371-374.

Whittemore, R. & Knafl, K. (2005). The integrative review: updated methodology. *Journal of Advanced Nursing, 52(5)*, 546-553.

Appendix A

Figure A1
Flow chart of literature search



Appendix B

Table B1
Systematic Extraction of Data/Findings from the Articles

Study: Author(s) and date	Objectives	Design and sample	Intervention (strategy and method)	Instruments and data collection	Results	Implications and recommendations
Beebe, Gurenlian, and Rogo (2014)	To identify what types of educational technology used in dental hygiene education. To assess the benefit perceived by students and the benefit perceived by faculty in learning course content with educational technology. To identify barriers that exist in implementing educational technology. H ₀ = there is no difference between the	Design: Non-experimental survey exploratory study. A questionnaire was used. The respondents had a choice of an identical paper-based or a web-based questionnaire. Sample selected by a stratified random sample of entry-level dental hygiene programs across the USA. Programs divided into west, central, and east regions and 30 were randomly	None.	Original survey was created. The survey consisted of ordinal scale questions with the option to add in “other” responses. Ordinal scale questions were used to rank the effectiveness of each technology. The questions were answered using a five-point scale from 1=not at all effective to 5=very effective. Test-retest reliability was completed with 7 members of the pilot group one week apart with a mean agreement of 91% (range 87-	Alpha level set at .05. Mean and median results presented for ordinal level questions. The Mann-Whitney U test used to test the difference in student and faculty perceived effectiveness of technology. The only tools with a significant difference was clickers ($p=.012$) and wikis ($p=.023$). 88% of student respondents were millennials. 62% of faculty respondents were baby boomers. Both faculty (82%) and students (54%)	A wide variety of educational technology is being used in dental hygiene education. Faculty favor technology tools that require active creation and utilization. Students tend to favor technological tools that support passive consumption (videos, podcasts, and e-books). Recommend further research to specifically see how the various technological tools are being used as well as a qualitative study to reveal faculty and students

<p>perceptions of students and faculty in terms of the effectiveness of educational technology strategies used in dental hygiene education programs.</p>	<p>selected from each region. Due to low response rate an additional 10 from each region were randomly selected. Of the 120 programs selected randomly 16 agreed to participate. 14 programs provided a total number of students and faculty totaling 415 potential participants. The total number of surveys returned were 128. 6 were excluded due to the respondent not indicating if they were a student or faculty. Of the 122 respondents 31% (n=38) were faculty and</p>	<p>93%). The content validity of the survey was tested and scored .93. Reliability coefficient and internal consistency not calculated.</p>	<p>preferred a hybrid of online and face-to-face formats. Both faculty and students report high use of videos (79%, 88%), course management software (82%, 68%), and electronic reading (53%, 61%). Other types of technology being used were games, podcasts, wikis, clickers, simulation, blogs, and social sharing sites. Faculty report increased learner engagement and students report increased communication and collaboration with faculty and classmates. The biggest barrier was technical difficulty.</p>	<p>insights into the use of technology for learning. Limitations include low response rate, the possibility of faculty who are not using technology might not have completed the survey, and the results cannot be used to make generalizations because of the limited scope of inference.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

		69% (n=84) were students.				
Evans and Hanes (2014)	To describe the strategies utilized to design a cultural competence course to engage millennial learners. To present findings about the success of the course and student's perspectives of the pedagogical strategies used for engagement. Discuss the results and share lessons learned. To examine the impact of interactive teaching strategies in a media-infused course for	Design: quasi-experimental mixed method pretest/posttest questionnaire and evaluation survey. Sample 88 students in the first offering of the <i>Healthy Perspectives</i> course - 81 first year dental students and 7 radiology students. 85 students completed the pretest, 71 students completed the posttest. 71 students completed both the pre- and posttest for an 81% response rate. 75 (85%) students	A cultural competence course was created for dental education with millennial learners in mind. The asynchronous course was comprised of modules. Each module was short in length but embedded with 5-17 links to social media content. The last module was a virtual patient simulation.	The Clinical Cultural Competency Questionnaire (CCCQ) was adapted by omitting questions that were beyond the scope of the course. The questions were five-point Likert-type scales. The adapted CCCQ was acknowledged as being validated for use in many health professions. Cronbach's alpha showed good internal consistency of the 4 main areas of interest on the scale: self-awareness ($\alpha=.87$), knowledge ($\alpha=.83$), skills ($\alpha=.89$), and attitude ($\alpha=.79$).	A two-tailed paired <i>t</i> test was used between the pretest mean and the posttest mean for the four areas of interest on the CCCQ scale and for overall cultural competence. The course was statistically significant in increasing knowledge (pre-test mean = 13.04, post-test mean = 17.46, $p<.001$), skill (pre-test mean = 13.70, post-test mean = 17.94, $p<.001$), attitudes (pre-test mean = 13.85, post-test mean = 14.96, $p=.031$), self-awareness (pre-test mean = 12.07, post-test mean = 12.88, $p=.045$), and overall cultural	Results indicate the online course was effective in increasing the students' knowledge and comfort with the subject matter. Some of the elements designed for millennial students (discussion boards and e-logs) had mixed reviews. The discussion board was designed to simulate a social sharing platform so the mixed results had the researchers perplexed. The researchers discussed the difference in personal interactions and professional interactions on social sharing sites and the possibility

Millennial dental students in regards to learning outcomes and evaluation of pedagogy.

completed the course evaluation. Ages of the participants not disclosed other than saying about 95% of students entering dental education nationwide (USA) in 2010 were in the millennial generation.

The second tool was the course evaluation which included closed and open ended questions. Reliability and validity not address for the course evaluation questionnaire.

competence (pre-test mean = 53.20, post-test mean = 63.54, $p < .001$) from the pretest to posttest results. For the course evaluation the students found the videos and embedded links (very useful = 51%, useful = 23%), and the virtual simulation (very useful = 44%, useful = 27%) helpful in engagement. The discussion boards (very useful = 27%, useful = 19%, slightly useful = 34%, not at all useful = 19%) and e-logs (very useful = 29%, useful = 28%, slightly useful = 25%, not at all useful = 18%) were less useful from the student's perspectives. The

that the difference is what contributed to the mixed reviews for the discussion board. Researchers were surprised to learn that students put course content, course structure, and clear guidelines above multimedia use. Students recognize pedagogical strategies involving technology augment the content not replace it. Limitations of this study include the lack of a control group.

qualitative comments align with the quantitative results.

<p>Hunter Revell and McCurry (2010)</p>	<p>To evaluate and compare the perceived effectiveness of personal response system (PRS) technology to actively engage students, foster critical thinking, and improve learning outcomes in small and large classes in undergraduate nursing education.</p>	<p>Design: quasi-experimental mixed method questionnaire. Sample: undergraduate students in nursing research (<i>n</i>=33) and undergraduate students in junior level medical-surgical nursing (<i>n</i>=116). From the total students (<i>n</i>=149) 139 participants completed the evaluation form. 92.8% of the participants were female. 95.7% were aged 18-22. 92.8% had greater than five years of experience with technology.</p>	<p>Faculty incorporated questions focused on content review, case studies, and reading quizzes during the didactic portion of the classes. Students used the PRS technology assigned to them for the semester to respond to the questions in class. The style of questions was varied to simulate the NCLEX-RN alternate</p>	<p>Students completed a fourteen item evaluation tool that collected demographic information and their perceptions of the effectiveness of the PRS. The perceptions were collected using a 6-point Likert type scale. The Likert type questions addressed the effectiveness of PRS technology in clarifying key concepts, providing instantaneous feedback, and increasing classroom participation. The students also</p>	<p>The summative results from the 6-point Likert scale questions supported the use of PRS technology to clarify key concepts (mean = 4.71), to provide instantaneous feedback (mean = 4.89), and to increase classroom participation (mean = 5.14). Students elevated their comfort (mean = 5.14) and satisfaction (mean = 5.20) using the PRS as well as if they thought the technology could be used in other nursing courses (mean = 5.16). In determining the effectiveness in</p>	<p>PRS technology is effective in large and small classroom to actively engage students, foster critical thinking, and improve learning outcomes. Faculty and students reported increased classroom participation in both classes. The use of NCLEX-RN format questions led to greater understanding of content as well as preparation for the NCLEX-RN exam. Students suggested using PRS technology for test preparation, exam review, attendance, polling questions, and discussion</p>
-----------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

88.5% of participants had no previous experience with PRS technology. format questions (multiple choice, true-false, fill in the blank, multiple response, and chart exhibit response). The collective responses were displayed on the board and the faculty member could provide alternate methods of explanation. evaluated their comfort and satisfaction, and if they thought PRS technology would be effective in other nursing courses. Qualitative data was collected through two open ended questions. Faculty also provide evaluation data at the end of the course. Reliability and validity for the fourteen item tool and the Faculty evaluation tool were not addressed. small versus large classroom the *t* test was reported and not displayed as not statistically significant in any of the Likert style questions. The qualitative responses aligned with the quantitative results supporting the effectiveness of PRS. The faculty evaluation data reinforced the student data. topic questions during lectures. Limitations of this study include the lack of a control group.

Lynch-Sauer et al. (2011) Describe the use of video games and related new technologies by nursing students. Describe nursing Design: Non-experimental thirty item cross-sectional survey. Sample: undergraduate and graduate nursing students recruited from None. A 30-item web-based cross sectional survey. Included questions on demographics, attitudes about new media technology, beliefs about multiplayer Puzzle games (79%), arcade games (29%), and simulation games (29%) were the three most reported favorite game genres. Games were used for Video games and related new technology are viewed positively by the majority of nursing students in this study. They can identify learning priorities

<p>students' experience with computer games. Uncover the attitudes of nursing students toward various instructional styles and methods in nursing education. Understand the role of video games and related new technology within nursing education.</p>	<p>two Midwestern (USA) universities. Together there were approximately 1420 students enrolled in the two universities. A total of 218 students completed the survey. 75% of the completed surveys were from University B. Undergraduate students comprised 68.8% (<i>n</i>=150) of the respondents. Graduate students comprised 31.2% (<i>n</i>=68).</p>	<p>simulations for nursing education, and perceived importance of acquiring new skills. Students asked to indicate their favorite types of games from a pre-determined list. Survey included skip patterns for items not relevant to the respondent's individual responses. Scale measuring agreement were written using a four-point Likert type scale. Items on the survey were created after consultation with subject experts. Internal consistency not reported.</p>	<p>relaxation (77%) and for problem solving (76%) by the students. Overwhelmingly, the respondents thought nursing education should make better use of video games (88%) and new technologies (94%) in nursing education. 60% of respondents thought video games could have educational value. 52% of respondents were interested in multi-player simulations. Significance between undergraduate nursing students and graduate nursing students in regards to game types, frequency of playing games, learning from mistakes, and attitudes</p>	<p>that could be enhanced with the use of video games (patient safety, professional knowledge, and patient-provider communication skills). Caution should be taken when using video games that promote violence or negative patient outcomes in nursing education because it may desensitize the student to real-world situations. Complex, multiplayer games could enable nursing students to experience and analyze system influences on patient safety. Nursing education has only begun to implement new gaming technologies with</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

					disappeared after logistic regression used to adjust for age. 79% of respondents ranked patient safety, 72% ranked patient-provider communication, 66% ranked professional knowledge as either first, second, or third most important categories in nursing education.	high-fidelity and virtual simulation to supplement content and clinical experiences. Limitations: small sample size therefore generalizability is cautioned. Nursing faculty should embrace new media technologies for nursing education to meet the needs of millennial nursing students.
Montenery et al. (2013)	To determine how a group of millennial nursing students views the effects of instructional technology on their satisfaction of their courses and the nursing program in regards to the effects of	Design: a quantitative, descriptive, longitudinal, anonymous survey (non-experimental). Survey administered on the last day of classes in the winter quarter and again in the spring quarter.	None.	Survey was administered in the winter quarter and again in the spring. The survey included nine ranked-response items and one narrative response item. The ranked response questions were on a five-point Likert scale. Content validity established by	Descriptive statistics presented. The use of clickers had a positive impact on participation (mean 4.2), enhanced learning (mean 4.3), increased attention (mean 4.5), and enhanced satisfaction (mean 4.1). Virtual learning (mean 4.4) and simulators	The use of clickers, virtual learning, and simulators promotes active involvement of the nursing student in their learning. Students prefer the use of technology. The use of technology may require adjustments to teaching philosophies and techniques by

technology on their attentiveness, their knowledge, their critical thinking.

Sample: a convenience sample of all sophomore, junior, and senior nursing students ($n=60$) from one institution were invited to participate each time. Fifty seven students returned the survey in the winter. Fifty one returned the survey in the spring. A total of 108 responses.

review of the survey by a panel of experts. Face validity was established by four senior nursing students reviewing the survey. Items addressed clickers, virtual environments, podcasts, human patient simulators, the extent of technology integration, and computerized testing. Internal consistency of questions 1-4, 8-9 was acceptable (Cronbach's $\alpha = .73$). Unable to determine internal consistency for questions 5-7 because of high number of *Not Applicable* responses.

(mean 4.0 winter, mean 4.2 spring) had positive impacts on learning and critical thinking. The sparingly used technology of podcasts had a moderate to neutral impact (mean 3.6 winter, mean 3.3 spring). The majority of the students (70.2% winter, 66.7% spring) preferred computerized testing to pen and paper testing. 92 respondents found technology was integrated more into their nursing courses than other academic disciplines. The narrative responses aligned with the quantitative data for clickers, virtual learning, and

faculty. This study is limited by the small sample size and the convenience sampling method. Other limitations include: investigators were current faculty members, anonymous survey meant the investigators could not do test-retest correlations or group comparisons. Investigators recommend research needed on the effects of instructional technology on achieving course objectives, NCLEX-RN pass rates, and quality health care outcomes in practice. The investigators also recommend research on how to

Vance (2012)	To show what students feel important to their learning process and whether they prefer Web 2.0 approaches or the more traditional Web 1.0 approaches. Do students want Web 2.0?	Design: non-experimental. An anonymous survey Sample: 1874 respondents (99% aged 18-20). Freshman students enrolled in a developmental writing program with three course levels (3L basic level <i>n</i> =147, 4L intermediate level <i>n</i> = 1483, 5L advanced level <i>n</i> =244). The intermediate course (4L) is further broken down into 4L1 and 4L2 based upon enrollment into two online	None.	Web based survey administered over a 2 week period. Survey had a total of three questions. Questions were multiple answer. Instructions given with the question directions to limit the number of preferences per question. Questions were phrased to highlight the active participation of Web 2.0 activities while Web 1.0 activities were created by the instructor. Validity and reliability not reported.	human patient simulators. Presented percentages of students in each course for each response. ANOVA was calculated between the groups for all three questions and was not significant each time. Respondents overwhelmingly had personal social networking accounts (3L 91%, 4L1 93%, 4L2 95%, 5L 93%). Blogs were the next most common personal Web 2.0 activity ranging from 15-20% of students. Web 2.0 suggestions for improvement made by the respondents favored the use of	link the educational needs of millennial nursing students and the realm of professional nursing practice. The results show a preference for social interaction activities with peers in an online connection forum within their courses. Students also have a preference for Web 1.0 activities supporting traditional instruction where the material is organized and processed by the instructor. The connection of students to Web 2.0 in their personal life does not equal a willingness to connect Web 2.0 into their learning. Limitations: the survey had limited
--------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

lab components
in the course.

blogs on course management systems (45-50%) and discussion boards for peer exchange (57-66%). Web 1.0 activities of podcasts (22-29%), twitter reminders (33-38%), and PowerPoint presentations (32-42%) were also selected for areas of improvement. The majority of respondents selected social networking sites (65-71%) and podcasting (45-51%) as instructional preferences.

response choices which may have limited the student responses.