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Generational Differences in Faculty and Student Comfort with Technology Use

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Abstract

Background: Navigating through online education courses continues to be a struggle for some nursing students. At the same time, integrating technology into online courses can be difficult for nursing faculty.

Purpose: The purpose of this study was to assess faculty technology integration practices, student attitudes about technology use, and generational differences related to faculty and student technology use.

Methods: A descriptive cross-sectional survey design was used to obtain data for this study.

Results: Integration of technology into online courses and student attitudes about technology use were not significantly different by generation. Faculty and students from the Baby Boomer and Generation X reported less comfort using technology and higher levels of anxiety using technology than did individuals from Generation Y.

Conclusion: Significant generational variations were not noted in relation to technology integration into courses and overall student attitudes about technology in this study, but differences were noted in relation to comfort with use of technology and anxiety when using technology. Student learning outcomes and satisfaction with learning may be influenced by the student's comfort using technology and faculty's confidence in integrating and using technology to provide online instruction.

Keywords

nursing, education, technology, faculty, students

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In the age of artificial intelligence, smart phones, and a software application for almost anything, it may be difficult to believe that anyone would experience discomfort using technology to obtain an online degree. However, some students continue to struggle to navigate online programs (Duffy et al., 2014) and faculty continue to be challenged by integrating technology into online education (Richter & Schuessler, 2019). Comfort with technology use and how we adapt to it is influenced by experience during our developing years and continued exposure to evolving technology as we age. For example, many of today's 5-year-old children are adept at locating videos on the internet and using various cell phone or tablet features; school-age children are whizzes at playing advanced video games; and teenage children

simultaneously watch videos, text friends, and post to social media.

Current statistics illustrate that university faculty and students are from different generations. National League of Nursing (2019) data indicate that the majority of university faculty are from either the Baby Boomer generation (ages 55–73) or Generation X (ages 40–54). Forty-nine percent of nursing faculty are aged 46 to

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60 years (National League of Nursing, 2019), while 31% of nursing faculty are over the age of 60 years (Fang & Kesten, 2017). Comparatively, approximately 91% of students are from Generation Y (also known as Millennials [ages 25–39; 26%]) and Generation Z (ages <24; 65%; Ginder et al., 2018). Most faculty are highly adaptable in relation to learning how to use technology. However, the majority learned how to use technology as adults while most members of Generation Y and the majority of Generation Z grew up using technology. These generational differences may influence the level of comfort with technology experienced by both online nursing faculty and online adult learners.

Integration of technology has led to a change in models of education. As the number of online programs and courses continue to increase, the need for faculty who are comfortable using learning management systems, simulation, educational software programs, and other technology to teach courses online also continues to increase. An Inside Higher Ed & Gallup report (2018) indicated that 33% of faculty reported being early adopters of technology in teaching, whereas 55% waited until their peers used the technology before adopting the practice. Research has shown that newer, less experienced nursing faculty had more positive attitudes about the use of technology than did more experienced faculty (Kotcherlakota et al., 2017). There have been benefits to using technology including improvement of course organization, facilitation of student interaction, and reduction of plagiarism (Marzilli et al., 2014). Considering the generational differences of online faculty compared with online students and the growth of online nursing programs, it is important to determine the level of comfort experienced by each group related to the integration and the use of technology in online education.

Student attitudes about the use of technology are important because these attitudes effect course engagement, which affects learning outcomes. Recent studies (Terkes et al., 2019; Tubaishat, 2014; Tubaishat et al., 2016) focused on attitudes of nursing students about technology use illustrated that students had an overall positive attitude about technology. Students who were comfortable using technology were found to have higher levels of satisfaction with their courses but tended to participate in the course to a lesser extent compared with those who were not as comfortable using technology to learn online (LoCasale-Crouch et al., 2016). Terkes et al. (2019) found that social sharing (Facebook 82%; Instagram 76%; Email 65%; Twitter 48%), followed by professional development and searching for health-related information were the most frequent purposes for which the technology was used by students.

Most research focusing on faculty and student comfort and opinions about technology was based on the classroom setting, instead of an online educational environment. More information needs to be obtained about faculty and student experiences with the use of technology in online environments, where the use of technology is mandatory. The purposes of this study were to assess faculty technology integration practices, student attitudes about technology use in online courses, and generational differences of faculty and students with the use of technology.

Methods

Design

This institutional review board-approved study employed a descriptive cross-sectional survey design. Faculty ($N=295$) who taught at least one online course in different colleges of nursing within the United States ($n=6$; southwest, southeast, and central United States) were invited to participate in this study. Faculty either taught in online RN-BSN or graduate programs (MSN, DNP, or PhD). Students ($N=2,902$) were from the same universities as the faculty and were enrolled in either RN-BSN or graduate nursing programs. Both faculty and student participants received an invitation to complete an anonymous survey through the Research Electronic Data Capture service (Harris et al., 2009).

Instruments

Items from the Teacher Technology Integration Survey (TTIS) that measured risk-taking behaviors and comfort with technology (nine items; Cronbach's $\alpha=.85$) and beliefs and behaviors about technology use (six items; Cronbach's $\alpha=.88$) were used in this study. The TTIS is a 5 point Likert-type scale with response options ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and is used to assess teacher's technology integration practices by measuring a variety of behaviors and beliefs of faculty in relation to technology use (e.g., "I feel comfortable with my ability to work with computer technologies"; Vannatta & Banister, 2008, 2009).

Student comfort level with using technology was measured by the Technology Attitude Scale (TAS), a 15-item, 5 point Likert-type scale with response options ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An example from this scale includes the item "I feel confident with my ability to learn about technology." The TAS has been tested and found to be valid and reliable (Cronbach's $\alpha=.88$; Maag, 2006; McFarlane et al., 1997). Confidence using technology is often based on the users' comfort using the technology; therefore, we

believe these concepts are closely related and are comparable. Working with technology is preceded by learning about the technology; hence, these concepts were again thought to be closely related and comparable.

Data Analysis

Descriptive statistics were used to summarize the characteristics of both faculty and students, using means, standard deviations, and percentages (Table 1). Subscale scores for the TTIS (faculty survey) including a component score for faculty, “risk-taking behaviors and comfort with technology,” and “beliefs and behaviors about technology use” were calculated. Risk-taking

Table 1. Demographic Characteristics of Students Enrolled in and Faculty Teaching in Online Nursing Programs.

Characteristic	Mean (SD); range or n (%)
<i>Students (n = 206)</i>	
Age	39.2 (9.5); 20–68
Generation	
Gen Z	13 (6.4%)
Gen Y	104 (54.5%)
Gen X	78 (38.6%)
Baby Boomers	7 (3.5%)
Degree program	
BSN	41 (19.9%)
MSN	82 (39.8%)
DNP	70 (34.0%)
PhD	13 (6.3%)
<i>Faculty (n = 100)</i>	
Age	53.4 (11.0); 26–74
Generation	
Gen Z	15 (15.3%)
Gen X	28 (28.6%)
Baby boomers	55 (56.1%)
Education	
MSN	17 (17.0%)
DNP	44 (44.0%)
PhD/other doctorate	39 (39.0%)
Years teaching nursing	12.5 (8.8); 1–42
Years teaching online courses	6.9 (5.1); 1–20

Note. n's vary due to sporadically missing data.

Table 2. Comparison of Items From the Teacher Technology Integration Survey (TTIS) Among Faculty Members Teaching Online Courses by Generation.

TTIS domain	Faculty			F (p)
	Gen Y (n = 15) mean (SD)	Gen X (n = 27) mean (SD)	Baby Boomers (n = 49) mean (SD)	
Risk-taking behaviors and comfort with technology	3.98 (0.81)	3.77 (0.87)	3.80 (0.71)	0.38 (.69)
Beliefs and behaviors about classroom technology use	3.74 (0.92)	3.70 (0.88)	3.70 (0.67)	0.02 (.98)

Note. Potential range for each domain mean score 1 to 5.

behaviors, according to the TTIS, include the ability and/or willingness to troubleshoot problems using technology and the willingness to use new technology. Beliefs and behaviors about technology use were defined as the faculty members' support of using technology without the actual use of technology, that is, they would consider using technology based on state and national standards (behavior) or whether technology was a priority (belief) for the content being taught (Vannatta & Banister, 2008, 2009). In addition, subscale scores for the TAS (student survey) including “confidence in and benefits of using technology” and “self-efficacy in the use of technology” were obtained (Tables 2 and 3). Confidence and benefits were related to the thought that technology is beneficial for learning; and self-efficacy was related to the ability to use technology to effectively learn content (Maag, 2006; McFarlane et al., 1997). Differences in each of these subscale scores for the generations were calculated using one-way analysis of variance.

Correlations between the number of years teaching and comfort using technology (as measured by the TTIS subscale “risk-taking behaviors and comfort with technology”) and number of years teaching nursing online and the same TTIS subscale were conducted using Pearson's correlation. Data analysis was conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC), using an alpha level of .05.

Results

Demographics

Data from 100 faculty members (34% response rate) and 206 students (14% response rate) were included in this study (Table 1). Over half (56%) of the faculty were members of the Baby Boomer generation, while over half (55%) of the students were members of Generation Y. The majority of all respondents were female (95% faculty and 87% students). Faculty had an average of nearly 7 (± 5.1) years of online teaching experience. Over half of students (57%) had taken five or more online courses.

Table 3. Comparison of Items From the Technology Attitudes Scale (TAS) Among Students Enrolled in an Online Nursing Program by Generation by Generation.

	Students				F (p)
	Gen Z (n = 12) mean (SD)	Gen Y (n = 104) mean (SD)	Gen X (n = 77) mean (SD)	Baby Boomers (n = 7) mean (SD)	
Confidence in and benefits of using technology	4.66 (0.37)	4.57 (0.44)	4.49 (0.53)	4.60 (0.40)	0.74 (.53)
Self-efficacy in the use of technology	4.28 (0.76)	4.28 (0.77)	4.04 (0.85)	4.02 (0.50)	1.50 (.22)
TAS total score	4.52 (0.48)	4.47 (0.49)	4.31 (0.60)	4.37 (0.40)	1.40 (.24)

Note. Potential range for each score 1 to 5.

Findings

Components of TTIS and TAS by Generation. In relation to the TTIS, faculty mean scores for the three generations of faculty for the subscale “risk-taking behaviors and comfort with technology” ranged from 3.77 ($SD=0.87$; Generation X) to 3.98 ($SD=0.81$; Generation Y; see Table 2). No significant differences were found between the three generations of faculty (Baby Boomers, Generation X, and Generation Y) for this subscale of the TTIS. Faculty scores for the subscale “beliefs and behaviors about classroom technology use” ranged from 3.70 ($SD=.67$) to 3.74 ($SD=0.92$), which were not significantly different. There were no members of Generation Z in the faculty sample.

In comparison, there were no significant differences in TAS total or subscale scores for the four generations of students (Baby Boomers, Generations X, Y, and Z). For the TAS subscale “confidence in and benefits of using technology,” mean scores ranged between 4.49 ($SD=0.53$) and 4.66 ($SD=0.37$; Table 2). Mean values for the TAS subscale “self-efficacy in the use of technology” ranged from 4.02 ($SD=.50$) and 4.28 ($SD=.77$; see Table 3).

Individuals Items/Variables From the TTIS and TAS. There was a significant difference found for the item “I am confident/comfortable with my ability to work with/learn about technology” between faculty and students. The faculty mean score was 3.98 ($n=96$) compared with mean score of 4.45 ($n=206$) for students ($p<.001$). Generation Z participants were the most comfortable with technology ($M=4.69$), followed by Generation Y (faculty and students; $M=4.47$), Generation X (faculty and students; 4.21), and Baby Boomers (faculty and students; 4.00). Generation Y and Generation Z participants were significantly more confident using technology than were participants belonging to the Baby Boomer generation (p 's $<.001$ and $.004$, respectively). Participants from Generation X were also less confident using new technology than those from Generation Y or Generation Z (p 's $=.009$ and $.033$, respectively).

Generational differences regarding anxiety were also evident for the variable “anxiety/nervousness created by using technology/using new technology.” In the combined data of both faculty and students, participants from the Baby Boomer and Generation X reported feeling more anxious about the use of technology compared with Generations Y (p 's $=.011$ and $.009$, respectively).

There was no correlation found between the number of years teaching nursing and the subscale of the TTIS, “risk-taking behaviors and comfort with technology” ($r=-.063$, $p=.55$). In addition, there was no correlation found between the number of years teaching online and the subscale of the TTIS, “risk-taking behaviors and comfort with technology” ($r=-.005$, $p=.96$).

Discussion

In this study, we focused on faculty integration of technology, students' attitudes about technology, and faculty and student comfort with technology. There was no significant difference found among three generations of faculty (Baby Boomers, Generation X, and Generation Y) related to teacher technology integration practices (“risk-taking behaviors and comfort with technology” and “beliefs and behaviors about technology use”), which indicates that faculty of all ages understand the importance of using technology to enhance teaching. However, Generation Y faculty indicated a higher level of risk taking in relation to the use of technology and comfort using technology than did their Generation X and Baby Boomer colleagues. This is not surprising considering that members of Generation Y grew up using technology, while more senior faculty learned to adapt to the use of technology in teaching.

Our findings were similar to what others have reported related to technology integration into teaching. Kotcherlakota et al. (2017) found that newer faculty have more positive attitudes about technology than do more experienced faculty. Literature also indicates that tenured professors, who are generally Baby Boomer and Generation X members, reported being less positive regarding technology use (Inside Higher Ed & Gallup,

2018). Experienced faculty understand the value of using technology in the online course environment, but this does not mean they have enough experience to feel totally competent or comfortable using new technology to conduct online courses.

In contrast to what has been reported in the literature, students in this study did not have significant differences in attitudes about technology, as measured by the TAS, although Generation Y and Z students reported more attitudes that are positive about technology. In contrast, Hampton et al. (2017) found distinct differences between Baby Boomers, Generation X, and Generation Y students regarding learning styles and technology use. Members of the Baby Boomers and Generation X enjoy lower technologically influenced learning activities such as discussion boards, textbook readings, and journal articles (Hampton et al., 2017, 2019). Generation Y and Z members expect to use technology (Williams, 2019) and prefer to use technology-enhanced methods (simulation, video lectures, and gaming) for learning (Hampton et al., 2019). Generation Z students want technologically enhanced education (Chicca & Shellenbarger, 2018), are savant with the use of technology, and *expect their teachers to be the same* (Williams, 2019). Considering that more than half of the student sample were members of Generations Y and Z and that members of these generations are “digital natives” who have grown up using multiple types of technology daily (Kirk et al., 2015), the finding that students have positive attitudes about the use of technology in the online education environment was not surprising. In fact, research conducted by Kirk et al. (2015) is consistent with the findings in this study.

Strengths and Limitations

The sample for this study included a diverse group of both graduate and undergraduate faculty and students from several schools of nursing across the United States. Despite sending the surveys out a total of three times (2 weeks apart), a lower than desired response rate for both faculty (34%) and student (14%) surveys was a limitation of the study. However, the mix of faculty and students from large and small universities helped mitigate this limitation. Furthermore, it has been determined that lower response rates do not indicate a lack of research quality or reliability of findings (Fosnacht et al., 2017). Another limitation of the study was that the instrument used to assess student and faculty comfort with technology were not the same, but the instruments did include some items that were very similar in wording/meaning. We analyzed similar items found on the TTIS and TAS to further elucidate differences between faculty and students and differences between generations of faculty and students.

Conclusions

Faculty development activities that assist faculty to learn, troubleshoot, and integrate technology into online courses may make using technology less daunting for faculty who have less experience working in online courses (Inside Higher Ed & Gallup, 2018; Williams, 2019). Faculty from the Baby Boomer or Generation X era may benefit from a reverse mentorship with members of Generation Y to assist with learning and integrating new technology into their online courses (Litchfield, 2016). Working in mentoring relationships may also help enhance the value of technology as faculty realize that technology can improve their teaching skills and possibly ease teaching load. Using resources available to faculty may alleviate some of the anxiety associated with integration of technology into courses.

The learning needs of the diverse student population that are taking online courses are critical to consider, as illustrated by the attitudes of students about technology. In that younger students (Generation Y and Z) value technology and expect it to be integrated into their learning, technology-based learning activities that are “hands-on,” require active engagement, and are immediately applicable to nursing practice may be useful (Hampton et al., 2017, 2019; Seemiller & Grace, 2017). The needs of older students must also be considered; therefore, a combination of low technology activities (discussion boards, journal articles, and textbook readings) and higher technology activities (simulation, online games, and video lectures) may enhance learning (Hampton et al., 2017). Increasing comfort with the use of technology in online education can maximize the educational experience for both faculty and students.

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