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Willingness and Preferences of Nurses Related to Learning With Technology

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Jobeth W. Pilcher, EdD, RN ❍ Laurie Bedford, PhD

To what extent are nurses willing to learn with technology-enhanced tools, such as online education, podcasts, webcasts, mobile learning, and realistic simulations? What factors influence their willingness? This article includes a description of a mixed methodology study that addressed these questions. Nurses of all ages indicated a willingness to learn with a variety of technological tools. Primary determinants of willingness were associated with ease of use, familiarity, convenience, and perceived benefit.

Technology has afforded nurse educators with numerous new teaching tools and strategies, such as podcasts, mobile learning, blended education, high-fidelity simulations, and others. Responses to these new tools may range from "build it and they will come" to "I've always taught it this way; I'm not changing now." Historically, nursing professional development activities have used traditional teaching strategies, such as lecture, small-group activities, and question-and-answer sessions. However, advances in technology have led to increased availability of technological tools and strategies that can be used in ongoing education for nurses. Gaining input from participants is a required criterion for formal continuing education (American Nurses Credentialing Center, 2009). Nurse educators often address this criterion by asking participants if they were satisfied with the content or speaker. However, it is unclear if this type of feedback is adequate or if it measures effectiveness or learning. It is also unclear regarding how nurses prefer to learn, how they would design educational activities if given a choice, or if they are willing to learn with technological tools.

Jobeth W. Pilcher, EdD, RN, Baylor University Medical Center, Dallas, Texas.

Laurie Bedford, PhD, Adjunct Faculty, Northcentral University, Prescott Valley, Arizona.

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ADDRESS FOR CORRESPONDENCE: Jobeth W. Pilcher, EdD, RN, Baylor University Medical Center, 3500 Gaston Avenue, Dallas, TX 75246 (e-mail: jobethp@baylorhealth.edu).

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REVIEW OF THE LITERATURE

A literature review provided limited insight about the willingness of hospital nurses to learn with technology. Several studies have addressed nurses' satisfaction with online and blended learning. For example, Bradley et al. (2007) demonstrated that nurses quickly adjusted to and seemed to enjoy a blended preceptor class as compared with a traditional class. Similarly, Berger, Topp, Davis, Jones, and Steward (2009) found that a majority of nurses selected online learning over traditional lecture for a required educational activity. However, only a few studies specifically addressed nurses' willingness to learn with other technological tools and factors influencing that willingness. An early study by Hegge, Powers, Hendrickx, and Vinson (2002) suggested lack of computer knowledge and financial and time constraints as potential factors. Learning styles and education delivery modes were also suggested as influencing factors. A study by Sweeney, Saarmann, Flagg, and Seidman (2008) indicated age, experience, employment status, and level of education as additional issues.

Age was found to be the most frequently cited variable related to nurses' willingness to learn with technology (Reime, Harris, Aksnes, & Mikkelsen, 2008; Walker et al., 2006). It was noted that many writers based their information and recommendations on the early work of Zemke, Raines, and Filipczak (2000) and Lancaster and Stillman (2002). Both of these references provide seminal work regarding generational age groups within the workforce. However, the information is dated and may not apply to today's learners. Only a few recent studies have evaluated age as a learning variable in healthcare settings. Most of the age-related research occurred in nursing schools, among college-aged students rather than among hospital nurses (Reime et al., 2008; Walker et al., 2006). The preferences of college students may have limited correlation to the preferences of nurses working in hospital settings, as the average age of nurses in the United States was last documented at 46.8 years (Health Resources and Services Administration, 2004).

In addition to online and blended education, other technologically enhanced educational tools are also available. High-fidelity computerized mannequins are being integrated into hospital education to provide experiential

learning without placing real patients at risk (Brannan, White, & Benzanson, 2008). The number of published articles on simulations using high-fidelity mannequins has increased dramatically in the past few years, yet none specifically address willingness to participate in this type of learning. However, as this educational modality becomes more available, it may become a job expectation rather than an elective learning opportunity (Halamek, 2008). Knowledge regarding nurses' willingness or resistance related to this learning modality will assist educators in planning strategies to deal with the receptiveness or resistance.

Researchers have also begun to evaluate mobile learning devices in healthcare settings. For example, Maag (2006) converted lectures into a format that could be used on a portable audio device (podcasts) for nursing students. Farrell and Rose (2008) investigated the use of personal digital assistants (PDAs) for the purpose of enhancing pharmacological knowledge of nursing students at a university in Australia. Similarly, Greenfield (2007) studied the use of PDAs among nursing students with a focus on medication errors. Although these studies indicate a potential benefit of PDAs in the clinical setting, there was no evidence available to indicate if similar findings would be documented among nurses working in the hospital setting. In addition, there is a lack of data about the percentage of practicing nurses who own handheld Internet or learning devices.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this study was to explore nurses' preferences regarding the use of technology for learning and to describe factors associated with their willingness and preferences. The research questions included the following:

1. To what extent are nurses willing to use technology for ongoing learning?
2. How do nurses' learning preferences vary based on the educational delivery mode?
3. What influence does the type of ongoing education have on nurses' preferences to learn with technology?
4. What role do demographic factors have on nurses' willingness to learn with technology?

RESEARCH DESIGN AND METHODS

A mixed methodological approach was used to explore nurses' technology-related learning preferences. Because of limited prior research on this topic, the study was exploratory and heavily weighted in the qualitative paradigm. Primary data collection incorporated in-depth interviews, with the goal of seeking rich and detailed descriptions from participants. Although the study was exploratory, some variables were known, resulting in the ability to also collect quantitative data (Johnson & Christensen, 2008). A questionnaire was developed to collect quantitative data and underwent reliability and validity testing prior to data collection.

Validity and Reliability of the Data Collection Tools

Prior to implementation of the study, a panel of experienced nurse educators reviewed the interview guide. These experts agreed that the questions addressed those issues posed by the study research questions. The experts also compared the interview guide to the questionnaire and indicated that both tools were seeking the same information. Triangulation was used to ensure the credibility, dependability, and confirmability of the qualitative research (Lincoln & Guba, 1985). The nurse educators also analyzed the questionnaire for validity and absence of bias or error. Because the questionnaire was going to be used to compare and corroborate findings from the qualitative interviews, volunteers from the target audience were sought to participate in the test–retest of this tool. From the group of volunteers, purposeful sampling was used to select a group of nine nurses, three from each generation age group. After a period of 2 weeks, the same nurses completed the survey again. Drawing on recommendations from Gay, Mills, and Airasian (2009), data from the first and second surveys were evaluated using correlation coefficients to determine the reliability of the questionnaire. Presurvey and postsurvey responses were entered into an SPSS software program for Spearman-Brown split-half reliability coefficient analysis, which demonstrated the reliability of the tool.

Setting and Participants

The target population included nurses working in six neonatal specialty units within a large healthcare system in Texas. The units varied in size from 7 to 83 bed spaces. The units were located in six different cities, two of which were urban and four were suburban. A total of 387 nurses were working in the units at the time of the study. Maximum variation sampling was used to select nine volunteers to participate in the qualitative interviews. Three volunteers from each generational age group participated, including those from the Baby Boomer age group (born between the years of 1943 and 1960), the Generation X age group (born between the years of 1961 and 1980), and the Millennial/Generation Y age group (born between the years of 1981 and 2000); (Zemke et al., 2000). Demographics for interview participants are included in Table 1.

The entire target audience (all 387 nurses working in the targeted units) were given the opportunity to complete the questionnaire. The response rate for all facilities combined was 49% (n = 190). One survey was unusable because there were several incomplete sections. Two participants

TABLE 1 Demographics for Participants in the Qualitative (Interview) Group					
Study Number	Age Group	Birth Year	Degree	Years in Nursing	Last College Course
B1	Baby Boomer	1956	BSN	30	22
B2	Baby Boomer	1958	BSN	14	2
B3	Baby Boomer	1956	AD	18	0
X1	Generation X	1974	BSN	13	13
X2	Generation X	1970	AD	6	0
X3	Generation X	1979	BSN	8	0
M1	Millennial	1984	BSN	1	1
M2	Millennial	1985	BSN	<1	<1
M3	Millennial	1985	BSN	2	2

Note. BSN = bachelor of science in nursing; AD = associate degree.

chose not to include their birth year and were not included in the generational analysis. One participant was over the age of 65 years (from the Veteran generational age group). This participant was considered an outlier for the generational age groups and was not included in the generational analysis.

The nurses who chose to return the surveys were predominately women, with only three men responding (see Table 2). The nursing experience of the respondents ranged from less than 1 to 45 years (mean = 13.7 years). The majority of respondents (63%) reported a bachelor's degree as the highest nursing degree. Time frame since last college level course ranged from none (for those currently attending school) to 43 years (mean = 9.39 years). The age of the respondents was recorded according to generational age groups. The largest percentage (52%) fell into the Generation X category.

TABLE 2 Demographics for Nurses Returning Questionnaires		
Variable	*n*	%
Generational age group		
Veteran	1	0.5
Baby Boomer	49	26
Generation X	99	52
Millennial	38	20
Highest nursing education		
Diploma	10	10
Associate's	55	29
Bachelor's	119	63
Master's	4	2
Other: Licensed Vocational Nurse	1	0.5

Procedures and Data Analysis

Approval for the study was obtained through the institutional review board process. Informed consent was gained from all participants. Those participating in the interviews were assigned code numbers to ensure anonymity and confidentiality. Interviews were scheduled at times convenient to the volunteers and took less than an hour. Interviews were audio-taped and transcribed verbatim into a word processing file. The data for each interview were analyzed in relation to the research questions, as well as for significant statements and recurring themes. Results were compared across the interviews for similar and contrasting findings.

Concurrently, surveys were distributed to every nurse in all target units. Although computer surveys are common, studies continue to document poor to fair computer skills among nurses (Wilbright et al., 2006). As a result, a paper-and-pencil format was chosen for this research study. Participants were requested to return the surveys within a 2-week period. Preparation and processing of the quantitative data included transfer of survey responses into SPSS software by the principal investigator. Patterns were sought through the calculation of frequency and percentage of responses to each item on the questionnaire. Analysis of variance was performed to evaluate the responses between the different generational age groups in relation to nurses' willingness to learn.

RESULTS

Qualitative Results

Qualitative data were obtained from interview responses. Most of the nurses reported prior use or awareness of the available technological learning tools, and all of the participants had prior exposure with online learning. However, the majority of the interview participants indicated a preference for lecture and classroom interaction. Several owned mobile learning devices such as iPods, Blackberries, or iPhones, and a portion of those nurses reported using the devices for educational purposes. Of the nurses who did not own a handheld device, only one indicated an interest in using mobile devices for learning.

Rather than the anticipated response of younger nurses having a higher preference for technology, a variety of responses among the different age groups was documented. For example, one Baby Boomer found mobile learning devices to be very useful, whereas a younger Millennial respondent did not. Similarly, a Baby Boomer participant reported willingness to learn about new policies and job expectations using online education, whereas other participants from all three age groups preferred face-to-face communication or a hard copy. Participants from all age groups indicated a willingness to learn with lectures and with realistic simulations using high-fidelity mannequins.

Interview participants were also asked about their perceived learning style (visual, auditory, reading/writing, or kinesthetic), as described by Fleming (2001). All of the participants were familiar with learning style preferences. They verbalized multiple learning styles, rather than a predominance of a single style. During the qualitative analysis, three themes emerged, including a contradiction between nurses' willingness and preferences, differences in how nurses defined *learning*, and technology acceptance factors.

Theme 1: Willingness Versus Preferences

The majority of interview participants agreed that they were willing to learn with technology; however, their willingness was not aligned with their preferences. For example, a Baby Boomer participant described multiple situations in which she participated in technology-enhanced education and specified that she was currently advancing her education through an online program, yet she stated, "I have to admit that I don't go into doing anything on the computer whole-heartedly, sometimes kicking and screaming."

Similarly, a Millennial participant touted the benefits of technology, including the ability to look up reference information quickly. She also described her participation in and appreciation for online discussion forums. However, when asked regarding her preferences for online learning, she stated "I'm not a fan. In school, I always thought of it as the blow-off classes."

Interview participants frequently indicated their preferences to be contingent on the topic, speaker, or other circumstances. Realistic simulations provided another situation in which participants identified contradictions between willingness and preferences. For example, comments included both positive and negative perspectives, including the following: "Simulation greatly increases my confidence," and "Mannequins are intimidating." Of particular interest, several nurses reported no prior exposure to high-fidelity mannequins yet selected realistic simulations as their first preference for learning new skills or new equipment.

Theme 2: Participant Definition of Learning

Some participants had never considered activities such as listening to a podcast as a learning activity. Two interview participants mentioned the use of mobile devices for "looking things up" yet indicated that they had not considered that activity to be learning. Throughout the interviews, participants mentioned that they had not considered various nonstructured, nonclassroom activities as *learning*. Conversely, a Millennial participant acknowledged the concept of just-in-time learning when she stated, "If you didn't know it before and you make the effort to look it up, then it's learning to me."

Theme 3: Technology Acceptance Factors

Familiarity, convenience, ease of use, and perceived benefit of the technology arose repeatedly during the interviews. For example, a Millennial participant stated, "The things I grew up with, I am good with." A survey participant wrote: "Sometimes learning new technology is a little scary, but after getting my hands on it—I feel a lot more confident." Another participant specified, "Mostly, it depends on how easy it is to access the program and if it will go at my pace." A predominant factor associated with willingness and acceptance was the perceived benefit of the technology. In particular, nurses who had participated in realistic simulations provided vivid descriptions of their experiences with high-fidelity mannequins. While they spoke of their experiences with simulations, it was noted that the tempo of their voices increased; they sat more upright; their eyes were more widely opened; and they made more facial expressions and hand gestures.

Quantitative Results

The survey was divided into four sections. The first section of the survey began with the statement "I am willing to learn by." Possible responses included both nontechnologic tools such as lecture and paper-and-pencil self-study and technologic tools including videoconferencing, podcasts, online self-study, and computerized mannequins. Participants indicated their willingness using

TABLE 3 Willingness to Learn With Different Modalities (in Percentages)					
Tool	SA	A	N	D	*SD*
Lectures	**49.5**	42.1	6.3	1.1	0.5
Video technologies	18.9	**48.9**	23.7	6.8	1.1
Podcasts/audio	6.3	28.4	**41.1**	21.1	1.6
Paper and pencil	19.5	**47.9**	21.1	9.5	1.6
Online self-study	26.8	**57.4**	9.5	3.7	1.1
Realistic Sims	**47.9**	37.9	10	3.2	0

Note. The highest percentage for each mode is in bold. SA = *strongly agree*; A = *agree*; N = *neutral*; D = *disagree*; SD = *strongly disagree*.

a Likert-style scale of choices ranging from *strongly agree*, *agree*, to *strongly disagree*. Results are included in Table 3. The majority (91.6%) of nurses reported a general willingness to learn with lecture and, to a lesser degree, with visual technologies, paper-and-pencil and online self-study, and realistic simulations. A neutral level of willingness (41.1%) was documented related to learning with audio technologies or podcasts.

Further analysis of quantitative data from the different age groups was evaluated using one-way analysis of variance. The independent variables for the analysis were the different generational age groups, Baby Boomers (n = 49), Generation X (n = 99), and the Millennials (n = 38). The dependent variables were willingness to learn with lecture, web/video conferencing, audio/podcasts, paper-and-pencil self-study, online education, and realistic simulations. Statistically significant differences were noted between the different generational age groups of nurses in regard to their willingness to learn with lecture, $F(2, 183) = 3.25$, $p = .041$, with paper-and-pencil self-study, $F(2, 183) = 7.89$, $p = .001$, and with online education, $F(2, 181) = 3.74$, $p = .026$. Nurses from the Millennial generation responded more often with *agree* as compared with *strongly agree* regarding their willingness to learn with online education ($M = 3.76$) and lecture ($M = 4.13$) and more neutrally ($M = 3.36$) toward paper-and-pencil self-study than their counterparts did. No significant differences between the age groups were shown in relation to video technologies, $F(2, 183) = 0.159$, $p > .05$, audio/podcasts, $F(2, 181) = 0.381$, $p > .05$, or realistic simulations, $F(2, 182) = 0.580$, $p > .05$.

The second section of the questionnaire focused on nurses' preferences for one mode of education over another. The questions began with the statement "I prefer." Questions compared lecture to online, paper-and-pencil to online, and class interaction to individual learning. Participants indicated their preferences using a Likert-style scale of choices ranging from *strongly agree* to *strongly disagree*. The majority (61.6%) specified their preference for lecture as compared with online learning. A large percentage (54.2%) indicated agreement with a mixture of both lecture and online learning, as compared with either of those modalities alone. Classroom interaction was preferred over individual learning among the larger percentage (64.2%) of survey respondents.

The third section of the survey focused on preferences according to the type of education: formal and informal. This section included a forced ranking scale in which participants were asked to indicate their top three preferences by writing a 1 for their highest preference, a 2 for the second highest, and a 3 for their third highest. Because of the exploratory nature of the study, survey participants' first choices were used for analysis purposes. The majority (40%) of nurses indicated lecture as their first choice for formal continuing education. For annual safety training and job expectations, the preferred delivery mode was online education (64.7% and 38.4%, respectively). Demonstration and realistic simulations were preferred for learning about new equipment and new skills (38.4% and 50.5%, respectively).

The fourth section included demographic questions. One question addressed perceived learning styles. The majority (54.8%) of survey respondents documented a preference for kinesthetic learning, followed by visual (24.3%). Ten percent of survey respondents circled more than one style. Additional questions focused on access to technology. Most (98%) survey respondents indicated having Internet access at home; four did not. Of those having home Internet access, 82% indicated using it for educational purposes. All participants indicated having Internet access at work. The majority (84%) reported using the Internet at work for educational purposes. A majority of participants (56.8%) reported owning an iPod device. Of those, 14 (7.4%) reported using their iPods for learning purposes. A number (39.5%) of survey participants reported ownership of a PDA or other handheld mobile device with Internet access. Of those, 10.5% indicated using the device for educational purposes.

DISCUSSION

Ongoing professional development is an expectation of nurses, and it is often associated with regulatory and licensing requirements (American Nurses Association, 2008; Institute of Medicine [IOM], 2001). Historically, educational activities for nurses have used traditional classroom techniques. However, advances in technology have led to increased innovative educational tools and strategies through which nurses can learn. This study examined the willingness of nurses to use these and other technologies in their learning. Among the key findings was that nurses are willing to engage in learning opportunities through diverse

delivery mechanisms. The participants articulated specific preferences based on a number of factors, including demographics and the nature of the educational content. In general, lecture, group interaction, and realistic simulations were most often identified as preferable. Finally, participants indicated a willingness to learn, although to a lesser degree, with technologies such as online instruction, webcasts, and handheld Internet devices. Audio technologies and podcasts received neutral acceptance from both the survey and interview participants.

Participants indicated an overwhelmingly positive response toward learning with high-fidelity mannequins. Of particular interest was the positive input gained from nurses who had never been exposed to this mode of education. As Brannan et al. (2008) pointed out, and as confirmed by this study, the perceived benefit of realistic simulations was the ability to learn during believable situations that eliminate placing real patients at risk. This concept supports the primary purpose of nursing professional development, which is to enhance and improve patient care (Decker, Sportsman, Puetz, & Billings, 2008; IOM, 2001).

Participants also indicated a preference for lecture. This preference was closely followed by a preference for a blend of lecture and online education, as compared with individual learning situations. This conclusion updates previous research findings (Atack, 2001; Cobb, 2003) in that it suggests that nurses are willing to learn in the online setting yet view the incorporation of more contemporary instructional designs features such as the use of blended formats as important considerations. Other instructional design concerns dealt with a desire for interactivity and classroom engagement. The participants further qualified their preference for lecture by indicating that instruction needed to be relevant, timely, and engaging.

Preferences appeared to be influenced by the nature and purpose of the educational need. For example, the majority of nurses indicated a preference for a lecture format for formal continuing nursing education contact hours. Conversely, an online format was indicated as the primary preference for required annual safety training and job-related expectations. In instances when learning involves new products, equipment, and skills, demonstration and realistic simulations were documented as the primary preference.

Generational age and individual learning styles were the primary demographic factors addressed in this study. Age was found to be the most frequently cited variable in the nursing literature with regard to the nurses' willingness to use technology in learning (Reime et al., 2008; Walker et al., 2006). However, participants from this study reported a willingness to learn with varied technological tools regardless of their generational status. This contradicts popular notion that younger nurses will have a higher preference for technology, as this study indicated a higher rate of technology acceptance among older nurses in some situations.

Learning styles and education delivery modes have also been suggested as influencing factors among some groups of healthcare learners. However, previous studies have not included nurses working in hospital settings (Friedlander, 2006; Walker et al., 2006). The results of this study help fill this gap. The majority of survey respondents self-reported a kinesthetic modality. The second most predominant perceived style was visual learning. Interview participants, on the other hand, were unwilling to identify a single predominant learning style. Instead, they indicated multiple styles. Participants reported that the learning style was dependent on what needed to be learned. Rather than a single influencing factor such as generational age or learning style preferences, the overall findings suggested multiple influencing factors. In particular, interview participants identified ease of use, perceived benefit, familiarity, and convenience as the key factors influencing willingness to learn with technology.

CONCLUSIONS AND RECOMMENDATIONS

Results from the present research study provide new evidence regarding nurses' learning preferences related to technology. The findings can provide evidence and insight to guide budget decisions regarding technologically enhanced teaching strategies. The results also provide evidence to guide nurse educators' decisions related to instructional modalities. In addition, some learning tools and strategies may be met with resistance or neutrality and may not be the optimal choice. If less preferred modes become a future requirement or expectation, rather than an elective learning opportunity, knowledge regarding nurses' preferences will assist educators in planning strategies to deal with the receptiveness or resistance (Halamek, 2008).

A particularly salient conclusion that should be drawn from this discussion is that willingness does not necessarily align with preferences. In other words, the participants acknowledged that they were willing to learn with technology, yet most indicated a preference for a lecture format, depending upon the situation. This is a key factor upon which nurse educators should be cognizant. However, it does not imply that educators should limit educational offerings to a lecture only format. Nor should educators eliminate lecture as a modality for ongoing nursing education. Educators need to seek input from their participants and, when possible, provide education that is congruent with their preferences. As more programs are designed based on participant input, such as the evidence gained from this study, nurses will be more likely to participate in educational programs. Increased participation will

optimally result in improved knowledge and expertise as those nurses care for patients.

References

American Nurses Association. (2008). *States which require continuing education for RN licensure: 2007 chart*. Retrieved August 30, 2008, from http://tinyurl.com/5dap6r

American Nurses Credentialing Center. (2009). *Accreditation process*. Retrieved February 7, 2009, from http://tinyurl.com/c7kqxj

Atack, L. I. (2001). *Web-based continuing education for registered nurses: Clinical application and learners' experiences*. Doctoral dissertation, University of Calgary, Canada. Retrieved January 25, 2009, from Dissertations & Theses: Full Text database (Publication No. AAT NQ64796).

Berger, J., Topp, R., Davis, L., Jones, J., & Steward, L. (2009). Comparison of web-based and face-to-face training concerning patient education within a hospital system. *Journal for Nurses in Staff Development*, *25*(3), 127–132.

Bradley, C., Erice, M., Halfer, D., Jordan, K., Lebaugh, D., Opperman, C., et al. (2007). The impact of a blended learning approach on instructor and learner satisfaction with preceptor education. *Journal for Nurses in Staff Development*, *23*(4), 164–170.

Brannan, J. D., White, A., & Benzanson, J. L. (2008). Simulator effects on cognitive skills and confidence levels. *Journal of Nursing Education*, *47*(11), 495–451.

Cobb, S. C. (2003). Comparison of oncology nurse and physician use of the Internet for continuing education. *Journal of Continuing Education in Nursing*, *34*(4), 184–188.

Decker, S., Sportsman, S., Puetz, L., & Billings, L. (2008). The evolution of simulation and its contribution to competency. *Journal of Continuing Education in Nursing*, *39*(2), 74–80.

Farrell, M. J., & Rose, L. (2008). Use of mobile handheld computers in clinical nursing education. *Journal of Nursing Education*, *47*(1), 13–19.

Fleming, N. D. (2001). *Teaching and learning styles: VARK strategies*. Canterbury, New Zealand: Lincoln College.

Friedlander, E. A. (2006). *Online continuing nursing education: A study of factors related to nurse practitioner participation*. Doctoral dissertation, Capella University. Retrieved March 7, 2009, from Dissertations & Theses: Full Text database. (Publication No. AAT 3206688).

Gay, L. R., Mills, G. E., & Airasian, P. (2009). *Educational research: Competencies for analysis and applications* (9th ed.). Upper Saddle River, NJ: Pearson.

Greenfield, S. (2007). Medication error reduction and the use of PDA technology. *Journal of Nursing Education*, *46*(3), 127–131.

Halamek, L. P. (2008). The genesis, adaptation, and evolution of the neonatal resuscitation program. *NeoReviews, 9*(4), e142–e149. Retrieved March 18, 2009, from http://www.aap.org/nrp/pdf/NeoReviews-Halamek-94e142.pdf

Health Resources and Services Administration. (2004). *The registered nurse population: Findings from the 2004 National Sample Survey of Registered Nurses*. Retrieved November 1, 2008, from http://bhpr.hrsa.gov/healthworkforce/rnsurvey04/

Hegge, M., Powers, P., Hendrickx, L., & Vinson, J. (2002). Competence, continuing education, and computers. *Journal of Continuing Education in Nursing*, *33*(1), 24–33.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health care system for the 21st century*. Washington, DC: National Academies Press.

Johnson, B., & Christensen, L. (2008). *Educational research: Quantitative, qualitative, and mixed approaches* (3rd ed.). Los Angeles: Sage Publications.

Lancaster, L. C., & Stillman, D. (2002). *When generations collide: Who they are. Why they clash, How to solve the generational puzzle at work*. New York: First Collins Business.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Maag, M. (2006). Podcasting: An emerging technology in nursing education. *Student Health Technology Information*, *122*, 835–836.

Reime, M. H., Harris, A., Aksnes, J., & Mikkelsen, J. (2008). The most successful method in teaching nursing students infection control—E-learning or lecture? *Nurse Education Today*, *28*(7), 798–806.

Sweeney, N. M., Saarmann, L., Flagg, J., & Seidman, R. (2008). The keys to successful online continuing education programs for nurses. *Journal of Continuing Education in Nursing*, *39*(1), 34–42.

Walker, J. T., Martin, T., White, J., Elliott, R., Norwood, A., Mangum, C., et al. (2006). Generational (age) differences in nursing students' preferences for teaching methods. *Journal of Nursing Education*, *45*(9), 371–374.

Wilbright, W. A., Haun, D. E., Romano, T., Krutzfeldt, T., Fontenot, C. E., & Nolan, T. E. (2006). Computer use in an urban university hospital: Technology ahead of literacy. *CIN: Computers, Informatics, Nursing*, *24*(1), 37–43.

Zemke, R., Raines, C., & Filipczak, B. (2000). *Generations at work: Managing the clash of veterans, boomers, Xers, and nexters in your workplace*. New York: American Management Association.