Live health assessment in a virtual class: Eliminating educational burdens for rural distance learners

JoAnn Klaassen, RN, MN, JD [1]

Carol Schmer, RN, PhD [2]

Anita Skarbek, RN, PhD(c) [3]

[1] Associate Clinical Professor, School of Nursing and Health Studies, University of Missouri Kansas City, klaassenj@umkc.edu

[2] Assistant Clinical Professor, School of Nursing and Health Studies, University of Missouri Kansas City, schmerc@umkc.edu

[3] Assistant Clinical Professor, School of Nursing and Health Studies, University of Missouri Kansas City, skarbeka@umkc.edu

Abstract

Online nursing education presents challenges for educators. Demonstrating and testing skills acquisition in a nontraditional face to face format is difficult. The Learning Exchange Reverse Demonstration (LERD) Model provides a mechanism that allows students in an online setting to demonstrate skills acquisition with real time faculty feedback, increased student satisfaction, and measureable learned outcomes. A sample consisting of online rural RN- BSN students who utilized the LERD Model was compared to a traditional face to face RN-BSN sample. Both groups were completing the same Health Assessment course. Questionnaires distributed to both groups after completion of the Health Assessment course indicated that the rural students were very satisfied with the LERD Model experience, had less travel and time off work expenses, and achievement of learning outcomes was equal to or greater than those in the traditional face to

face format. Although initial expenses are required for the LERD Model, once instituted this model offers a viable alternative to the traditional face to face format that in today's world of online learning is not always possible or practical. This method could allow rural students the opportunity to continue their nursing education while remaining in their communities, thus insuring needed health care will continue in rural areas.

Keywords: Online learning, Student satisfaction, Nursing education, Rural nursing innovations

Live health assessment in a virtual class: Eliminating educational burdens for rural distance learners

Nursing education has always been challenging. In the era of technology-based health care delivery and online education delivery many challenges persist. Although the opportunities new technologies provide for distance education are numerous, there continue to be concerns regarding teaching methods, course designs, cost containment for both students and higher education institutions, and learning outcomes. Furthermore, the expansion of health information technology and the renewed emphasis on tele-health, raise new challenges related to best practices and instructional methods in the use of emerging technology as a component of online instruction. The purpose of this study was to compare student satisfaction and learning outcomes using a novel, tele-health based, live on-line Learning Exchange Reverse Demonstration (LERD) Model© for instruction in health assessment skills, versus student satisfaction and learning outcomes in a traditional, onsite health assessment skills lab.

Background

In 2010, over 19 million undergraduate students and nearly three million graduate students were enrolled in federally funded post-secondary schools (National Center for Educational Statistics, 2012). As such, educational institutions are continually challenged to meet the diverse

needs of adult learners who often struggle balancing educational, work, and personal commitments (Ross-Gordon, 2011). Many colleges and universities transitioned to online instruction in order to provide adult learners with greater access to higher education programs (Ko & Rossen, 2010). Research has shown that online educational experiences have demonstrated benefits such as autonomy enhancement, improved cognitive development, and increased problem –solving skills (Kocaman, Dicle & Ugur, 2009). Nursing education is one of several disciplines that continue to expand these opportunities for students.

Literature also illustrates that online education provides an excellent opportunity for rural nurses to continue their education, while living and working in their own communities (Bushy, 2006; Fairchild, 2012). Providing the opportunity for rural nurses to remain in their communities while they are continuing their education is an essential factor in order to meet the urgent need for rural nurses with advanced education and skills (Fitzgerald & Townsend, 2012). Although online instruction is proliferating traditional online instructional methods do not provide a mechanism to teach skill acquisition, such as health assessment skills (Gray, 2013). For this reason, many distance education programs require rural distance learners to travel for portions of their educational experience. For example, rural nurses are required to leave their home and work for either a weekend learning experience, or to meet some form of residency requirement. Both approaches are burdensome for these rural distance learners in terms of time and costs, and are de-motivating factors to distance nurses desiring to enhance their education.

Innovative online educational approaches provide opportunities to deliver high-quality education, while eliminating travel requirements and associated costs for distance learners. In addition, being able to deliver high quality skills-based education may allow rural distance nurse learners to be better prepared to meet the recommendations of both the National League for

Nursing's excellence model (2006) and the Institute of Medicine's (2011) "The Future of Nursing." These recommendations stress the importance of integrating technology utilization as a component of future nursing practice in order to enhance the delivery of optimum health care.

Educational research (Ruhe & Zumbo, 2009) has demonstrated that it is possible to achieve equal or better learning outcomes, manageable costs of instruction, and high student satisfaction rates using an online format as compared to the traditional face-to-face educational format. Cobb (2011) and Leasure, Davis, and Thievon (2000) described online students as being satisfied with the online learning environment, and more engaged in the learning process than their face to face counterparts. Although studies (Billings, 2000; Gikandi, Morrow & Davis, 2011) related to online nursing education have validated online education as a legitimate instructional format, little is known about the effectiveness of using emerging technologies, such as video tele-health, for on-line nursing education. Despite the fact that both the Commission on Collegiate Nurse Educators (CCNE) (2009) and the American Academy of Colleges of Nursing (AACN) (2008) have established student competencies for nursing informatics, measuring the effectiveness of technology application for student learning in the on-line environment is still in its infancy. Lamb and Shea (2006) contended that even though emerging technologies are being used extensively in the health care setting, "few undergraduate programs expose nursing students to the full range of technologies available" (p. 7). Tele-health, the predominant emerging transformative patient delivery technology now at the fore-front of health care, has been largely overlooked by nursing education. A review of United States nursing programs revealed a few certificate programs related to tele-health technology use with only one or two nursing programs emphasizing tele-health in undergraduate pre-licensure nursing education. There is a paucity of

research regarding educating nurses on tele-health best practices and on student learning outcomes related to innovative technology applications.

In one of the few studies addressing student learning outcomes with tele-health application, Winters and Winters (2007) reported increased nursing student satisfaction when using video-conferencing to assess and teach skills to community-based patients. Another study by Seibert, Guthrie and Adamo (2008) utilized standard patients via video-conferencing to evaluate health assessment skills of master's prepared clinical nurse specialists. The distance group members collaborated to conduct an interview and examination of the standard patient by directing an onsite examiner to examine the patient. Although student knowledge demonstrably increased, student satisfaction with the experience was low possibly due to lack of familiarity with the technology and lack of student-faculty interaction during the assessment process. Nevertheless, Seibert, Guthrie and Adamo concluded that innovative technologies, such as tele-health technology offered promise for the re-design of online nursing education.

The authors of this article, seeing the need for research related to tele-health concept application in the online environment, developed a proprietary teaching-learning model designed to blend the virtual classroom platform, best practices in skill acquisition, and tele-health concepts. The model was piloted in an undergraduate health assessment course provided for RN-BSN students, comparing a section of totally online rural distance learners using the tele-health based LERD Model© to a section of blended onsite online learners.

The LERD Model©

The LERD Model© was carefully and systematically designed to combine both best practices for skills instruction and tele-health concepts. As in tele-health, visualization of a standard patient in a live setting is possible when utilizing the LERD Model©. Distance learners

utilize enhanced tools, such as a video-otoscope and audible stethoscope, streamed through the Wimba Live Classroom™, to assist with their health assessment skill-building learning. The LERD Model© blends videoconferencing via the Wimba Live Classroom™ platform, videography, a standard patient model, and an instructor-student interaction communication loop to teach and observe the distance student's assessment skills (Figure 1). Similar to tele-health delivery modalities, interaction between end users is live and instant. In tele-health practice, the expert generally guides the distance generalist who completes the assessment or intervention under the expert's guidance and direction. In contrast, the LERD Model© requires the distance student to guide the expert instructor through a health assessment demonstration for skills acquisition (Figure 1). This innovative approach allows for immediate feedback and correction of student assessment techniques by the instructor during lab practice sessions, as well as the end-of-the-semester head-to-toe assessment check-off.

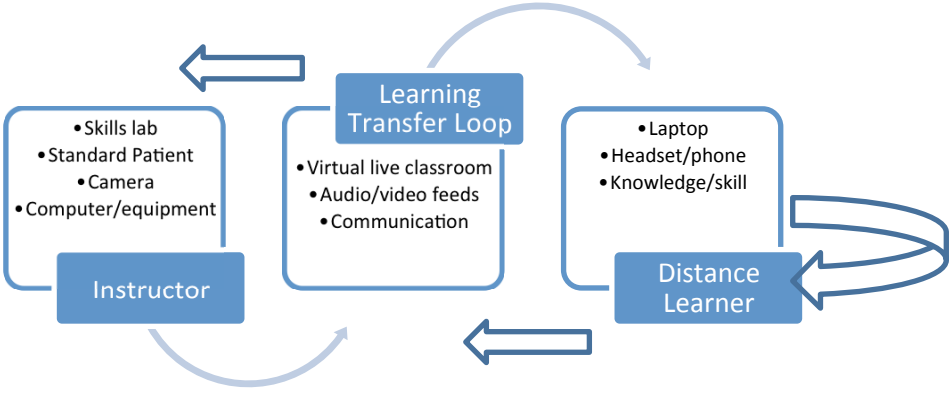

Figure 1. LERD Model Process

Educationally, the LERD Model© allows students to progress through the steps of instructor demonstration, guided practice, and reverse student demonstration to display achievement of learning outcomes. This progression comports with Benner's (1984) novice to expert framework which has been utilized in clinical instruction for nursing students. Unlike other non-traditional health assessment methods, such as student videotaped health assessments

or the aforementioned studies, the live LERD© process allows for an interactional approach and immediate instructor feedback to the student (Figure 2).

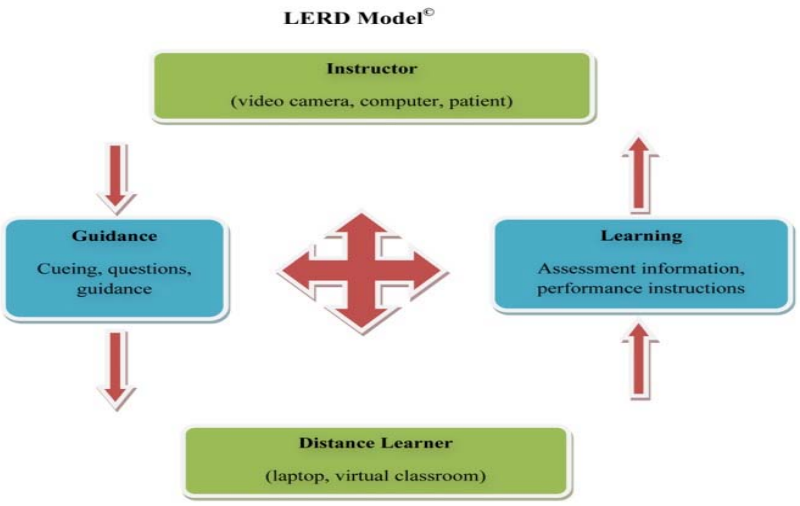

Figure 2. LERD Model

Methods

After obtaining Social Science Institutional Review Board approval from the affiliated university, an anonymous online survey was offered to Registered Nurses (RN) who were baccalaureate nursing students nearing the completion of the online Health Assessment Course for Clinical Practice at a Midwestern University. Consent was implied if the students participated in the survey. Students were assured that participation in the survey would have no impact on their final grade. The health assessment course was offered to local, mostly urban students as an online didactic course combined with a four day onsite face-to-face health assessment lab/skills demonstration. Distance learners, who were all rural students, received an online course utilizing the innovative live LERD Model© for health assessment lab/skills demonstration.

The Wimba Live Classroom™ (n.d.) operating within the Blackboard® information management system of the university formed the platform for the online portions of the health

assessment course for both sections of students. Wimba™ is a live virtual classroom which permits sharing of audio and visual information through a university web browser to which students has access through the course. Didactic lectures for all students were delivered via Tegrity©. Tegrity© is a class capture web service which allows students to access classes from i-Pods, MP3 players, a web browser, or mobile device.

Both the onsite and the online LERD© model sections were taught by the same instructors and completed over the same 16 week semester. Survey questions addressed issues such as: a) student satisfaction; b) years of nursing experience; c) level of computer knowledge prior to attending this course; d) technological difficulties encountered and; e) what burden if any, this course imposed on the student. Demographic information was collected to allow for comparison of the two groups. In addition, course grades for the two sections were compared for knowledge and skill acquisition.

Sample/Participants

For the study, 38 students from the onsite course and 23 students from the distance online course were offered participation in the survey. A total of 42 students completed the survey; onsite students consisted of 54.8% (23) and distance students included 45.2% (19), providing a response rate of 69%

A Health Resources and Service Administration (HRSA) grant provided us the opportunity to recruit rural nurses wishing to complete their baccalaureate degree. We considered rural as any county with a population of less than 50,000 according to the 2010 US census. As an incentive to return to school, and to help alleviate some of the burden that rural nursing students face returning to school, the grant allowed us to provide a laptop computer and cover the cost of internet for these students while they were enrolled in the nursing program.

Self-disclosed demographic data identified that onsite students were 91% female and consisted of White-non-Hispanics (87%), African Americans (9%), and Hispanics (4%). Their ages ranged from less than 25 years to 55 years of age with the majority (74%) in the 31 to 45 year old range. English was identified as the primary language by 91% of the onsite students, with Spanish or Haitian Creole each being identified as the primary language by less than 4%. Distance students were 84% female. They were 95% White-non-Hispanic, and 5% Hispanic. Distance students ranged in age from under 25 years to over 55 years. The largest group ranged in age from 45-55 years (32%). All of the distance students identified English as their primary language. Both quantitative and qualitative data were collected and analyzed by the researchers. Participants were given a five point likert scaled instrument with the options of extremely dissatisfied to extremely satisfied, and participants were allowed to explain any answer in a written qualitative format.

Results

Student Satisfaction

Study results indicated that 90% (38) of all the students in both sections were satisfied or extremely satisfied with the health assessment course. Only 5% (2) students were very dissatisfied with the course. Among the onsite students 87% (20) were satisfied or extremely satisfied and 9% (2) were very dissatisfied with the course. Distance students identified that 95% (18) were satisfied or extremely satisfied.

Nursing Experience

Onsite students worked across a variety of specialty areas, while the rural distance students tended to care more generally for adult and older adult client populations. These data reflect the

lack of specialized health care services available in rural areas (Skinner, & Slifkin, 2007). Most students from both groups worked in acute care settings – typical of associate degree RNs (Mahaffey, 2002). More onsite students indicated that they performed targeted health assessments, while rural students performed head-to-toe health assessments as part of their clinical practice. Years of professional nursing experience also varied between the onsite and distance groups as illustrated in Figure 3, with the distance nurses having both the least and the greatest years of nursing experience.

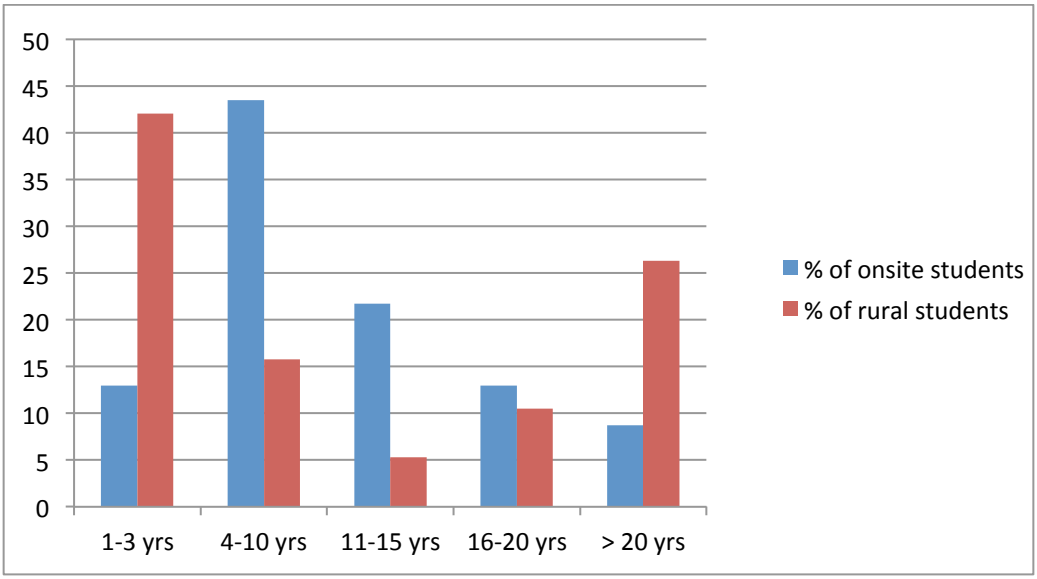

*Figure 3***.** Years of Nursing Experience

Level of Computer Skills

Students self-identifying themselves as beginner computer users prior to taking the Health Assessment of Clinical Practice course included 9% of the onsite students and 11% of distance students. The majority of students identified themselves as either intermediate or advanced computer users (91% onsite, 84% distance) prior to the course, with only one student self-identifying as an expert user. Students were asked to rate their computer skills at the conclusion of the course. There were no students who continued to identify themselves as beginner

computer users. While most students again identified themselves as intermediate or advanced computer users, more students shifted from intermediate to advanced users. One onsite and one distance student self-identified as expert users at the conclusion of the course.

Technological Difficulties

Students reported problems with technology during the health assessment course. Technology problems were reported by 65% (15) of the onsite students and 79% (15) of the distance students although, most students experienced low problem frequency, and a significant number 24% (10) reported no problems at all.

Student comments regarding the nature of technology problems primarily included problems with the quality of Tegrity© lectures in the didactic portion of the course and posted online videos which caused lags and pixilization. Rural students also reported some problems with connectivity. Several students occasionally lost connectivity during the Wimba® practice sessions and one student reported problems with audio requiring the student to call in by phone to the Wimba classroom.

Course Burden for Students

Students were asked to identify time and cost burdens of the course such as travel, time off work, etc. Onsite students reported that 22% (5) took off work four to five times, 22% (5) took off two to three times, 30% (7) took off work once, and 13% (1) never took off work. A number of students reported using vacation time to attend the onsite health assessment skills laboratory. Distance students reported that 5% (1) took time off work more than five times, 16% (3) took time off work two to three times, 26% (5) took time off work once, and 42% (8) never took time off work. Of the students who took time off from work to attend the class, distance students averaged four to six hours away from work while onsite students reported an average of four

days off work. Distance students reported no costs for travel, hotels, etc., while the costs for the onsite students ranged from $10.00 to $2,000 of unreimbursed costs to attend the onsite health assessment skills lab. Onsite students found time away from work and the related costs to be one of the most burdensome aspects of the course even though they reported extremely positively on the quality of the experience. Rural students reported few burdensome aspects of the course. Several students asked for additional practice lab times, but most feedback recommended making no significant changes to the course structure. The problems with Tegrity© and video streaming were mentioned as the most burdensome aspect of the course by both groups of students.

Learning Outcomes

Since both courses were taught by the same instructors it may be assumed that the course outcomes and grading were comparable for each group. Final course grades were similar for both sections with the onsite students averaging 95.7%, and the distance students averaging 97.1%. These grades are analogous to grade averages of previous students who had taken the Health Assessment for Clinical Practice course. Instructor perceptions of student learning and performance of health assessment skills was equal for both sections.

Limitations

A relatively small sample size of student participants from only one course in one university and the fact that all students were practicing RN's returning to school limits the generalizability of this study. Future studies should include a variety of university/college sites, larger sample sizes, and a variety of graduate and undergraduate students.

Other considerations for study replication include personnel resources, time, and costs for management of the online LERD Model© instruction. Although students could easily participate

in the course from their personal laptop computers at home or work, the university incurred additional faculty and staff costs as each online instructional/practice session required a faculty member, videographer and standard patient. In addition, the school purchased specialized electronic stethoscopes, video cameras, and computer laptops for the online laboratory instruction, as well as reserved dedicated examination rooms at the School of Nursing. Using the LERD Model© requires small group sizes of 8-10 students per lab session for effective instruction thus requiring 2-3 instruction/practice sessions each week over the 16 week semester to accommodate the 23 online students. In contrast, the onsite laboratory sessions required 2-3 faculty members for four 8-hour days of boot camp to accommodate 38 students. The onsite group incurred no university costs associated with the laboratory space, computer equipment, or standardized patient models, as students conducted the assessments on their peers. However, once the system and equipment were in place, operation costs were only slightly higher for the LERD Model© than the traditional boot camp.

Conclusions

Both the onsite group and the online rural distance LERD Model© group expressed satisfaction with the Health Assessment for Clinical Practice course. The group responses and grades demonstrated that learning outcomes were similar and not affected negatively by either learning format. Rural students participating in the online format were less burdened with travel cost, time away from work and family thus making their overall satisfaction with the course slightly higher than the onsite group. Online rural distance students further benefitted by exposure to tele-health concepts through use of the LERD Model© thus, preparing them to utilize tele-health technology and skills in nursing practice. As the LERD Model© has been utilized by the university school of nursing undergraduate RN-BSN program for three years, it has become a

sustainable teaching-learning methodology and one that we would like to assess further for its applicability at the graduate level of instruction and for continuing nursing education, especially within rural communities which generally have less convenient access to higher levels of nursing education.

The results of this study have positive implications for nursing education and rural nursing education in particular, by providing a means for quality, convenient access to nursing courses that have traditionally required on-site presence. The provision of skills development and enhancement in the on-line environment is an innovative solution to educational barriers that provides cost and time savings for students while increasing student enrollment. Early exposure to tele-health concepts prepares nursing students for the highly transformative technological health care environment. Finally, although this study was conducted with nursing students, the technology has the potential to be used in multidisciplinary courses for team skills-building.

In the era of rapidly expanding technology in health care and an increasing demand for relevant, applied online learning experiences, it is important to develop innovative instructional approaches. It is equally important to evaluate these novel instructional approaches for student satisfaction rates, problem-solving and critical thinking skills, and learning outcomes.

References

American Academy of Colleges of Nursing, (2008). *The essentials of baccalaureate education for professional nursing practice*. Boston, MA: AACN.

Benner, P. (1984). *From novice to expert: Excellence and power in clinical nursing practice*. Menlo Park: Addison-Wesley.

Billings, D. (2000). A framework for assessing outcomes and practices in web-based courses in nursing. *Journal of Nursing Education 39* (2), 60-67. [MEDLINE]

Bushy A. (2006). Nursing in rural and frontier areas: Issues, challenges and opportunities. *Harvard Health Policy Review, 9*(1), 17-27.

Cobb, S. (2011). Social presence, satisfaction, and perceived learning of RN-to-BSN student in web-based nursing courses. *Nursing Education Perspectives, 32* (2), 115-119. [MEDLINE]

Commission on Collegiate Nurse Educators, (2009). *Standards for accreditation of baccalaureate and graduate degree nursing programs.* Boston, MA: CCNE.

Fairchild, R. M. (2012). Hold that tiger A collaborative service-learning academic-practice partnership with rural healthcare facilities. *Nurse Educator. 37*(3), 108-114. [MEDLINE]

Fitzgerald, C. E., & Townsend, R. P. (2012). Assessing the continuing education needs and preferences of rural nurses. *The Journal of Continuing Education in Nursing, 43*, 420-7.

Gikandi, J., Morrow, D., Davis, N. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education 57*, 2333 - 2351.

Gray, D. (2013). Barriers to online postsecondary education crumble: Enrollment in traditional face-to-face courses declines as enrollment in online courses increases. *Contemporary Issues in Education Research (Online), 6* (3), 345. Retrieved from http://journals.cluteonline.com/index.php/CIER/article/view/7906

Institute of Medicine. (2011). *The Future of Nursing: Leading Change, Advancing Health.* Washington, DC: The National Academies Press.

Kocaman,G., Dicle, A., & Ugur, A. (2009). A longitudinal analysis of the self-directed learning readiness level of nursing students enrolled in a problem-based curriculum. *Journal of Nursing Education 48*, 286 - 290. [MEDLINE]

Ko, S. & Rossen, S. (2010). *Teaching online: A practical guide* (3rd ed.). New York, NY: Routledge.

Lamb, G. & Shea, K., (2006). Nursing education in telehealth. *Journal of Telemedicine & Telecare*, 12: 55 – 56. [MEDLINE]

Leasure, A. R., Davis, L., & Thievon, S. L. (2000). Comparison of student outcomes and preferences in a traditional vs. world wide web-based baccalaureate nursing research course. *Journal of Nursing Education 39*, 149-154. [MEDLINE]

Mahaffey, E., (2002). The relevance of associate degree nursing education: Past, present, and future. *Online Journal of Issues in Nursing, 7* (2). [MEDLINE]

National Center for Education Statistics (2012). *Enrollment in post-secondary institutions, fall 2010; financial statistics, fiscal year 2010, and graduation rates, selected cohorts, 2002-2007.* U.S. Department of Education.

National League for Nursing. (2006). *Excellence in nursing education model.* New York: Author.

Ross-Gordon, J. M. (2011). Research on adult learners: Supporting the needs of a student population that is no longer nontraditional. *Peer Review, 13*(1), 26-29.

Ruhe, V. & Zumbo, B.D. (2009). *Evaluation in distance education and e-learning.* New York, NY: Guilford Press.

Seibert, D., Guthrie, J. & Adamo, G. (2004). Improving learning outcomes: Integration of standardized patients & telemedicine technology. *Nursing Education Perspectives, 25,* 232 - 237. [MEDLINE]

Skinner, A. C. & Slifkin, R. T. (2007), Rural/Urban differences in barriers to and burden of care for children with special health care needs. *The Journal of Rural Health, 23,* 150–157. [MEDLINE]

Tegrity (n.d.). *Lecture Capture.* Retrieved from http://www.tegrity.com/?gclid=CI2kw8XB37ACFQlN4AodSkkY0g

United States Census Bureau (2010). *2010 Census urban and rural classification and urban area critera.* Retrieved from http://www.census.gov/geo/reference/ua/urban-rural-2010.html

Wimba, Inc. (n.d). *Wimba classroom for higher & further education.* Retrieved from http://www.wimba.com/solutions/higher-education/wimba_classroom_for_higher_education/

Winters, J. & Winters, J., (2007). Videoconferencing and telehealth technologies can provide a reliable approach to distance assessment and teaching without compromising quality, *Journal of Cardiovascular Nursing, 22,* 51 – 57. [MEDLINE]