8-1-2014

Methodological Quality and Study Report Characteristics of Current Nursing Education Research

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METHODOLOGICAL QUALITY AND STUDY REPORT CHARACTERISTICS OF CURRENT NURSING EDUCATION RESEARCH

By

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Bachelor of Science in Nursing
University of Nevada, Reno
2008

A thesis submitted in partial fulfillment of the requirements for the

Master of Science in Nursing

School of Nursing
Division of Health Sciences
The Graduate College

University of Nevada, Las Vegas
August 2014

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

THE GRADUATE COLLEGE

We recommend the thesis prepared under our supervision by

Staci Lynn Warnert

entitled

Methodological Quality and Study Report Characteristics of Current Nursing Education Research

is approved in partial fulfillment of the requirements for the degree of

Master of Science - Nursing
School of Nursing

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August 2014

Abstract

The state of the science of nursing education is determined by the extent of and characteristics of nursing education research. Based on previous research findings, the methodological quality of nursing education research could be much higher. The purpose of this study was to evaluate the methodological quality, funding, journal impact factor, international nature, and areas of inquiry of current nursing education research (Aim 1). The study also aimed to determine research characteristic differences between current nursing education research and research published four to six years ago (Aim 2).

For Aim 1, this study was a cross-sectional design study. Nursing education research articles (N = 108) published from January 2011 to December 2013 were assessed. The articles were obtained by performing an advanced search in the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database for nursing education research articles published between January 2011 and December 2013. The other limits of the search were English language, peer-reviewed, research article, nurse first author and nursing education as special interest. Quantitative studies involving nursing student data generated by either recruiting nursing students as subjects or using nursing student records were included in the study. Articles were excluded if they were conference abstracts (51); non-research articles (13); qualitative research reports (40); published in a non-peer reviewed journal (1); research reviews or literature reviews (8); if the study subjects were exclusively nursing faculty (35), nursing programs (6), staff nurses or clinical nurse specialists (68), new graduate nurses (17), or other non-registered nursing students (5); and if the study did not involve current students at the time of data collection (2). The resulting 108 articles were then analyzed by two independent raters. Methodological quality was assessed using the Medical Education

Research Study Quality Instrument (MERSQI). Research funding, journal impact factor, international nature, and areas of inquiry were also evaluated.

For Aim 2, methodological quality, areas of inquiry, international nature, research funding, and journal impact factor of current research were compared with research findings of 133 nursing education research published between July 2006 and December 2007.

In comparison with past research, current research consisted of more studies with a randomized control trial design and an U.S. setting. Also, areas of inquiry have changed from past to current research, including a greater focus on simulation. The overall methodological quality, funding, and journal impact factor were found to be comparable to previous research.

In conclusion, current nursing educational research with more randomized control trial design suggests increasing rigor in nursing education research. Furthermore, current nursing educational research involves new areas of inquiry, indicating an expansion of nursing education research subject matter.

Acknowledgements

MS Thesis Award from the University of Nevada, Las Vegas School of Nursing. (2014). "Methodological Quality and Study Report Characteristics of Current Nursing Education Research." $500.

Thesis Chair - Dr. Barbara St. Pierre Schneider DNSc, RN, CNE

Thesis Committee - Dr. Patricia Alpert DrPH, MSN, APRN, FNP-BC, PNP-BC, CNE, FAANP, Dr. Trisha Gatlin PhD, RN, CNE, and Dr. Sue Schuerman PT, GCS, PhD

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Chapter 1: Background, Significance, and Aims

In 2011, Yucha, Schneider, Smyer, Kowalski, and Stowers examined the methodological quality of 133 nursing education research studies published from July 2006 to December 2007, using the Medical Education Research Study Quality Instrument (MERSQI). The MERSQI is a tool that assesses the methodological quality of quantitative research articles, and has a total score of 5 to 18 (Reed et al., 2007). The mean total MERSQI score of the 133 studies analyzed by Yucha et al. (2011) was 9.8. Therefore, the methodological quality of nursing education research could be higher to support nursing education. Without quality research to support nursing education pedagogies nurse educators implement new teaching and learning strategies without evidence of true outcomes (Broome, Ironside, & McNelis, 2012; Diekelmann, 2005). Accordingly, the Institute of Medicine (2010) states nursing education research is essential to support the development of competent future generations of nurses.

In the past four to six years, three significant changes in the science of nursing education have occurred. The National League for Nursing (NLN), a major funding source of nursing education research, has increased the annual allocated funding for nursing education research studies from $10,000 in 2000 to $70,000 in 2010 (Duffy, Frenn, & Patterson, 2011). In 2010 the NLN established the Jonas Scholars Program, which awards doctoral candidates with a nursing education focus, funding and mentoring to complete their PhD dissertations (National League for Nursing [NLN], 2013). In addition to increased funding, expectations regarding methodological quality have changed. Methodological quality is now a critical factor in being awarded funding from the NLN (Duffy et al., 2011). Furthermore, methodological quality is affecting

publication decisions. For example, the journal, *Nursing Education Perspectives*, has become more selective in publishing studies demonstrating high methodological quality (Fitzpatrick, 2013). Finally, the number of PhD students who have a focus in nursing education has increased (Broome et al., 2012). For example, the University of Nevada, Las Vegas School of Nursing enrolled its first cohort of students in its PhD program with a nursing education focus in fall 2005, with the first student graduating in spring 2007. To date, there are 30 PhD graduates from the University of Nevada, Las Vegas (E. Gardner, personal communication, May 28, 2014). Collectively, these changes of increased numbers of PhD prepared nurses and the funding and publishing of studies of high methodological quality suggest that in the past four to six years more nurses have acquired the substantive and methodological skills to conduct significant and higher methodological quality nursing education research. Therefore, one specific aim of this study was to evaluate the methodological quality of recent nursing education research. In addition, other characteristics that are often positively correlated with the methodological quality, such as funding and journal impact factor, or that could potentially affect methodological quality will be examined as a second aim.

Chapter 2: Review of Literature

In 2005, Diekelmann wrote an editorial in *Nursing Education Perspectives* stressing the importance of increasing funding and research in nursing education to strengthen and extend nursing education pedagogies. Diekelmann (2005) called for a science of nursing education that is inclusive with multi-method, multi-site, and multi-paradigmatic studies. Additionally, in 2005, the NLN stated the need for nursing education science to have a strong research base, with competent educators using research findings to increase the effectiveness of nursing educational approaches, advance evidence-based teaching, and create educational models to improve quality of nursing care. Furthermore, in 2009, Broome stated nursing education science had a serious lack of knowledge, having significant impact on the rest of the nursing profession. Thus, nursing leaders have recognized the need to strengthen the science of nursing education through research.

State of the Science of Nursing Education

Grove, Burns, and Gray (2013) define science as "a coherent body of knowledge composed of research findings and tested theories for a specific discipline" (p. 7). Therefore, the state of the science of nursing education refers to the extent of and characteristics of knowledge within nursing education, based on research findings. When evaluating the state of the science, various characteristics can be examined. This examination of the state of the science of nursing education will involve five characteristics: methodological quality, research funding, the impact factor of the journal, international nature, and areas of inquiry. These characteristics were selected because data regarding the characteristics are available in the literature or through databases.

Methodological quality. Methodological quality is the extent to which a study's research methods conform to recognized good practice (National Institute for Health Care Excellence, 2011). Since the science of nursing education is established through research, recognizing the methodological quality of nursing education research allows for greater understanding of the state of the science of nursing education.

Medical education research study quality instrument. Reed et al. (2007) developed the MERSQI to study the methodological quality of medical experimental, quasi-experimental, and observational studies. The MERSQI consists of 10 items organized into six domains of methodological quality (see Appendix A). Each item is given a score, then all item scores are added together to obtain a total MERSQI score. There is a possible score of 3 for each domain, with the maximum score on the MERSQI being 18. Total scores on the MERSQI can range from 5 to 18. Since qualitative studies have fundamentally different designs, sampling, evaluation instruments, and analysis the MERSQI can only be used with quantitative studies (Reed et al., 2007).

Reed et al. (2007) established the reliability and validity of the MERSQI, using the MERSQI to evaluate the quality of 210 medical education studies from 13 peer-reviewed journals from September 1, 2002 to December 31, 2003. The mean total MERSQI score of the studies was 9.95. Reed et al. (2007) used Cronbach's alpha to determine internal consistency of the individual MERSQI domains as well as the total MERSQI with all items combined. Cronbach's alpha was 0.6 for the total MERSQI; 0.92 for the validity of evidence domain; and 0.57 for study design, data analysis, and outcomes domains. Interrater and intrarater reliability for all items was assessed using Landis and Koch's intraclass correlation coefficients (ICCs) scale: less than 0.4 is poor,

0.4 to 0.75 is fair to good, and greater than 0.75 is excellent (Reed et al., 2007). Reed et al.'s (2007) interrater reliability for each item ranged from 0.72 to 0.98, and intrarater reliability ranged from 0.78 to 0.99. Thus, interrater and intrarater reliability were determined to be excellent. Reed et al. (2007) established content validity of the MERSQI by correlating MERSQI scores with global quality ratings from two independent nationally recognized experts, a three-year citation rate, and journal impact factor. Total MERSQI scores were strongly correlated with the median global quality rating of the two independent experts, where $\rho = 0.73$ with a 95% confidence interval (Reed et al., 2007). The number of times a research article was cited in a three-year citation period as well as the publishing journal's impact factor was considered an indicator of quality (Reed et al., 2007). Reed et al. (2007) found MERSQI scores were associated ($p = 0.003$) with a three-year citation rate and journal impact factor. The MERSQI had a 0.8 increase in score per 10 citations and a 1.0 increase in score per six unit increase in journal impact factor.

Medical education studies. Since its development the MERSQI has been used in other studies to evaluate the methodological quality of medical education research. Reed et al. (2008) used the MERSQI to evaluate the quality of 100 research manuscript submissions to the *Journal of General Internal Medicine* medical special edition and determine if MERSQI scores could predict editorial publishing decisions. A 1.31 increase in total MERSQI score was demonstrated for manuscripts sent to be peer-reviewed versus manuscripts that were immediately rejected (Reed et al., 2008). The mean total MERSQI score was significantly higher (10.7 ± 2.5 *SE*) in accepted manuscripts versus rejected manuscripts (9.0 ± 2.4 *SE*) and predicted final acceptance.

In 2009 Reed, Beckman, and Wright compared the MERSQI score of medical education research published in the *American Journal of Surgery* to that of medical education research published in 12 other peer-reviewed journals from January 1, 2003 to December 31, 2003. In addition, the 2003 and 2007 MERSQI scores of medical education articles published in the *American Journal of Surgery* were compared (Reed et al., 2009). The 19 studies published in 2003 in the *American Journal of Surgery* had greater response rates, were more likely to report content validity of evaluation instruments, and had a higher mean total MERSQI score (11.03 ± 2.1 *SE* versus 9.83 ± 2.4 *SE*) than the 198 studies published in the other 12 journals in 2003. In regard to the 2003 and 2007 comparison of the *American Journal of Surgery* articles, the mean total MERSQI score of the 38 articles from 2007 was one point higher (12.03) than that of 2003 (11.03), thus demonstrating the *American Journal of Surgery* maintained methodological rigor of published educational studies over a four-year period.

Windish, Reed, Boonyasai, Chakrabort, and Bass (2009) used the MERSQI to evaluate the quality of studies related to quality improvement curricula in medical education. Fourteen studies published between January 1, 1980 and April 30, 2008 were included after searching for relevant studies in four electronic databases: Cumulative Index to Nursing and Allied Health, Education Resources Information Center, Experta Medica Database, and MEDLINE. Total MERSQI scores ranged from 5 to 14 with a mean total MERSQI score of 9.86. Interrater reliability using the ICC for total MERSQI score was 0.89.

More recently the MERSQI has been used to evaluate the quality of medical education research studies focused on specific areas of inquiry. Kothari et al. (2011)

investigated the methodological quality of 31 research studies focused on undergraduate medical education targeted toward treatment of substance abuse disorders and published between January 1950 and December 2008. The studies were selected from searches conducted using four electronic databases: MEDLINE, PsychInfo, PubMed, and Web of Science. Seventeen studies were examined using the MERSQI. The mean total MERSQI score was 10.42. Interrater reliability using the ICC for total MERSQI score was 0.82.

Quartey, Ma, Chung, and Griffiths (2012) used the MERSQI to evaluate the quality of 12 studies focused on traditional, complementary, and alternative medicine education as a component of a larger study reviewing evidence of effective traditional, complementary, and alternative medicine education. The sample was derived from primary studies focused on doctors or medical students and traditional, complementary, and alternative medicine education. The search involved four electronic databases: MEDLINE, Cochrane Database of Systematic Reviews, Experta Medica Database, and the Allied and Complimentary Medicine Database, and was conducted from database inception to November 2010. Total MERSQI scores for the 12 studies ranged from 8.5 to 13.5, with a mean total score of 10.83. No reliability was reported. The two lowest domain scores were 0.36 for validity of evaluation instruments and 0.90 for sampling. Quartey et al. (2012) concluded a mean low score for validity of evaluation instruments prevented the authors from generating conclusions on the effect of traditional, complementary, and alternative medicine education on doctors and medical students.

In 2013, Mookherjee, Pheatt, Ranji, and Chou used the MERSQI to evaluate the quality of 14 studies related to teaching physical examination in graduate medical

education. The sample was obtained by searching for studies concerning physical examination published between January 1951 and December 2012 in three electronic databases: Education Resources Information Center, Experta Medica Database, and PubMed. The mean MERSQI score was 9.0. Interrater reliability was ideal (kappa = 1.0) for all but two domains, sampling (kappa = 0.44) and content validity (kappa = 0).

Thus, since its development the MERSQI has been used by authors to evaluate medical education research from specific journals as well as medical education research obtained from searching various databases.

Nursing education studies. Although the MERSQI was created for the evaluation of medical education research, the instrument has also been used to study the methodological quality of nursing education research.

In 2011, Yucha et al. assessed the methodological quality of 133 nursing education research articles published between July 1, 2006 and December 31, 2007, and this assessment was performed using the MERSQI. The total MERSQI scores ranged from 6.0 to 14.5, with a mean total MERSQI score of 9.8 ± 2.2 *SE*. Cronbach's alpha for total MERSQI score was 0.6. The majority of these studies were cross-sectional in design or posttest only (55.6%), involved only one institution (82.7%), had response rates of greater than 50% (71.4%), collected participant self-report data (64.7%), and reflected satisfaction and attitudes (63.1%). These data suggest a need for greater methodological quality in nursing education research.

Recently Schneider, Nicholas, and Kurrus (2013) compared the methodological quality and study-report characteristics of 100 clinical nursing research articles published

from 2007 to 2009 and in five journals with the highest impact factor (mean journal impact factor = 1.093), and 37 nursing education research articles analyzed in the Yucha et al. study that were published in journals with an impact factor > 0.867 (mean journal impact factor = 1.308). Schneider et al. (2013) used the six MERSQI domains to assess methodological quality because the reliability of the MERSQI for the clinical articles was low (Cronbach's $\alpha = 0.24$). The clinical nursing research studies were found to have about two times more randomized controlled trials then the education studies and had a significantly higher mean score for number of institutions. The mean study outcomes and type of data domain scores were also significantly higher for the clinical nursing studies than for the education studies. In addition, funding was more likely to be reported in the clinical articles than the nursing education studies (Chi Square = 16.203, $p = 0.0001$). Schneider et al. (2013) concluded the higher methodological quality of the clinical studies is likely due to greater funding of the clinical studies than that of educational studies.

The MERSQI assists with quantifying the methodological quality of educational research and can demonstrate areas where methodological rigor of educational research can improve. Although the MERSQI is limited to quantitative research studies the MERSQI is a valid and reliable tool that identifies areas of methodological quality in research. In regard to nursing education research, Yucha et al. (2011) demonstrated the application of and reliability of the MERSQI. Yucha states the MERSQI has the potential to improve quality of nursing education research by: providing a guideline for the development of research studies, permitting the evaluation of the methodological

quality of nursing education research reports across journals, and providing supporting evidence for greater funding for nursing education research.

Research funding. Nursing education leaders have often called for the funding of nursing education research, explaining the value of funding nursing education research for the science of nursing education. For instance, Broome (2009) suggests funding of nursing education is the way to build a strong science of nursing education. Tanner (2011) argues "to have high quality evaluation of educational innovations, we must have investment of resources - investigator expertise, time, and money - to develop measures that are appropriate for a clinical practice discipline that will reflect variations in educational approaches" (p. 492). Nevertheless, funding is uncommon in nursing education research. During an inventory of 1,286 nursing education research articles published from 1991 to 2000, Yonge et al. (2005) discovered 80% of the studies were not funded. This percentage is similar to what Yucha et al. (2011) reported of 133 nursing education research articles published in July 2006 to December 2007. Interestingly, of those studies that were funded, 15% had received internal funding, 18% external funding, and 0.8% both internal and external funding (Yucha et al., 2011).

A major source of funding of nursing education research is the NLN (Duffy et al., 2011). In the early 1980s the NLN recognized a need to provide funding to support the science of nursing education (Duffy et al., 2011). Since then, the NLN has continued to provide annual funding and grants for nursing education research (Duffy et al., 2011). Duffy et al. (2011) analyzed the NLN's 2008 to 2010 grants program and noted:

- A total of 113 nursing education research proposals were submitted during this time period.

- The majority (103) of the proposals were from doctorally prepared faculty members.
- Four proposals were from MSN prepared faculty, and six were from PhD candidates.
- Out of the 113 proposals that were submitted only 24, or 21.2%, were funded.

In the future, the NLN will fund research projects that address the NLN research priorities. The NLN (2013) has called for:

> Transforming nursing education research to create greater linkages between education and practice, advancing the science of nursing education through the development of rigorous and robust research designs and evaluation protocols, evaluating new curriculum models related to inter-professional education and practice, studying the use and cost-effectiveness of technologies to expand capacity in nursing education, developing leadership programs for research scholars to build educational research capacity, and co-creating a more diverse nursing faculty workforce. (p. 66)

Funding and methodological quality. One funding agency of nursing education research, the NLN, has identified methodological quality as a research funding priority. In its description of research funding priorities, the NLN (2013) has called for "advancing the science of nursing education through the development of rigorous and robust research designs and evaluation protocols" (p. 66). The development of these designs is likely because Duffy et al. (2011) reported a shift to more complex designs in proposals. For

example, the 2008 proposals were mostly from one or two data collection sites, but in 2009 and 2010 many proposals had samples with multiple sites (Duffy et al., 2011).

Relation between mean total MERSQI score and study funding. To date, the relation between total MERSQI score and the funding of the study has been examined in two medical and one nursing education investigations. Reed et al. (2007) found the amount of funding of medical education studies, $20,000 or more in funding, was correlated with an increase in the total MERSQI score of 1.29 points. Furthermore, in Reed et al.'s (2007) study the medical education studies with funding of $20,000 or more had a higher rate of randomized control study design and multi-institutional site sampling than studies with less funding. These findings suggest methodological quality is greater when the study is funded at $20,000 or more.

The positive relationship between funding and the total MERSQI score has not been consistently supported in medical and nursing education studies. For example, in Windish et al.'s (2009) study, the mean MERSQI score for studies with no funding was (9.17), while the mean MERSQI score for studies with funding was (10.21), which was not statistically significant ($p = 0.49$). Yucha et al. (2011) also examined the relationship between funding and the mean total MERSQI score and had similar results to Windish et al. (2009). Although not statistically significant, the mean total MERSQI score of 99 studies with no stated funding was lower (9.7 ± 2.2 *SE*) than that of 18 studies with stated external funding (10.5 ± 2.1 *SE*).

Nursing leaders have called for funding of nursing education research to support the science of nursing education. Funding has been associated with methodological

quality of medical and nursing education research and can provide support for high quality research within nursing education.

Journal impact factor. Journal impact factor is a way to rank the quality, or prestige, of journals and subsequently the supposed quality of the articles within the journals (Hunt, Jackson, Watson, & Cleary, 2013). The greater number of times an article is cited is thought to indicate the higher quality of an article (Polit & Northam, 2011). Journal impact factor "is defined as the number of citations to a journal's articles published in the previous two years divided by the number of citable articles in the journal during those two years" (Hunt et al., 2013, p. 1441). Journal impact factors are calculated and published annually through citation analysis by *Journal Citation Reports* (Polit & Northam, 2011). Because journal impact factor is calculable, measureable, and is commonly used to evaluate and compare journals, the state of the science of nursing education can be evaluated by examining journal impact factors of nursing education journals (Fooladi et al., 2013). However, the reliability of the journal impact factor has been questioned. Critics of journal impact factors state journal impact factors are not reliable in determining quality because there is a possibility of citation errors (Polit & Northam, 2011). Also, editors may publish numerous review articles that are cited frequently or encourage self-citations in an attempt to increase impact factor and thus prestige of their journal (Fooladi et al., 2013; Polit & Northam, 2011). In addition, not all journals are indexed in *Journal Citation Reports* (Hunt et al., 2013).

In 2012, 106 nursing journals were listed in *Journal Citation Reports*, with an impact factor ranging from 0.027 to 2.926 (Thomson Reuters, 2013). Only three of the 106 journals included in *Journal Citation Reports* were nursing education journals:

Journal of Nursing Education, *Nurse Education Today*, and *Nurse Educator* (Thomson Reuters, 2013). *Nursing Education Today* had the highest impact factor (1.218), followed by *The Journal of Nursing Education* (1.133) and *Nurse Educator* (0.562; Thomson Reuters, 2013).

Because journal impact factor is calculated by examining the citation rate of the entire published articles within a journal, Oermann and Shaw-Kokot (2013) argue individual published articles within a journal may have varying degrees of quality. However, the relationship between journal impact factor and the quality of individual published articles has been investigated. Jarwal, Brion, and King (2009) examined the relationship between the journal impact factor of 178 Australian journals of varying disciplines and the peer-determined quality of 2,155 research articles. Jarwal et al. (2009) found impact factor correlated significantly (r = 0.29, p <0.01) with peer-determined rating of quality on a 1 to 5 scale. Recently, Lokker et al. (2012) studied journal impact factor in relation to 1,267 medical clinical research articles published in 103 medical journals. Articles were chosen from the McMaster University Premium LiteratUre Service List, which is a list of articles ascertained by large panels of experts to have category-specific quality characteristics (Lokker et al., 2012). The 103 medical journals had 2007 journal impact factors ranging from 0.7 to 52.6. In the study, the articles on the McMaster University Premium LiteratUre Service List were significantly (r = 0.29, p < 0.001) correlated with journal impact factor.

Relation between mean total MERSQI score and journal impact factor. For both medical and nursing education studies, the relationship between journal impact factor and the MERSQI has been examined. In Reed et al.'s (2007) study, mean total

MERSQI scores were significantly and positively associated with journal impact factor, with a 1.0 increase in total MERSQI score per six-unit increase in impact factor (95% CI [0.34-1.56], $p = 0.003$). In contrast, Kothari et al. (2011) found no correlation between the total MERSQI scores of medical education substance abuse articles and the journal impact factor. Journal impact factors ranged from 0.83 to 9.13 with a mean of 2.83.

In Yucha et al.'s (2011) study of nursing education research articles, the total MERSQI score was significantly and positively correlated with journal impact factor ($r = 0.22$, $p < 0.05$). In Yucha et al.'s (2011) investigation, the journal impact factor published two years after the article publication date was used, and the mean journal impact factor was 0.996. However, 55 of 133 articles were published in journals without an impact factor identified in *Journal Citation Reports.*

Journal impact factor is considered a quality indicator for journals and publication purposes (Reed et al., 2007). Thus, the methodological quality of articles published in journals with impact factors has been examined using the MERSQI and mean total MERSQI score has been correlated with journal impact factor.

The international nature. Nursing research is conducted worldwide. In 2009, Polit and Beck examined 1,072 nursing research articles published in eight nursing journals between 2005 and 2006 to describe the international nature of nursing research, including nursing education research, and identify international differences. Of the eight journals, five journals were from North America: *Journal of Nursing Scholarship*, *Nursing Research*, *Qualitative Health Research*, *Research in Nursing and Health*, and *Western Journal of Nursing Research*. The remaining three were from the United Kingdom: *International Journal of Nursing Studies*, *Journal of Advanced Nursing*, and

Journal of Clinical Nursing. However, all eight journals contained articles authored by a variety of researchers from around the world.

To determine the geographical origin or country differences of these articles, Polit and Beck (2009) classified the country of each article based on the institutional affiliation of the first author. The majority of the first authors were from North America (37.5%) and Europe (36.5%). The remainder were from Asia and the Middle East (19.1%) followed by Australia and New Zealand (6.9%).

Polit and Beck (2009) also identified country differences in study design characteristics. Polit and Beck (2009) identified quantitative studies comprised the majority ($\geq$ 75%) of studies in Korea, Taiwan, Turkey, and other Asian and Middle Eastern countries (Iran, Israel, Japan, Jordan, Malaysia, and Thailand). About three-quarters of the studies in the United States were quantitative or mixed method studies. In contrast in Norway, Sweden, Australia, Ireland, and the United Kingdom less than half of the studies were quantitative or mixed method studies.

Although intervention studies with an experimental or quasi-experimental design comprised only 13.9% of the total articles in the study, country differences were evident in regard to intervention studies in Polit and Beck's (2009) study. Country differences for intervention studies were significant (Chi square = 25.6, p = 0.029). Taiwan (24.1%) and Hong Kong-China (22.8%) had the greatest percentage of intervention studies. Nurse researchers in every country primarily relied on self-reports such as interviews and questionnaires. Self-reports were used in 77.1% of all of the included studies.

Polit and Beck (2009) also found country differences in areas of inquiry. The countries with the largest percentage of nursing education studies were Ireland (18.5%),

followed by the United Kingdom (8.8%). Only 1.8% of studies from the United States focused on nursing education. However, nursing education research only comprised 4.4% of the total research articles.

In Yonge et al.'s (2005) inventory of nursing education research from 1991 to 2000, 58% of the nursing education research was conducted in North America, 31.6% in Europe, 6.7% in Australia, 2.8% in Asia, 0.7% in Africa, and 0.2% in South America. Nursing education research comprised 4.4% of the total research articles.

Relation between mean total MERSQI score and country of origin. In Yucha et al.'s (2011) study 43.6% of nursing education research studies were conducted in North and South America, 24.8% in Europe, 12.8% in Australia and New Zealand, 10.5% in Asia, 7.5% in the Middle East, and 0.8% in Africa. Yucha et al. (2011) discovered studies conducted in the United States had significantly higher total MERSQI scores (10.3 ± 2.5 *SE*) than other countries (9.5 ± 1.9 *SE*).

Nursing education research is conducted worldwide; however, there are limited reports of where and what type of nursing research is taking place (Polit & Beck, 2009). Regarding nursing education research, Yonge et al. (2005) and Yucha et al. (2011) found the majority of nursing education research is conducted in North America and Europe. Analyzing the geographic locations of nursing education research along with other variables, such as areas of inquiry and methodological quality, could give researchers a better understanding of the state of the science of nursing education research.

Areas of inquiry. Nursing education research can cover multiple areas of inquiry. For instance researchers may study students, faculty, or staff nurses in areas regarding teaching, learning, curriculum, or skills acquisition. Recognition of areas of

inquiry will identify researcher priorities and focus, as well as potentially lead to a discovery in gaps in areas of inquiry (Yonge et al., 2005).

Classification approach. In 2005, Yonge et al. categorized 1,286 nursing education research articles published from 1991 to 2000 into 17 topic categories: continuing education, patient education, preceptorship, community health nursing, teaching and learning, faculty, skills acquisition, computers and technology, graduate education, clinical teaching, curriculum, gerontology, HIV/AIDS, mental health, critical thinking, recruitment and retention, and stress and anxiety. Continuing education was the area of inquiry with the greatest number of articles (128) followed by patient education (119) (Yonge et al., 2005). The area of inquiry with the least amount of articles was stress and anxiety (24) (Yonge et al., 2005). One limitation of this classification system is that the categories are overlapping and not mutually exclusive. For instance, an article could potentially fit into both faculty and teaching and learning categories. Therefore, to examine areas of inquiry within nursing education research, a more systematic and objective approach is needed.

Word cloud approach. A more objective approach may be to generate a word cloud and examine the font size of individual words. A word cloud is a visual representation of word frequency within written text. Words that appear more frequently in a block of text, excluding prepositions, are displayed larger in the word cloud (Atenstaedt, 2012). Word clouds have been used to study areas of inquiry within the scientific literature.

McGee and Craig (2011) analyzed the pediatric literature for researcher priorities by retrieving the title of every article published in the Australian journal, *Journal of*

Paediatrics and Child Health, from February 1990 to March 2011 and then entering the titles into an online word cloud generator. The most prominent words that appeared in the word cloud were: children, infants, neonatal, syndrome, and words related to study locations, such as Australia, Australian, and Zealand.

In addition, Atenstaedt (2012) generated a word cloud from the entire content of the 2011 volume of *British Journal of General Practice* to identify and affirm that the content reflected the *British Journal of General Practice's* interests in primary care clinicians, researchers, educators, and patient care. The two most prominent words in the word cloud were care and patients. The words, GP/s, primary, general, practice, and trainer, appeared in the word cloud; however, the word, education, did not. The overall word cloud demonstrated that the *British Journal of General Practice* is publishing material aligned with its stated topics of interest and intentions.

Investigating areas of inquiry lead to understanding the current direction of the state of the science of nursing education. Word clouds could be used as an objective way of examining areas of inquiry within the science of nursing education.

Conclusion

Tanner (2011) states content knowledge is insufficient for safe nursing practice because nurses need to utilize knowledge and clinical reasoning in many different situations. Tanner (2011) further states "self-reports or opinion surveys are relatively easy to develop and provide preliminary evidence for program effectiveness, but they are far from adequate for grounding instructional decisions for the adoption of educational innovations" (p. 491). Since research in nursing education provides the foundation for instructional pedagogies and ultimately nursing and patient outcomes, use of quality

research is important to establish an evidence-based practice in nursing education (Diekelmann, 2005). Determination of the methodological quality of nursing education research provides understanding about what science is supporting educational pedagogies. Furthermore, methodological quality, funding, journal impact factors and publication, international nature, and areas of inquiry of nursing education research all provide insight for nurse educators and leaders about the state of the science of nursing education and nursing education research.

Chapter 3: Methodology

Studying recent nursing education research can provide nurse educators and leaders a greater understanding of the current state of the science of nursing education. The two research questions of this study were as follows:

1. What are the methodological quality and other study characteristics of current nursing education research?
2. Have methodological quality, funding, country, journal impact factor, and areas of inquiry of nursing education changed in the last four to six years?

Study Design

The study was a cross-sectional design, looking at patterns over time periods. The study examined articles published from January 2011 to December 2013 and compared the data collected to data previously collected from articles published from July 2006 to December 2007. Since the study did not have direct contact with human subjects, the University of Nevada, Las Vegas Internal Review Board excluded the study from review.

Sample

The sample consisted of published nursing education research articles. The target sample size was 100 or more articles. This sample size was chosen based on the sample size of 100 to 210 reports examined in previous medical and nursing education studies (Reed et al., 2007, Reed et al., 2008, Yucha et al., 2011, & Schneider et al., 2013). The articles were obtained by performing an advanced search in the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database for nursing education research articles published between January 2011 and December 2013. A preliminary search indicated that this time period was the most current to yield 100 or more articles. The

other limits of this search were English language, peer-reviewed, research article, nurse first author, and nursing education as special interest. The final search yielded 361 total articles. Quantitative studies involving registered nursing student data generated by either recruiting registered nursing students as subjects or using student records were included in the study, totaling 108 articles. Figure C1 (see Appendix C) is a flow diagram depicting how the final sample size was obtained and the exclusion criteria.

To examine areas of inquiry over time, the researcher obtained the titles of the 133 articles used in the Yucha et al. (2011) study. Yucha et al. (2011) did not examine areas of inquiry in their study.

Study Procedure

On December 10, 2013, the researcher performed an advanced search in the CINAHL database with search criteria. A follow up search was performed in CINAHL on February 26, 2014 to ensure all articles published in December 2013 were examined. The resulting 361 articles were examined for inclusion and exclusion criteria by two researchers. One hundred eight articles met the inclusion criteria and were analyzed by two independent raters. The raters collected data using the MERSQI (see Appendix A) and the data collection form, which is a modified version of a form developed by Yucha et al. (2011) (see Appendix B). At the start of data collection, five random articles of the 108 articles were rated by the two raters to establish rater comfort and consistency. Upon completion of these five articles, the two raters collected data from the rest of the articles independently. After collecting all data, the raters compared their findings. Discrepancies were discussed and reconciled between the two raters. When discrepancies regarding an article were not easily reconciled a third rater reviewed the

article and a decision was made. The data were entered into a Microsoft Excel spreadsheet. From the data the statistical analysis was performed.

Using the titles of the included articles, two raters independently generated word clouds for this study as well as Yucha et al.'s (2011). The word clouds were examined for the words appearing largest in height or the most common words. The most common words depicted in the word cloud were used to search Microsoft Word documents consisting of the article titles of this study and Yucha et al.'s study for common words.

Variables

For the articles published from 2011 through 2013, the study variables were: methodological quality, funding, journal impact factor, country, areas of inquiry, journal type, ethics, novelty of approach, novelty of findings, and relevance of findings. For the articles used in the Yucha et al. (2011) study, areas of inquiry was the study variable.

Data Collection Methods and Procedures

Methodological quality. Methodological quality was measured by using the MERSQI. Total MERSQI scores can range from 5 to 18. Four items on the MERSQI have an option of not applicable. When articles had items that rated not applicable on the MERSQI a standardized formula was used to adjust the MERSQI score.

Reliability and validity of the MERSQI was originally established by Reed et al. (2007). In the Yucha et al. (2011) study, Cronbach's alpha was 0.6, representing internal consistency. A table of the reliability and validity MERSQI results from 10 studies is included in Appendix A.

Funding. Study funding was determined based on the author acknowledgment within the article. Funding was categorized as internal, external, or both. Two raters recorded this information on the data collection form (see Appendix B).

Country. Two independent raters determined the country where the study occurred and recorded the information on the data collection form (see Appendix B). If a study was conducted in more than one country, the country of the institutional affiliation of the first author was chosen.

Journal impact factor. A list of journal titles was created from the 108 articles. These articles were published in 1 of 25 different journals. The 2012 impact factors of the journals were then collected from *Journal Citation Reports*. The 2012 impact factor was used because annual impact factors are published in *Journal Citation Reports* in July of the following year (Thomson Reuter, 2013). Thus, the 2012 impact factor was the most current reported impact factor. Not all journals have a journal impact factor within this database.

Areas of inquiry. Nursing education areas of inquiry were identified through the use of word clouds. A Hyper Text Markup Language (HTML) text document of the 108 article titles (2011 to 2013 articles) was entered into Tagxedo software to create a word cloud. Tagxedo attempts to make the word cloud aesthetically looking. Five word clouds were created to identify the most frequently occurring words. These words were then listed in a Microsoft Word document. After removing the common words, with; of; the; a; on; for; to; an; by; and; in; as; so; is; their; they; are; and at from the article titles, 920 words were left to search from. Using the Microsoft Word find function, the number of matches for each word was determined. For similar words a stem was created, such as

evaluat and nurs, and the number of matches determined. The number of matches of a word or word stem was divided by the total number of words (920) to obtain a percentage. The words or word stems with the highest percentage were identified as the most common areas of inquiry. For data representation purposes, instead of word stems, the most recurring variation of the words was chosen as the exemplar for each area of inquiry.

To compare areas of inquiry between this study and the Yucha et al. (2011) study, the titles of the 133 articles from the Yucha et al. (2011) study underwent the same process as those of the current study to identify the common areas of inquiry. The Yucha et al. (2011) article titles had 1,084 words to search. The common areas of inquiry were compared between the two studies.

Journal type. Journal type was defined as education or non-education. If a journal title of the 108 articles contained the word education, it was classified as an education journal by the two raters independently. All other journals were classified as non-education.

Ethics. Each article was searched for a statement that indicated human subject approval was obtained or waived, such as review by an institutional review board or ethics committee. Both raters independently scored this variable as yes/no on the data collection form (see Appendix B).

Novelty of approach. Each article was searched for statements describing the novelty of the study's approach. Two raters independently scored this variable as yes/no on the data collection form (see Appendix B).

Novelty of findings. Each article was searched for statements describing the novelty of the study's finding. Using the search function, PDfs of the articles were searched for key words commonly included in statements describing novelty of study findings. On the data collection form (see Appendix B) novelty of findings consisted of two categories:

1. Author states how the research refutes or extends previous findings.
2. Author states that the study provides new findings.

The words, add; conflict; differ; refute; and contribute, were searched to find author statements indicating the research refuted or extended previous findings. The words, novel; new; first; and only, were searched to find author statements indicating the study provided new findings. Two raters independently scored this variable as yes/no on the data collection form for the two categories (see Appendix B).

Relevance of findings. Each article was searched for statements describing the relevance of the study's findings to nursing education and patient outcomes. Two raters independently scored this variable as yes/no on the data collection form (see Appendix B).

Statistical Analysis

Research question 1. What are the methodological quality and other study characteristics of current nursing education research? The statistical analysis was conducted with alpha set at 0.05. Cronbach's alpha was used to determine the reliability of the MERSQI. Comparisons between mean total MERSQI scores for studies with and without funding, education and non-education journals, U.S. and non-U.S. studies, and articles published in journals with and without impact factors were analyzed using t-tests.

Pearson's correlation was used to analyze the relationship between mean total MERSQI scores and journal impact factors. Descriptive statistics were used to further describe the data collected for methodological quality, funding, journal impact factor and country of origin and to describe other variables such as areas of inquiry.

Research question 2. Have the methodological quality, funding, journal impact factor of nursing education, and areas of inquiry changed in the last four to six years? The statistical analysis was conducted with alpha set at 0.05. A t-test was used to compare mean total MERSQI score between this study and Yucha et al.'s (2011) study. Chi-Square was performed to examine the relationship between study design and study period (2006-2007 and 2011-2013). Descriptive statistics were used to analyze and describe areas of inquiry.

Chapter 4: Results

Research question 1. What are the methodological quality and other study characteristics of current nursing education research?

Methodological quality. Reliability of the MERSQI in this study was determined to be 0.6 by Cronbach's alpha, indicating moderate internal consistency. Total MERSQI scores ranged from 5.0 to 15.5, with a mean total MERSQI score of . Appendix D has a table listing the number (*n*) and percentage (%) of articles scored for each MERSQI item. The majority of the studies were cross-sectional in design or posttest only (58.3%), involved only one institution (79.6%), and had response rates of greater than 50% (50.9%). More than one-half of the studies involved participant self-report data (60.2%), and reflected satisfaction and attitudes (60.2%). For the instruments used in the studies, internal structure was reported in about one-half of the studies (53.8%). Content validity and relationships to other variables of the instruments were largely not reported (70.5% and 74.8%, respectfully). However, the majority of the studies were appropriate for study design and type of data (95.4%) and used statistical analyses beyond descriptive statistics (72.2%).

Funding. Of the 108 articles 77.8% did not mention funding. Of those studies in which funding was acknowledged, 8.3% acknowledged internal funding, 12.0% acknowledged external funding, and 1.9% acknowledged both internal and external funding. There was no difference in the mean total MERSQI score of studies that acknowledged (10.04 ± 0.6 *SE*) and did not acknowledge funding (9.80 ± 0.3 *SE*) (p = 0.67).

Journal impact factor. In this study, 9 of the 25 journals (36%) had a 2012 impact factor, ranging from 0.34 to 1.45 (mean = 0.8 ± 0.3 *SE*). Out of the 108 articles, 82 articles (75.9%) were published in these nine journals. There was a moderate positive linear association between journal impact factor and total MERSQI score ($n = 82$, $r = 0.22$, $p = 0.0454$). However, the mean total MERSQI score of the 82 articles published in journals with impact factors (9.94 ± 0.3 *SE*) was not significantly higher than that of the 26 articles published in journals without an impact factor (9.56 ± 0.5 *SE*; $t = -0.68$, $df = 106$, $p = 0.50$).

Country. The majority (78.7%) of the articles were from the United States. When separated by continent, 84.2% of the articles were from North America (United States, 85; Canada, 6); 6.5% from Asia (Taiwan, 3; South Korea, 1; India, 1; Turkey, 1; Israel, 1); 4.6% from Australia and New Zealand (Australia, 4; New Zealand, 1); 2.8% from Europe (Ireland, 2; Scotland, 1); and 1.9% from South America (Brazil, 2). There was no difference in the mean total MERSQI score of the U.S. studies (10.0 ± 2.6 *SE)* and studies from other countries (9.3 ± 0.4 *SE*) ($p = 0.23$).

Areas of Inquiry. The most prominent words identified in the word clouds (>1%) for the current study were nursing (8.59%); students (8.37%); learning (2.93%); clinical (1.96%); education, using, and effects (1.63%); evaluation and simulation (1.3%); and undergraduate, knowledge, and experience (1.09%).

Journal Type. Fifty-four of the articles (50%) were published in education journals. The mean total MERSQI score from articles published in education and non-education journals was compared. The mean total MERSQI score of the 54 articles published in education journals (9.91 ± 0.4 *SE*) was not significantly higher than that of

the 54 articles published in non-education journals (9.80 ± 0.3 *SE*; t =-0.23, df = 106, p = 0.36).

Ethics. The majority of the studies (86.1%) stated human subject approval was obtained or waived, demonstrating ethical research.

Novelty of approach. In 28.7% of the articles, the author stated a new population was tested. Less than 5.0% of authors stated a different problem was addressed using established procedures. However, 38.0% of the authors stated additional concepts were introduced, such as instrument or procedure development or refinement.

Novelty of findings. Few authors (17.6%) stated the research refuted or extended previous findings, or stated the study provided new findings (14.8%).

Relevance of findings. Almost one-half (44.4%) of the authors stated the study findings expanded existing knowledge. The majority (92.6%) of the authors stated the study findings had the potential to improve education procedures, and nearly one-half (41.7%) of the authors stated the study findings had the potential to change non-educational policy or patient outcomes.

Research question 2. Have methodological quality, funding, country, journal impact factor of nursing education, and areas of inquiry changed in the last four to six years?

Only differences in methodological quality, country, and areas of inquiry were observed between this study and the Yucha et al. (2011) study. Twelve percent of the articles in this study used a randomized control trial design in comparison with 3.8% in the Yucha et al. (2011) study. When the relationship of study design and study was statistically analyzed, there was a dependence between the study design and study period

(Chi-square = 11.4, *df* = 3, *p* = 0.0097). However, there was no significant difference in the mean total MERSQI score between the two studies (*t* = 0.23, *df* = 239, *p* = 0.82).

Although the majority (78.7%) of the articles were from the United States in this study, less than one-half (37.6%) of the articles in the Yucha et al. (2011) study were from the United States. In both studies the highest percentage of articles were from North America; however, 84.3% of articles were from North America in this study compared to 43.4% of articles in the Yucha et al. (2011) study. When separated by continent/region, the Yucha et al. (2011) study had higher percentages of articles from Asia and the Middle East, Australia and New Zealand, and Europe.

Appendix E has a table with the number and percentages of times words appeared in the Microsoft Word document for both this study and the Yucha et al. (2011) study. Words with >1% frequency were compared between the current study and the Yucha et al. (2011) study. Out of the words with >1% frequency, ten were identified as the same for both studies: nursing, students, learning, clinical, using, education, evaluation, undergraduate, knowledge, and experience. After examining both the absolute differences and the percentage differences of word frequency in both this study and the Yucha et al.(2011) study, the words with the greatest differences were: simulation, effects, care, anesthetists, study, test, quality, community, health, and mental. Simulation, effects, care, anesthetists, study, test, quality, and community appeared more frequently in this study, while health and mental appeared more frequently in the Yucha et al. (2011) study.

Chapter 5: Discussion

The major findings of this study were that current nursing educational research consisted of more randomized control studies, a higher percentage of U.S. studies, and more simulation studies in comparison with nursing education research published in 2006-2007. In addition, this study is novel in approach by creating word clouds of article titles to identify common areas of inquiry.

In the current study, a dependence between study period and study design was found. That is, studies with a randomized control trial design were more likely to be in the current study than in the Yucha et al. (2011) study. This finding indicates that current nurse researchers are utilizing a randomized control trial design more frequently. Because randomization enhances quality by reducing chance association between the intervention and outcome in a study, a higher number of studies with a randomized control trial design suggests a move toward greater methodological quality in nursing education research (Cook, Levinson, & Garside, 2011).

Another difference between this study and Yucha et al. (2011) is the mean total MERSQI score between U.S and non-U.S. studies. In the current investigation, no statistical difference in the mean total MERSQI score was detected between these studies. In contrast, Yucha et al. (2011) reported a higher mean total MERSQI score in U.S. studies than in non-U.S studies. One possible explanation for this difference between the two studies is the low percentage of non-U.S., specifically European, studies in the current investigation. In the current investigation, only 2.8% of the studies were from Europe; however, in Yucha et al.'s (2011) study 24.8% of the studies were from Europe. Furthermore, in Yonge et al.'s (2005) study 31.6% of the studies were from Europe. The

current low percentage of European studies might reflect a focus on areas of inquiry away from nursing students or nursing education.

Investigation of areas of inquiry by examining article titles using word clouds was an innovative approach in the current study. This approach yielded common areas of inquiry between this study and Yucha et al.'s (2011) study (e.g., nursing, students, learning, clinical, and education) and unique areas of inquiry. In the Yucha et al. study, words, such as health and mental health, were common. In contrast, these words were not common in the current article titles, and other words were, such as simulation and nurse anesthetists. Simulation is a more common area of inquiry in today's nursing education research as simulation has become a popular pedagogy. Since nursing educators are increasingly implementing simulation it is valuable to the state of the science of nursing education to have research to support and guide the use of simulation.

The correlation between journal impact factor and total MERSQI score for both the current study and the Yucha et al, study yielded the same Pearson's *r* of 0.22, demonstrating a moderate positive linear association between journal impact factor and total MERSQI score. Yucha et al. (2011) found articles published in journals with impact factors had significantly higher total MERSQI scores than articles published in journals without impact factors. In contrast to Yucha et al. (2011), this study did not find a significant difference in methodological quality between articles published in journals with and without journal impact factors. The Yucha et al. (2011) study had a greater variety of total journals included in the study (64), as well as a higher percentage (41.5%) of journals with impact factors. This may account for the reason for the differences in the

methodological quality between journals with and without impact factors and the current study versus Yucha et al.'s (2011) study.

The studies that were funded did not exhibit higher methodological quality than those that were not funded, which is concurrent with Yucha et al.'s (2011) findings. However, these findings are inconsistent with Reed et al. (2007). When studying methodological quality and funding per dollar amount, Reed et al. (2007) found studies that received funding of $20,000 or more were of greater methodological quality. Thus, dollar amount of funding may be a larger indicator of methodological quality than simply any funding. A small percentage of the studies were funded in this study, suggesting a need for increased funding to promote further nursing education research.

Lastly, the current study also examined author acknowledgement of the novelty of study findings. The vast majority of the authors stated their research had the potential to improve educational practice and almost half of the authors stated the study findings had the potential to change non-educational policy of patient outcomes. Author recognition of research potential to improve educational practice demonstrates overall expansion of the state of the science in nursing education through nursing research.

Limitations

There are five major limitations of the study. Because the MERSQI is only suited for quantitative studies (Reed et al., 2007), this investigation did not examine the methodological quality of qualitative studies. Therefore, this investigation is limited in scope regarding the breadth of nursing education research.

Another limitation is the search time frame for the sample. The search was closed February 26, 2014; therefore, articles indexed in the CINAHL database after February 26, 2014 were not examined for inclusion and exclusion criteria.

Another limitation is the analysis of funding. Funding information in this study was collected as internal, external, or both because the specific amount of funding is not typically stated in an article. Associations between variables, such as methodological quality, are more easily detected when specific dollar amounts are compared. For instance, Reed et al. (2007) studied specific dollar amounts of funding in relation to MERSQI scores.

Another limitation is the approach of determining areas of inquiry. This approach consisted of examining the article titles using word cloud software and relying upon the words of the article titles to indicate each study's focus. Therefore, certain areas of inquiry might have been excluded because of authors' word choice or title restrictions by the journal.

Lastly, the search limiter of nurse as first author may be an additional limitation. One feature of CINAHL is the identification of first author as nurse. However, the availability of this information depends on the way in which first author's credentials are entered (S. Skarl & M. Rachal, personal communication, May 15, 2014). The possibility exists this information may not be entered consistently across journals or due to publication requirements authors did not list all of their credentials. Therefore, certain articles with nurse as first author may be missing from this analysis.

Outcomes

Identification of changes in areas of inquiry is significant to understanding the current direction of nursing education research. Examination of new areas of inquiry influences effective implementation of emergent educational pedagogies, such as simulation.

More research with randomized control trial design suggests increasing rigor in nursing education research. This move toward increased methodological rigor in nursing education research should urge current and future nursing education researchers to engage in high methodological quality research. The increased methodological rigor is significant to the state of the science of nursing education, as research supports nursing education pedagogies and ultimately preparation of nurses and patient outcomes.

Appendix A

Methodological Education Research Study Quality Instrument

Domain	MERSQI Item	Item Score	Score
Study Design	Study Design		
	Single group cross-sectional or single group posttest only	1	
	Single group pretest and posttest	1.5	
	Nonrandomized, 2 or more groups	2	
	Randomized controlled trial	3	
Sampling	No of institutions studied		
	1	0.5	
	2	1	
	>2	1.5	
	Response rate %		
	Not applicable		
	<50% or not reported	0.5	
	50-74%	1	
	≥75%	1.5	
Type of data	Type of data		
	Assessment by study participant (knowledge self-report)	1	
	Objective measurement (knowledge test)	3	
Validity of evaluation	Internal structure		
instrument	Not applicable		
	Not reported	0	

	Reported	1	
	Content validity		
	Not applicable		
	Not reported	0	
	Reported	1	
	Relationships to other variables		
	Not applicable		
	Not reported	0	
	Reported	1	
Data Analysis	Appropriateness of analysis		
	Inappropriate for study design or type of data	0	
	Appropriate for study design & type of data	1	
	Complexity of analysis		
	Descriptive analysis only	1	
	Beyond descriptive analysis	2	
Outcomes	Outcomes		
	Satisfaction, attitudes, perceptions, opinions, general facts	1	
	Knowledge, skills	1.5	
	Behaviors	2	
	Patient/health care outcomes	3	
Total Score		18	

Figure A1. Copy of the MERSQI. The six domains are listed in the left column. The next column lists the 10 items corresponding with each domain. The third column contains the possible scores for each item. The last column is for the researcher to write the score of the article being assessed.

Table A1

Reliability and Validity of MERSQI

Article (Author/ Year)	Reliability	Validity
Reed et al. (2007)	Principal components analysis Cronbach's α 0.6 Interrater reliability 0.78 - 0.98 Intrarater reliability 0.78 - 0.99	Criterion validity -0.73 correlation with experts MERSQI score significantly increased with number of citations and journal impact factor
Reed et al. (2008)	Interrater reliability 0.76 - 0.98	Predictive validity established - articles with higher MERSQI scores are more likely to be accepted for publication
Reed et al. (2009)	None Reported	None Reported
Windish et al. (2009)	Interrater reliability 0.89	None Reported
Cook, Levinson, & Garside (2011)	Interrater reliability for appropriateness of data analysis 0.53 Interrater reliability for other subscales 0.76	None Reported
Kothari et al. (2011)	Interrater reliability 0.82 Correlation to citation rate 0.49 No significant correlation to journal impact factor	None Reported
Quartey et al. (2011)	None Reported	None Reported
Yucha et al (2011)	Cronbach's α 0.6 Interrater reliability 0.72 - 0.98 Intrarater reliability 0.78 - 0.998	None Reported
Mookherjee et al. (2013)	Interrater agreement kappa 1.0 for all domains except sampling kappa 0.44 and content validity kappa 0	None Reported
Schneider et al. (2013)	Cronbach's α for clinical articles 0.24	None Reported

Appendix B

Demographic Data Form

Report Associated Factor Information Sheet (Demographics form)

Collection Date: _____ Recorder: _____
First Author: _____
Year Published: _____ Author Credentials: _____
First Author is RN: Yes No

Journal Title: _____

Study Location: (circle) U.S. Other? _____

Total Subject Number: _____

Level of Students (circle all that apply):
Associate Degree Diploma
Baccalaureate Undergraduate
Graduate Master's
Doctoral Other? _____

Students from another field: No Yes: Field 1 _____ Field 2 _____

Study funding (circle): Yes, internal Yes, external Not Stated

Place a check in the appropriate column.

Ethics	Yes	No
Author states Human Subject Approval was obtained or waived.		
Novelty of Approach		
Author states that a new population is tested.		
Author states that a different problem is addressed using established procedures.		
Author states that additional concepts are introduced (includes instrument or procedure development or refinement).		
Novelty of Findings		
Author states how the research refutes or extends previous findings.		
Author states that the study provides new findings.		
Relevance		

Author states that the findings expand existing knowledge.		
Author states that the findings have the potential to improve educational procedures (includes providing examples or implications for policies/procedures).		
Author states that the findings have the potential to change non-educational policy or patient outcomes.		

Note: Study funding is determined based on the author's acknowledgment. When studies have subjects or data originating from multiple countries such as with internet studies, the first author's country of origin will be used.

Figure B1. Demographic data form.

Appendix C

Sample

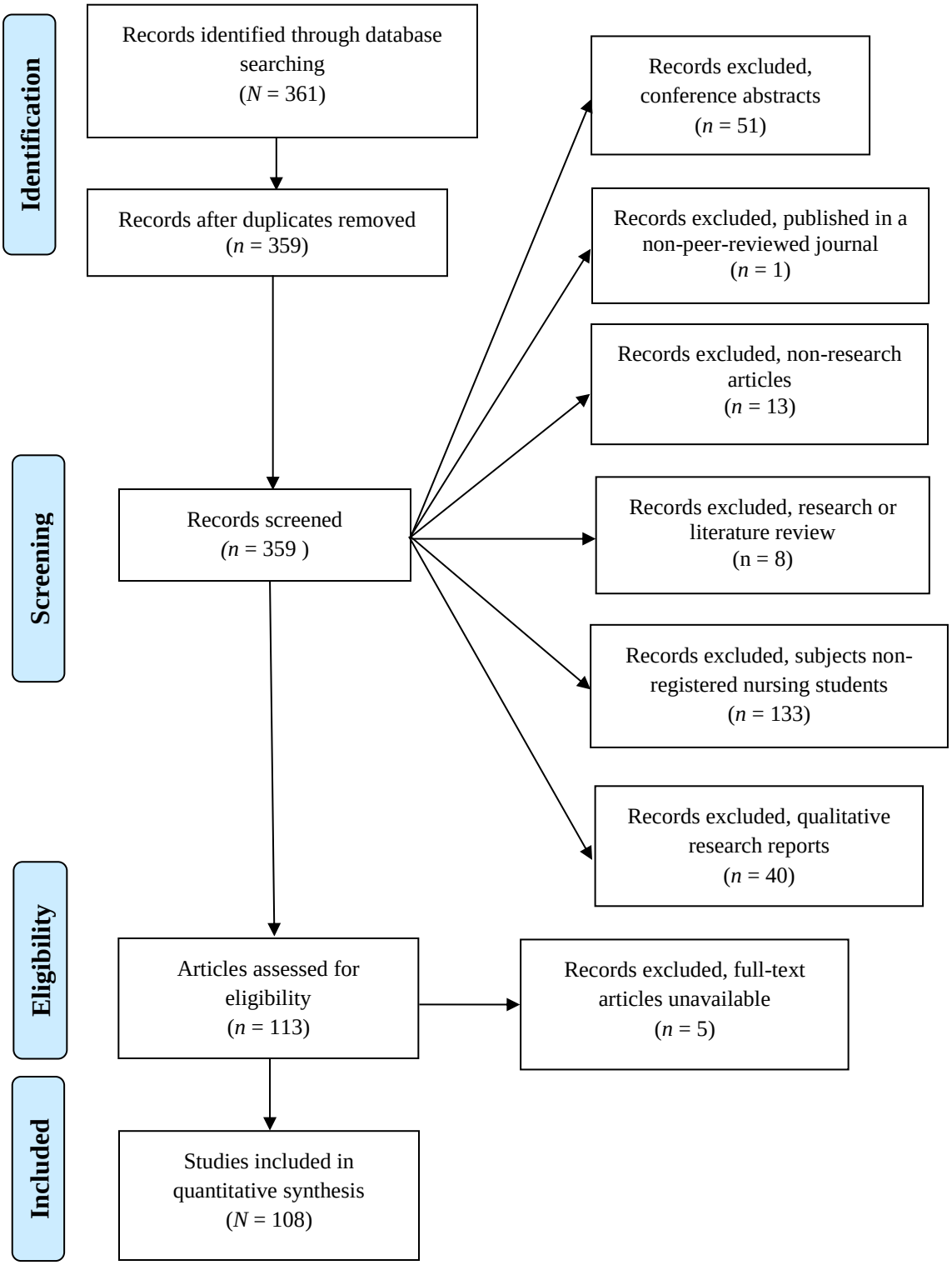

Figure C1. Flow diagram of sample adapted from Moher, Liberati, Tetzlaff and Altman (2009).

Appendix D

Descriptive Results of the MERSQI

Table D1

DOMAIN	MERSQI Item	*n*	%
STUDY DESIGN	Single-group cross sectional or single group posttest only	63	58.3
	Single group pretest and posttest	22	20.4
	Nonrandomized, two or more groups	10	9.3
	Randomized controlled trial	13	12.0
SAMPLING	No. of Institutions Studied		
	1	86	79.6
	2	6	5.6
	>2	16	14.8
RESPONSE RATE %	N/A	5	
	<50% or not reported	48	46.6
	50-74%	21	20.4
	≥ 75%	34	33.0
TYPE OF DATA	Assessment by study participant	65	60.2
	Objective measure	43	39.8
VALIDITY OF EVALUATION	INTERNAL STRUCTURE		
	Not Applicable	2	
	Not Reported	49	46.2
	Reported	57	53.8
	CONTENT VALIIDITY		
	Not Applicable	3	
	Not Reported	74	70.5
	Reported	31	29.5
	RELATIONSHIPS TO OTHER VARIABLES		
	Not Applicable	6	
	Not Reported	80	78.4
	Reported	22	21.5
DATA ANALYSIS	APPROPRIATENESS OF ANALYSIS		
	Inappropriate for study design or type of data	5	4.6
	Appropriate for study design and type of data	103	95.4
	COMPLEXITY OF ANALYSIS		
	Descriptive analysis only	30	27.8
	Beyond descriptive analysis	78	72.2
OUTCOMES	Satisfaction, attitudes, perceptions, opinions, general facts	65	60.2
	Knowledge, skills	34	31.5
	Behaviors	9	8.3
	Patient/ Health care outcomes	0	0

Appendix E

Comparisons of Areas of inquiry

Table E1

Comparisons of Areas of Inquiry

Areas of Inquiry	This Study		Yucha et al. (2011) Study	
	n	%	*n*	%
nursing	79	8.59	110	10.15
students	77	8.37	97	8.95
learning	25	2.72	16	1.48
clinical	18	1.96	17	1.57
education	15	1.63	15	1.38
effects	15	1.63	7	0.65
using	15	1.63	17	1.57
evaluation	12	1.30	13	1.20
simulation	12	1.30	3	0.28
undergraduate	10	1.09	12	1.11
knowledge	10	1.09	12	1.11
experience	10	1.09	11	1.01
perceptions	9	0.98	11	1.01
teaching	9	0.98	8	0.74
care	8	0.87	4	0.37
baccalaureate	8	0.87	7	0.65
assessment	8	0.87	6	0.55
practice	8	0.87	11	1.01
program	8	0.87	11	1.01
patient	8	0.87	8	0.74
development	7	0.76	6	0.55
attitudes	7	0.76	12	1.11
course	7	0.76	5	0.46
anesthetists	7	0.76	0	0
impact	7	0.76	4	0.37
outcomes	6	0.65	3	0.28
registered	6	0.65	4	0.37
study	6	0.65	2	0.18
self	6	0.65	6	0.55
test	6	0.65	1	0.09
performance	5	0.54	3	0.28
academic	5	0.54	3	0.28
skills	5	0.54	10	0.92
quality	5	0.54	1	0.09

based	5	0.54	8	0.74
predictors	5	0.54	2	0.18
exploring	5	0.54	2	0.18
community	4	0.43	1	0.09
implementation	4	0.43	0	0
competence	4	0.43	4	0.37
perceived	4	0.43	2	0.18
spiritual	4	0.43	2	0.18
curriculum	4	0.43	5	0.46
technology	4	0.43	2	0.18
enhancing	4	0.43	3	0.28
dedicated	4	0.43	1	0.09
graduate	4	0.43	2	0.18
senior	4	0.43	2	0.18
service	4	0.43	0	0.00
health	4	0.43	13	1.20
life	4	0.43	0	0.00
culture	4	0.43	4	0.37
unit	4	0.43	2	0.18
collaboration	3	0.33	1	0.09
environment	3	0.33	4	0.37
measuring	3	0.33	8	0.74
classroom	3	0.33	0	0.00
critical	3	0.33	3	0.28
virtual	3	0.33	1	0.09
related	3	0.33	1	0.09
success	3	0.33	3	0.28
leadership	3	0.33	1	0.09
efficacy	3	0.33	3	0.28
immersion	3	0.33	0	0.00
engagement	3	0.33	0	0.00
lecture	3	0.33	0	0.00
online	3	0.33	1	0.09
pilot	3	0.33	0	0.00
writing	3	0.33	0	0.00
safety	3	0.33	1	0.09
older	3	0.33	1	0.09
year	3	0.33	6	0.55
level	3	0.33	2	0.18
literacy	3	0.33	1	0.09
level	3	0.33	2	0.18
learners	2	0.22	2	0.18
interprofessional	2	0.22	1	0.09

assignments	2	0.22	0	0.00
intelligence	2	0.22	2	0.18
intervention	2	0.22	2	0.18
innovative	2	0.22	2	0.18
practitioner	2	0.22	1	0.09
psychometric	2	0.22	1	0.09
satisfaction	2	0.22	0	0.00
faculty	2	0.22	2	0.18
design	2	0.22	1	0.09
distance	2	0.22	0	0.00
emotional	2	0.22	1	0.09
characteristics	2	0.22	1	0.09
seminar	2	0.22	0	0.00
participation	2	0.22	1	0.09
behavior	2	0.22	1	0.09
intent	2	0.22	1	0.09
professional	2	0.22	2	0.18
value	2	0.22	2	0.18
centered	2	0.22	0	0.00
orientation	2	0.22	3	0.28
awareness	2	0.22	0	0.00
mentoring	2	0.22	1	0.09
pediatric	2	0.22	1	0.09
factor	2	0.22	0	0.00
beliefs	2	0.22	1	0.09
fidelity	2	0.22	0	0.00
increase	2	0.22	0	0.00
thinking	2	0.22	3	0.28
adult	2	0.22	1	0.09
model	2	0.22	1	0.09
gaming	2	0.22	0	0.00
guide	2	0.22	0	0.00
making	2	0.22	2	0.18
pre	2	0.22	5	0.46
anxiety	2	0.22	3	0.28
web	2	0.22	4	0.37
pain	2	0.22	3	0.28
intervention	2	0.22	2	0.18
differences	1	0.11	3	0.28
personal	1	0.11	4	0.37
assistant	1	0.11	4	0.37
preferences	1	0.11	4	0.37
styles	1	0.11	4	0.37

risk	1	0.11	5	0.46
scale	1	0.11	3	0.28
approach	1	0.11	3	0.28
promoting	1	0.11	2	0.18
structural	1	0.11	2	0.18
examinations	1	0.11	3	0.28
instruction	1	0.11	2	0.18
PDA	1	0.11	4	0.37
advanced	1	0.11	2	0.18
settings	1	0.11	2	0.18
medical	0	0.00	4	0.37
mental	0	0.00	5	0.46
mathematic	0	0.00	3	0.28
calculation	0	0.00	3	0.28
associated	0	0.00	3	0.28
substance	0	0.00	3	0.28
relationship	0	0.00	2	0.18
determinants	0	0.00	2	0.18
phenomenon	0	0.00	2	0.18
support	0	0.00	3	0.28
evidence	0	0.00	3	0.28
handling	0	0.00	3	0.28
strategy	0	0.00	3	0.28
AIDS	0	0.00	2	0.18
live	0	0.00	2	0.18
management	0	0.00	2	0.18
preventive	0	0.00	2	0.18
RN-BSN	0	0.00	3	0.28
industry	0	0.00	2	0.18
injuries	0	0.00	2	0.18
survey	0	0.00	2	0.18
college	0	0.00	2	0.18
library	0	0.00	2	0.18
portfolio	0	0.00	2	0.18
training	0	0.00	2	0.18
digital	0	0.00	2	0.18
problem	0	0.00	2	0.18

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Curriculum Vita

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EDUCATION

University of Nevada, Reno
Orvis School of Nursing
Bachelors of Science of Nursing
May 17, 2008

CERTIFICATIONS

Progressive Care Certified Nurse (PCCN)
Advanced Cardiac Life Support (ACLS) certified
Pediatric Advanced Life Support (PALS) certified
Instructor Certified for Certified Nursing Assistant

EXPERIENCE

Great Basin College, Elko, Nevada

May 2013 – present

Practice Lab Manager – Responsible for managing learning resources and coordinating clinical learning in the nursing practice lab. Coordinate nursing Practice Lab usage, including ordering, monitoring, and maintaining equipment and supplies. Program and maintain patient simulators and assist faculty with facilitation of simulation. Assist associate degree nursing students with learning and practicing skills in the nursing lab, evidence-based practice.

Northeastern Nevada Regional Hospital, Elko, Nevada
Medical Surgical Pediatric Unit

April 2010 – present

Staff Nurse – In charge of providing patient care for 6 patients during a 12-hour shift, incorporating the nursing process to provide care, delegating tasks to CNAs, coordinating patient care amongst different disciplines including: physicians,

therapy, case coordination, imaging, and lab. Care of patients with medical surgical alterations as well as caring for the pediatric patients.

May 2011 – May 2013
Preceptor - Precept nursing students as they were completing their nursing program and new-graduate nurses on the Medical Surgical Pediatric Unit.

Renown Regional Medical Center, Reno, Nevada
Stepdown/Special Care and Telemetry Unit

May 2008 – April 2010
Staff Nurse – In charge of providing patient care for 5 patients during a 12-hour shift, incorporating the nursing process to provide care, delegating tasks to CNAs, coordinating patient care amongst different disciplines. Care of patients with cardiac alterations as well as patients with medical surgical alterations.

January 2009 – April 2010
Member of Skin Team - Participate in quarterly hospital wide breakdown/ pressure sore studies as well as implement and promote skin breakdown prevention through nursing and patient education.

May 2009 – April 2010
Preceptor – Precept newly graduated nurses.

CONTINUING EDUCATION

2012-2014

University of Nevada, Las Vegas – Master of Science in Nursing Nurse Educator Program

2014

Elsevier Faculty Development Conference
National League for Nursing and Boise State Simulation Conference
International Nursing Association for Clinical Simulation and Learning

2013

International Nursing Association for Clinical Simulation and Learning