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Factors which influence the use of active learning strategies by nursing faculty

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FACTORS WHICH INFLUENCE THE USE OF

ACTIVE LEARNING STRATEGIES BY NURSING FACULTY

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ABSTRACT

Nursing education is facing a crisis. Anachronistic teaching methods are no longer keeping up with the needs of new graduates entering practice. Despite a body of knowledge which supports the use of active learning in higher education, nursing faculty continue to rely on lecture as their primary pedagogical approach. Previous study of the use of research products in clinical nursing practice identified systematic factors such as characteristics of the communication of research findings and characteristics of the organization form the greatest barrier to use. This study discovers if these same barriers face nursing educators.

Using Roger's Theory of Diffusion of Innovation as a framework, a large national survey of accredited pre-licensure nursing programs was conducted. Results demonstrate that three-quarters of nursing faculty utilize lecture for at least half of an average teaching session. Findings also indicate that nursing faculty experience similar barriers to the use of research as do nurses in clinical practice with lack of time and a diffuse and difficult to access knowledge base forming the greatest barriers. Of the components analyzed, approach to teaching is the most predictive of use of active learning. Suggestions for future research are discussed.

Keywords: nursing education, active learning, Roger's Theory of the Diffusion of Innovation, BARRIERS.

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CHAPTER 1 - INTRODUCTION

Background and Significance

Nursing education is facing a crisis – new graduates are expected to enter the highly technical, ethically complex, and intellectually demanding healthcare system of the 21st century, yet are educated using methods that are anachronistic, almost antithetic, to this reality. Exponential growth in both technology and scientific knowledge is straining nursing education.

Traditional conceptions of healthcare education assumed that a practitioner would be able to use the information they acquired during their formal education as a basis for their day to day practice throughout their career. This assumption is "no longer valid, with human memory becoming increasingly unreliable in keeping pace with the ever-expanding knowledge base on effective care" (Institute of Medicine [IOM], 2003, p. 33). In 2003, the IOM estimated that over 10,000 clinical trials are conducted each year. This is an impossible amount for any individual to read, process, and absorb on a continual basis. Nursing education has hit a saturation point for content where it is no longer possible to add additional factual content yet faculty still feel pressure to "cover the content" (Ironside, 2005). Nobel Laureate, Herbert Simon (in Bransford, Brown & Cocking, 2000), observed early in the internet age that easy access to volumes of information through the use of computing devices has shifted the meaning of "knowing" from being able to recall specific information from memory to the ability to quickly assimilate and evaluate information from multiple sources.

The American Association of Colleges of Nursing (AACN) collaborated with the American Association of Medical Colleges on a Macy Foundation Report (2010) which

asserts that entry-level health professions education must undergo a shift from a focus on outdated conceptions of education where knowledge acquisition and application are paramount, to one where an individual's adoption of knowledge management, information retrieval, and related skills are valued. The old adage, "teach as you were taught" is no longer applicable to health professions education. Although traditional conceptions of education may meet the perceived needs of both faculty and students, they do little to reflect the true learning needs for graduates to be able to function in the highly complex and adaptive system that characterizes healthcare in the 21st century (Macy Report, 2010).

Nursing in the 21st century is no longer the simplistic yet nostalgic image of a white uniformed, nurturing, caring presence at the bedside. Today nurses are expected to not only administer medications and treatments that they did in previous centuries, but they must also critically appraise patient response to such treatments and adjust the therapy to maximize patient outcomes. This level of independent judgment and responsibility was reserved for experienced physicians just a few decades ago. To be able to evaluate response to therapies, nurses now must synthesize multiple data points, consider alternative scenarios, and determine a justifiable course of action based on sound scientific evidence. A recent Carnegie Foundation Report (Benner, Sutphen, Leonard & Day, 2010) highlights this concept emphasizing that nurses are now required to interpret and alter treatments based on laboratory findings rather than simply notifying a physician if something fell outside of set "normal" parameters.

Nurses today must integrate knowledge from many sources with mental agility, be able adeptly use complex technology, communicate successfully with patients and

colleagues, and effectively function as member of an interdisciplinary team. Despite these daunting requirements, much of nursing education still focuses on traditional conceptions of learning – acquisition of factual information is often considered 'learning' and demonstration of this learning comes almost exclusively through standardized objective examinations. Where new graduates need to be able to synthesize dynamic information from multiple and sources then clearly articulate their clinical judgment to other members of the healthcare team, nursing education is often relies on static information sources (i.e. textbooks) and standardized written assessments. Where new graduates are expected to function as members of a multidisciplinary team, they are educated in isolation from other disciplines. Where new graduates are expected to become lifelong learners, they are not taught the mental inquiry and knowledge-seeking behaviors needed to do so.

Despite calls for reform from the IOM, AACN and other national bodies, as well as significant evidence demonstrating that other methods are more effective for student learning, traditional lectures continue to form the pedagogical foundation for the majority of nursing faculty (Young & Diekelmann, 2002; Schaefer & Zygmont, 2003; Brown, Kirkpatrick, Greer, Matthias & Swanson, 2009). In the health professions educational literature, there is ample evidence that alternative learning pedagogies often grouped under the term *active learning* (i.e. team-based learning, cooperative learning, problem-based learning, simulation), improve student engagement (Kelly, Haidet, Schneider, Searle, Seidel, & Boyd, 2005), attitudes towards difficult content (Pugsely & Clayton, 2003), critical thinking skills (Ozturk, Muslu, & Dicle, 2007), performance on examinations (Yoder & Hochevar, 2005), clinical success (Hoke & Robbins, 2005;

Winter, Matthers, & Nowson, 2002) and memory of course content (Cherney, 2008). Brown and colleagues (2009) found that although the majority of nursing faculty (78%) rely on lecture as a primary pedagogical approach, only 17% believe that it is one of the most effective methods for student learning. This is not surprising. As Schaefer and Zygmont (2003) report, most nursing faculty perceive their primary role as one of instilling knowledge (content-centered) rather than helping students learn how to think (process-centered). As a profession striving to utilize research to inform practice, it is striking that few nursing faculty actively seek out the evidence basis for their teaching strategies and utilize active learning in their teaching practice. The duplicity is unmistakable – students are implored to engage in evidence-based nursing practice yet many faculty do not engage in evidence-based teaching practice.

To date, there has been little study at use of research to guide teaching practice among nursing faculty. This lack of an existing framework necessitates the use of a proxy framework for initial exploration of the topic. Within clinical nursing, the term *research utilization* has been used to describe the process of integrating research findings in to practice. Since the majority of nursing faculty gained their expertise through work in clinical settings, it is likely that their research-seeking behaviors were formed during this time making research utilization a suitable proxy framework for initial exploration.

The majority of researchers (Funk, Champagne, Tornquist & Wiese, 1987; Hutchison & Johnston, 2003; Atkinson, Turkel, & Cashy, 2008, etc.) who have examined research utilization in clinical practice have found that characteristics of the organization in which an individual works and the communication channels through which research findings are disseminated are the most frequently cited barriers to use. Specifically,

multiple studies (Fink, Thompson & Bonnes, 2005; Brown, Wickline, Ecoff & Glaser, 2008; Ashley, 2005; etc.) have indicated that a lack of slack time to locate, read, and implement research findings present the greatest barrier to changing clinical nursing practice. Kerfoot (2007) supports this concept asserting that integration of evidence-based innovations is impossible if personnel do not have protected time in which to critically reflect on current practice issues, research solutions, and develop realistic plans for implementation. This type of protected think-time time appears to be contrary to the ethos of efficiency and productivity which permeates clinical nursing yet without protected time, this culture of "busyness" precludes the widespread use of evidence to inform practice, further widening the research-practice gap (Thompson, O'Leary, Jensen, O'Brien-Pallas & Estabrooks, 2008).

Closely following lack of time is research findings are communicated. Fink, Thompson & Bonnes (2005), Brown, Wickline, Ecoff and Glaser (2008) and Niederhauser and Kohr (2005) all considered a diffuse and widely distributed evidence-base as a key barrier to the use of research to guide nursing practice. A few studies (Estabrooks, et al, 2005; Mountcastle, 2003; Strickland & O'Leary-Kelly, 2009) have found that individual characteristics such as confidence in interpreting statistical analysis and awareness of research inhibit use. Interestingly the characteristics of the innovation (i.e. complexity, ease of use, etc.) have not been found to be a major barrier in any of the studies of clinical nurses.

Statement of Problem

Because nursing curricula cannot withstand the exponentially increasing factual content coupled with anachronistic and unsupported teaching methods, it is imperative that nursing faculty utilize teaching strategies which have a sound scientific foundation if nursing education is going to meet the reality of practice for healthcare practitioners in the 21st century. As has been found in clinical nursing, adoption of research findings in practice is often limited by systematic barriers such as how research findings are communicated and where they are located as well as by organizational characteristics such as lack of slack time. Rarely is adoption of evidence-based practice dependent upon individual attributes of the adopter. Because nursing faculty gained their content expertise through clinical practice, logical extension would make it prudent to explore if nursing faculty face the same barriers to the integration of evidence-based teaching practice as do nurses implementing evidence-based clinical practice. To date, no study which examines nurse faculty perceptions of the factors which influence the adoption of active learning strategies has been published.

Statement of Purpose

The purpose of this study is to identify nurse faculty perceptions of factors which influence the adoption of active learning strategies in their teaching practice. Results of this study will be used to strengthen factors which facilitate use of active learning and develop strategies to ameliorate perceived barriers to the incorporation of active learning in nursing education.

CHAPTER 2 REVIEW OF RELATED LITERATURE

The Evidence-Base for Active Learning

The goal of this section of the literature review is to concisely summarize the current state of the science regarding the use of active learning methods in nursing education. While there is a great deal of literature which supports the use of active learning in higher education, the reports specific to nursing education are often anecdotal or lack consistent and valid measurements, making the construction of body of evidence difficult, if not impossible, when limited to nursing education alone. Broadening the scope of literature evaluated to those disciplines that prepare students for professional practice (i.e. medicine, allied health, engineering, etc.) as well as those classes which form the foundation of pre-nursing education (i.e. sciences, humanities, etc.) yields a great deal more quality evidence for the incorporation of active learning methods. For the purposes of this review, *active learning* will follow the definition set forth by Bonwell and Eison (1991) which is, "instructional activities involving students in doing things and thinking about what they are doing" (Para. 2). Because this definition is difficult to operationalize, it is considered to be any method which increases student to student, student to content, or student to faculty interactions. Common forms of active learning include problem-based (PBL), team (TL), cooperative and collaborative learning (CL), inquiry-based methods, simulation, and active lecture.

Perhaps the seminal work promoting active learning in higher education is Chickering and Gamson's (1987) "Seven Principles for Good Practice in Undergraduate Education". Written as a guideline for faculty, students, and administrators but synthesized from a half-century of research on teaching and learning, this document

provides concise articulation of what constitutes "good teaching and learning" practices in higher education. Among their assertions is that quality undergraduate education encourages student to faculty contact, develops reciprocity and cooperation among students and encourages active learning. While this publication does not specifically cite individual studies supporting their assertions, it is widely viewed as an effective summary of relevant teaching methods for higher education as evidenced by its use on numerous university excellence in teaching websites.

Within nursing education, Ozturk, Muslu, and Dicle (2007) compared critical thinking disposition of senior level students (n=147) taught using two different instructional methods: traditional lecture and problem-based learning. Students were from separate campuses located in the same city. One campus (n=52) uses PBL as the main instructional model for the entire program and the other campus (n=95) uses traditional methods throughout their program. Comparison of scores as measured by the California Critical Thinking Inventory just prior to graduation demonstrated that students taught using problem-based learning methods scored higher on critical thinking disposition, especially in regards to "open mindedness" and "truth-seeking" behaviors. While the practical significance of the differences is difficult to justify as both groups remained in the "moderate" critical thinking disposition range, both concepts are essential for reflective practice, a defining concept of nursing education (Bastable, 2008).

Although the sample size is small (n=44) in Pugsley and Clayton's (2003) analysis of the effect of experiential learning on difficult nursing course content (nursing research), the authors found that students taught using active learning methods (engaged problem solving, research project and research critique) demonstrated a more positive

attitude towards the course content than did those taught with traditional methods. Attitude was measured using a Swenson and Kleinbaum (1984 as cited in Pugsley & Clayton, 2003) designed survey. As with the Ozturk, Muslu, and Dicle (2007) study, the practical significance of this difference is difficult to ascertain however, historically, the content is difficult for students to grasp so any improvement in student attitudes should be viewed positively.

Hoke and Robbins (2005) assessed the impact of the use of active learning techniques (case studies, small group learning, role playing) during instruction on both didactic and clinical course grades in a combined Licensed Practical Nurse and associate level Registered Nursing medical-surgical course. As is true with many nursing education studies, the sample size was quite small (n=23). Final course grades (as a percentage of total points possible) were compared to those of the previous year. Students educated using an active learning method averaged a clinical grade of 87.03% compared to 84.19% in the previous year. Unfortunately, the authors do not provide an analysis of statistical significance of this difference nor do they provide any insight to the practical significance. While this study only provides minimal support for improvements in clinical performance, Winter, Matters, and Nowson (2002) also found better clinical performance in dietician students (n=35) taught using PBL than those taught with conventional methods (n=33). Clinical performance was measured by student satisfaction with instruction, clinical and academic competency outcomes. When combined, the Hoke and Robbins (2005) and Winter, Matters, and Nowson (2002) studies do support improved clinical performance when using active learning as a key instructional method.

Comparing traditional lecture with early distribution of detailed lecture notes plus small group discussion, Johnson and Mighten (2005) assessed mean student examination scores as well as overall course pass rates. The intervention was constructed so that students (n=81) received detailed lecture notes one week prior to class. The time that was previously spent delivering the lecture was converted to small group discussions and problem-solving exercises. The authors findings indicate that receiving lecture notes in advance combined with small group activities increased mean examination scores by 3 points ($p<0.010$). While they report that the differences in pass rate did not reach statistical significance, their analysis may be incorrect as the failure rate in the traditional lecture class was more than three-fold greater: 17 of 88 students failed in the control group compared to just 5 of 81 in the modified class. Even if this analysis is correct and does not reach statistical significance, it appears to be practically significant and should be more closely considered.

August-Brady (2005) evaluated the impact of concept mapping on approach to learning as well as self-regulation of learning among 80 baccalaureate nursing students spread over four different institutions. These constructs were measured using the Study-Process 2 Questionnaire and Strategic Flexibility Questionnaire. Interestingly, both the control and intervention groups initially preferred deep approaches to learning but the intervention group sustained use of a deep approach to learning while the control group resorted to more superficial ones as the semester progressed. No major differences were found in self-regulation between the groups. Unfortunately, this study only occurred over a one semester period, so long term results are unknown.

From the field of psychology, Yoder and Hochevar (2005) provide an interesting analysis of the effect of instructional method on multiple-choice test performance. Using a cross-over design, material in a psychology of women course was divided so that some content was covered using traditional methods and other content used active learning methods (discussion, case analysis, etc.). The following year, methods were switched so that content taught with traditional methods in year one was taught using active learning methods in year two. This design allowed for all content to be taught using both methods thus isolating the method of instruction on multiple choice examination performance. Both within and across classes, students (n=110) performed higher on material taught with active learning methods ($p<.05$). Interestingly, material not 'covered' during class because of reduced time available for lecture when active learning methods are utilized, did not negatively affect student performance on exams. The authors suggest that perhaps this is due to increased meta-cognition and deeper learning that occurs when students actively engage in other course content. This study is important for nursing education, especially in light of the exponentially increasing content and potential for faculty resistance to employing active learning methods in fear of not being able to 'cover all the content' (see Ironside, 2005; Clynes, 2009, etc.) This study provides support for improved multiple choice testing performance even on content not 'covered' during class.

Also from psychology comes Cherney's (2007) analysis of memory of course content by instructional method. Upon completion of a course, students (n=314) were asked to recall ten important concepts from the entire course. Across courses on introductory psychology, introductory statistics, and cognitive psychology, students remembered the concepts covered via active learning methods (discussion, interactive

exercises, vivid demonstrations) to a greater extent ($p<.001$) than those covered with a traditional lecture method. These results held true for both upper and lower division courses. While free-recall of course concepts or content does not assure effective knowledge management, it does indicate that active learning methods are superior to retention of basic information for retrieval at a later time. This provides support for the utilization of active learning, even with the foundational taxonomies of nursing education.

Armbruster, Patel, Johnson and Weiss (2009) found similar results in their restructuring of a large introductory biology course. The course typically enrolled approximately 170 students per year. Over a three-year period, the team migrated from a traditional pedagogy to one that included the incorporation of active learning and problem-based learning in each lecture. They also adopted repeated low-stakes assessments and reordered the presentation of content so that specific concepts were delivered within broader conceptual themes. These changes led to progressive increases in student performance on final examinations ($p<0.05$) and significantly higher ($p<0.0001$) student satisfaction with the learning environment (i.e. interest in content, relevance of material to long-term goals, stimulating presentations, challenging course). Improved student attitudes and performance reinvigorated faculty and also provided department-wide adoption of particular aspects of the restructuring (e.g. frequent low-stakes assessments, use of interactive devices during lecture, etc.), demonstrating the power of individual and incremental changes in affecting departmental pedagogy.

Buckely, Bain, Luginbuhl, and Dyer (2004) also found similar results when modifying an environmental geography course. As a gateway course with typical

enrollments of 120-200 students, the faculty was dubious of the feasibility of incorporating active learning in such large classes. As is true for many of the articles published on educational innovation, this article provides an anecdotal account of their experience, offering little outcomes-based evaluation but provides encouragement and insight in to the processes used to change the pedagogy in large classes (i.e. gaining administrative support, redeveloping course schedules and assignments, developing learning teams, etc.) as well as suggestions for avoiding pitfalls. This study is also interesting in that the changes were implemented within the context of a large class, often cited as one of the barriers to the implementation of active learning.

In an attempt to quantify the engagement of students using various different instructional methods in medical education, Kelly, Haidet, Schneider, Searle, Seidel, and Richards (2005) used the previously developed STROBE Classroom Observation Tool in classes (n=25) employing traditional lecture (n=8), problem-based learning (n=8), and team-based learning (TBL) (n=9) formats. Through direct observation of student activity (learner to learner, learner to instructor or self-engaged) at specified intervals during a class, the researchers documented the varying levels and types of engagement experienced. Not surprisingly, the lecture format produced primarily learner to instructor engagement with the majority (>85%) of the time being spent listening and writing. In contrast, both PBL and TBL produced significantly more learner-to-learner engagement (51 - 92%) with TBL demonstrating the greatest proportion of time where students were actually speaking (27%) rather than listening or self-engaged (writing). These results demonstrate superior interaction and learner engagement with the active learning methods of PBL and TBL. As a practice which heavily relies on communication, TBL

could provide nursing students with additional experience articulating complex ideas while improving their listening and interpersonal communication skills.

Also focused on engagement but using a different measurement instrument (The Classroom Engagement Survey), Clark, Nguyen, Bray, and Levine (2008) assessed junior level nursing students taught using a traditional pedagogy in a pharmacology course (n=67) concurrent with TBL in a case management course (n=51). As would be expected, students in the TBL course demonstrated significantly higher engagement but also expressed higher levels of anxiety (lack of enjoyment) about not knowing how to focus their study without specific lecture outlines (i.e. PowerPoint slides). While this might be viewed as a draw-back of TBL, especially from a student perspective, its value in developing independent learning skills should not be overlooked and potentially be considered a strength.

Looking at the affective aspects of learning and the reasons behind the exodus of college freshmen after their first year of school, Braxton, Milem, and Sullivan (2000) identified the presence of active learning (using Bonwell & Eison's 1991 definition) as critical to both social integration and institutional commitment and are predictors of perseverance in first-year college students (n=718). Specifically, class discussions ($p<0.0001$) and activities which promote higher order thinking ($p<0.001$) were considered most influential on student perseverance. The authors posit that engaging students with the content and with each other enhances their perceptions of truly gaining knowledge and understanding from their coursework, thus enhancing their commitment to further learning. They also suggest that the social integration (friendships, peer support networks, etc.) which occur when students work cooperatively positively impact

their commitment not only to the institution but to the process of learning as well. While not directly related to the field of nursing, this study provides support for the use of active learning in the role formation and role taking aspects of nursing education. In a time when many nurses are leaving the field, socialization, integration, and commitment to the profession are critical to the long-term stability of the profession.

In defense of a traditional pedagogy, Jones (2007) emphasizes that oral transmission of knowledge from those *with* information to those *without* it has been broadly utilized for millennia. Prior to the printing press, didactic instruction from master to student formed the basis of education and has remained relevant despite significant technological advances (Jones, 2007). Specific to nursing, Oermann (2004) highlights that lecture offers the opportunity to focus student attention on what the teacher believes to be most important content, explain difficult concepts and provide direct application to client scenarios, allows for the delivery of up-to-date information, and conserves time through delivery to a large audience.

Mattson (2005) provides insight on potential concerns with blindly joining what he terms as the "active learning bandwagon" citing that the key issue with higher education is not the use of passive versus active learning strategies, but rather that chronic underfunding and exponentially expanding class sizes. Recognizing that active learning has substantial historical support, especially in the United States, his argument centers on the perceived migration of faculty from academic to entertainer (or "edu-tainer") as class sizes increase and students are viewed as 'customers' rather than learners.

Curriculum Design and Pedagogical Approaches

Providing a foundation for pedagogic integrity, Ferguson and Day's (2005) concept analysis explores not only what constitutes "evidence-based nursing education" but also the barriers which limit the enactment of evidence-based teaching. Working from the assumption that evidence-based nursing education is the use of the best evidence available for the justification of teaching and curricular interventions, the barriers identified by the authors are a disjointed research base, chronic underfunding of research on teaching methods and poor agreement in what specifically constitutes *knowledge*. While this analysis provides an interesting perspective and support for alternative pedagogies, it does not address the issue of accountability in relation to traditional program outcomes such as National Council Licensing Examination (NCLEX) pass rates, etc.

Ironside (2005) examined the relationship between covering content and teaching thinking through explicating the common experiences of teachers enacting interpretive pedagogies. From her qualitative study (n=36), it becomes evident that the reformation of pedagogy is a slow process where one builds upon small changes in pedagogy before taking on larger ones. This process allows for progression according to faculty (and student) confidence in the process. Clynes (2008) provides a personal account of the transformation from a traditional pedagogy to incorporating active learning highlighting the need for including small changes in the beginning then building on successes.

Suggesting a way to shift the focus away from the additive curricula of many nursing schools, Candela, Dalley, and Benzel-Lindley (2006) articulate an argument in favor of changing educational practices from a content-focused to a learning-centered

process. Highlighting the need to focus on learning processes rather than informational content, the authors present a strong case supporting the need for change. Guidelines and suggestions are made for enacting curricular change.

Finally, Stage and Kinzie (2009) provide a case study analysis of institutions which successfully transformed their science, technology, engineering and mathematics (STEM) curricula and pedagogies. From 18 institutions funded by the National Science Foundation, three were chosen as exemplars of successful restructuring. Each chosen institution focused on a different population – one a mid-west liberal arts college, one a large, selective urban university and a third urban university with a high population of at-risk students. Common characteristics of successful transformation include: decreased reliance on faculty as sole source of knowledge in the classroom, increased student interaction with faculty, learning as a collaborative process, use of active learning strategies, focus on authentic contexts and practical knowledge, and increased emphasis on interdisciplinary connections. Although presented as almost a side note, the authors reinforce the concept that while wholesale pedagogical revision and reformation is rarely possible, there are substantial gains to be made through small, incremental changes by individual faculty. All successful institutions profiled had the support of their faculty in the process. Unfortunately, the authors do not compare successful to unsuccessful institutions nor do they illuminate to what extent the successful institutions are representative of others that were funded.

In summary, active learning has demonstrated improvement in student engagement (Kelly, Haidet, Schneider, Searle, Seidel, & Boyd, 2005), attitudes towards difficult content (Pugsely & Clayton, 2003), critical thinking skills (Ozturk, Muslu, &

Dicle, 2007), performance on examinations (Yoder & Hochevar, 2005), clinical success (Hoke & Robbins, 2005; Winter, Matthers, & Nowson, 2002) and memory of course content (Cherney, 2008). While changing pedagogy can be intimidating for faculty, nursing curricula have reached the point of maximum saturation (Ironside, 2005; Clynes, 2009). Candela, Dalley, and Benzel-Lindley (2006) suggest that adopting a learning-centered curriculum rather than a content-centered one will allow for students to develop in to life-long learners.

Characteristics of Adopters and Non-Adopters of Active Learning

Although evidence in support of active learning is widely distributed in the literature, individual faculty must choose to undergo a change in pedagogy to incorporate it to their classrooms. In looking at how faculty make such pedagogical decisions, Schaefer and Zygmont (2003) surveyed 187 baccalaureate-level faculty and found that self-reported teaching styles were largely in agreement with stated teaching philosophies. In this study, faculty respondents expressed belief that their primary role was as a nurse instilling knowledge to students rather than a teacher helping students learn how to think. This perspective is manifest in that chosen teaching methods were largely teacher- and content-centered and is consistent with other assessments of preferred teaching style in health professions education (IOM, 2003).

Supporting the use lecture as a primary instructional method, Al-Modhefer and Roe (2009) surveyed 162 first year nursing students in the United Kingdom to assess preferred characteristics of lecturers in a basic science course. Not surprisingly, students preferred lecturers who speak clearly, emphasize content that will be on the examination, stimulate interest in the topic and provide real-life examples to illustrate theory. All of

these characteristics reinforce the role of the student as a passive, dependent learner. In follow-up interviews, students stated that interactive aspects of lecture were intimidating, but did not mention if they thought that they would learn more if active learning was incorporated. This study, in conjunction with the Schaefer and Zygmont study above reinforce the notion that both students and faculty prefer content- and teacher-centered instruction, clearly an obstacle when trying to enact active learning.

Kohtz (2006) provided qualitative insight to the characteristics of nursing faculty in relation to the adoption of non-conventional pedagogies. In general, faculty beliefs remain teacher-centered even while they describe themselves as "facilitators" of learning. Lecture was a common teaching method as faculty believed that they must "cover content" rather than teach students how to learn. Several faculty expressed the perception that students are incapable of directing their own learning because content is complex and concerns about the maturity level of students, a belief often associated with conventional pedagogies.

More recently, Brown, Kirkpatrick, Greer, Matthias and Swanson (2009) found that 78% of nursing faculty (n=946) relies on lecture as a primary method of instruction yet only 17% believe that it is one of the most effective methods to foster student learning. Interestingly, faculty claim to use a mean of 21 different instructional methods, recognizing that not all students learn in the same manner and most (70%) use some sort of active learning methods. Similarly, Bedgood, et al. (2010) found that among Australian university science faculty (n=46) at 29 different universities, 81% spend nearly three-quarters of class lecturing but less than 10% felt that students learn well using the lecture format. Although the sample size is low, it supports Brown, et al (2009)

findings that university faculty continue to rely on instructional methods which they do not believe are effective.

In a secondary extraction of the Brown, et al, (2009) data set, Greer, Pokorny, Clay, Brown, and Steele (2010) provided a qualitative analysis of faculty who claim to use contemporary pedagogies at least 50% of the time. Key findings from this analysis are congruent with previous studies in that faculty who use contemporary pedagogies view the students differently, almost diametrically opposed, to those who ascribe to a conventional pedagogy. Progressive faculty view the students as unique individuals capable of directing their own learning and being responsible for the outcomes. They also perceive their role as a teacher to be a guide for the student in their own development rather than as the director or controller of the learning environment. Not surprisingly, non-conventional faculty also tended to be more adaptable and have a positive self-perception. No comparison was given for conventional faculty.

Although somewhat dated, Moffett and Hill (1997) provide personal insight to the challenges and barriers experienced when shifting from a traditional pedagogy to active learning. Through presenting "lessons learned" the authors support faculty considering or enacting a change of pedagogy. Critical challenges encountered included faculty teaching style, planning time, student characteristics (i.e. previous experiences, attitudes, etc.) and available resources and support. While this study does not provide any support or outcomes data, it does provide a brief, concise and useful guide for faculty who are considering changing pedagogy.

Use the Delphi technique, Schell (2006) attempted to describe the process of innovative teaching in baccalaureate nursing students. From a panel of 90 potential

experts, 28 completed all three rounds of the process. The essential facilitators of innovative teaching included faculty characteristics (openness to new ideas, motivation, commitment, and enthusiasm), open communication patterns with their students, and cultural support for innovation. Highest ranked barriers include faculty attitudes, fears, and lack of knowledge of innovative teaching methods. While this study provides interesting insight, it must be noted that even the author acknowledges that the panel selection process did not yield the level of expertise desired and may not represent the consensus opinion of higher level experts. Despite this limitation, it does provide initial identification of potential facilitators and barriers to the use of alternative pedagogies.

Outside of nursing, Michael (2007) identified faculty perceptions of barriers to the use of active learning strategies in their classrooms. Although drawn from a small sample (n=29), the most common barriers identified were concerns about student characteristics (expectations of learning, preparation, maturity, etc.), teacher characteristics (too much preparation time involved, loss of control, perceptions of colleagues, lack of knowledge of how to do it, etc.) and issues pedagogical issues (coverage of content will be sacrificed to allow in-class time for active learning, difficulty with assessment, class sizes, etc.). Michael also provides interesting counter-points to some of the expressed concerns noting that active learning does not intrinsically take more preparation than any other pedagogical approach and that simply "covering content" does not assure learning has taken place. One of the most salient concerns expressed about engaging in active learning is that students lack the cognitive skills, maturity, and ability to be self-directed learners. While the elementary and secondary educational systems in the United States often focus more on breadth than depth, this

does not imply that students are incapable of meaningful learning as active learning has been demonstrated to be effective at all levels of education.

Patterson (2009) provides an interesting qualitative analysis of the nature of evidence on which nursing educators base their teaching practices. From a sample of 14 nurse educators who identified themselves as using research to inform their teaching practice, "objective data" (e.g. course grades, standardized testing scores, programmatic data), "professional knowledge" (e.g. classroom feedback, educational background, reflective practice) and "professional sources" (e.g. colleagues, conferences, etc.) formed the foundation of evidence. Notably missing, and quite disturbing, is any reference to the use of empiric evidence as a foundation for practice. This study provides a reminder that many decisions, even those made by practitioners who claim to use research as the foundation for their practice, still lack a strong evidence base.

Using the approach of information literacy, Williams and Coles (2007) surveyed 400 teachers from the United Kingdom to identify teacher's strategies for locating, evaluating, and using research information. Although most teachers were highly motivated to use research to inform their practice, lack of time to seek out research findings, accessibility of research results and confidence in interpreting research findings proved to be the most cited barriers to use. Interestingly, these barriers are similar to those identified by practicing nurses in the United States. Suggested remediation to these barriers includes improving informational literacy of faculty, greater attention to local dissemination of research findings, and development of an information culture and ethos within each school. Using information literacy as a foundational approach could prove valuable for nursing education as it transfers a known theory to a new situation.

Factors Influencing Research Utilization in Clinical Nurses

Many of the studies of research utilization by clinical nurses use Roger's Theory of the Diffusion of Innovation (2005) as a framework, specifically through the use of the well-tested BARRIERS Scale discussed in greater detail in Chapter 3. Of the factors identified by Roger's, the four main aspects which affect research utilization within nursing are characteristics of the adopter, the organization, the communication and the innovation.

In 2005, Fink, Thompson, and Bonnes found that characteristics of the organization were perceived as the greatest barrier to the utilization of research in 239 nurses at a magnet hospital. Specifically, lack of time to read, evaluate, and implement research as well as lack of authority to change practice presented the greatest barriers for working nurses. This is an interesting finding given that magnet hospitals are supposed to be innovative, support research, and improve outcomes. Behind characteristics of the organization, communication of research findings (understandability of findings, location and volume of research) and characteristics of the adopter (inability to understand findings, unaware of research findings) were rated as the next highest barriers. The authors do not indicate if they performed a confirmatory factor analysis on their sample to assure that the items loaded to the same factors as originally published.

From California, Brown, Wickline, Ecoff and Glaser (2008) investigated registered nurses' practices, knowledge, attitudes, and the perceived barriers to the use of evidence-based practice at academic medical centers. From a sample of 458 nurses, organizational characteristics (time to implement new ideas, time to read research and authority to change practices were rated as the highest barriers with communication

factors (findings not disseminated, reports not understandable) ranking second. Overall, they found that higher knowledge levels about evidence-based practice correlated with higher levels of use of EBP. Although a large sample with clearly described analyses, some caution should be exercised as there was a large amount of missing data in this sample – with only 46 to 62% of the surveys being complete.

In comparison to magnet and academic hospitals which are known for innovation and progressive practices, Schoonover (2009) assessed nurses in a community hospital located in Washington State. Similar to larger hospitals and more progressive settings, registered nurses believe that lack of authority, lack of time and lack of awareness of research findings are the greatest barrier to research utilization. With a small sample (n=79) and single location, the results are difficult to draw conclusions from, but are consistent with findings in many other settings and with larger samples.

Exploring perceived barriers to the use of research findings among critical care nurses, Ashley's (2005) dissertation work surveyed 511 critical care nurses in the United States. The top five barriers were all associated with characteristics of the organization (lack of authority, insufficient time, lack of support and cooperation by physicians and staff). Similarly, LaPierre, Ritchey, and Newhouse (2004) provide analysis of 20 Post Anesthesia Care Unit nurses in a single hospital in the mid-Atlantic. Although a painfully small sample, lack of cooperation from physicians, administration, and staff was cited as the top barrier with the closely related lack of authority to change practice.

Focusing on advanced practice nurses, Mountcastle (2003) explored the barriers to research utilization among clinical nurse specialists (n=162) in the United States in her doctoral dissertation. She found that organizational characteristics (lack of time,

authority and support) presented the greatest barrier followed by characteristics of the adopter (lack of awareness of research findings, lack of confidence in ability to evaluate research findings, and low valuation of research informing practice). Among Pediatric Nurse Practitioners (PNPs), Niederhauser and Kohr (2005) found that time constraints for reading and implementing research (organizational characteristics) were followed by the actual amount of research available and how it is complied (characteristics of the communication) were the greatest barriers for the 431 PNPs surveyed. Rounding out the advanced practice studies, Strickland and O'Leary-Kelly (2009) also found that organizational characteristics (authority, time to implement, and time to read) were the top barrier with individual characteristics (awareness of research and confidence in evaluating findings) following for clinical nurse educators (n=121) from California.

Providing a systematic review of 45 studies exploring the individual determinants of research utilization by clinical nurses, Squire, Estabrooks, Gustavsson and Wallin (2011) surmise that a favorable attitude towards research is the only individual characteristic which consistently demonstrates a positive effect on use. Other individual characteristics such as educational level and preferred sources of knowledge show more mixed results with some studies showing an effect yet others not. Interestingly, age, gender and years in practice demonstrated no influence on research utilization.

Probing deeper to the sources of practice knowledge among clinical nurses, Estabrooks, et al. (2005) provide a secondary extraction of qualitative data collected earlier from 213 field notes, 119 interviews, and 17 focus groups. In this analysis, the authors found that both formal (seminars, workshops, etc.) and informal (discussions with peers, physicians, students, patients) social interactions provide the majority of

"evidence" on which the nurses based their practice. Many nurses commented on the fact that sources easily at hand (peers, physicians, etc.) provided the preponderance of evidence used because they rarely pursued new knowledge unless they had a specific problem that needed to be resolved quickly. This is often termed as *situated learning* or *experiential knowledge* in educational resources. Interesting yet slightly discomforting for a profession which claims to strive to be based on scientific evidence, when nurses in this study experienced discord between what the research demonstrates and what they have personally experienced, they will preferentially use their experiential knowledge over scientifically generated evidence.

Summary

This literature review has included an exploration of the use of active learning in health sciences education as well as identifying the degree to which characteristics of the individual, communication channels and organizational structure impact application of research findings to practice. Results from research utilization in clinical nursing practice have been reviewed to form a proxy foundation for use of research by nursing faculty. Studies were chosen for having been published within the past 10 years (unless a seminal work which may be older) and, when possible, focused on healthcare in the United States.

Active learning has been demonstrated to improve multiple student outcomes including memory of course content, critical thinking disposition, examination scores, clinical success, complexity of thought, meta-cognition, attitude, and engagement. Despite the evidence which exists in support of active learning, many nursing faculty continue to rely on the unsupported traditional read-lecture-test model. Potential reasons

for this reliance is that faculty view their primary responsibility as instilling knowledge rather than teaching students how to learn, do not view students as capable of directing their own leaning, and lack the knowledge, interest and confidence to change pedagogy. Facilitators of the adoption of alternative pedagogies is that the faculty have open communication patterns with their students, strong self-image, and are willing to take the risk of trying something new. While it may not be feasible for many institutions to undertake large scale pedagogical revision, small changes made by individual faculty such as incorporating an active learning method to each instructional period or implementing repeated testing, can have profound effects on the culture of a department and the school.

A lack of "slack time" to read and implement research findings consistently rank among the top perceived obstacles among clinical nurses. Closely following lack of time is lack of cooperation and support for changing practice in the clinical setting. A diffuse and voluminous research base is also perceived as a barrier to implementing researching findings from clinical nurses. Although not consistently rated as a key barrier, individual characteristics are only occasionally found to hamper use of research by practicing nurses.

CHAPTER 3 FRAMEWORK

Roger's Theory of Diffusion of Innovation

The theoretical framework for this study is Roger's Theory of Diffusion of Innovation (2005). Originating from the social sciences of sociology, anthropology, and education, this theory asserts that "innovation is communicated through certain channels over time within members of a social system" (p. 5). In its most simple form, the theory posits that the dispersion of an innovation is related to a combination of factors: characteristics of the innovation (i.e. compatibility with known information, complexity, relative advantage, trialability, observability), communication channels (i.e. how the information is spread from person to person), characteristics of the individual (i.e. attitudes to new ideas, time from knowledge of an innovation to acceptance or rejection), and characteristics of the social system or organization in which it is being distributed (i.e. norms, distribution of authority, frequency of contact, etc.). Each factor is insufficient by itself and can only be viewed in its relationship to the other factors.

Characteristics of the Innovation

Roger's (2005) asserts that there are five main attributes of an innovation which influence the rate of adoption: relative advantage, compatibility, complexity, trialibility, and observability. The *relative advantage* of an innovation is "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2005, p. 265). Higher levels of perceived relative advantage are positively related to its rate of adoption. *Compatibility* refers to "the degree to which an innovation is consistent with existing values, past experiences, and the needs of potential adopters" (Rogers, 2005, p. 266). Innovations which are more compatible with previously held perceptions are more likely

to be adopted than those which are significantly different. *Complexity* is "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2005, p. 266). As might be expected, the more complex an innovation appears to be, the less likely it is to be adopted. The degree to which an innovation may be experimented with on a limited basis is known as *trialibility* (Rogers, 2005, p. 266). When innovations have greater trialability, they are more likely to be adopted. Finally, the degree to which the results of an innovation are visible to others is termed *observability* (Rogers, 2005, p. 266) and is positively related to adoption. Understanding the perceived attributes of the innovation can help predict the rate of adoption of the innovation, but are greatly influenced by other aspects of the diffusion process (characteristics of the individual adopter, communication channels, social systems) as well.

Characteristics of Communication Channels

The communication channels through which individuals transmit and receive information about innovations is termed as the *diffusion network*. Each diffusion network is a complex interpersonal communication structure in which interconnected individuals convey their experience with an innovation to others within the network. The structure of networks may be either centralized with highly formal, proscribed channels of communication and authority; or de-centralized with informal communication channels and higher degrees of power sharing.

Within the more formal diffusion networks, certain individuals function as change agents, facilitating the flow of communication from resource to end-user through the use of structured interventions. Often highly educated and technically competent but outside of the local social system, the role of the change agent is to understand the client's needs

and be able to exchange the relevant information on a level which translates intent to change into actual action. As an outsider to the local social system, the change agent is often a marginalized but necessary link for centralized diffusion networks.

Rogers (2005) asserts that decentralized diffusion networks which have high degrees of heterophily tend to be more open to innovation because of the porous and vertical social boundaries. In contrast, diffusion networks which are homophilious may be slower to adopt innovation because of horizontal social patterns which limit the input of new ideas. When diffusion networks are heterophilious, followers of lower status tend to look to opinion leaders for guidance and information regarding innovations. Opinion leaders are able to informally influence other individual's attitudes and overt behavior with relative frequency (Rogers, 2005). When compared to followers, Rogers goes on to assert that opinion leaders tend to have greater exposure to media, greater social participation (including with those considered change agents), more innovativeness, and are closer to the system's social norms than are followers (p. 362).

Characteristics of the Adopter

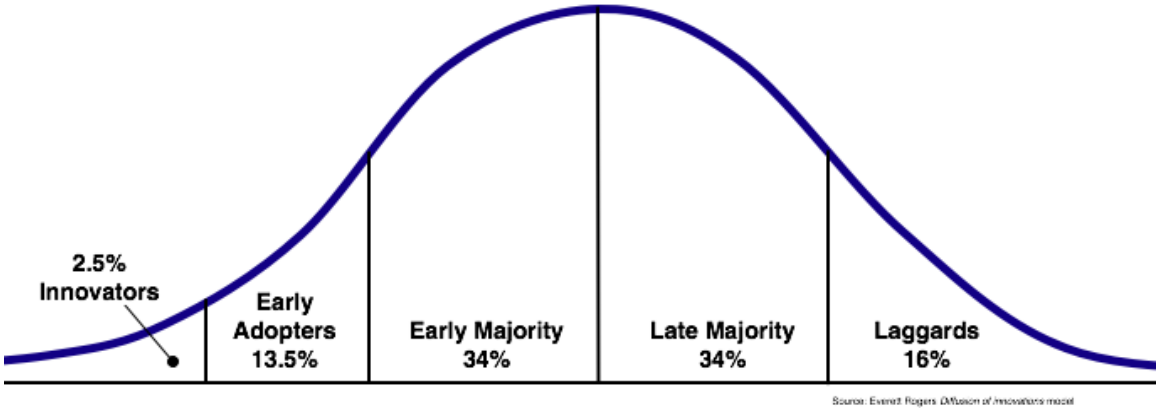
Because individuals within a social system do not all adopt innovation at the same rate, Rogers (2005) devised a classification for identifying adopters along a normally-distributed continuum based on their tendency for "innovativeness". The five major categories are: innovators, early adopters, early majority, late majority, and laggards. As depicted in Figure 1, innovators are the narrowest band of adopters (usually 2.5% or less of a given population) with a strong interest in new ideas, prospects, and possibilities. Rogers (2005) asserts that these individuals have broad, often geographically dispersed, social networks but are often disconnected from local social system. They also possess

the ability to understand complex situations and can accept a high degree of uncertainty or setbacks with minimal resistance or discomfort.

The second category, early adopters (approximately 13% of a population), share many of the same characteristics of the innovators but have greater connection to local social systems. This connection allows them to assert opinion leadership (Rogers, 2005) and influence others in their area through role modeling and change agency. Early adopters must, however, use their influence and leadership judiciously if they are to maintain the esteem of their colleagues.

Figure 1

Roger's Adoption Distribution



Early majority adopters (roughly 34% of a population) are more cautious in their adoption of innovation and rarely hold positions of opinion leadership. Rather, these individuals are deliberate and cautious in their adoption of new ideas, taking greater time to reach an acceptance or rejection decision, but yet are not resistant to change. The late majority (also roughly 34% of a population) are skeptical of innovation, but can be convinced when system norms are strongly in favor of it and when pressure from social peers becomes significant.

The laggards (up to 16% of a population) are traditionalists who resist change and are suspicious of anything which differs from past experiences. Laggards tend to have restricted social systems, lack opinion leadership, and are extremely cautious in their approach to change. While it may seem logical to place the responsibility for resistance to change on individual laggards, Rogers (2003) points out that there are frequently systematic, economic, or social barriers which necessitate that the person be absolutely certain the innovation will not fail prior to the decision to adopt.

Rogers (2005) also asserts that earlier adopters differ from later adopters on several relevant socio-economic, personality, and communication behaviors as well. Citing "voluminous research literature" (p. 287), Rogers (2005) characterizes early adopters as possessing higher levels of education, greater empathy, greater ability for abstraction, higher tolerance for uncertainty, and higher tendency to actively seek information about innovations than those who are later to adopt. Interestingly age is not a consistent factor for indicating tendency for early vs. late adoption.

Characteristics of the Social System and/or Organization

In general, innovation adoption decisions can happen on three different levels; optional innovation-decisions which can be made by individuals independent of the social system or organization, collective innovation-decisions which are made by consensus of a social system or organization, and authority innovation-decisions which are mandated by relatively few individuals on an entire system. A fourth category, contingent innovation-decisions, can happen only subsequent to another decision (i.e. a faculty can only adopt active learning methods in to their class if the school has not adopted mandated methods), so are considered to be a blending of two or more

innovation-decision levels. The social systems in which these innovation-decisions occur has great influence on the choice for adoption or non-adoption.

Individuals and organizations making optional innovation-decisions undergo a process by which they become aware of an innovation, but not always through active information-seeking. Rogers (2005) points out that often it is difficult to determine which comes first – a need or an awareness of an innovation – as many "needs" may go unrecognized until the awareness of an innovation becomes widespread. Once the individual or organization becomes aware of the innovation, they develop a favorable or unfavorable attitude towards it which influences their decision to adopt or reject the innovation. If they choose to adopt the innovation, they then implement the innovation and seek confirmation or reinforcement for the decision. If the information they obtain after the implementation is conflicting, the adopter can either discontinue the innovation or re-invent it through substantial change, thus completing the process.

Collective innovation-decisions happen on a larger scale, often through formalized social structures (i.e. city council) and organizations, but follows a similar process to the way that innovations diffuse among individuals (Rogers, 2005). Rogers asserts that larger organizations tend to be more innovative (p. 409), perhaps because of access to greater resources (economic, expertise, etc.). He also suggests that the centralization (degree to which power and control are concentrated) is inversely related to the innovativeness of organizations, but positively correlated to the implementation of accepted innovations.

Assumptions

This study assumes that the use of educational research follows a process similar to the diffusion of other innovations. This assumption has been supported in the study of research utilization by clinical nurses but has not been transferred to nursing education research. It is also assumed that research utilization by clinical nurses is a process similar to research utilization by nurse educators.

Summary

Roger's Theory of the Diffusion of Innovations (2005) asserts that the rate of the diffusion of an innovation is related to four main factors; characteristics of the innovation, characteristics of the communication channels, characteristics of the organization or social structure, and characteristics of the adopter. Innovations which have greater trialiblity, observablility, compatibility with current practices and relative advantage but with lower complexity are more likely to be widely adopted. Communication channels which are open, decentralized, and informal assist in the adoption of new innovations. Social systems and organizations which are larger, have greater economic resources, low levels of formality, and decentralized decision making are quicker to adopt innovations. Characteristics of the individuals who adopt innovation more readily are those which higher socio-economic status, greater empathy, greater ability for abstraction, higher tolerance for uncertainty, and who actively seek new information. These characteristics are graphically depicted in Roger's model is has been widely utilized in research related to nursing practice (Funk, Champagne, Wiese & Tornquist, 1991; Porche, 2004; Lee, 2004, etc.). Components of this model have support in the findings of research specific to nursing education (see Figure 2). For example,

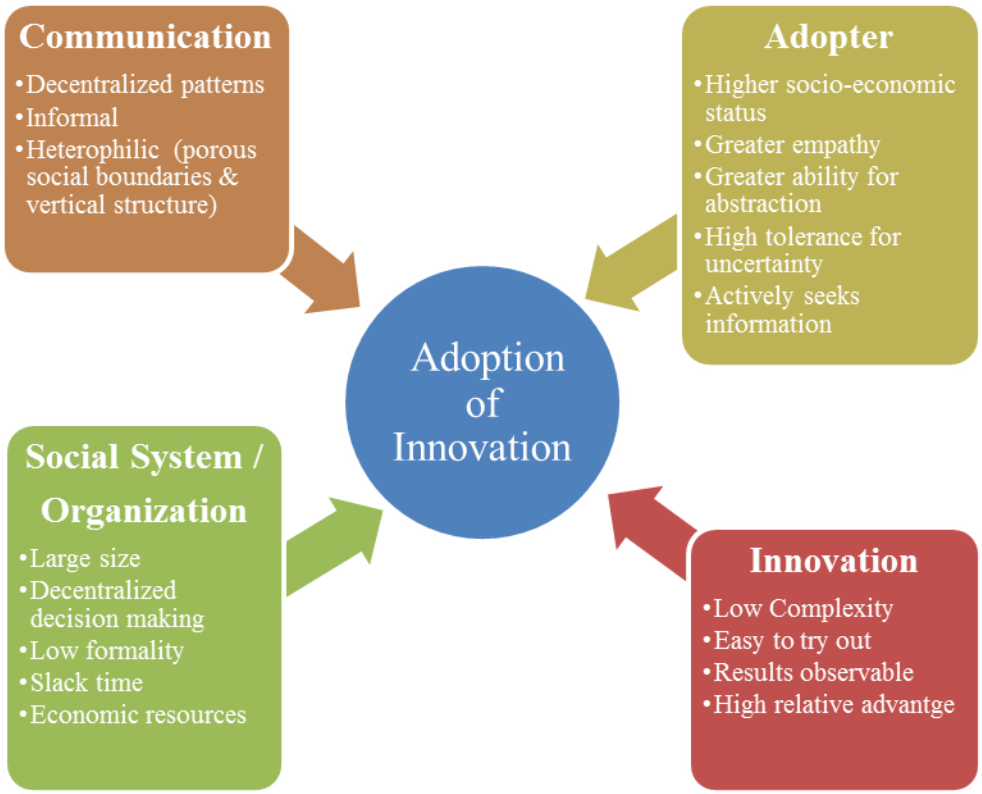
Roger's model predicts that individual adopters who posses greater empathy and higher tolerance to uncertainty are more likely to adopt innovation. This assertion is confirmed in nursing education through Greer, Pokorny, Clay, Brown, and Steele's (2010) findings which indicate that faculty who adopted innovative teaching methods tended to have more adaptability (tolerance for uncertainty) as well as greater understanding of the uniqueness of each student (empathy). Schell (2006) found that faculty openness to new ideas promotes the adoption of educational innovation, paralleling Roger's assertion that individual adopters who actively seek new ideas are more likely to adopt innovation. .

Roger's model is has been widely utilized in research related to nursing practice (Funk, Champagne, Wiese & Tornquist, 1991; Porche, 2004; Lee, 2004, etc.). Components of this model have support in the findings of research specific to nursing education (see Figure 2). For example, Roger's model predicts that individual adopters who posses greater empathy and higher tolerance to uncertainty are more likely to adopt innovation. This assertion is confirmed in nursing education through Greer, Pokorny, Clay, Brown, and Steele's (2010) findings which indicate that faculty who adopted innovative teaching methods tended to have more adaptability (tolerance for uncertainty) as well as greater understanding of the uniqueness of each student (empathy). Schell (2006) found that faculty openness to new ideas promotes the adoption of educational innovation, paralleling Roger's assertion that individual adopters who actively seek new ideas are more likely to adopt innovation. Moffett and Hill's (1997) findings that organizational characteristics such as lack of planning time (slack time) and available resources impeded adoption of active learning, just as Roger's model predicts. Patterson (2009) provides support for Roger's assertion that informal and decentralized

communication patterns positively influence the rate of adoption of innovation through her findings in which nurse educators who claim to use research to inform their teaching practice relied on informal sources (colleagues, student feedback, conferences) for the majority of the evidence on which they base their practice. These results indicate that Roger's model is likely to accurately predict the barriers and facilitators to the adoption of innovative but evidence-based pedagogies in nursing education.

Figure 2

Roger's Characteristics Which Positively Influence Rate of Adoption



Research Questions

The research questions guiding this inquiry are:

1. What demographic characteristics of nursing faculty are associated with the adoption of active learning strategies?
2. Which component(s) of the BARRIERS Scale does faculty perceive as the greatest barrier to the adoption of active learning strategies?
3. Are there differences in individual nursing faculty score on their perceptions of the communication of educational research as measured by the BARRIERS Survey and the Sources of Practice Knowledge Survey?

4. Are there differences in individual nursing faculty score on the characteristics of the adopter as measured by the BARRIERS Survey and the Revised Approaches to Teaching Inventory?
5. Are there differences in individual nursing faculty score on their perceptions of organizational support for innovation as measured by the BARRIERS Survey and the Siegel Scale for the Support of Innovation Survey?
6. What factors predict the adoption of active learning strategies by nursing faculty?

Definition of Terms

Conceptual Definitions

For the purposes of this study, the terms below will utilize the following conceptual definitions:

Active learning – This uses Chickering and Gameson's (1986) concept of active learning as instructional activities involving "students in doing things and thinking about what they are doing". Operationally, active learning in this study is considered to be any method which increases student to student, student to content, or student to faculty interactions Common formats include team-based learning, cooperative learning, active lecture, discovery learning, etc. Active learning is considered synonymous with *engaged learning* and *evidence-based educational methods.*

Barrier – Any impediment, be it real or perceived, which acts as an obstacle.

Facilitator – Anything that encourages, supports or makes a process easier.

Pedagogy – The strategies or style of instruction utilized by a faculty member. While strict interpretation of the word specifies instruction to children, pedagogy for this study will include instruction to adults as well.

Traditional pedagogy – a conventional teacher-centered instructional method where the instructor is considered the ultimate arbiter of what constitutes knowledge, what will be discussed at any given point, and which concepts are considered important. Content is transmitted through formal didactic text-driven lectures, evaluation is largely in the form of multiple choice examinations, and control of the classroom is firmly the domain of the faculty.

Innovative pedagogy – Any non-traditional form of instruction or pedagogy. The focus of innovative pedagogies is often student-centered including critical, feminist, postmodern, constructivist, and phenomenological.

Operational Definitions

For the purposes of this study, the terms below will utilize the following conceptual definitions:

Characteristics of the Adopter – individual aspects of a person which affect their approach to teaching and research. These characteristics will be measured by the BARRIERS Scale Factor 1 and the Revised Approaches to Teaching Inventory.

Communication of Educational Research – the methods though which information about educational innovations is transmitted. These characteristics will be measured by the BARRIERS Scale Factor 3 and the Sources of Practice Knowledge Survey.

Organizational Support– aspects of the institution in which the respondent is employed which either support or act as a barrier to the adoption of innovation. These characteristics will be measured by the BARRIERS Scale Factor 2 and the Siegel Scale for the Support of Innovation.

CHAPTER 4 METHODS

Design

This overarching purpose of this study is to identify the perceived barriers to the adoption of evidence-based educational methods in nursing education. As an initial exploration of this topic, a non-experimental quantitative correlational design was chosen to identify key variables which influence faculty choice of pedagogy. According to Polit & Beck (2008), correlation methods are most applicable when the researcher's aim is to discover and describe the interrelationship of many variables rather than defining a causal relationship among them (i.e. experimental research). This method is effective for situations where it is possible to collect large amounts of data relatively quickly and allows for new phenomenon to be identified and described. Later research can build upon the findings of this initial exploration through experimental research which determines the most effective methods for ameliorating the key barriers identified in this initial study.

Selection bias, a concern for descriptive correlation studies, was reduced through probability-based sampling procedures as this study was a large nation-wide survey. Because this study aimed to determine faculty perception of barriers, the use of self-report did not present a threat to internal validity. Other concerns such as attrition, effect of maturation, etc. did not present any threats to internal validity as this was a one-time survey.

Population and Sample

The population of interest for this study is all nursing faculty in pre-licensure Registered Nursing programs within the United States. Because it is not feasible to

survey every faculty in every program, stratified random sampling was used. State by state lists of all institutions accredited by either the Commission on Collegiate Nursing Education (CCNE) or the National League for Nursing Accrediting Committee (NLNAC) were obtained through publicly available information sources. Institutions which share dual accreditation were alternately distributed to either CCNE or NLNAC lists so that each institution will have only one chance for inclusion. At the time of study, there were approximately 600 baccalaureate nursing programs accredited by CCNE and roughly 60 diploma programs, 600 associate degree programs and 260 baccalaureate programs accredited by the NLNAC for a total of nearly 1500 potential programs. From each accrediting agency list, 20% of all potential programs within each state were selected using the random selection feature of IBM SPSS Version 18®.

Letters of invitation were emailed to the Dean/Director from each selected program. Included in the letter of invitation were a brief introduction to the study (Appendix A), a copy of IRB approval (Appendix B), and a link to the survey (see Appendix C for full list of survey questions). Deans/Directors were asked to forward the email to all faculty who teach in their pre-licensure programs. Inclusion criteria were that the faculty member has taught at least one pre-licensure lecture (didactic) course during the past academic year (Fall of 2010 or Spring of 2011). Exclusion criteria were having completed the survey at another institution (in the case of dual appointment).

Response rates for online surveys can vary dramatically based on topic, length, selection criteria, etc. (Greenlaw & Brown-Welty, 2009), but generally average around 25% across disciplines (Hamilton, 2009). Within nursing, response rates on similar topics from respondents in the United States range from 13% (Sommer, 2003) to more

than 40% (Strickland & O'Leary-Kelly, 2009; Mountcastle, 2003; etc.). Assuming a relatively conservative 20% response rate, the intended sample would provide approximately 90 schools participating, yielding perhaps 400 total respondents. Sample size calculation for multiple regression based on a desired alpha level of .05, 8 predictors, anticipated small effect size (.20), and desired power of .80 would be n=108 (Sloper, 2011). Sample size calculation for a one-tailed Student's t-test based on a desired alpha level of .05, small effect size (.20), and desired power of .80 would be n=310 (Sloper, 2011). To assure an adequate sample for all calculations, the larger sample size (n=310) was chosen as the intended sample size.

Instrumentation

The first page of the survey included an explanation of the anticipated risks and benefits of participation, a link to a copy of IRB approval for study, and a statement of consent to participate (i.e. radio button which indicates agreement with the following statement "I have read the above information and agree to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age. I have had a copy of this form made available to me.").

Following individual enrollment, the participants completed the 90 item survey. The foundation of the survey came from the well-tested BARRIERS© scale (Funk, Champagne, Wiese & Tornquist, 1991) with alternate questions coming from the Approaches to Teaching Inventory (Trigwell & Prosser, 2004), the Siegel Scale of Support for Innovation (SSSI) by Siegel and Kaemmerer (1978), Sources of Practice Knowledge Questionnaire (Estabrooks, 1998) with additional Primary Investigator (PI) designed demographic questions. Permission to use each of the tools was secured from

the creators. The questionnaire consisted of affirmation of consent to participate followed by four open-ended demographic questions (age, years teaching, number of pre-licensure courses taught in preceding year) and one open-ended question establishing the percentage of time using lecture each yielding continuous data. There were three forced choice questions (level of program, gender, academic degrees) yielding nominal data.

BARRIERS© Scale

Drawing on Roger's Theory of the Diffusion of Innovation, the BARRIERS scale items were originally developed from the Conduct and Utilization of Research in Nursing (CURN) Project, an attempt to improve the use of research findings by practicing nurses through organizational support (Porche, 2004). Realizing that the end-users (clinicians) play a significant role in the decision to adopt an innovation or change in practice, Funk, Champagne, Wiese, and Tornquist (1991) began informal data gathering from practicing nurses. Potential questions were formulated then refined with the help of a psychometrician, nurse researchers, consultants, and practicing nurses. Gradations on the Likert scale consist of "to no extent", "to a little extent", "to a moderate extent", "to a great extent", and "no opinion" yielding data that would, strictly speaking, be ordinal in nature. When consensus was reached for face and content validity, the 29 item instrument was pilot tested with graduate nursing students, many of whom were practicing nurses, for feedback. After revisions, the finalized version was sent to a stratified random sample of 5,000 nurses. A total of 1, 948 usable questionnaires were returned.

Factor analysis of the returned surveys revealed four main factors: characteristics of the adopter, characteristics of the organization, characteristics of the innovation, and

characteristics of the communication. Only items which loaded at a level of .40 or above were included (see Table 1). Factor 1, characteristics of the adopter, includes eight items with loadings of .40 to .78. This factor examines the specific attitudes of the nurse which influence use of research – values, skills, abilities, willingness to change, perceptions of power or authority to change, etc. Factor 2, characteristics of the organization, delineates the characteristics of the environment in which the clinician works which influence adoption. This factor addresses issues of administrative support, colleague and physician support, time, infrastructure, etc. Loadings for Factor 2 ranged from .41 to .80, totaling eight items as well. With a total of six items loading between .41 and .79, Factor 3 evaluates characteristics of the innovation (research), including concepts related to the methods, reporting, and conclusions of the research itself. It also includes the potential for conflicting results. The final factor, characteristics of the communication, is somewhat less robust than the others, but each of the six items load between .40 and .65. This factor includes characteristics which relate to readability, clarity, comprehensibility, location, and relevance of the findings as well as how they are communicated from person to person. Each of the factors remained stable with split-half and whole group analysis. In all analyses, one item, "there is an overwhelming amount of research information" did not load to any particular factor. Additionally, the item, "relevant literature is not complied in one place", had a low loading (.36) when the halves were compared.

Table 1

Factor Loadings for the BARRIERS Scale

Factor	Number of Items	Loading
Characteristics of the Adopter	8	.40 to.78
Characteristics of the Organization	8	.41 to .80
Characteristics of the Innovation	6	.40 to .79
Characteristics of the Communication	6	.40 to .65

Tests for reliability and internal consistency were calculated for each of the factors. Factors 1, 2, and 3 had Cronbach's alpha levels of .80, .80, and .72 respectively. Factor 4 was somewhat less reliable at .65 but item-total correlations were each in the acceptable range (.30 to .55) and the overall reliability went down significantly with deletion of any item (Funk, Champagne, Wiese, & Tornquist, 1991). Test-retest reliability one week apart indicated correlations that ranged from .68 to .83 indicating temporal stability. Polit and Beck (2008) suggest that a coefficient of .80 is desired but lower coefficients may be needed in some circumstance.

In addition to the Likert-scale questions, the BARRIERS© scale includes three open-ended questions which allow respondents to enter their own perceived barriers, a question which ranks the top three barriers to utilization, and an open ended question to identify the greatest facilitator of research utilization, each yielding categorical data. Historical use of these questions has not yielded significant new information but rather allows for respondents to personalize the phrasing to emphasize the importance of a particular barrier.

Since its development, the BARRIERS scale has been used in more than 40 studies, dissertations, and other explorations of research utilization in the health professions.

Additional Tools

While the BARRIERS to Research Utilization has been well-utilized to study clinical nurses, it has not been well-utilized within nursing education nor education in general. To assure that this study identifies key aspects to the use of active learning by nursing faculty, three different tools which measure similar constructs (characteristics of the adopter, organization, and communication) but different facets of the construct than are captured by the BARRIERS Scale were used for comparison (see Table 2). The fourth factor, characteristics of the innovation, has not been demonstrated to be among the top concerns in any use of the BARRIERS Scale in clinical practice so was not considered pertinent to this use.

Table 2

Summary of Factor Loadings for All Items

Factor	BARRIERS Scale		Alternative Assessment Tool		
	Items	Loading	Items	Loading	Name
Characteristics Adopter	8	.40 to.78	11	.49 to .71	Revised Approaches to Teaching Inventory
Characteristics Organization	8	.41 to .80	24	.40 to .70	Siegel Scale for Support of Innovation
Characteristics Communication	6	.40 to .65	16	None	Sources of Practice Knowledge
Characteristics Innovation	6	.40 to .79			None

Characteristics of the adopter.

For characteristics of the adopter, the key concern to the adoption of evidence-based instructional methods has been identified as the teaching style of the faculty. Greer, Pokorny, Clay, Brown, and Steele's (2010) qualitative analysis of faculty who claim to use contemporary pedagogies at least 50% of the time, one of the key findings was that frequently view the students as unique individuals capable of directing their own learning and being responsible for the outcomes. They also perceive their role to be that of a guide for the student in their own development rather than as the director or controller of the learning environment. With the focus being on the student and the process rather than the faculty expertise or content, this type of faculty is termed *learner-centered* or *student-centered*. In contrast, faculty who rely on traditional pedagogy and a focus on the transmission of knowledge from the expert faculty to the novice student are termed *teacher-centered*. Learner-centered instruction is a key construct of the principles of adult learning as asserted by Knowles (1980) and is considered a key indicator of faculty attitude towards alternative pedagogies.

Two additional tools were evaluated for inclusion in this study - the Principles of Adult Learning Scale (Conti, 1985) and the revised Approaches to Teaching Inventory (Trigwell & Prosser, 2004). To maintain the focus on quantifying the instructional approach chosen by each faculty respondent, the Revised Approaches to Teaching Inventory (r-ATI) was selected for inclusion. Questions for the r-ATI are positively scored on a 5-point Likert scale ranging from "only rarely true" to "almost always true". The original ATI (Trigwell & Prosser, 1996) was utilized with more than 1,600 faculty over an eight year period. Because of consistently low loadings on specific questions and

factors, the scale was revised in 2004 to a 22 item, two factor version. The new version was then tested with 318 university-level faculty yielding excellent discrimination. Each question retained in the r-ATI has an individual question loading of .40 or above with many in the .60-.70 range (Trigwell & Prosser, 2004). Question loadings for each factor range from .44 to .74 in the testing of the revised scale.

Characteristics of the organization.

Although a myriad of tools exist to explore perceptions of organizational behaviors the main tools considered for inclusion in this study were the Perceived Organizational Support Scale (POS) (Eisenberg, Huntington, Hutchison, & Sowa, 1986) and the Siegel Scale of Support for Innovation (SSSI) by Siegel and Kaemmerer (1978). Both scales are often used and well-validated so were viable options. The POS measures beliefs and attitudes about support provided to employees by employers where the SSSI is more innovation focused, specifically looking at the support for changing behaviors, not just overall support for employees. Because the adoption of active learning involves a major shift in paradigm, the inclusion of acceptance or support for innovation is paramount so the SSSI was chosen as the more appropriate too.

The SSSI consists of 61 items derived from multiple previous research endeavors of the primary investigator. Each item is scored on a six point Likert-type scale with gradations ranging from strongly agree to strongly disagree with no neutral point. After development of an item pool, the tool was pilot tested with a small group of participants (n=25), revised, then distributed to a larger sample (n=2,135) for factor analysis. A third study (n=58) validated the factors established in the larger sample. Three main factors emerged from Siegel and Kaemmerer's analysis: support for creativity (the degree to

which a person feels supported independently pursuing new ideas), tolerance of differences (acceptance of diversity among its members), and personal commitment (the degree to which person feels committed to the institution). Factor loadings for the entire scale range between .28 and .70, with Factor 1 Support for Creativity loading all items at .40 or above. The phenomenon of interest for this study is the degree to which faculty feel supported by the organization in the adoption of innovative evidence-based teaching methods, so only the 24 items directly related to Factor 1 (Support for Creativity) will be utilized.

Characteristics of communication.

For this factor, the BARRIERS Scale utilizes two main constructs for communication: the dissemination of information and the person-to-person transmission of information. Because of this bipartite nature, two different tools were pursued. For dissemination of information, the Edmonton Research Orientation Scale (EROS) is the most obvious choice. Well-tested in nursing but also predicated on Roger's Theory of Diffusion (2005), this tool is formatted in two sections, the first consisting of background information about exposure to research, self-rated understanding of specific topics, etc. and the second which assesses participant values, involvement, perspectives, and use of research. Because the phenomenon of interest for this study is nursing faculty, the majority of whom have advanced degrees in nursing, the EROS evaluation of exposure to, involvement with, and use of research would likely not yield useful information for this study so will not be utilized.

Pursuing the second aspect of communication – person-to-person transmission presented more difficulty in locating a usable tool. After much searching, the two most

applicable tools appeared to be Perceived Communication Openness Measure (COM) from Roberts (1987) and the Sources of Practice Knowledge Questionnaire (Estabrooks, 1998). Building on previous work, the COM consists of 13 items assessing both formal and informal communication patterns within an organization. Each of the items loads at .60 or higher, providing excellent discrimination. The main concern with this tool is that it is largely focused on supervisor-subordinate communication rather than peer-to-peer communication. For the intended purpose, a tool which more effectively analyzes peer to peer communication was desired as Roger's Theory of the Diffusion of Innovation asserts the impact of informal communication patterns. An additional benefit of the Estabrooks tool is that it measures other aspects of knowing such as aesthetics, ethics, and reflection as well.

The Sources of Practice Knowledge Questionnaire was developed by Estabrooks in 1998 to identify the sources which nurses use to find information to guide their nursing practice. Using Baessler, et al's (as cited in Estabrooks, 1998) Research Utilization Questionnaire as a foundation, additional items were added to capture knowledge gained through non-formal channels as well. The resulting questionnaire is 16 Likert-type items which assess the frequency (never, seldom, sometimes, frequently, always) with which a nurse acquires practice knowledge through specific communication channels (i.e. from colleagues, textbooks, research journals, in-services or conferences, etc.).

Data Collection

Utilizing the online survey administrator SurveyMonkey.com, data were collected electronically in September 2011. The use of online data collection allowed for true anonymity of responses, ease of completion (increasing response rates), secured storage,

decreased cost of collection, as well as the ability to obtain data quickly from geographically disparate institutions.

A priori sample size calculation for a Student's t-test based on a desired alpha level of .05, small effect size (.20) and desired power of .80 (Sloper, 2011) indicated a sample size of greater than 310 was necessary. Upon receiving an adequate number (n=328) of complete surveys in the first 10 days after the survey launched, data collection was closed. A total response of 409 users logged on to the survey, of which 9 did not agree to participate, leaving a beginning sample size of 400. Attrition from the survey was substantial with losses at nearly every progression mark (see Table 3) possibly indicating survey fatigue. For the majority of participants who completed the survey, the actual time involved to complete all 90 questions was the anticipated 15 minutes or less. Several respondents were logged on to the survey in excess of 45 minutes potentially indicating that they had been interrupted by another activity.

Table 3

Number of Participants Completing Survey Components

Survey Component	Completed *n*	Completed %
Informed Consent	400	100
Demographic Information	378	94.5
Percent of Class Lecturing	375	93.8
BARRIERS Scale	328	82
Approaches to Teaching Inventory	320	80
Support for Change	309	77.3
Sources Practice Knowledge	305	76.3

Data Analysis

All data analyses were conducted using IBM SPSS Version 18® software. The dataset was first screened for missing information. As noted earlier, there was consistent attrition throughout the length of the survey. Of the completed surveys, a random distribution of individual missing values was found throughout the survey. Further analysis revealed no consistent patterns (either by respondent or by item) so individual missing values were excluded pair-wise when needed.

Demographic Analysis

Descriptive analyses were performed for demographic data. Tests of normality were assessed through analysis of skewness, kurtosis and visual inspection of the plots. Tabachnick and Fidell (2007) assert that assessing the shape of the of the distributions is more important than establishing significance levels through formal inference tests when sample sizes are greater than 200, as in the sample for this study. Use of these methods of assessing normality revealed a mixture of both normally and non-normally distributed data. Components of the data which conformed to the assumptions of normality were analyzed parametrically and non-normally distributed components received non-parametric analyses. Visual inspection of the histogram and other plots (see Appendix D) support this designation. Tabachnick and Fidell (2007) suggest considering transformation of non-normal distributions if the transformation does not make interpretation of the data more difficult. This is done so that power is not lost through use of non-parametric analysis methods. Attempted transformations of the data with log, log 10, and square root conversion did not improve compliance with the assumptions of normality so the original values were retained and non-parametric analyses used.

Question 1 Analysis

To answer Question 1, "What demographic characteristics of nursing faculty are associated with the adoption of active learning strategies?" analysis was carried out using the question 10, "In an average class session, what proportion of the time do you spend lecturing?" as the independent variable. This question was chosen as an indication of the degree to which a faculty has adopted evidence-based educational methods as there is essentially no available research which demonstrates lecture as a superior instructional method for student learning. A scatter plot was created for each pair of variables then analyzed for distribution. No significant outliers were identified.

Because the independent variable was not normally distributed and could not be transformed to meet the criteria for a normal distribution, non-parametric analysis was used, specifically a Spearman's Rho for scaled variables (age, years teaching, number of courses taught) and Kendall's Tau for categorical variables (gender, level of program). For the level of program analysis, the type of program in which the faculty does the majority of teaching was ranked with diploma programs coded as a 1, associate degree programs coded as a 2, baccalaureate programs coded as a 3 and masters programs coded as a 4. Correlation of gender and amount of time lecturing during an average class session were analyzed using point-biserial analysis, a specific form of a Pearson's Product Moment Correlation where one variable is dichotomous and the other is continuous.

Question 2 Analysis

To answer the second question, "Which component(s) of the BARRIERS Scale do faculty perceive as the greatest barrier to the adoption of active learning strategies?"

only answers from the BARRIERS Scale were analyzed. First, the scale was assessed for reliability in this sample then for congruence with previous factor analysis. Next mean scores for each factor were established and evaluated for normality of distribution. Because three of the four factors did not meet the criteria needed for a normally distributed sample, non-parametric analysis using Kruskal-Walis formula was performed to assess the differences in sum ranks. The dependent variable for this analysis was the amount of time spent lecturing during a typical class session. Groupings for this analysis were lecture amount proportion 0-49 (n=90, 28%), 50-70 (n=104, 32%), and 71-100 (n=127, 40%) creating a roughly one-third distribution for each group. A more equal distribution of responses was not possible because of large numbers of responses being grouped at the lecture amount 50% (n=70) and again at 75% (n=45). Content analysis of the open-ended questions assessing additional perceived barriers

Question 3 Analysis

To analyze the question, "Are there differences in individual nursing faculty score on their perceptions of the communication of educational research as measured by the BARRIERS Survey and the Sources of Practice Knowledge Survey?" individual faculty scores from the BARRIERS Scale Factor 1 – Characteristics of the Adopter, are compared to scores from the revised Approaches to Teaching Inventory (r-ATI) to determine if differences in measurement. Non-parametric analysis of r-ATI mean to Factor 1 mean using Kappa Measure of Agreement was used to determine the degree of agreement between the two measurement tools. Additionally, non-parametric Spearman's Rho correlation analysis was performed to assess which of the tools was most closely associated with use of lecture.

Question 4 Analysis

For the fourth question, "Are there differences in individual nursing faculty score on the characteristics of the adopter as measured by the BARRIERS Survey and the Revised Approaches to Teaching Inventory?", the Siegel Scale of Support for Innovation (SSSI) responses were compared with Factor 2 – Characteristics of the Organization responses from the BARRIERS Scale. Non-parametric analysis of factor means using Kappa Measure of Agreement was used to determine the degree of agreement between the two measurement tools. Additionally, non-parametric Spearman's Rho correlation analysis was performed to assess which of the tools was most closely associated with use of lecture.

Question 5 Analysis

To analyze the fifth question, "Are there differences in individual nursing faculty score on their perceptions of organizational support for innovation as measured by the BARRIERS Survey and the Siegel Scale for the Support of Innovation Survey?" individual faculty scores from the BARRIERS Scale Factor 3 – Characteristics of the Organization were compared to scores from the Siegel Scale for Support of Innovation. Non-parametric analysis of factor means using Kappa Measure of Agreement was used to determine the degree of agreement between the two measurement tools. Additionally, non-parametric Spearman's Rho correlation analysis was performed to assess which of the tools was most closely associated with use of lecture.

Question 6 Analysis

The last question, "What factors predict the adoption of active learning strategies by nursing faculty?" was analyzed using standard multiple regression analysis. With the

dependent variable of proportion of time spent lecturing during a typical class session, the mean score for each measurement scale (or subscale if available) was entered as the independent variables. This created eight independent variables: BARRIERS Factor 1 and the two aspects of the r-ATI (ITTC and CCSC) capturing different aspects of the individual adopter, BARRIERS Factor 2 and SSSI capturing characteristics of the organization, BARRIERS Factor 3 capturing aspects of the innovation, and BARRIERS Factor 4 and SPK capturing different characteristics of the communication of research findings.

Ethical Assurances

Permission to use each of the tools for data collection was secured from the originating authors. Participants were protected from harm using all available safe-guards. Institutional Review Board approval from the researcher's home institution was obtained prior to initiation of any research. This study was deemed exempt from full board review. Because this survey was completed anonymously, no unique identifiers were collected, and participation was completely voluntary it is estimated that participants incurred no more than minimal risk. Data has been securely transferred at each transmission and will be kept securely stored and destroyed according to University of Nevada, Las Vegas Graduate College procedures.

CHAPTER 5 RESULTS

Demographic Characteristics of Respondents

Overall, the sample roughly reflects current demographics of nursing faculty (see Table 4): 97% of respondents were female; the median age was 54 with 40% of respondents over the age of 55, and 35% hold a doctorate degree. These characteristics largely parallel the NLN and Carnegie Foundation findings (Kaufman, 2007). Respondent years teaching ranged from 1 to 48 years with a mean of 13.73 and a standard deviation of 9.89 years. The majority (53%, *n*=170) have their primary teaching responsibility at the baccalaureate level and roughly one-third (32%, *n*=104) teaching at the associate level. This parallels national proportions of accredited programs with 820 (56%) baccalaureate level programs and 600 (34%) associate level programs. Although not all states were represented in this sample, a total 43 different states plus the District of Columbia received at least one response.

Table 4

Demographic Characteristics of Sample Compared to National Averages

	National	% This Sample	*n* from this sample
Age (median)	55 years	54 years	
Age ≥ 55	48%	45%	145
Female	96%	96%	308
Earned Doctorate	33%	35%	111

Source: Kafuman, K. (2007)

Level of Primary Teaching Responsibility			
Diploma	4%	1%	3
Associate	34%	32%	104
Baccalaureate	56%	53%	170
Master	6%	13%	42

Source: AACN & NLNAC (2011)

Lecture Amount

Respondents indicated that overall they spend an average of 56% of class lecturing with a range of 0 to 100% and a standard deviation of 26.32. Nearly three-quarters of all respondents lectured for more than half of each class session. As predicted by Tabachnick and Fidell (2007), the distribution of lecture in this moderately large sample does not meet formal tests of a normally distributed sample.

Question 1 – Relationship of Demographic Variables and Active Learning

Spearman's Rho analysis revealed that the proportion of time spent lecturing has a small negative correlation to the years teaching (r = -.152, p=.006) indicating that the longer someone has been teaching the less time they spend lecturing during an average class session. The converse of this would also be true; a newer teacher is likely to spend more time lecturing than an experienced teacher. Age and number of courses taught did not demonstrate a significant relationship to the amount of time lecturing. An incidental finding of this analysis is that there is a strong relationship between age and years teaching but does not provide any additional information related to use of lecture as it is an expected correlation.

Kendall's Tau analysis also demonstrated a small negative correlation between the level of the program usually taught and the amount of time spent lecturing (T = -.115, p=.012) indicating that faculty who teach primarily in lower-level programs (diploma and associate degree) tend to use slightly more lecture than higher-level programs (baccalaureate and master degree). Point-biserial results do not demonstrate a significant relationship (r= -.60, p=.285) between gender and use of lecture.

Question 2 – Components of Roger's Theory

The developers of the BARRIERS Scale (Funk, Champagne, Wiese, & Tornquist, 1991) assert that reliability for the scale is adequate with reliability for Factors 1, 2, and 3 having a Cronbach's alpha levels of .80, .80, and .72 respectively in initial testing. Factor 4 was somewhat less reliable at .65 but item-total correlations were each in the acceptable range (.30 to .55) and the overall reliability went down significantly with deletion of any item (Funk, Champagne, Wiese, & Tornquist, 1991). Cronbach's alpha for this sample for the entire survey was .90 with all individual items at .89 or above (see Appendix D).

Principle component analysis using Varimax rotation yielded a six factor solution with eigenvalues >1 and coefficients >.40. In evaluating the initial extracted components, two factors had only two items loading to each factor. Analysis of these items demonstrated that they were substantively sub-components of the original factors as established by the authors of the scale. Forcing a four-factor solution produced very good congruence with the original four factors. Of the 28 original items, all but 4 loaded to their original factor (see Appendix D). Of the four items which did not load to the original factors, two items (14 and 26) did not load at .40 or above. Item 26 has never produced significant loadings but has been retained in the instrument as it is considered to yield useful data despite low-loading (Funk, Champagne, Wiese, and Tornquist, 1991). Item 14 (the nurse does not feel that the results are generalizable to their own setting) had very low load at .20 so was not included in this analysis.

The other two items (Items 15 and 23) loaded to different factors in this sample. Item 15, the nurse is isolated from knowledgeable colleagues, loads to Factor 1 - Characteristics of the Adopter in the original use of the scale but loads to Factor 2 -

Characteristics of the Organization in this sample. This is a logical transfer as an individual rarely has influence on the quality of their peers so was retained under Factor 2. Item 23, the research is not reported clearly and readably, originally loaded to Factor 4 - Characteristics of the Communication, but loads to Factor 1- Characteristics of the Adopter in this sample. This transfer is less obvious than for Item 15, but may have resulted from respondents having difficulty understanding the terminology and methods used in educational research, which could be viewed as an individual characteristic.

Evaluation of mean scores from each factor reveals that Factor 4 – Characteristics of the Communication present the greatest perceived barrier (mean = 1.97) with Factor 2 – Characteristics of the Organization (mean = 1.87) narrowly trailing. Analysis of the individual items reveals that four of the six items with the highest mean score were components of Factor 4. Specifically, these items identify specific attributes of the communication of the research (including articles) are not readily available (mean = 2.20), implications for practice are not made clear (mean = 2.09), statistical analyses are not clear (mean = 2.13) and relevant literature is not compiled in one place (mean = 2.20). Two additional items from Factor 2 – Characteristics of the Organization also demonstrated mean scores above 2.00. These items identify that there is not enough time to read research (mean = 2.10) and there is not enough time on the job to implement new ideas (mean = 2.32) as significant barriers. It is interesting to note that the concept of time is consistent through the four of the top six barriers – nursing faculty perceive that there is not enough time to find, read, analyze, and implement promising methods.

Because the sample does not demonstrate normality of distribution non-parametric analysis of the means for each factor was necessary. Kruskal-Wallis analysis

revealed that Factors 2 (H =10.30, p = .006) and 4 (H =6.86, p=.032) demonstrate statistically significant difference in responses based on amount of lecture used in a typical class session.

Content analysis of the open-ended questions assessing additional perceived barriers reveals no new themes but rather personalization of the existing factors, consistent with the findings of previous use of the scale (Funk, Champagne, Wiese, & Tornquist, 1991). The most consistent theme identified was that of time but spans two different factors – Factor 2 Characteristics of the Organization and Factor 4 Characteristics of the Communication. As previously discussed, there are multiple aspects to the concept of time including the lack of time to find and read the research, lack of time to implement new ideas, etc. In the open-ended questions, additional components of the concept of time identified included lack of time to complete all job requirements; an over-burdened curriculum leaves little time for implementation of new ideas, lack of time for faculty development of teaching skills, and lack of contemplation, prep or release time due to faculty shortages. The concept of lack of contemplation, prep or release time was also related to issues of funding and financing – educational research is not valued as highly as clinical research.

The second theme commonly discussed was that of a lack of organizational support for change including lack of cooperation from students, colleagues, administration or the institution. Common organizational barriers were often described using terms such as “students who like to be entertained”, “pressure to teach to the NCLEX”, “old habits die hard” or “institutional tradition”. Additional organizational barriers also include a lack of infrastructure and incentives to change pedagogy as well as

faculty evaluation methods which discourage use of innovative or unconventional methods. All of these aspects are captured in Factor 2 - Characteristics of the Organization.

Several respondents also identified that the quality of published nursing education research as a significant barrier with many studies having small sample sizes, poorly defined outcome measures, and poor generalizability to different environments. These aspects would likely be considered Characteristics of the Innovation – Factor 3 but this is not evidenced in the responses to the structured survey questions providing an indication that they are not perceived as a significant barrier to use.

Question 3 –Characteristics of the Adopter

The BARRIERS Scale Factor 1 reliability has been reported to be adequate with a Cronbach's alpha of .80 (Funk, Champagne, Wiese, & Tornquist, 1991). For this sample, Factor 1 Cronbach's alpha was found to be .77 in congruence with previous uses of the survey. Reliability for the r-ATI has been reported at .73 for the ITTF component and .75 for the CCSF component. For this sample, reliability was above previous uses with a Cronbach's alpha of .84 for the ITTF component and .80 for the CCSF component. Principle component analysis results (see Appendix D) were in exact congruence with previous results from Trigwell & Prosser (2005).

Distribution of r-ATI mean scores follow a roughly normal distribution as however Factor 1 does not (see Appendix D3), necessitating non-parametric comparison of means. Results demonstrate poor agreement ($\kappa = -.001$, $p > .05$) according to Cohen's Conventions (as cited in Pallant, 2008). This lack of agreement is likely because the two tools measure different aspects of the same construct but from different aspects. The r-

ATI assesses the degree to which a faculty member is more teacher-centered or more student-centered and Factor 1 measures the inclination of the individual faculty to utilize research findings. Descriptive analysis of the results of the r-ATI responses demonstrates a roughly normal distribution with respondents being more student-centered than teacher-centered (see Appendix D).

Spearman's Rho analysis revealed a moderately strong correlation between the mean score on the ITTF aspect of the r-ATI and use of lecture (r =.345, p<.0001) and an inverse correlation with the CCSF aspect (r = -.161, p =.004) (see Appendix D). Although correlation does not determine causation or allow for the prediction of outcomes, it does provide a measure of the degree to which two phenomenon are related. This is logical because higher mean scores to the ITTF indicate a stronger propensity for faculty to focus on "covering content" which is most easily accomplished through use of formal lectures. Interestingly, mean score to Factor 1 also demonstrates a small correlation with lecture amount (r =.129, p=.021), but not to the degree that ITTF and CCSF do. Factor 1 is also minimally correlated with ITTF (r =.151, p=.007) and inversely correlated with CCSF (r = -.204, p<.0001) further demonstrating that they measure different aspects of the same construct with ITTF the most strongly correlated of time spent lecturing.

Question 4 –Characteristics of the Organization

Factor 2 reliability has been reported to be adequate with a Cronbach's alpha of .80 (Funk, Champagne, Wiese, & Tornquist, 1991). For this sample, Cronbach's alpha for Factor 2 was found to be .76 which is roughly in congruence with previous uses of the survey. Reliability for the SSSI has been reported at .94 (Siegel & Kaemmerer, 1978).

For this sample, Cronbach's alpha was .93 indicating similar reliability to previous uses. Neither the SSSI nor Factor 2 complies with the assumptions of normality.

Kappa Measure of Agreement demonstrate poor agreement (κ= -.002, p=.163). As with the previous comparison, this is likely because the two tools measure different aspects of the same construct with the SSSI assesses the level of organizational *support* for innovation perceived by faculty and Factor 2 measures the perceived *barriers* which may not include organizational support. Previous use of the instrument (Siegel & Kaemmerer, 1978) among secondary schools revealed that faculty at schools considered "alternative" mean score was 3.9 with mean score from this sample exceeding that baseline with a mean of 4.2 providing evidence that nursing faculty feel that their organization is supportive of innovation.

Because there was not significant agreement between the two measurement tools and because they measure different aspects of the same construct, non-parametric correlation analysis was performed to assess which of the tools was most closely associated with use of lecture. Spearman's Rho correlation revealed a significant correlation (r =.181, p=.001) between mean score for Factor 2 and amount of time using lecture in an average class session. Interestingly, there is a moderate but inverse relationship (r = -.444, p<.001) between Factor 2 and SSSI indicating that as organizational support for innovation increases the nurse faculty perceptions of organizational characteristics as a barrier to the use of active learning decreases.

Question 5 –Characteristics of the Communication

Reliability for only the items in Factor 4 in this sample demonstrated to be minimally adequate with a Cronbach's alpha of .73. This is higher than previous reports

of reliability of .64 (Funk, Champagne, Wiese, & Tornquist, 1991). Reliability for the SPK in this sample was similarly robust with a Cronbach's alpha of .74. Unfortunately, previous reliability for the SPK is not available for comparison.

Comparison of mean scores between Factor 4 and the SPK demonstrated a large difference with the SPK mean response of 3.4 and a standard deviation of .39 and Factor 4 having a mean response of 2.0 and standard deviation of .6. Kappa measure of agreement demonstrates poor agreement (κ=-.003, p=.523) however this is not unexpected as the SPK measures frequency of use of particular sources of information where Factor 4 assesses dissemination of research products, essentially capturing the full scope of research communication.

As with previous determinations of correlation, because there was not significant agreement between the two measurement tools and because they measure different aspects of the same construct, non-parametric analysis was performed to assess which of the tools was most closely associated with use of lecture. Spearman's Rho analysis of the proportion of time lecturing during an average class session correlated with the mean response to the BARRIERS Factor 4 and the SPK reveals that Factor 4 has a small correlation (r = .146, p = .009). There is also a small but inverse correlation (r = -.158, p =.006) between responses to Factor 4 and the SPK indicating that the tools measure different aspects of the characteristics of the communication of research findings in nursing education.

Although the findings above provide insight to the individual characteristics which influence a nurse faculty in their use of research and active learning, perhaps a more useful finding from this analysis are the descriptive findings that the two most

consistent sources for knowledge for nurse faculty were attending conferences or workshops (*n*=234, 76.3%) and personal experience (*n*=240, 78.4%) with over three-quarters of respondents stating that the *frequently* or *always* use information from these sources. The next most frequently used sources are and what is learned from peers or colleagues (*n*=176, 57.7%) and intuition (*n*=149, 48.9%) with each of these questions receiving approximately half of respondents replying *frequently* or a*lways*. Research articles published in nursing (*n*=150, 50%), educational (*n*=137, 44.9%) or research (n=132, 43.3%) journals and information from educational texts (*n*=124, 40.9%) also received substantial use, but it is important to note that nearly half of all respondents noted that they only use them *sometimes* or s*eldom* with 2% (*n*=6) of respondents admitting to *never* using these sources.

Question 6 – Factors Predicting the Use of Active Learning

Analysis of correlations between independent variables demonstrated all correlations to be less than .500 indicating independence of each variable (see Appendix D). Preliminary analysis (see Appendix D) was conducted to assure that there were no violations of the assumptions of normality, linearity, multicollinearity and homoscedasticity as using the criteria set forth by Tabachnick and Fidell, 2007. The sample demonstrated a relatively normal distribution, largely linear correlation, the absence of multicollinearity, and a homoscedastic relationship. Collinearity diagnosistcs revealed that all tolerances were greater than .10 and variance inflation factors less than 10, the limits asserted by Pallant (2008). Further evaluation identified 21 multivariate outliers. The analysis was then re-run without these cases yielding a model which predicts 15.8% of the variance in the amount of lecture used by faculty (see Appendix D).

The model only explains a small amount of the variance indicating that use of lecture is likely a multi-factorial phenomenon.

Summary of Results

The total sample size for this analysis was n=328. It is not possible to determine the response rate as invitations were initially sent to Deans/Directors who forwarded the invitation to their eligible faculty creating an unknown quantity of individual invitations. Demographic characteristics of respondents closely parallels national trends with 95% being female, a median age of 54, roughly one-third holding an earned doctorate and distribution of primary teaching responsibility by program level mimicking those of accredited programs making this a representative sample to the target population.

Results indicate that, overall, nearly three-quarters of all faculty lecture for at least half of each class session. The proportion of time spent lecturing has a small correlation (r = -.152, p=.006) with years teaching indicating that the longer a faculty has been teaching, the less likely they are to use lecture as a primary instruction method. Kendall's tau analysis of the level of program also has a significant negative correlation (T = -.115, p=.012) with use of lecture implying that lecture is used more frequently at the lower levels (diploma and associate degree) of nursing education. Age and gender did not form significant correlations with use of lecture.

The component of Roger's Theory of the Diffusion of Innovation which demonstrated the highest mean score was Factor 4 – Characteristics of the Communication (mean = 1.97) with Factor 2 – Characteristics of the Organization (mean = 1.87) and Factor 3 – Characteristics of the Innovation (mean = 1.73) following. Evaluating the individual items within the BARRIERS Scale reveals that of the top six

barriers, four are related to the concept of "time" and span Factors 2 and 4. Content analysis of open-ended questions did not reveal any additional or new themes but emphasized the concept of time as a key barrier to the use of research.

Comparison of the BARRIERS Scale to the other tools used within this analysis indicated little agreement. This was to be expected as each additional tool was chosen to complement the data obtained by the BARRIERS tool. Overall, the Information Transfer-Teacher Centered component of the r-ATI (r =.345, p<.0001) provided the most direct indication of use of lecture with Factors 2 (r =.181, p=.001) and 4 (r =.146, p =.009) from the BARRIERS Scale demonstrating only small correlations. Findings from the r-ATI demonstrate that respondents were substantially more Conceptual Change-Student Centered (mean = 3.52) than Information Transfer-Teacher Centered (mean = 2.99). Descriptive analysis of the Sources of Practice Knowledge revealed that nurse faculty use attendance at workshops and personal experience as their most frequent source for educational knowledge with more than three-quarters of respondents indicating that they "frequently" or "always" use these sources. Formal sources of knowledge such as published articles and textbooks were used by less than half of respondents indicating that they "frequently" or "always" use these resources to guide their teaching practice.

Multiple regression analysis of the eight components of this survey indicate that response to the two components of the r-ATI (ITTF and CCSF) provide the greatest prediction of use of lecture among nursing faculty. Overall these two factors explain 15.8% of the variance found in this sample. This relatively low predictive value likely indicates that there are a multitude of factors which impact faculty use of lecture.

CHAPTER 6 - SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to identify nurse faculty perceptions of factors which influence the adoption of active learning strategies in their teaching practice. This was accomplished through a national survey of pre-licensure nursing faculty at programs accredited by the National League for Nursing Accrediting Committee. Using Roger's Theory of the Diffusion of Innovation as a guiding framework, this study explored the effects of Characteristics of the Adopter, Organization, Innovation, and Communication Channels as they influence the diffusion of educational methods in nursing education. With the BARRIERS Scale as a foundation, three additional tools were chosen to supplement the information collected in order to assure that multiple aspects of each construct were captured.

The demographic characteristics of this sample (n=328) closely match those of the entire population of nursing faculty on the basis of gender, age, highest degree attained, and level of program enhancing the generalizability of the findings to the target population of all nursing faculty in the United States. Results demonstrate that nearly three-quarters of all faculty respondents report using lecture for at least half of a typical class session. This is in congruence with findings from previous nursing studies (Brown, Kirkpatrick, Greer, Matthias & Swanson, 2009; Schaefer and Zygmont, 2003; Greer, Pokorny, Clay, Brown, S. & Steele, 2011; IOM, 2003; etc.) as well as those outside of the health professions (Bedgood, et al, 2010). Other significant findings are described below.

Question 1 – Relationship of Demographic Variables and Active Learning

Results from this survey demonstrated that the demographic variables of age, gender, and highest degree attained are not indicative of the use of active learning. This

is supported by both Roger's Theory as well as many findings within nursing (Fink, Thompson & Bonnes, 2005; Ashley, 2005; Champion & Leach, 1989, etc.). The only study to find demographic characteristics significantly correlated with use of research to inform practice was Hanberg's (2008) study of the barriers to use of high-fidelity simulation in nursing education in which age was a contributing factor. In a larger and more recent study, Squire, Estabrooks, Gustavsson and Wallin (2011) found that a favorable attitude towards research is the only individual characteristic which consistently demonstrates a positive effect on use of research in nursing practice. These findings combined with the results from this study indicate that an aging and predominantly female faculty should not present a barrier to the use of active learning.

An inverse correlation was noted between length of time teaching and use of lecture. Because length of time in practice has not been correlated with use of research among clinical nurses (Squires, Estabrooks, Gustavsson & Wallin, 2011), there may be factors in addition to research utilization which impact pedagogical choices for nursing faculty. Potential concepts to pursue would include both how faculty develop their pedagogy and if that pedagogy transforms with experience. Additional exploration of this topic would be beneficial.

The level of program in which the respondent primarily teaches was correlated with the proportion of time spent lecturing with faculty at lower levels of pre-licensure education (diploma or associate degree) using more lecture. The reasoning for this difference was beyond the scope of this study but may be related to the above finding that nursing faculty who have been teaching longer tend to use less lecture and many novice nursing faculty begin their careers in associate level programs. Alternatively, this finding

may stem from the historical perspective of associate degree programs focusing more on nursing-specific content than liberal education and lecture is perceived as the most efficient way to convey large amounts of information quickly.

Question 2 – Components of Roger's Theory

Findings from this study are substantially similar to those of nurses in clinical practice, supporting use of research utilization (based on Roger's Theory of the Diffusion of Innovation) from clinical nursing as a proxy framework for the use of research by nurse faculty in academic settings. As has been found in clinical nursing (Funk, Champagne, Tornquist & Wiese, 1987; Hutchison & Johnston, 2003; Atkinson, Turkel, & Cashy, 2008, etc), Factor 4 – Characteristics of the Communication and Factor 2 – Characteristics of the Organization formed the greatest perceived barriers to the use of research in academic settings.

Specific items from Factor 4 which demonstrate the highest mean scores identify that nurse faculty perceive that relevant educational literature is neither easily located nor not readily available. This parallels findings from clinical practice with Fink, Thompson & Bonnes (2005), Brown, Wickline, Ecoff and Glaser (2008), and Niederhauser and Kohr (2005) all implicating a diffuse and widely distributed evidence-base as the key barrier to the use of research to guide clinical nursing practice. Ferguson and Day (2005) also assert that a disjointed knowledge base is a key barrier to the use of evidence to inform nursing education practice. This barrier can be minimized through the development of an easily accessible repository for up-to-date educational literature relevant to nursing education or the development of systematic reviews similar to the Cochrane Collaboration or the Campbell Collaboration.

Of the six individual items which had the highest mean score, four were focused on different facets of the concept of time – lack of time to locate and retrieve research (discussed above), lack of time to read research, and lack of time to implement new findings. The latter two aspects are classified under Factor 2 – Characteristics of the Organization. In clinical nursing practice, this lack of "slack time" has been determined to be a significant barrier by several authors as well (Fink, Thompson & Bonnes, 2005; Brown, Wickline, Ecoff & Glaser, 2008; Ashley, 2005; etc.). Kerfoot (2007) asserts that for clinical nurses, this lack of time to critically reflect on practice issues, research solutions, and develop implementation plans is antithetical to the tenets of evidence-based practice. Rogers Theory (2005) specifies that increasing organizational slack-time demonstrates a positive impact on the adoption of innovation. Thompson, O'Leary, Jensen, O'Brien-Pallas and Estabrooks (2008) also highlight how the lack of time to integrate evidence to practice is widening the theory-practice gap in clinical nursing.

Unlike the issue of a diffuse and widely distributed knowledge base, the perceived lack of time is not easily rectified. Both Thompson, et al (2008) and Kerfoot (2007) note that, in clinical nursing, the culture of "busyness" is valued as a tangible manifestation of accomplishment. Thompson, et al., (2008) explain the construct of busyness as "an individual perception of internalized pressure created by a situation where there is a shortage of time to accomplish valued work and often results in a reduced energy level" (p. 542). Time spent actively thinking about practice issues is not recognized as productive. In academia, a largely intellectual endeavor, one may anticipate a greater level of support for intellectual "busyness" instead of the physical "busyness" of clinical

practice, but perhaps the foundation of nurse educators initially as expert clinical nurses subverts this perception.

Beyond external perceptions of value and internalized pressure to accomplish more, the concept of busyness for nurse educators may have a quantifiable physical dimension. Nurse educators currently work an average of 56 hours per week when school is in session and 24 hours a week when school is out of session (Kaufman, 2007), slightly more than others in academia who work an average of just over 50 hours per week and health care practitioners in private practice who work an average of 47 hours per week (Hoffer & Grigorian, 2005). Because maintenance of current practices requires less mental time and energy for individual faculty, without organizational changes which create and protect slack time (i.e. valuing slack as integral to the stability and viability of the institution) , nurse faculty are likely to remain "too busy" to actively seek, evaluate and integrate educational research to their teaching practice. Williams and Coles (2007) support this citing that although most teachers in higher education were highly motivated to use research to inform their practice, lack of time to seek out research findings, accessibility of the results formed the greatest barriers to use. Qualitative exploration of this construct in higher education could provide insight as to how organizational factors impact perceptions of time, slack-time and busyness for academic faculty. In the short-range it will be difficult to improve slack-time for nursing faculty because of both budget constraints and the current faculty shortages which will likely continue to increase in the future (AACN, 2011). To develop slack time under these conditions, creative and mutually beneficial strategies such as developing partnerships between clinical agencies and educational institutions to maximize use of expert nurses as clinical teaching faculty

and developing collaborations between schools of nursing from different institutions which reduce redundancy may improve organizational slack time and thus the use of active learning.

Question 3 – Characteristics of the Adopter

Findings from this study indicate that the key characteristic of individual faculty which predicts use of active learning is the faculty member's role conception. Specifically, responses to the r-ATI which demonstrated a higher propensity to approach teaching form an information transfer (teacher-focused) perspective also demonstrated greater use of lecture. The converse was also true, faculty whose responses demonstrated more emphasis on conceptual change (student-focused) instruction were less likely to lecture. Respondent scores on the ITTF component of the r-ATI demonstrated the largest correlation to use of lecture among any of the variables studied. Although only a moderate correlation (r=.345, p<.0001), it is the single best predictor identified in this study.

These findings are consistent with those from previous research. Greer, Pokorny, Clay, Brown, and Steele (2010) found that faculty who viewed their role to be that of a guide for students were less likely to rely on lecture. Schaefer and Zygmont (2003) found that most faculty view their primary role to be that of instilling knowledge and the IOM (2003) found that faculty tend to utilize lecture to transmit large amounts of content. These last two findings, when combined, indicate that most nursing faculty view their primary role to instill knowledge so rely on lecture as an expedient delivery system for content. Kohtz (2006) also supports this result with the finding that although faculty view themselves as facilitators of learning, they lecture to "cover the content". Brown,

Kirkpatrick, Greer, Matthias and Swanson (2009) also find that faculty lecture to "cover the content". Findings from this study reinforce Kohtz's dichotomy in that faculty responses to the r-ATI indicate a student-centered approach yet most (72%) lecture for more than half of each class.

These findings also support assertions from previous studies but, perhaps more importantly, when considered in relation to the findings from Research Question 2, connect concepts which have not been directly linked in the past. Specifically, even though many faculty approaching teaching from a student-centered pedagogy, the majority continue to rely on lecture as a primary instructional method. Results from the BARRIERS Scale provide insight to the reason why this may happen – a lack of time. Specifically, faculty perceive that there is not enough time to consider new approaches or to find quality information which supports changing practice and content analysis from the open-ended questions reveals that an over-burdened curriculum which does not have room for changes in practice limits use of active learning. Even though faculty may want to use a student-centered approach, there are external pressures inhibiting the expression of that desire. Deeper exploration of the internal and external factors influencing faculty pedagogical approaches would be beneficial to the profession.

Also useful from the findings of this study is that faculty who view their primary role to be that of information transfer are more likely to use lecture as a primary instruction method despite a lack of evidence supporting its use. Information-focused faculty may resist the use of active learning because it reduces the time available for lecture and therefore the amount of content they can cover. While this seems intuitively true, several authors (Yoder and Hochevar, 2005; Cherny, 2007; Armbruster, Patel,

Johnson & Weiss, 2009, etc.) have demonstrated that the inclusion of active learning does not negatively impact course performance despite less time to "cover the content". Beyond not having a negative impact, active learning can improve student engagement (Kelly, Haidet, Schneider, Searle, Seidel, & Boyd, 2005), attitudes towards difficult content (Pugsely & Clayton, 2003), critical thinking skills (Ozturk, Muslu, & Dicle, 2007), performance on examinations (Yoder & Hochevar, 2005), clinical success (Hoke & Robbins, 2005; Winter, Matthers, & Nowson, 2002) and memory of course content (Cherney, 2008). Replication of studies specific to nursing education utilizing Yoder and Hochevar's (2005) format may begin to convince skeptical faculty that overall knowledge and performance on standardized examinations is not sacrificed when utilizing an active learning approach. It would also be beneficial to quantify faculty satisfaction with their chosen pedagogy as this information could be used to motivate disgruntled faculty to consider alternative approaches.

Changing faculty pedagogy is a slow transformative process where faculty must build upon small changes before taking on larger ones (Ironside, 2005; Clynes, 2008) and must be viewed as a long-term investment to improve nursing education. Studies which evaluate changes in pedagogy would need to begin with small interventions and occur over long periods of time to develop true changes.

Question 4 – Characteristics of the Organization

As noted previously in the discussion of Question 2 - Components of Roger's Theory, the characteristic of the organization most associated with research utilization in clinical nursing is that of time; specifically slack time to critically reflect on practice issues, find relevant research and implement findings. The findings from this study

indicate that nursing faculty also perceive this to be the greatest barrier. Because these aspects have been discussed in great detail in the results of Question 2, it will not be revisited here.

Beyond the concept of lack of slack-time, this study also demonstrated that nursing faculty generally view their institutions as supportive of innovation. Schell (2006) found institutional support to be a key facilitator to the use of innovative pedagogies in nursing education. This perception of openness to innovation in academia is in contrast to findings from clinical practice which indicate that lack of cooperation among peers (Schoonover, 2009) and administrators and lack of authority to change practice (Brown, Wickline, Ecoff & Glaser , 2008; LaPierre, Ritchey & Newhouse, 2004; etc.) as significant barriers to change. The findings of this study imply that a lack of organizational support for innovation as not perceived as a significant barrier in nursing education. Strategies which maintain this support of innovation in schools of nursing should be encouraged.

Question 5 –Characteristics of the Communication

Perhaps the most intriguing result of this analysis is that the most frequently used sources of practice knowledge among nursing faculty are informal, interpersonal, and aesthetic ways of knowing. These results support Patterson's (2008) conclusions of similar sources. Conceptually, this is congruent with Roger's Theory (2005) in that use of informal sources of knowledge and de-centralized communication patterns can have a substantial influence on the diffusion of innovation.

Although somewhat disturbing, the fact that less than half of respondents frequently utilize formal sources of knowledge (textbooks, research articles, etc.), it also

provides insight as to potential barriers to the dissemination of educational research. As discussed under the implications of Question 2, the development of systematic reviews or a central repository for educational literature may have limited effect on the use of active learning because few faculty access these sources regularly. Also, Squires, et al (2005) found that the influence of personal experience and local sources such as colleagues supersedes scientific evidence. Efforts for intervention may be better utilized through more active engagement of informal opinion leaders and creating champions within each school. This could be facilitated through the development of informal learning communities, presentations at local, regional and national conferences, or through small-scale faculty development efforts within geographically similar institutions. Faculty could share resources and knowledge on a larger scale through online networks such as Facebook, Twitter and other social media or through the development of active learning discussion boards.

Also of interest in this analysis is that nearly three-quarters of respondents (n=240) indicated that they use their personal experience as a key source of knowledge for their teaching practice on a "frequent" or "always" basis. Roger's Theory (2005) predicts that innovations which are compatible with personal experience are more likely to be adopted. As a practice profession, nursing education has relied on active learning in the form of practical clinical experience for centuries. It would likely be difficult to find a faculty member in the United States who would support nursing education without significant clinical practice experiences. However, personal experience with the efficacy of active learning during clinical rotations is often viewed as disparate from didactic instruction for many nursing faculty (Benner, Stuphen, Leonard & Day, 2010).

Highlighting the conceptual underpinnings of why active learning in the clinical setting is essential to learning and how those same tenets can be applied to classroom instruction may allow for faculty to more readily accept active learning in didactic instruction.

Question 6 – Factors Influencing the Use of Active Learning

Although the multiple regression analysis did not reveal a model with great predictive value, the key findings of this aspect are those discussed in the summary of Question 3 – Characteristics of the Adopter. The two most predictive factors of use of active learning are the responses to the r-ATI components (ITTF or CCSF) accounting for 15.8% of all variation. Addition of other factors evaluated in this study did not significantly add to the predictive ability of the model.

Because the best model available accounts for less than 16% of all variation, future research can focus on defining the other characteristics which influence the use of active learning. Aspects of Roger's model not specifically addressed in this study include characteristics of the individual adopter such as empathy, tolerance for ambiguity, socio-economic status and ability for abstraction. Characteristics of the communication not explored in this study, but possibly influencing adoption of active learning, are the social boundaries and structure of communication patterns. Aspects of the characteristics of the organization not included in this study were the size of the organization and economic resources available. Further study of all of these aspects may reveal a model with greater predictive value.

Limitations

The major limitation to this study was that it was done only at one point in time. Longer studies which assess the development and evolution of pedagogy for faculty would be beneficial for understanding the factors which influence this process. Also, as a convenience sample, the results might not be indicative of the target population as a whole. However, this limitation is somewhat mitigated by the representativeness of this sample to the target population.

The lack of a structured tool to study this phenomenon necessitated the use of a variety of tools, each chosen for their congruence with Roger's Theory of the Diffusion of Innovation. Although this approach has been used extensively in clinical nursing and results from this study indicate similar impediments to the use of research, a different framework (i.e. Information Literacy) may yield a model which more accurately predicts use of active learning by nursing faculty.

Summary

Key findings from this study are two-fold: first, how individual faculty approach teaching (teacher-focused or student-focused) is the greatest single predictor to the use of active learning in nursing education and second, the broader concept of time (including time to contemplate practice issues, find and evaluate research, and implement changes) is the greatest perceived barrier to the use of active learning. Demographic characteristics such as age and gender were not correlated with the use of active learning but type of program and years teaching had significant correlations.

Suggestions for future research include further exploration of the concept of time in academia and specifically within nursing education, larger and more comprehensive

studies which compare the efficacy of active learning to traditional lecture, exploration of the development and transformation of pedagogy, faculty satisfaction with their chosen pedagogy and examination of aspects of Roger's Theory not assessed in this study but which may impact the diffusion of nursing education research.

The findings of this study can be used immediately to increase the use of active learning though capitalizing on the perception that institutions and organizations are supportive of innovation, developing a centralized repository or systematic reviews for easier access to research findings, and through connecting the efficacy of active learning in the clinical arena to the use of active learning in the class room. A longer-range use for the findings of this study include developing strategies which will migrate faculty from a focus on traditional conceptions of knowledge to more progressive ones applicable to health care in the 21st century through focusing less on transmission of knowledge to those which focus on knowledge management and integrated learning.

Conclusion

Nursing education is facing a crisis – outdated conceptions of education are not preparing graduates to effectively transition to practice. Exponentially increasing factual knowledge has surpassed the ability of human memory necessitating a change in pedagogy. Where students need to work in multidisciplinary teams, they are educated in professional silos. Where new graduates need to be able to synthesize information from multiple sources then articulate their clinical judgment to other members of the healthcare team, they are educated using static information sources and evaluated using standardized written tests. No longer able to tolerate unsupported and anachronistic teaching methods,

nursing faculty must utilize active learning to adequately prepare students to function in practice.

Nursing faculty, like clinical nurses, perceive systematic organizational and communication factors to be the great barriers to the use of evidence to inform practice. Specifically, a perceived lack of time to reflect on practice issues, search out and evaluate research findings then develop and implement changes in practice inhibit the use of research-supported educational methods such as active learning. Individual characteristics such as age, gender, or years in practice rarely influence the use of active learning.

Findings from this study add to the body of knowledge related to nursing education methods and can be used to develop immediate interventions to increase the use of active learning, create longer-range plans to migrate faculty to more contemporary pedagogies, and to direct future research efforts.

APPENDIX A – INVITATION TO PARTICIPATE

Dear Dean/Director:

As a doctoral student at the University of Nevada, Las Vegas, I am conducting a study which explores factors influencing nursing faculty in the adoption of evidence-based active learning strategies. Through identification of these factors, we hope to learn more about how to increase use of these strategies in preparing nurse-graduates to enter the healthcare environments of the 21st century. I am requesting your consideration in forwarding the information contained in this e-mail to your nursing faculty so that they may participate in this 15 minute electronic survey if they so choose.

Approval for this study has been obtained from the Institutional Review Board at the University of Nevada, Las Vegas. All information collected in this study is anonymous so will not be linked to any particular faculty member or institution.

Enclosed in this email are the informed consent for those who choose to participate, a link to the survey and a copy of the IRB approval form. Participation in the survey should take approximately 15 minutes.

Faculty wishing to participate in this survey may access it by clicking on the following link: https://www.surveymonkey.com/s/active_learning

If you have any additional questions or would like additional information about this study, please do not hesitate to contact myself or Dr. Candela.

Sincerely,

Deborah Lowell Shindell, PhD-C
Student Investigator
University of Nevada, Las Vegas
shindell@unr.edu
(775)682-7152

Lori Candela, EdD, RN, FNP-BC, CNE
Principal Invesitgator
University of Nevada Las Vegas
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APPENDIX B – IRB APPROVAL

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Biomedical IRB – Exempt Review
Deemed Exempt

DATE: July 27, 2011

TO: **Dr. Lori Candela,** Physiological Nursing

FROM: Office of Research Integrity – Human Subjects

RE: Notification of review by /Josi dos Santos/Ms. Josi dos Santos, CIP
Protocol Title: Factors Which Influence the Use of Active Learning Startagies by Nursing Faculty
Protocol # 1106-3859

This memorandum is notification that the project referenced above has been reviewed as indicated in Federal regulatory statutes 45CFR46 and deemed exempt under 45 CFR 46.101(b)2.

PLEASE NOTE:
Upon Approval, the research team is responsible for conducting the research as stated in the exempt application reviewed by the ORI – HS and/or the IRB which shall include using the most recently submitted Informed Consent/Assent Forms (Information Sheet) and recruitment materials. The official versions of these forms are indicated by footer which contains the date exempted.

Any changes to the application may cause this project to require a different level of IRB review. Should any changes need to be made, please submit a **Modification Form**. When the above-referenced project has been completed, please submit a **Continuing Review/Progress Completion report** to notify ORI – HS of its closure.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

APPENDIX C - SURVEY

Perceived Barriers

TITLE OF STUDY: "FACTORS WHICH INFLUENCE THE USE OF ACTIVE LEARNING STRATEGIES BY NURSING FACULTY."

Principal Investigator: Lori Candela, EdD, RN, APRN, BC, CNE
Student Investigator: Deborah Shindell, MSN, RN, ARNP, CNE

Contact: Lori Candela, EdD at (702)895-2443 or lori.candela@unlv.edu or Deborah Shindell, MSN, ARNP, CNE at (775) 682-7152 or shindell@unr.edu.

*1. PURPOSE OF THIS STUDY: You are invited to participate in a research study. The purpose of this study is to examine the factors which influence the use of active learning strategies by nursing faculty.

PARTICIPANTS: You are being asked to participate in the study because you are a nursing faculty currently teaching in an accredited pre-licensure nursing program in the United States.

PROCEDURES: If you volunteer to participate in this study, you will be asked to complete an electronic survey. The purpose of this survey is to identify the educational approach you use when teaching nursing students as well as some of the challenges and facilitators associated with your chosen approach. The intent of this study is not to change your pedagogy, but rather to better understand the unique benefits and challenges you have experienced in implementing it.

BENEFITS OF PARTICIPATION: While there will be no direct benefit to you for your participation, the aim of this study is to identify the factors which influence you and your approach to teaching. Through identification of these factors, we hope to learn more about how to decrease or remove barriers to the use of evidence-based teaching methods that can be employed to prepare nurse-graduates to enter healthcare environments in the 21st century.

RISKS OF PARTICIPATION: There are risks involved in all research studies. There is no more than minimal risk associated with participation in this study. You may find that you are uncomfortable answering some of the questions. Please know that all responses are confidential as no unique identifiers are collected. You may choose to not answer any question or questions in the survey that you do not wish to answer. Also, you may quit the study at any time by simply clicking on the X button at the top right corner of any page.

COST/COMPENSATION: There will not be any financial cost to you for participation in this study. Completing the survey will take approximately 15 minutes. You will not be financially compensated for your time.

Perceived Barriers

CONTACT INFORMATION: If you have any questions or concerns about the study, you may contact Lori Candela, EdD, APRN-BC, CNE at (702)895- 2443. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794 or via email at IRB@unlv.edu.

VOLUNTARY PARTICIPATION: Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may choose to not answer any question or questions in the survey that you do not wish to answer. You may withdraw from the study at any time without effect to your relations with the ky simply clicking on the X button at the top right corner of any page of the survey. You are encouraged to ask questions about this study at the beginning or any time during the study.

CONFIDENTIALITY: All information gathered in this study will be kept completely confidential. No IP addresses will be collected. All data will be reported in aggregate form only. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility in the Principal Investigator's office at UNLV for 3 years after completion of the study. All data related to this study will be destroyed three years after completion of the study.

PARTICIPANT CONSENT: By marking "Yes" below, I am indicating that I have read the above information and agree to participate in this study. I have been able to ask questions about the research study. I am at least 18 years of age. A copy of this form has been made available for me. If you would like to retain a copy of this form for your records, please print this page.

- ◯ Yes.
- ◯ No.

Perceived Barriers

2. What is your age?

Age (in years) *

3. How many years have you been teaching nursing?

Years teaching *

4. In which state do you teach?

State:

5. In the past academic year (Fall 2010 or Spring 2011), how many didactic (lecture) pre-licensure registered nursing cours have you taught?

Number of courses*

6. In what type of program do you do MOST of your teaching?

- ◯ Diploma level program
- ◯ Associate level program
- ◯ Baccalaureate level program
- ◯ Master level program

7. What is your gender?

- ◯ Male
- ◯ Female

8. Which of the following degrees do you hold? (Please choose all that apply).

- ☐ Bachelor of Science Nursing
- ☐ Master of Science Nursing
- ☐ Master of Science in another field
- ☐ Doctor of Philosophy in Nursing
- ☐ Doctor of Philosophy in another healthcare related field
- ☐ Doctor of Nursing Practice
- ☐ Doctor of Education
- ☐ Doctor of Nursing Science
- ☐ Other

9. If you answered "Other" to Question 8 above, what other degrees do you hold?

Perceived Barriers

10. During an average teaching session, approximately what proportion of the class period do you spend lecturing?

I spend ___ % of class lecturing.

Perceived Barriers

This first section explores your perceptions of the barriers and facilitators to the use of nursing education research in your teaching practice.

For the purposes of this study, the term "NURSING EDUCATION RESEARCH" refers to the study and analysis of teaching methods, learning strategies, evaluation methods, and related concepts which provide the evidence-base for NURSING EDUCATION.

11. For each item in this section, check the response that best represents your view related to NURSING EDUCATION RESEARCH as defined above.

	NO EXTENT	LITTLE EXTENT	MODERATE EXTENT	GREAT EXTENT	NO OPINION
The research reports/articles on educational practices are not readily available.	○	○	○	○	○
Implications for teaching practice are not made clear.	○	○	○	○	○
Statistical analyses are not understandable.	○	○	○	○	○
The research is not relevant to my teaching practice.	○	○	○	○	○
I am unaware of the educational research.	○	○	○	○	○
The facilities at my institution are inadequate for implementation.	○	○	○	○	○
I do not have time to read education research.	○	○	○	○	○
The research has not been replicated.	○	○	○	○	○
I feel that the benefits of changing my teaching practice will be minimal.	○	○	○	○	○
I am uncertain whether to believe the results of the education research.	○	○	○	○	○
The research has methodological inadequacies.	○	○	○	○	○
The relevant education literature is not compiled in one place.	○	○	○	○	○
I do not have enough authority to change teaching methods.	○	○	○	○	○
I feel that the results are not generalizable to my own setting.	○	○	○	○	○
I am isolated from knowledgeable colleagues with whom to discuss the	○	○	○	○	○

Perceived Barriers

research.					
I see little benefit for myself.	○	○	○	○	○
Research reports/articles are not published fast enough.	○	○	○	○	○
Administration will not cooperate with implementation.	○	○	○	○	○
I do not see the value of research for practice.	○	○	○	○	○
There is not a documented need to change practice.	○	○	○	○	○
The conclusions drawn from the research are not justified.	○	○	○	○	○
The literature reports conflicting results.	○	○	○	○	○
The research is not reported clearly and readably.	○	○	○	○	○
Other staff are not supportive of implementation.	○	○	○	○	○
I am unwilling to change/try new ideas.	○	○	○	○	○
The amount of research information is overwhelming.	○	○	○	○	○
I do not feel capable of evaluating the quality of education research.	○	○	○	○	○
There is insufficient time on the job to implement new ideas.	○	○	○	○	○

12. Are there other things that you think are barriers to the use of NURSING EDUCATION RESEARCH? If so, please describe each barrier in a separate box.

First additional barrier _____

Second additional barrier _____

Third educational barrier _____

Perceived Barriers

The next section explores how faculty approach the practice of teaching nursing.

13. Please mark the box which best describes how often the statement is TRUE about your approach to teaching. Do not spend a long time on each answer, your first response is probably the best.

	RARELY	SOMETIMES	HALF OF THE TIME	FREQUENTLY	ALMOST ALWAYS
Students should focus their study on the information that I provide for them.	○	○	○	○	○
It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items.	○	○	○	○	○
It is important to present a lot of facts to students so that they know what they have to learn.	○	○	○	○	○
I concentrate on covering the information that might be available from key texts and readings.	○	○	○	○	○
I structure my teaching to help students pass formal assessment items.	○	○	○	○	○
I think an important reason for running teaching sessions is to give students a good set of notes.	○	○	○	○	○
I provide students with the information they will need to pass formal assessments.	○	○	○	○	○
I should know the answers to any questions that students may put to me.	○	○	○	○	○
My teaching focuses on the good presentation of information to students.	○	○	○	○	○
My teaching focuses on delivering what I know to the students.	○	○	○	○	○
I present material to enable the students to build up an information base.	○	○	○	○	○
In my interactions with students, I try to develop a conversation with them about the topics we are studying.	○	○	○	○	○

Perceived Barriers

I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.	○	○	○	○	○
I set aside some time for students to discuss among themselves the difficulties that they encounter studying this subject.	○	○	○	○	○
I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	○	○	○	○	○
In teaching sessions, I use difficult or undefined examples to provoke debate.	○	○	○	○	○
I make opportunities available for students to discuss their changing understanding of the subject.	○	○	○	○	○
I feel that it is better for students to generate their own notes rather than always copy mine.	○	○	○	○	○
I feel that a lot of teaching time could be used to question students' ideas.	○	○	○	○	○

Perceived Barriers

This next section explores your perceptions of the support for innovation or change in your current work environment.

14. For the following questions, please check the box which best describes your agreement with the environment of the organization (program) where you are CURRENTLY teaching.

	STRONGLY AGREE	MOSTLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	MOSTLY DISAGREE	STRONGLY DISAGREE
The organization is always moving toward the development of new answers.	○	○	○	○	○	○
This organization can be described as flexible and continually adapting to change.	○	○	○	○	○	○
Our ability to function creatively is respected by the leadership.	○	○	○	○	○	○
Around here people are allowed to try to solve the same problem in different ways.	○	○	○	○	○	○
Creativity is encouraged here.	○	○	○	○	○	○
The role of the leader in this organization can best be described as supportive.	○	○	○	○	○	○
In this organization, we sometimes re-examine our most basic assumptions.	○	○	○	○	○	○
The way we do things seems to fit with what we are trying to do.	○	○	○	○	○	○
People in this organization are always searching for fresh, new ways of looking at problems.	○	○	○	○	○	○
The leadership acts as if we are not very creative.	○	○	○	○	○	○
Assistance in developing new ideas is readily available.	○	○	○	○	○	○
New ideas can come from anywhere in the organization and be equally well-received.	○	○	○	○	○	○
We're always trying out new ideas.	○	○	○	○	○	○
People in this organization are encouraged to develop	○	○	○	○	○	○

Perceived Barriers

their own interests, even when they deviate from those of the organization.						
Members of this organization feel encouraged by their superiors to express their opinions and ideas.	○	○	○	○	○	○
In this organization, the way things are taught is as important as what is taught.	○	○	○	○	○	○
Members of this organization realize that in dealing with new problems and tasks, frustration is inevitable therefore it is handled constructively.	○	○	○	○	○	○
This organization is open and responsive to change.	○	○	○	○	○	○
Creative efforts are usually ignored here.	○	○	○	○	○	○
I mostly agree with how things are done here.	○	○	○	○	○	○

Perceived Barriers

In this final section, we are interested in how and where you find information regarding your teaching practice.

18. For each of the following questions, please mark the box which best describes how and where you find information that guides your TEACHING practice.

	NEVER	SELDOM	SOMETIMES	FREQUENTLY	ALWAYS
The information I learn about each student or class.	○	○	○	○	○
My intuition about what seems to be "right" for the situation.	○	○	○	○	○
My personal experience of teaching over time.	○	○	○	○	○
What peers/colleagues discuss with me.	○	○	○	○	○
New methods I learn about after others use them with their students.	○	○	○	○	○
Articles published in nursing journals.	○	○	○	○	○
Articles published in educational journals.	○	○	○	○	○
Articles published in research journals.	○	○	○	○	○
Information in education textbooks.	○	○	○	○	○
What has worked for me for years.	○	○	○	○	○
That's the way I've always done it.	○	○	○	○	○
The information peers share with me.	○	○	○	○	○
The information I get from attending conferences or workshops.	○	○	○	○	○
The information I get from media (i.e. television, magazines, internet, etc.).	○	○	○	○	○

APPENDIX D – DATA ANALYSIS TABLES, PLOTS AND GRAPHS

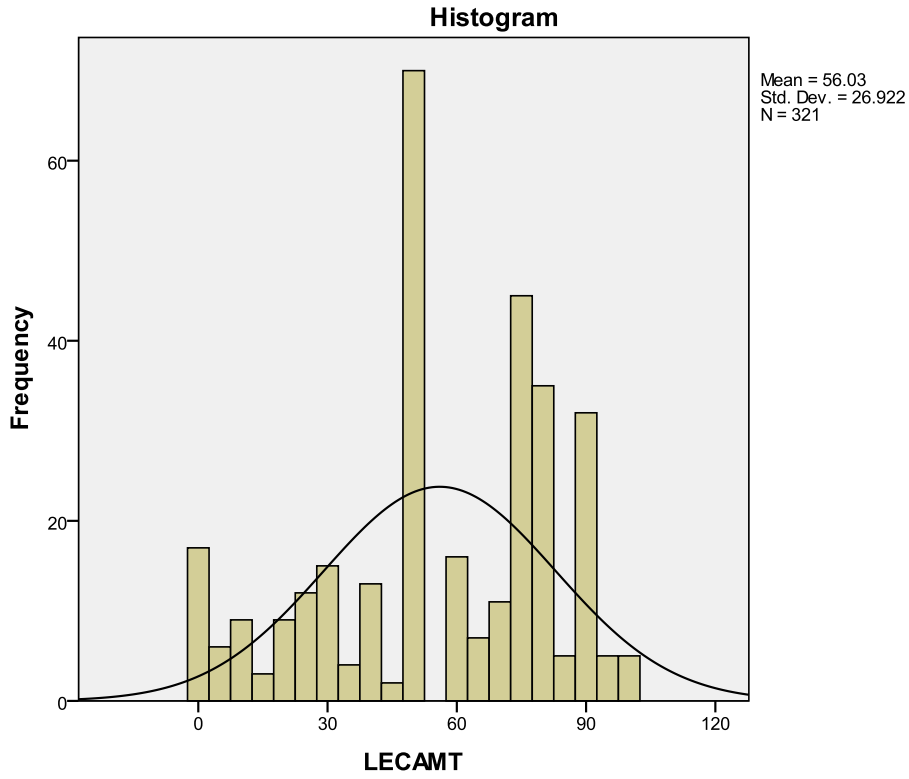
Table D1

Proportion of Time Lecturing

% Class Lecturing	N	Percent of Respondents	Cumulative Percent
0	16	5.0	5.0
2	1	.3	5.3
4	1	.3	5.6
5	5	1.6	7.2
10	9	2.8	10.0
15	3	.9	10.9
20	9	2.8	13.7
25	12	3.7	17.4
30	15	4.7	22.1
35	4	1.2	23.4
40	13	4.0	27.4
45	2	.6	28.0
50	70	21.7	49.8
60	16	5.0	54.8
64	1	.3	55.1
65	6	1.9	57.0
70	11	3.4	60.4
75	45	14.0	74.5
80	35	10.9	85.4
85	5	1.6	86.9
90	32	9.9	96.9
95	5	1.6	98.4
100	5	1.6	100.0

Table D2

Lecture Amount Distribution Histogram



Question 1 – Demographic Variables

Table D5

Spearman's Rho Correlations of Lecture Amount and Demographic Variables

		Age	Years Teaching	Number of Courses Taught	% of Class Lecturing
Age	Correlation Coefficient	1.000	.599**	.063	-.088
	Sig. (2-tailed)	.	.000	.261	.114
	N	322	322	322	321
Years Teaching	Correlation Coefficient		1.000	.054	-.152**
	Sig. (2-tailed)			.333	.006
	N			322	321
Number of Courses Taught	Correlation Coefficient			1.000	.020
	Sig. (2-tailed)			.	.716
	N				321
% of Class Lecturing	Correlation Coefficient				1.000
	Sig. (2-tailed)				.
	N				321

**. Correlation is significant at the 0.01 level (2-tailed).

Table D6

Kendall's Tau Correlation of Lecture Amount and Program Level

		Program Level	Lecture Amount
Program Level	Correlation Coefficient	1.000	-.115*
	Sig. (2-tailed)	.	.012
	N	319	318
Lecture Amount	Correlation Coefficient		1.000
	Sig. (2-tailed)		.
	N		321

Table D7

Point-biserial Correlation of Lecture Amount and Gender

		% of Class Lecturing	Gender
% of Class Lecturing	Pearson Correlation	1	-.060
	Sig. (2-tailed)		.285
	N	321	319
Gender	Pearson Correlation		1
	Sig. (2-tailed)		
	N		320

Question 2 – Components of Roger's Theory

Table D8

BARRIERS Scale Reliability

Cronbach's Alpha	N of Items
.903	28

	Scale Mean if Item Deleted	Cronbach's Alpha if Item Deleted
B1	46.19	.899
B2	46.29	.898
B3	46.28	.899
B4	46.63	.899
B5	46.89	.903
B6	46.44	.902
B7	46.23	.901
B8	46.44	.900
B9	46.71	.898
B10	46.79	.898
B11	46.60	.900
B12	46.21	.897
B13	46.76	.900
B14	46.56	.897
B15	46.59	.901
B16	46.95	.899
B17	46.40	.900
B18	46.82	.900
B19	47.16	.901
B20	46.88	.900
B21	46.91	.899
B22	46.56	.898
B23	46.61	.895
B24	46.50	.899
B25	47.15	.902
B26	46.43	.900
B27	46.69	.901
B28	46.00	.900

Table D9

Rotated Component Matrix BARRIERS Scale

	Adopter	Organization	Innovation	Communication
B1				.776
B2				.694
B3				.541
B4				.602
B5				.406
B6		.578		
B7		.488		
B8			.785	
B9	.462			
B10			.431	
B11			.797	
B12				.484
B13		.648		
B14				
B15		.666[1]		
B16	.647			
B17			.709	
B18		.583		
B19	.667			
B20	.669			
B21			.408	
B22			.546	
B23	.518[2]			
B24		.680		
B25	.631			
B26	Has not loaded to any factor in previous uses of scale			
B27	.434			
B28		.466		

[1] originally loaded to adopter [2]originally loaded to communication

Table D10

BARRIERS Factor Mean Score and Tests of Normality

Factor Mean Descriptive Statistics

	N	Range	Min	Max	Mean	Std. Deviation
Factor 1 - Adopter	322	3.57	.00	3.57	1.4820	.51019
Factor 2 - Organization	322	3.57	.14	3.71	1.8645	.63080
Factor 3 - Innovation	322	3.67	.00	3.67	1.7275	.72706
Factor 4 - Communication	322	3.00	.83	3.83	1.9727	.59855

Factor Mean Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Factor 1 - Adopter	.148	322	.000	.914	322	.000
Factor 2 - Organization	.065	322	.002	.991	322	.040
Factor 3 - Innovation	.107	322	.000	.965	322	.000
Factor 4 - Communication	.069	322	.001	.977	322	.000

Factor Mean Score H Test

		Kruskal-Wallis Test Statistic		
	N	H	df	Sig.
Factor 1 Mean	321	3.47	2	.177
Factor 2 Mean	321	10.30	2	.006
Factor 3 Mean	321	.301	2	.860
Factor 4 Mean	321	6.86	2	.032

Question 3 – Characteristics of the Adopter

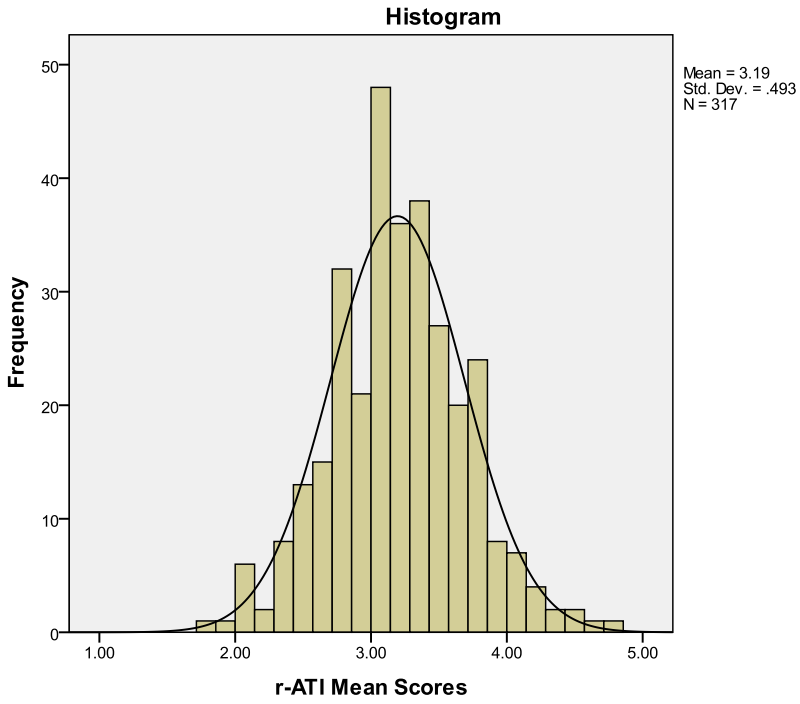
Table D11

r-ATI Principle Component Analysis

	Information/Teacher Centered	Conceptual Change/Student
AT1	.595	
AT2	.522	
AT3		.665
AT4	.671	
AT6	.654	
AT7		.768
AT8		.698
AT9	.685	
AT10	.649	
AT11	.717	
AT12	.556	
AT13		.752
AT14		.415
AT15		.662
AT16	.712	
AT18		.708
AT19	.687	
AT22	.541	

Table D12

r-ATI and Factor 1 Distribution Histograms



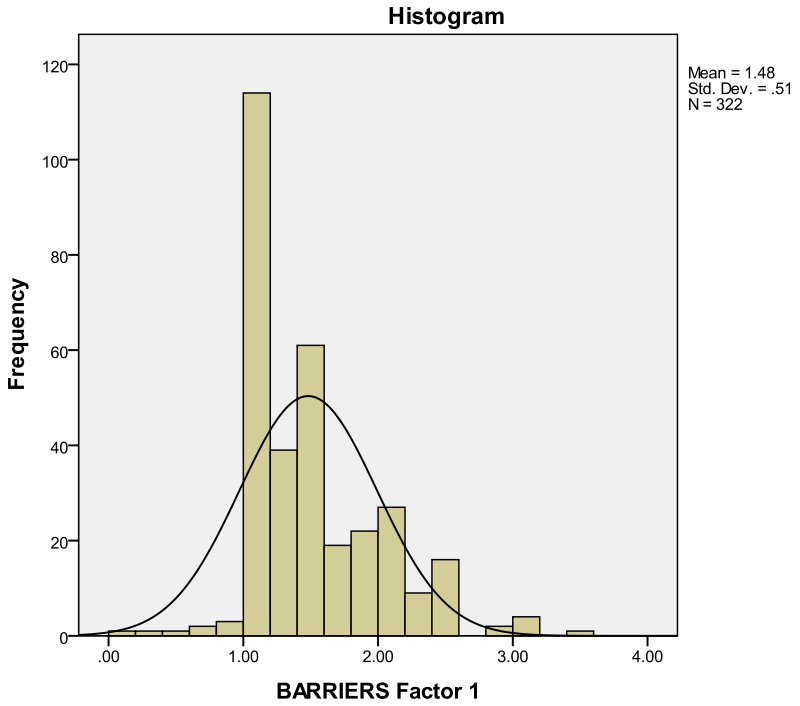


Table D13

r-ATI/Factor 1 Agreement

	N	Mean	Std. Deviation
Factor 1	322	1.4820	.51019
r-ATI	317	3.1949	.49284

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	-.001	.000	-.508	.611
N of Valid Cases		317			

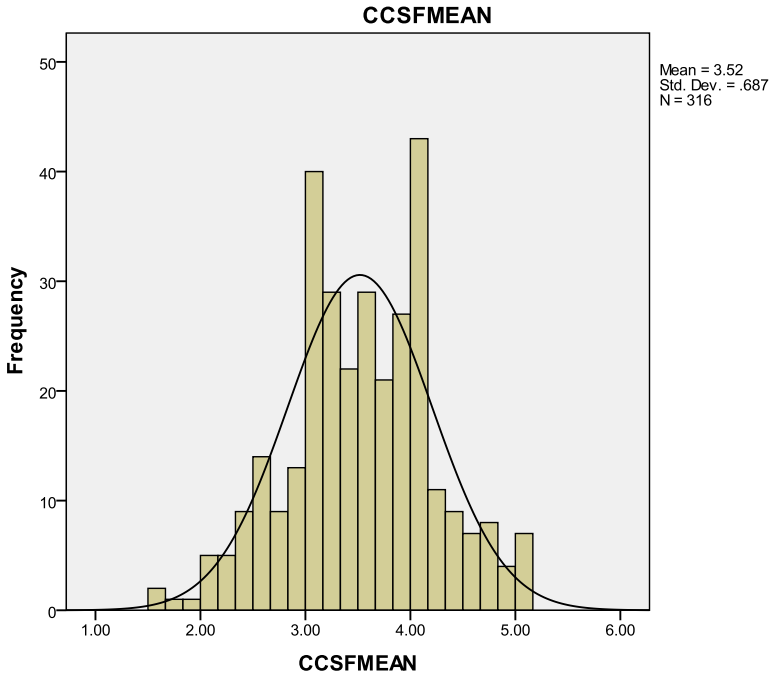
Table D14

Descriptive Analysis r-ATI

	N	Min	Max	Mean	Std. Dev	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
ITTF Mean	317	1.27	4.82	2.9929	.66198	.042	.137	-.218	.273
CCSF Mean	316	1.57	5.00	3.5192	.68716	-.122	.137	-.155	.273
rATI Mean	317	1.80	4.78	3.1949	.49284	.091	.137	.275	.273
Valid N	316								

Table D15

ITTF and CCSF Distribution Histograms



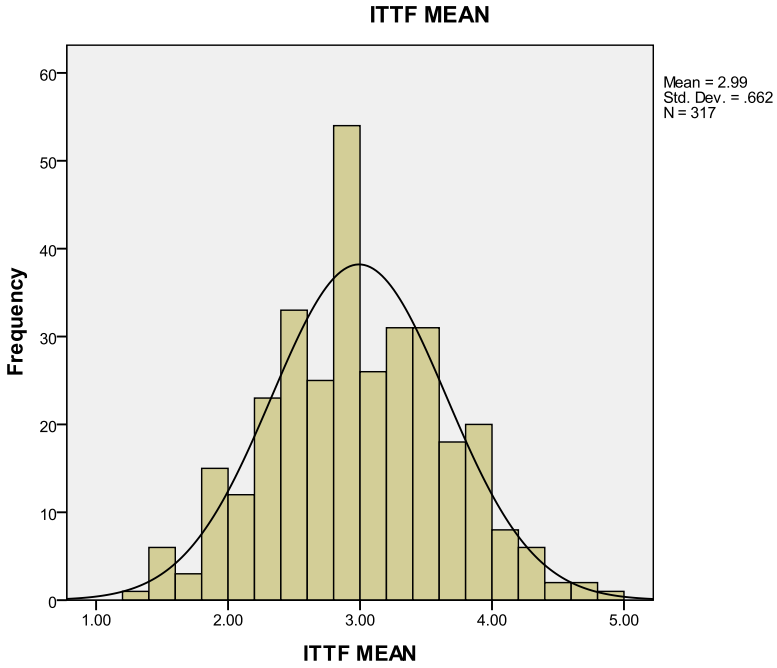


Table D16

Spearman's Rho Correlation Between Lecture Amount, Factor 1 and r-ATI Responses

		Lec Amt	Factor 1 Mean	ITTF Mean	CCSF Mean
Lec Amt	Cor Coefficient	1.000	.129*	.345**	-.161**
	Sig. (2-tailed)	.	.021	.000	.004
	N	321	321	316	315
Factor 1 Mean	Cor Coefficient		1.000	.151**	-.204**
	Sig. (2-tailed)		.	.007	.000
	N		322	317	316
ITTF Mean	Cor Coefficient			1.000	.017
	Sig. (2-tailed)			.	.769
	N			317	316
CCSF Mean	Cor Coefficient				1.000
	Sig. (2-tailed)				.
	N				316

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Question 4 – Characteristics of the Organization

Table D17

SSSI/Factor 2 Agreement

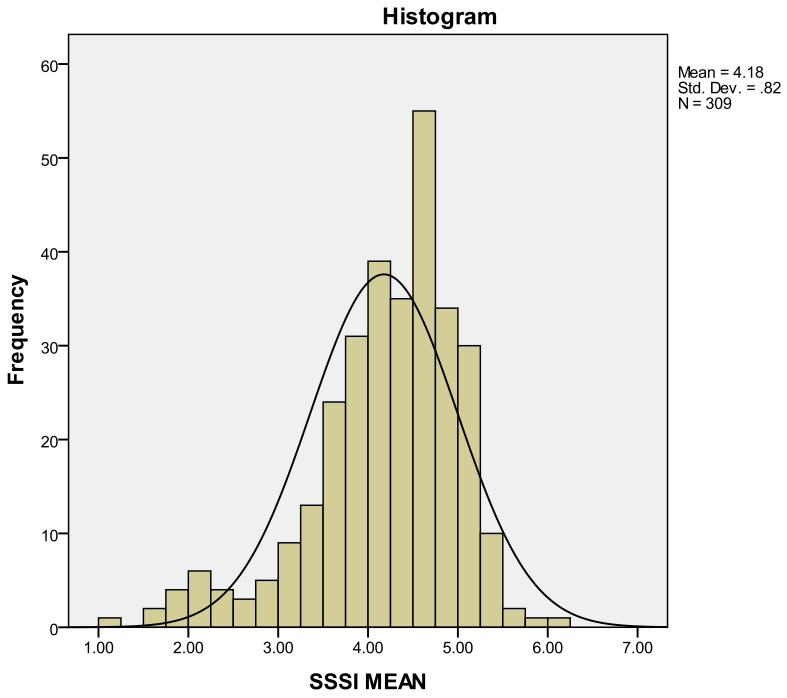
	N	Mean	Std. Deviation
Factor 2	322	1.9	.63
SSSI	309	4.2	.82

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	.002	.003	1.394	.163
N of Valid Cases		309			

Table D18

SSSI/Factor 2 Distribution Histograms



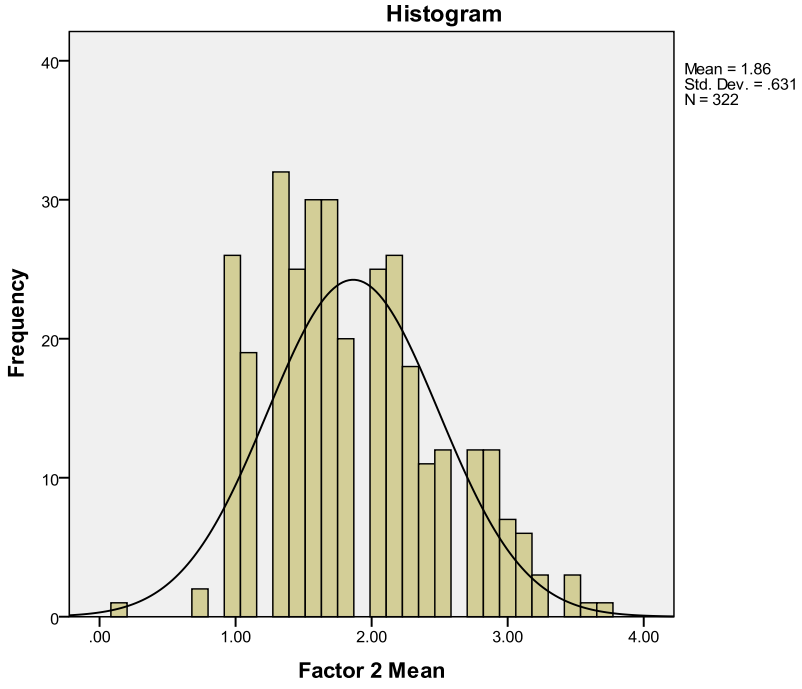


Table D19

Spearman's Rho Correlation of Lecture Amount, Factor 2 and SSSI Responses

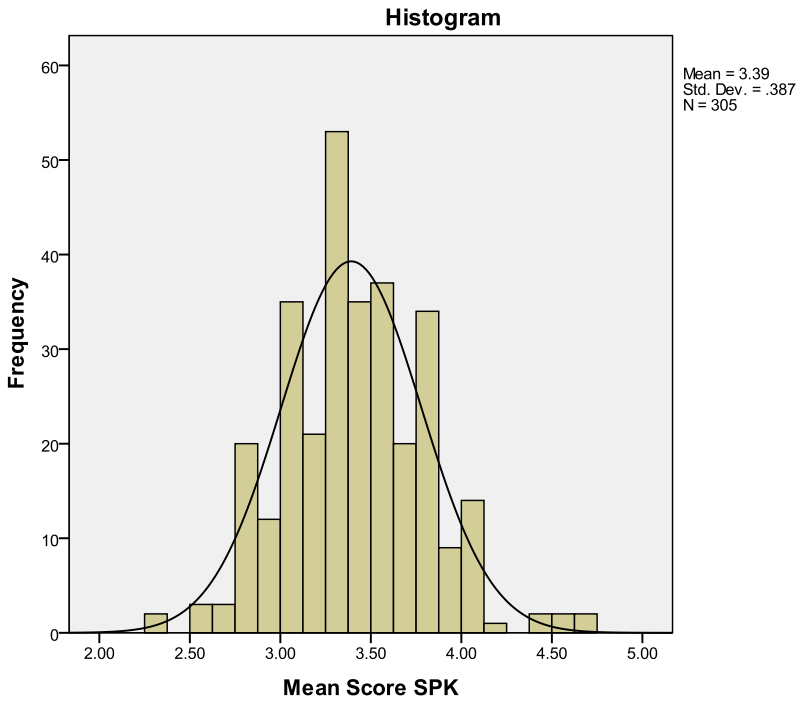
		Lec Amt	SSSI Mean	Factor 2 Mean
Lec Amt	Correlation Coefficient	1.000	-.092	.181**
	Sig. (2-tailed)	.	.106	.001
	N	321	308	321
SSSI Mean	Correlation Coefficient		1.000	-.444**
	Sig. (2-tailed)		.	.000
	N		309	309
Factor 2 Mean	Correlation Coefficient			1.000
	Sig. (2-tailed)			.
	N			322

**. Correlation is significant at the 0.01 level (2-tailed).

Question 5 – Characteristics of the Communication

Table D20

SPK and Factor 4 Distribution Histograms



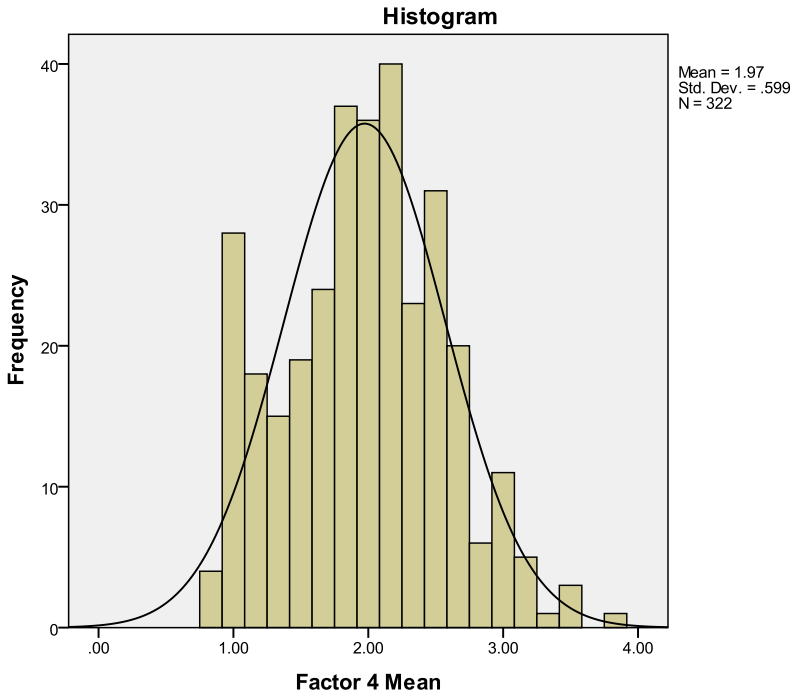


Table D21

SPK/Factor 4 Agreement

	N	Mean	Std. Deviation
Factor 4	322	2.0	.60
SPK	305	3.4	.39

Symmetric Measures

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Measure of Agreement	Kappa	-.003	.003	-.639	.523
N of Valid Cases		305			

Table D22

Spearman's Rho Correlation of Lecture Amount, Factor 4 and SPK Responses

		Lec Amt	Factor 4 Mean	SPK Mean
Lec Amt	Cor Coefficient	1.000	.146**	-.047
	Sig. (2-tailed)	.	.009	.414
	N	321	321	304
Factor 4 Mean	Cor Coefficient		1.000	-.158**
	Sig. (2-tailed)		.	.006
	N		322	305
SPK Mean	Cor Coefficient			1.000
	Sig. (2-tailed)			.
	N			305

Question 6 – Factors Predicting use of Active Learning

Table D23

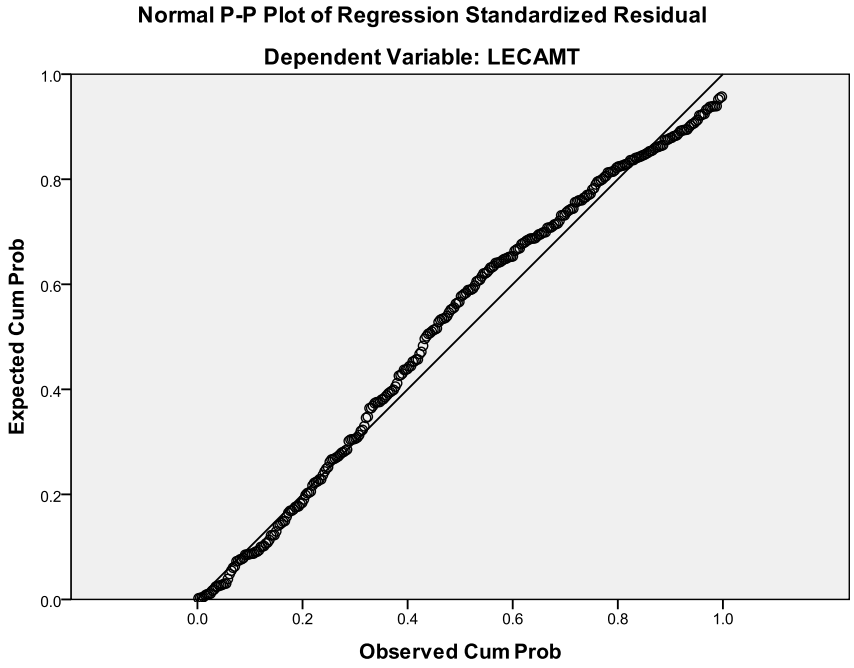
Correlations for Lecture Amount and Other Components

		Lecture Amt	Factor 1	Factor 2	Factor 3	Factor 4	SPK	ITTF	CCSF	SSSI
Lecture Amt	Cor Coefficient	1.000	.096*	.133**	-.008	.109**	-.034	.253**	-.119**	-.067
	Sig. (2-tailed)	.	.019	.001	.845	.007	.409	.000	.003	.098
	N	321	321	321	321	321	304	316	315	308
Factor 1	Cor Coefficient		1.000	.437**	.435**	.466**	-.073	.108**	-.148**	-.081*
	Sig. (2-tailed)		.	.000	.000	.000	.077	.007	.000	.044
	N		322	322	322	322	305	317	316	309
Factor 2	Cor Coefficient			1.000	.245**	.408**	-.105*	.125**	-.055	-.316**
	Sig. (2-tailed)			.	.000	.000	.010	.001	.167	.000
	N			322	322	322	305	317	316	309
Factor 3	Cor Coefficient				1.000	.317**	.037	.003	.045	-.045
	Sig. (2-tailed)				.	.000	.368	.931	.260	.255
	N				322	322	305	317	316	309
Factor 4	Cor Coefficient					1.000	-.114**	.071	-.139**	-.104**
	Sig. (2-tailed)					.	.005	.075	.001	.009
	N					322	305	317	316	309
SPK	Cor Coefficient						1.000	.104**	.165**	.164**
	Sig. (2-tailed)						.	.010	.000	.000
	N						305	305	305	305
ITTF	Cor Coefficient							1.000	.012	-.006
	Sig. (2-tailed)							.	.752	.869
	N							317	316	309
CCSF	Cor Coefficient								1.000	.041
	Sig. (2-tailed)								.	.303
	N								316	309
SSSI	Cor Coefficient									1.000
	Sig. (2-tailed)									.
	N									309

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table D24

Plots of Regression Residuals



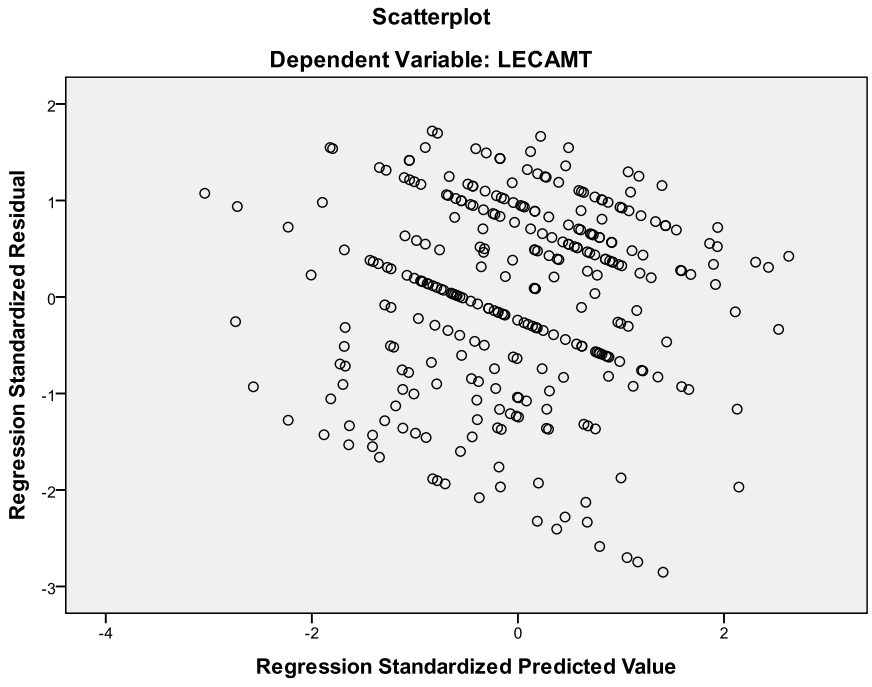


Table D25

Coefficients of Lecture Amount to Model Factors

Model	Std Co-eff Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound	Collinearity Statistics Tol	VIF
Lecture Amount		2.445	.015	8.667	80.135		
Factor 1 Mean	-.284	4.173	-.005	-.068	.946	-8.496	7.927
Factor 2 Mean	.084	1.029	.304	-3.401	10.853	.452	2.215
Factor 3 Mean	-.105	-1.474	.142	-9.640	1.385	.598	1.672
Factor 4 Mean	.122	1.621	.106	-1.241	12.810	.528	1.895
SPK Mean	.000	-.007	.994	-8.737	8.671	.857	1.167
ITTF Mean	.308	5.384	.000	8.314	17.900	.921	1.086
CCSF Mean	-.171	-2.877	.004	-11.806	-2.212	.848	1.179
SSSI Mean	-.030	-.456	.649	-5.916	3.691	.718	1.393

Table D26

Lecture Amount Model Multiple Regression Correlations

		Lect Amt	Fac 1 Mean	Fac 2 Mean	Fac 3 Mean	Fac 4 Mean	SPK Mean	ATI Mean	ITTF Mean	CCSF Mean	SSSI Mean
Pearson Correlation	Lect Amt	1.000	.143	.190	-.021	.194	-.039	.156	.328	-.213	-.090
	Factor 1		1.000	.564	.561	.586	-.115	.025	.157	-.197	-.105
	Factor 2			1.000	.366	.542	-.180	.083	.160	-.098	-.457
	Factor 3				1.000	.460	.054	.055	.023	.059	-.037
	Factor 4					1.000	-.162	-.043	.100	-.246	-.099
	SPK Mean						1.000	.240	.145	.214	.219
	ATI Mean							1.000	.837	.562	.037
	ITTF Mean								1.000	.015	-.005
	CCSF Mean									1.000	.073
	SSSI Mean										1.000
Sig. (1-tailed)	Lect Amt	.	.007	.000	.360	.000	.255	.004	.000	.000	.065
	Factor 1		.	.000	.000	.000	.027	.335	.004	.000	.038
	Factor 2			.	.000	.000	.001	.079	.003	.047	.000
	Factor 3				.	.000	.184	.173	.349	.159	.266
	Factor 4					.	.003	.232	.044	.000	.047
	SPK Mean						.	.000	.007	.000	.000
	ATI Mean							.	.000	.000	.265
	ITTF Mean								.	.398	.468
	CCSF Mean									.	.110
	SSSI Mean										.
N	Lect Amt	298	298	298	298	298	281	293	293	292	285
	Factor 1		299	299	299	299	282	294	294	293	286
	Factor 2			299	299	299	282	294	294	293	286
	Factor 3				299	299	282	294	294	293	286
	Factor 4					299	282	294	294	293	286
	SPK Mean						282	282	282	282	282
	ATI Mean							294	294	293	286
	ITTF Mean								294	293	286
	CCSF Mean									293	286
	SSSI Mean										286

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CURRICULUM VITAE

Deborah Lowell Shindell, PhD, FNP-BC, CNE

Summary of Qualifications

- Program coordinator for RN-BSN and DNP programs.
- Certified Nurse Educator
- Extensive experience teaching online and face-to-face.
- Exceptional interpersonal, communication, and collaborative skills with 18 years of leadership experience.
- Long-standing personal and professional commitment to working with underserved and special-needs populations.
- Demonstrated success in developing and implementing programs that address a variety of needs and achieve desired results.
- Delivered oral presentations to groups of 30-300 including keynote address to group of more than 700 people.
- 11 years experience designing and implementing educational curriculum including those for special needs populations (youth-at-risk, adults with disabilities, teen mothers).

Publications

- "Pediatric Patients with Sickle Cell Disease: Use of Complementary and Alternative Therapies" Journal of Complementary and Alternative Therapies, Volume 12, Number 2, 2006
- *State of Nevada Strategic Plan for the Prevention of Obesity*, September 2006

Outside Presentations

- Prenatal Mercury Exposure- Nevada State Health Division Bureau of Community Health 2005
- Pediatric Physical Assessment During the Well Child Check- Nevada State Health Division Bureau of Community Health 2005
- Native American Women's Health in Northern Nevada –Inter-Tribal Council of Nevada 2004
- Topics in Women's Health - The Nevada Disability and Law Advocacy Center 2004
- Pediatric Development- Nevada State Health Division Bureau of Community Health 2004
- Attention Deficit Disorder and Related Pathology- Nevada State Health Division Bureau of Community Health 2004
- Teens and Tobacco- Lyon Council on Drugs and Addiction 2003

Education

University of Nevada, Las Vegas Las Vegas, NV
Doctor of Philosophy - Nursing Education 2011.
Johns Hopkins University School of Nursing Baltimore, MD
Master of Science in Nursing, 2001.
Bachelor of Science in Nursing, 1999.
San Jose State University San Jose, CA
Bachelor of Arts in Environmental Education, December 1990.

Relevant Experience

Education

- Assistant Professor teaching both clinical and didactic nursing courses. Subjects taught regularly include community and population health, health and wellness, professional issues, health assessment, and clinical practice for Family Nurse Practitioner students.
- Significant experience with developing online nursing courses.
- Curriculum Committee Member for 6 years. During four-year service as Chair, assisted in the development of a new DNP program, revised entire RN to BSN curriculum, provided ongoing analysis of undergraduate curriculum.
- Member of university-wide Tibbits Excellence in Teaching Evaluation Committee. The Committee observes, ranks, and recommends faculty for recognition of exemplary teaching from 12 schools across the university.
- Course-reviewer for Teaching and Learning Technology's Course Makeover program. Evaluate and recommend improvements for online courses in a variety of disciplines.

Healthcare

- Providing care across the life-span as a Family Nurse Practitioner at a tribal health clinic with a special focus on women's health and pediatrics.
- Contract Nurse Practitioner for the Community Health Division- Family Planning Program.
- 11 years healthcare experience in variety of settings including comprehensive inpatient rehabilitation, orthopedics, otology, diagnostic radiology, and operating room.
- Wilderness First Responder responsible for providing initial evaluation of and care for complex wilderness accidents/illness. Lead and assisted back-country evacuations.
- Lead ambulatory care clinic in initial stages of obtaining national accreditation.
- Interviewed, hired, trained, and supervised staff of 22 seasonal employees. Developed supportive atmosphere to encourage teamwork and collaboration.
- Coordinated and lead 1-6 day wilderness adventure programs including whitewater rafting, canoeing, backpacking, and rock climbing. Mentored new instructors/staff.

Community Involvement

- Developed Senior Wellness Center for elders living in subsidized housing project. Extensive involvement with community to determine scope of center and to problem-solve barriers to implementation of programs.
- Collaborated with multiple stakeholders in the development of statewide strategic plan.
- Women's Health Connection provider.
- Board of Trustee member for non-profit educational initiative.

Employment History

2006-	Assistant Professor	University of Nevada, Reno	Reno, NV
2009-2011	Program Coordinator	University of Nevada, Reno	Reno, NV
2004-2006	Nurse Practitioner	State of Nevada	Various, NV
2002-2006	Nurse Practitioner	Paiute Tribal Health Clinic	Yerington, NV
1998-2001	Student	Johns Hopkins School of Nursing	Baltimore, MD
1999-2001	Nurse Researcher	Johns Hopkins Dept. of Pediatrics	Baltimore, MD
1997-1998	Program Coordinator	Academy Child Development	Rockville, MD
1990-1996	Supervisor	Jackson Hole Ski Resort	Jackson, WY

Licensure and Certifications

Certified Nurse Educator – National League for Nursing
Family Nurse Practitioner – Inactive - State of Nevada
Registered Nurse- State of Nevada
DEA Registration
American Nurses Credentialing Center Board Certified FNP
Registered Nurse- State of Maryland
CPR (Basic Life Support) certified for 20 consecutive years
Wilderness First Responder Certification for 6 years

Honors, Awards, and Scholarship

Johns Hopkins Alumni Award for Patient Centered Health Care Delivery
National Health Service Corps Scholar
Sigma Theta Tau
Maria Restuccia Scholarship Recipient
Dean's List Johns Hopkins School of Nursing 1998-2001
Graduation with Distinction, San Jose State University, 1990