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Nurse Perceptions of Interactivity during Their Onboarding Orientation: Effect of an Audience Response System

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by

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Abstract

Nurse educators must use effective teaching-learning tools to orient nurses hired into healthcare organizations. There is a vast amount of literature related to teaching-learning strategies such as audience response systems (ARS) in academia, but little research on ARS use in nursing classes outside of academia. The purpose of this research was to determine nurse perceptions of interactivity during lecture utilizing ARS versus lecture without ARS in an initial onboarding nursing orientation, using constructivism as the theoretical framework. A convenience sample of nurses attending an initial onboarding nursing orientation evaluated a PowerPoint based lecture using an interactivity instrument that included four 9-point Likert subscales: *Individual Degree of Interactivity, Overall Degree of Interactivity, Perceived Usefulness, and Perceived Ease of Use*. Thirty-four nurses evaluated their perception of interactivity of lecture without ARS, and 41 nurses evaluated their perception of interactivity of an identical lecture with ARS, and *Perceived Usefulness* (M=8.69, SD=0.05) and *Perceived Ease of Use* (M=8.89, SD=0.04) of ARS. Independent samples t-tests suggested significant differences between *Individual Degree of Interactivity* for lecture without ARS (M=7.33, SD=0.32) and lecture with ARS (M=7.94, SD=0.39); t (18) = -3.83, p = .001; and between *Overall Degree of Interactivity* for lecture without ARS (M=7.64, SD=0.22) and lecture with ARS (M=7.99, SD=0.16); t (18) = -4.014, p = .001. Findings from this research suggested ARS use during a PowerPoint presentation in an onboarding nursing orientation significantly increased both individual and overall interactivity in the classroom, and ARS was easy to use and useful in this setting.

Keywords: Nursing orientation, audience response system, constructivism, constructivist learning theories

Table of Contents

List of Tables

CHAPTER I

Introduction

The purpose of this research was to determine nurse perceptions of interactivity during lecture utilizing an audience response system (ARS) in comparison to lecture without this technology in an initial onboarding nursing orientation. Initial onboarding nursing orientation introduces newly hired nurses to the mission, vision, and values of the organization and of nursing in the organization. Other important elements of nursing orientation include, but are not limited to, clinical skills practice, state boards of nursing guidelines, information regarding The Joint Commission National Patient Safety Goals, and nursing quality indicators as stated by the National Database of Nursing Quality Indicators (NDNQI). Nurses need to be fully aware of this information, as it is important in providing safe and quality care to patients.

Significance

According to the Bureau of Labor Statistics (2015), the projected growth in employment for registered nurses from 2014 to 2024 is 16%. This projected rate of job growth for registered nurses is significantly higher than the average projected rate for other professions (Bureau of Labor Statistics, 2015). Two factors related to the anticipated increase in nursing jobs is the aging population and the focus on preventative care (Bureau of Labor Statistics, 2015). Nurse educators must be prepared to effectively orient nurses into the healthcare system. Orientation programs are designed to guide nurses to become confident and competent caregivers who deliver safe, quality care (Park & Jones, 2010).

Nurses who attend initial onboarding nursing orientation come from various backgrounds with different levels of experience. Some of the nurses are new graduate nurses; however, many of the participants in nursing orientation are not new to the profession of nursing, only new to the health system they were hired into. There are many reasons why nurses enter a new healthcare organization, and with those, there may be added stressors in their lives other than starting a new job. For example, they may have recently moved to the area, may be changing job roles, or may have been unhappy at a previous healthcare organization. Entering a new place of employment, for any reason, is a time of change; and the nurses attending an initial onboarding nursing orientation can be excited, stressed, or distracted during class. Nurse educators facilitating this type of orientation must be sure they are utilizing effective educational approaches to engage nurses in the learning process.

Nurse educators play an important role in guiding the development and socialization of all learners, as well as effectively facilitating learning (National League for Nursing [NLN], 2012). ARS is an interactive educational tool for classroom use that allows two-way communication between faculty and students. With ARS, participants anonymously respond to multiple-choice or true/false questions during didactic presentations with a hand-held device. The computer software then collates answers given and displays the percentage of participants that selects each answer. ARS has been found to increase interactivity in the classroom (Siau, Sheng, & Fui-Hoon Nah, 2006; Heaslip, Donovan, & Cullen, 2014). Interactivity is important in the teaching-learning process (Siau et al., 2006). The goal of this research was to determine nurse perceptions

of interactivity during lecture with and without ARS technology in an initial onboarding nursing orientation.

Problem Statement

Nurse educators have a responsibility to ensure they are incorporating effective teaching-learning strategies to facilitate learning (NLN, 2012). It is also the responsibility of nurse educators to be aware of how different teaching methods and interpersonal interactions influence learner outcomes (NLN, 2012). Literature includes a vast amount of research related to teaching and learning strategies, including the use of ARS in academia. However, there is little research on the use of ARS in nursing classes outside of academia, such as classes in a nursing orientation program.

Purpose

The purpose of this research was to determine nurse perceptions of interactivity during lecture utilizing an audience response system (ARS) in comparison to lecture without this technology in an initial onboarding nursing orientation. The nursing orientation included in this research consists of classes held over several days. These mandatory classes for nurses who have been newly hired into the health system include a variety of teaching strategies. The use of ARS encourages participants in nursing orientation to be active learners in the classroom. While classes in this nursing orientation use different forms of active learning, such as questioning, group learning, and case scenarios; the researcher wanted to determine whether the use of ARS in lectures effected the nursing orientation participants' perceptions of interactivity in this setting.

Theoretical/Conceptual Framework

Constructivism was the theoretical framework used to guide this research regarding nurse perceptions of interactivity with the use of ARS in an initial onboarding nursing orientation classroom. The constructivism theory indicated that learners construct new knowledge from interactions in the environment based upon previous knowledge. The construction of knowledge is related to the interaction of the subject with their environment and the way that information is processed and interpreted based on prior knowledge (Piaget, 1952/1965). Foundational to the construction of knowledge are the concepts of schema, assimilation, accommodation, and equilibrium (Piaget & Inhelder, 1966/1969). Schema is described as an intricate system that organizes information from the perception of the individual (Piaget & Inhelder, 1966/1969). Schema in the brain is constantly expanding, multiplying, and changing as experiences and learning evolves (Wadsworth, 1973). Assimilation is the process in which new information is sorted and filtered into existing schemes. Accommodation occurs when schemes are modified to accept information because there is no current schema in which to place the new information (Piaget & Inhelder, 1966/1969). Intellectual adaptation involves a balance between assimilation and accommodation, which is referred to as equilibrium (Piaget, 1952/1965).

Constructivism suggested that engagement and attention of the learner are important for learning to occur (Siau et al., 2006). An interactivity instrument was utilized in this research to measure nurse perceptions of individual and overall degrees of interactivity in the classroom. This research examined nurse perceptions of the concepts of individual interactivity in the classroom environment through the use of the *Individual*

Degree of Interactivity subscale and overall classroom interactivity through the use of the *Overall Degree of Interactivity* subscale on the interactivity instrument. The interactivity instrument measures participants' perception of classroom involvement, engagement, participation, feedback received from instructors, and the participants' self-assessment, as well as the perceived ease of use and perceived usefulness of ARS (Siau et al., 2006).

ARS is a tool used in educational settings to promote active learning in the classroom. ARS use aligns with the concept of learner interaction with the environment. ARS can help facilitators gauge learners' knowledge to correct any misunderstandings of information or expand on information as needed based on the answers to ARS questions by the class (DeBourgh, 2008). Using ARS as an educational tool aids in the process of assimilating new knowledge into existing schema or the process of accommodation, which modifies schema for the new information to exist, by facilitating interaction with the classroom environment and other learners. The use of ARS in the classroom gives the instructor the opportunity to guide the lecture based on the learners' previous level of knowledge, which is important in constructivism. This construction of knowledge is possible when the lecture provides participants an opportunity to answer ARS questions throughout the lecture and the instructor uses the answers to guide further education or correct misunderstandings of concepts in real-time.

Research Questions and Hypotheses

This research addressed four questions. First, will the use of ARS in an initial onboarding nursing orientation increase nurse perceptions of individual nurse interactivity in the classroom? The associated hypothesis to this question is: the use of ARS in an initial onboarding nursing orientation class will increase nurse perceptions of

individual nurse interactivity in the classroom. The next research question is: will the use of ARS in an initial onboarding nursing orientation increase nurse perceptions of overall interactivity in the classroom? The associated hypothesis to the second question is: the use of ARS in an initial onboarding nursing orientation will increase nurse perceptions of overall interactivity in the classroom. The third research question is: what are nurse perceptions of the ease of use of ARS in an initial onboarding nursing orientation class? The hypothesis associated to the third question is: ARS is perceived as easy to use in an initial onboarding nursing orientation class. The final research question is: do nurses perceive ARS as useful in an initial onboarding nursing orientation? The hypothesis associated to the final question is: nurses will perceive ARS as useful in an initial onboarding nursing orientation class.

Definition of Terms

For the purposes of this research, initial onboarding nursing orientation is defined as a mandatory series of classes held over several days for registered nurses (RNs) and licensed practical nurses (LPNs) newly hired into a large academic health system in the southeastern United States. An audience response system (ARS) is defined as a wireless handheld polling device that class participants use to actively and anonymously participate in lectures. Interactivity is theoretically defined as "the active involvement and participation of students in the classroom" (Siau et al., 2006, p. 400). In this research, nurses' perception of interactivity is operationally defined by the scores on the interactivity instrument, specifically, the subscales *Individual Degree of Interactivity* and *Overall Degree of Interactivity.*

CHAPTER II

Research Based Evidence

The purpose of this research was to determine nurse perceptions of interactivity during lecture utilizing an audience response system (ARS) in comparison to lecture without this technology in an initial onboarding nursing orientation. Nurses must be prepared and knowledgeable when entering a new healthcare organization; therefore, it is essential for nurse educators to utilize effective educational tools. Literature revealed many benefits to the use of ARS in classrooms for both the learner and the facilitator; however, most research has been conducted in academic institutions, not in educational settings in a work environment such as nursing orientation. Constructivism was the theoretical foundation for this research. Constructivism is a learning theory in which learners build on their previous knowledge and experience to construct new knowledge.

A literature review was conducted to find research related to the use of ARS in the classroom setting, especially work-related classroom settings for nurses. The sources used for this literature search were Cumulative Index for Nursing and Allied Health Literature (CINAHL) and Medline. The keywords explored for this research were: nursing orientation, audience response system, constructivism, and constructivist learning theories.

Literature Related to Statement of Purpose

Student Perception

An interventional study in Sweden evaluated 59 Bachelor of Science nursing students to investigate three questions related to individual response technology (IRT) use in the classroom (Heden & Ahlstrom, 2016). First, Heden and Ahlstrom (2016)

investigated whether IRT made a difference in student participation, engagement, and active learning. They also explored whether participation, engagement, and active learning with the use of IRT were different in a pediatric lecture versus a statistical lecture and if IRT is supportive technology for lecture.

Heden and Ahlstrom (2016) performed a literature search and found no previous studies investigating students' self-reported IRT experiences over time in higher education that focused on the caring sciences. First-year nursing students in two different courses (statistics and pediatrics) evaluated IRT, both prior to and after the introduction of IRT, with a questionnaire specifically developed for the study. Analysis of data provided by the completed questionnaires revealed a significant difference between the lectures that incorporated IRT and the ones that did not. Students reported an increase in engagement, participation, and learning opportunities with the use of IRT during lecture. Students in both courses reported more participation and active learning with the use of IRT, while the students in the pediatric course reported more engagement with the use of IRT. Students also found IRT to be a supportive technical system for lectures (Heden & Ahlstrom, 2016).

A strength of this study was the internal validity, with some of the same students evaluating both courses with and without using IRT (Heden & Ahlstrom, 2016). There was a sample size of 59 students, and the low standard deviations in the results suggested reliable results. The study results also point to external validity because there were significant differences found in both the pediatric and statistic courses. According to Heden and Ahlstrom (2016), there was no evaluation of participants' gender, which may have been a limitation of the study since females are generally the majority in classes

based in the caring sciences. The questionnaire has only been used in this study; therefore, its validity may be questionable.

The evaluation of whether nursing students had a positive perception of student response systems (SRS), or clickers, was studied at a community college (Fifer, 2012). The mixed-method study involved a convenience sample of 47 first-year nursing students. The students were asked to score a 14-item Likert scale survey and to answer two open-ended questions regarding the strengths and weaknesses of SRS. Thirty-five (74.47%) of the students completed the survey. All participants responded positively to the survey, with the highest rated statements being those related to the ability to receive instant feedback and the ease of use of SRS. Positive responses of the open-ended questions spoke to increased confidence, engagement, and immediate feedback. Some of the negative comments were related to the battery life of the clickers and the desire for more challenging questions to prepare them for testing.

A strength of this study was that students could answer questions anonymously. Weaknesses included a small convenience sample with only 18 of the 35 responding to the open-ended questions (Fifer, 2012). Also, the author did not address the validity or reliability of the tool used to survey students.

Lee and Dapremont (2012) reported they found no studies that evaluated student perception of ARS use in large nursing classes or that determined whether there was a relationship between the age of the student and the perception of ARS use. To address these two questions, Lee and Dapremont conducted an exploratory study with a convenience sample of 119 nursing students enrolled in a medical-surgical course. Eighty-two students between the ages of 20 and 48 responded to the anonymous 10-

question survey, which was designed for this study to examine students' perceived satisfaction with, and usefulness of ARS within this population. Students found the use and set up of ARS to be simple and they were very satisfied with the use of ARS during lectures. No correlation was found between the age of the student and the perceived ease of use of ARS. Strengths of this study included a large sample size and the anonymity of the participants, which may increase the likelihood of participants honestly responding to questions. Limitations of the study may have included not having negative consequences associated with the responses to ARS questions, such as attaching answers to a grade (Lee & Dapremont, 2012). Also, validity and reliability of the survey could not be established prior to the study.

Since nurse educators have a responsibility to effectively facilitate learning, they must seek out effective teaching-learning tools (NLN, 2012). Nursing faculty studied ARS use with baccalaureate nursing students in their junior year who were enrolled in a medical-surgical course during one semester (Porter & Tousman, 2010). Porter and Tousman (2010) conducted a literature review and found information pertaining to student perception and the use of ARS with question-driven instruction (QDI), but little data with nursing students as the focus. Therefore, a study was conducted to determine how nursing students perceived their educational experience when using ARS with QDI. An exploratory descriptive study was conducted. The study utilized an 11-item Likert scale survey that had been used in a previous study to explore students' learning experience when utilizing ARS in the classroom. Two open-ended questions provided qualitative data were also included in the survey. Twenty-three surveys were evaluated. Seventy-seven percent of the students surveyed had no prior experience with ARS

technology. The results from the survey showed overall agreement with the positively worded statements in the survey, and the negatively worded statement on the survey reflected disagreement (Porter & Tousman, 2010). The comments from this study reflected three themes: ARS allowed for post-question discussion that improved students' understanding of the material, ARS questions formatted like questions in the National Council Licensure Examination for Registered Nurses (NCLEX-RN) helped students feel more prepared to take the exam, and ARS helped increase students' interactivity in the class. Strengths of this study included the use of an instrument that was found to be valid and reliable, and students had the ability to add narrative comments to the survey, which gave additional insight on their perceptions of the use of ARS. Weaknesses of the study included a small sample size, and the study was inclusive of only one course over one semester.

An investigation into the use of ARS as a means of formative assessment in a nursing bioscience class was conducted to introduce students to questions similar to the ones on their examinations, to increase active participation during lecture, and to identify students' need of expanded information (Efstathiou & Bailey, 2012). In this investigation, ARS was used during two sessions: at the end of the first module and at the end of the third module before the final examination. The first session consisted of 110 students, and 85 students participated in the second session. A questionnaire assessed content knowledge and student perception of the effectiveness of using ARS when learning about bioscience. The investigation found students thought the use of ARS in the bioscience class facilitated learning, provided a safe and anonymous way to determine which areas individuals needed to focus study time, increased active

participation, helped with determining which content information needed clarification, and gave instant feedback to students. A strength of this investigation was the relatively large sample sizes. Weaknesses of the investigation included the fact that it was not a true study that included a hypothesis and the questionnaire had not been determined to be valid and reliable.

Nursing students are challenged with gaining advanced reasoning skills needed for nursing practice, while nurse educators are challenged in maintaining participation and engagement in the classroom (DeBourgh, 2008). Clickers were introduced into a 15-week advanced nursing therapeutics course in which 92 students were enrolled (DeBourgh, 2008). During the fourteenth week of class, an anonymous survey was given to obtain the students' perception of clicker use in the classroom and the effectiveness of clickers in aiding their learning of complex information and developing advanced reasoning skills. Qualitative data was obtained via a survey. Sixty-five students completed the survey, with most students responding positively regarding the operation and instructional effectiveness of ARS use, as well as the usefulness of clickers in facilitating learning of complex information and correcting misinformation. Quantitative data was also obtained via a survey with questions on a five-point Likert scale. This survey found students enjoyed the use of clickers and found clickers helpful learning tools, however the cost of the clickers was an issue. A strength of this study was that it utilized Chickering and Gamson's model which described standards of good practice in undergraduate education (DeBourgh, 2008). Weaknesses included the study was conducted over only one 15-week semester using a convenience sample of students, and the researcher does not speak to the validity and reliability of the surveys.

Chickering and Gamson's principles for undergraduate education were also used as the theoretical framework in a study conducted by Meedzan and Fisher (2009) regarding student satisfaction of clickers in the classroom. The purpose of this non-experimental descriptive study was to determine and describe the satisfaction of students in a baccalaureate nursing program regarding the use of clickers as an instrument to promote active learning in the classroom. The convenience sample consisted of 29 sophomore student nurses who were enrolled in a 12-week health assessment course in an undergraduate nursing program. The authors designed a 5-point Likert scale survey instrument to measure student satisfaction with using the clickers in class (Meedzan & Fisher, 2009). This survey was built based upon Chickering and Gamson's principles of good practice in undergraduate education. The results of the survey suggested all students found the use of clickers enjoyable and should be continued to be used in the class. Ninety-eight percent of the students found the feedback and interaction provided by clickers enjoyable. Most students also found the technology helpful in realizing how well they were understanding the course information and that it assisted them in preparing for exams. A lower percentage of students found clickers to be a motivational tool to attend class, which could be attributed to the fact that students were required to attend even without the integration of clickers. Overall, the results were highly positive for the use of clickers in the classroom. Strengths of this study included the fact that participation was voluntary and was guided by a theoretical model. Weaknesses included a small sample size, with the study conducted over a short period of time. The researchers did not speak of the validity and reliability of the survey used in this study, however it was based on Chickering and Gamson's principles.

A study including undergraduate students who were enrolled in an introductory psychology course was conducted to compare clickers to other methods of classroom participation regarding student participation, learning, and emotion (Stowell & Nelson, 2007). The study sample was recruited from students enrolled in an introductory psychology course. Students were recruited to participate in one of four one credit hour psychology classes for the study. The four classroom methods studied were standard lecture, hand raising, response cards, and clickers. The class with standard lecture included informal, open-ended questions asked during lecture; and the three other methods included more formal review questions during lecture with students answering these questions by either hand raising, response cards, or clickers. The purpose of the study was to investigate whether clickers would pose greater participation in the learning environment, increase honesty of student feedback, and have a more positive effect on academic emotions related to other student response methods (Stowell & Nelson, 2007).

One survey used for this study was the Academic Emotions Questionnaire (AEQ), which measures academic emotions on a 5-item Likert scale (Stowell & Nelson, 2007). The AEQ was completed by students before, during, and after lecture. Upon completion of the lectures, participants completed a quiz regarding lecture content, demographic information, and a five-item evaluation regarding the classroom feedback method. Lectures were video-recorded for two evaluators to individually review student participation and accuracy of responses to formal questions for each of the different classes. These evaluations were compared and had a high degree of agreement between the two evaluators. When there was a discrepancy between the evaluations, the mean values of the two evaluations were utilized for data analysis.

Results of the study revealed similar rates of participation between the groups during spontaneous questioning; however, during formal, planned questioning, the group utilizing clickers had the highest rate of participation (Stowell & Nelson, 2007). The group utilizing clickers did the poorest on answering the formal review questions, while the hand-raising group performed the best. There was no significant difference on the quiz between the groups, however, because the group that utilized clickers had similar results on the quiz and the formal review questions, a more accurate reflection of learning is suggested of the clicker group. Regarding emotions, standard lecture had the lowest score over time. Clickers were found to slightly increase enjoyment and have increased accuracy of student feedback as compared to the other methods. Students who were in the hand raising and response card groups seemed to be influenced by others when answering, but students in the clicker group were not.

A strength of the study was fairly even sample sizes for each group, however they each had less than 30 students per group who participated in the study. Also, there were no significant differences in demographics, grade point averages, or self-reported prior knowledge of lecture content among the groups. A weakness of the study was the fact that the quiz given after the lecture may have been too difficult, or students may not have tried their best since it was not used as a summative grade (Stowell & Nelson, 2007).

ARS and Exam Scores

The effect of ARS, or clickers, in improving exam scores in nursing education has also been studied. One study used a two-sample pretest/posttest experimental design to determine whether the use of clickers during lecture influenced exam scores (Welch, 2012). Students in an adult health nursing course were randomly assigned to two groups:

the experimental group utilizing clickers and the control group not utilizing this technology during lecture. The lectures were identical, with questions throughout. The only difference was the control group raised their hands to answer questions and the experimental group answered using clickers. The pretest and posttests consisted of 50 multiple-choice questions that were items utilized in previous nursing classes. The test items were evaluated for reliability via a computer testing program to determine their point biserial index (PBI). All questions used were application and analysis type questions with a PBI of .20 or greater. Students in both groups were given a pretest prior to classroom instruction of content regarding a specific body system to determine their baseline knowledge and a posttest on the same content was given at the end of the content instruction. A second posttest was given three months later. Classroom instruction of content was provided for the two groups by two different nurse educators; however, the educators had the same nursing degrees, similar work experiences, and had worked as co-instructors with similar instruction styles for several years prior to this study (Welch, 2012).

The results of this study showed the group that did not use clickers had higher posttest scores and a greater improvement in posttest scores than the group that utilized clickers during instruction (Welch, 2012). The results from the posttest three months after the instruction were not used because of low participation rate for this test. Strengths of this study included the validity and reliability of the test questions, interrater reliability because of the similarity in the two instructors, and the randomization of the two groups. Weaknesses of the study included small sample size, short amount of content instruction time and inclusion of only one class in each study group.

ARS was introduced in an undergraduate nursing anatomy and physiology course. The use of ARS in this course was studied with three outcomes in mind (Stein, Challman, & Brueckner, 2006). One goal of the study was to determine whether using ARS as a tool for anatomy and physiology exam review enhanced student learning outcomes. Other outcomes of the study were to outline the steps involved in designing an ARS review and to encourage nurse educators to utilize ARS in their classrooms.

The pilot study included 155 nursing students in a spring semester and 128 nursing students in the following fall semester enrolled in anatomy and physiology courses (Stein et al., 2006). Four examinations were given in each semester. There was a review before each of the exams, with three of the four exam reviews each semester incorporating the use of ARS. Reviews utilizing ARS were pretests in a Jeopardy game format that included 25 multiple choice and true/false questions. During the Jeopardy game, all students anonymously answered questions with their clickers and responses were displayed for the class. The instructor then expanded on information based on the knowledge of the class, explaining why answers were correct or incorrect. The study did not find a difference on average scores between the groups for test review. However, during the review with ARS the content that was missed by more than one-third of the class was correctly answered on the examination by significantly more students. At the end of the course, students were asked to complete a survey regarding the ARS reviews. Seventy-six of the nursing students responded, with 94% stating the ARS reviews positively impacted their exam scores. Students were also asked to give suggestions for improving the exam reviews that incorporated ARS. There were no suggestions for improvement given by the students; but comments specified the students enjoyed the use

of the system for exam review, found it helpful, and allowed them to determine how to focus their study time (Stein et al., 2006).

Strengths of the study included the instructor who developed the ARS review questions also facilitated the examination reviews that utilized ARS, and all ARS review sessions were conducted in the same format with the same number of questions (Stein et al., 2006). Another strength of this study was the large sample size over two semesters in two separate nursing anatomy and physiology courses. There is however, no mention of validity and reliability of the exams or survey, which could be a weakness in this study.

Clickers were introduced into a pediatric nursing course that included 40 on-site students and 24 off-site students (Berry, 2009). Faculty noticed difficulty in engaging learners in lectures, especially with students who were off-site (Berry, 2009). An exploratory study was conducted to determine if the use of clickers influenced examination scores, and to evaluate student satisfaction with the use of clickers in the classroom. The exam scores for the group utilizing clickers were compared to those of the students the year before. Students in the group that utilized clickers for lecture and test review scored higher exam averages than the group that did not utilize clickers. The second exam and final grades were shown to be significantly higher, but all other grade differences were not statistically significant. A questionnaire that measured satisfaction revealed the majority of the class enjoyed the use of clickers during class lectures, finding it fun and helpful in understanding content. Negative comments about the use of clickers were regarding the cost for the students. Strengths of this study included the use of statistical analysis to compare grades for each group, the use of the same content and schedules for examinations for both groups, and similar group sizes and composition with

similar grade point averages on admission. A weakness of the study was a difference in formatting of the exam questions between the two groups. Exam questions were changed to multiple choice to accommodate for the use of clickers, which could have influenced exam scores.

Nurse educators are challenged with engaging students in the classroom, while classes are increasing in size (Patterson, Kilpatrick, & Woebkenberg, 2010). A research study was conducted utilizing a quasi-experimental design comparing two groups: one incorporating the use of clickers, or student response systems (SRS) during lecture and one without the use of SRS during lecture (Patterson et al., 2010). The goals of this study were to determine if there was a difference in test scores when SRS is utilized in the classroom versus standard teaching approaches, as well as student perception of SRS use during class.

The study by Patterson et al. (2010) included a total of 70 students, 38 in the group that had SRS incorporated in lecture and 32 in the group with traditional didactic classes. There were no significant differences in exam scores between the two groups. Qualitative data was gathered to determine the students' perceptions of SRS in the classroom, in which three themes emerged: the ability to respond anonymously, obtaining immediate feedback regarding their answers, and interactivity and engagement in the classroom. Strengths of the study included no significant differences found between the two groups concerning demographics and attributes. Weaknesses included the two groups were not selected randomly, there were technical difficulties with using the SRS, and the time in which students were exposed to the technology was limited.

Literature Related to Theoretical Framework

Constructivism is a learning theory that has been utilized as a framework for studies in different aspects of healthcare education. For example, constructivism has been foundational in studies regarding engagement in the classroom. Constructivism is based on active learning principles (Sternberger, 2012). ARS can facilitate active learning in the classroom. One of the ways ARS is utilized in initial onboarding nursing orientation is to assess participant knowledge so the instructor can correct or fill in any gaps in knowledge. The ability to assess the knowledge level of learners utilizing ARS responses allows the instructor to build on that knowledge. Interactive learning and building of knowledge onto prior knowledge, known as accommodation and assimilation, are key concepts in constructivism (Wadsworth, 1973).

Constructivism was the theoretical framework for a descriptive study concerning the use of clickers that included a convenience sample of 72 undergraduate nursing students (Sternberger, 2012). The instrument used in this study was a 5-point Likert-type questionnaire with 22 items created by the researchers to measure the influence of clickers on learning, the students' perception of clicker integration, students' perception of clicker use regarding constructing knowledge and critical thinking, and student satisfaction with using clickers. A course examination was available for students to take immediately following, and up to four weeks after the teaching sessions. The study indicated that participants felt the use of clickers improved engagement, enhanced learning, and facilitated the construction of knowledge; however, test results did not reflect increased learning. Students also commented they enjoyed the novelty of clicker

use in the learning environment, the use of scenarios and images to enhance learning, and using clickers to compete in a game for learning.

A strength of this study was validity of the questionnaire content utilized was established and reviewed by two members of the research faculty (Sternberger, 2012). Also, the examination at the end of the session had different questions than the ones presented in the lectures, and the question designs were similar in the session and the post-session examinations. However, the last examination was available for four weeks, which may have had an effect on knowledge retention. Another weakness of the study was the population was a convenience sample that was not diverse, with 92% being white and 88% female (Sternberger, 2012). There was no mention of reliability of the questionnaire, and this was the first time the instrument was used.

There have been many studies conducted on the use of classroom response systems (clickers) in the classroom, but little on the effect of clickers on interactivity in the classroom (Siau et al., 2006). The transfer of knowledge can be facilitated by interactivity through asking and answering questions and giving feedback or explanations during class (Siau et al., 2006). A study on interactivity in the classroom, before and after the implementation of clickers during the lecture was conducted using qualitative and quantitative data (Siau et al., 2006). Interactivity is an important factor in three learning theories: behaviorist, cognitivist, and constructivist, which are theoretical frameworks for this study on interactivity in the classroom.

A pretest/posttest study design was conducted by Siau et al. (2006) over a 16-week semester in a systems analysis and design course offered in a university to both undergraduate and graduate students. The pretest, which was the instrument regarding

interactivity, was given to students in the middle of the semester before ARS was incorporated into the course. After eight weeks of ARS incorporation in the classroom, the posttest (interactivity instrument) was given along with questions pertaining to the perceived ease of use and usefulness of ARS. The researchers found that students perceived both individual and overall interactivity as significantly improved when ARS was introduced into the lecture. Qualitative data was also gathered to obtain student perspectives on the strengths and weaknesses of using ARS during lecture. Positive findings of using ARS included increased interactivity, enjoyableness, ability to anonymously answer questions, ease of use, addition of technology to class, promotion of learning, and instructors' ability to explain information based on student responses. However, the ARS should be working properly, questions can only be in multiple choice or true/false format, ARS can take more time than lecture alone, students may not take the use of ARS seriously, and ARS use can sometimes be distracting in class.

A strength of this study was the validity and high reliability of the interactivity instrument (Siau et al., 2006). A weakness of the study includes a small sample size, with only 26 students participating in the pretest, posttest, and qualitative portions of the study. Also, the study was conducted with students in only one 16-week semester course.

Another study investigating the use of student response systems (SRS) and learner engagement in large classes was conducted using constructivism as the theoretical model (Heaslip et al., 2014). The purpose of this study was to explore reasons students participate more when SRS is used, how SRS use encourages learners to participate, and whether students are more motivated to be engaged in the classroom with SRS use. Heaslip et al. (2014) stated the constructivist learning model suggests student engagement

and attention are important during the learning process. Therefore, the instrument used in this study measured interactivity by measuring students' class involvement, engagement, participation, instructor feedback, and self-assessment. The study was a pretest/mid-test/posttest design in which 120 second-year students in a school of business in Ireland participated. The pretest assessed the students' perception of individual and class interactivity prior to implementing SRS in the classroom. After implementation of SRS, mid-tests were given at set intervals during the semester utilizing the same tool given for the pretest to measure individual and class interactivity. A posttest questionnaire given at the end of 12 weeks was the same tool as the pretest and mid-tests. The posttest also included the addition of questions regarding the perceived usefulness and ease of use of the SRS. Qualitative data was also collected at weeks six and eleven using student evaluations and one-to-one semi-structured interview. Based on the results of the questionnaires and qualitative data at the six-week period, changes were made to the use of the SRS during lecture. Feedback indicated that students would like to see how others answered the questions in the lectures, however anonymity was important to them when answering questions. Students were then placed in self-selected groups for classroom SRS responses and could see how each group answered. This method seemed to increase the excitement and allowed for competition during the lectures. The study suggested interactivity can be increased with the use of SRS during lecture. Students found SRS useful and easy to use; and they were more engaged, attentive, and involved during class (Heaslip et al., 2014). A strength of this study was the valid and reliable tools utilized to measure interactivity and usefulness. However, the study was only conducted with one group of students over a 16-week semester.

Constructivism has been used as a framework for implementing collaborative testing in nursing courses (Duane & Satre, 2014). Collaborative testing was incorporated in two nursing courses to potentially help nursing students increase collaboration skills that are necessary in nursing practice (Duane & Satre, 2014). After collaborative testing had been integrated for about two years, the faculty surveyed 67 pre-licensure nursing students on the effectiveness of collaborative testing in nursing classes. The survey revealed that over 75% of the students felt collaborative testing helped retain information, supported learning, and improved their ability to critically think. Over 50% of the surveyed students indicated collaborative learning enhanced their social skills and improved productivity and accountability. A strength of this study was that collaborative testing had been integrated into the courses for about two years, so this was not a new concept for the faculty members. Another strength was that collaborative testing was utilized as extra credit after the students took the test as individuals for a grade, which was an incentive to participate. The investigators did not speak to the validity and reliability of the survey used for the study, which is a weakness of the study.

Constructivism has successfully been used as a theoretical model for teaching cultural competence in a graduate level nursing program (Hunter & Krantz, 2010). Hunter and Krantz (2010) conducted a study using a quasi-experimental, pretest-posttest control group design to explore whether students' learning experiences effected their levels of cultural competence. The sample in this study included students in two semesters enrolled in a healthcare cultural awareness course. The pretest was given to online and onsite students at the beginning of each semester and the posttest was given at the end of each semester. Only results from pretest and posttest pairs were included in

the evaluation of data, therefore, if a student only completed one of the assessments, it was not included in the results. There was a total of 48 online assessment pairs completed and 21 assessment pairs completed by onsite students. Results of the study proposed constructivism may be an effective foundation for teaching cultural competence for both online and classroom based settings. There were significant changes in cultural competence for all learners in this course. There were also significant improvements in cultural knowledge, cultural skill, cultural desire, and overall cultural competence. However, there were no significant differences found in cultural awareness and cultural encounters. There were no significant differences in results between the onsite and online students.

The instrument used in this study to measure cultural competence was the Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals Revised (IAPCC-R), which has been shown to be valid and reliable (Hunter & Krantz, 2010) and lends to a strength of the study. Another strength of the study was that participation did not affect course grades, therefore, there was the likelihood that participants gave honest answers. A weakness of the study was a total sample size of 69 students, however, of those, the classroom student sample size was only 21. Also, since the subscales of the instrument utilized only had five questions each, the instrument may not have been sensitive enough to convey significant change in all areas (Hunter & Krantz, 2010).

In nursing education, clinical locations are often challenging to obtain, and it is especially difficult to acquire the mandated number of clinical hours in accelerated courses (Hampton, 2012). Instructors of a ten-week accelerated psychiatric mental health

clinical nursing course incorporated constructivism as a foundation for creating a project to supplement clinical education (Hampton, 2012). In order to supplement clinical hours, a five-stage project was developed based on constructivism. Forty-nine nursing students were enrolled in the course, and 41 of the students consented to participate in a qualitative study to evaluate the effectiveness of the project that supplemented 30 clinical hours. Another goal was to identify learning outcomes that represented themes regarding pertinent understanding, personal relevance, and the ability to problem-solve. With the constructivist view, a learner will grow in these three themes if they are actively engaged and involved in their role of gaining knowledge (Hampton, 2012).

For the project, students were to select someone they knew who had been diagnosed with a mental illness and interview them regarding the mental illness (Hampton, 2012). Students were also to explore realistic treatment resources based on location and insurance coverage, research best practices for symptom or illness management/treatment, and journal a comparison of the person they chose to use as a case study to someone in a book, movie, or documentary with the same diagnosis. For the last part of the project, students were expected to briefly present the information they obtained throughout the project and to journal a summation of the learning experience.

Three overall themes were found in this study (Hampton, 2012). The three themes reflected that more than 90% of the students reported a deeper understanding of aspects of the case study's illness, over 90% of the students were able to problem solve in relation to needs of their case study, and 42% of the students noted a shift in their beliefs regarding mental illness. Therefore, the learning outcomes were achieved in this study.

A strength of the study was that it was created utilizing constructivism as a theoretical foundation. A weakness of the study was it was conducted with one accelerated 10-week class. Other weaknesses of the study included the small, convenience sample and results may not be generalizable to other nursing courses (Hampton, 2012).

Contextual constructivism has also been used as a foundation in the study of a nursing preceptorship course (Josephsen, 2013). Goals for the course were identified and assignments were made based on contextual constructivism, including narrative reflection and study in a real-life setting. Students who were enrolled in the preceptorship clinical course in two different semesters were invited to participate in a voluntary exploratory survey study to determine the effectiveness of the course assignments (Josephsen, 2013).

Fifteen students in the first semester and 14 students in the second semester completed the five-point Likert scale survey, which was based on the goals and objectives of the course assignments (Josephsen, 2013). Descriptive frequency analysis was completed on the survey items, and items with a frequency of less than 60% strongly agree or agree were considered for revision for the next semester. During the first semester, the participants scored items regarding the orientation exercise strongly agree or agree with a frequency of 73% which indicates course objectives were met, however one item was identified as scoring less than 60% and was removed for the next semester. After this revision, students in the second semester scored the orientation exercise strongly agree or agree with a frequency of 63% suggesting course objectives were met. Two other assignments, a clinical skill self-assessment form and a professional nurse role exercise, were found to meet course objectives in the first semester, therefore no

revisions were made to these assignments for the following semester. The narrative reflection exercise was shown to meet course objectives, however, the timeline for this assignment was changed from midterm to the end of the course. This change was based on comments suggesting there was not sufficient time to choose an experience to reflect and write about. The exercises in this study were based on contextual constructivism, and were found to be effective for learning in the preceptorship clinical course. Since this study was specific to the preceptorship clinical course, it may not be generalizable to other clinical areas. Also, the response rates were low, especially during the first semester, therefore results may not be indicative of the opinions of the entire student population in the course.

Constructivism has also been used as a theoretical framework in developing a course in professionalism in a medical school (Elliott et al., 2009). The course was designed to facilitate the learning of professionalism and assess professionalism in the practice of medicine. Students build on previous knowledge and experiences throughout the two-year course. The course is scheduled for two-hour sessions, with 24 sessions in the first year and 16 sessions in the second year. Students work together in groups called learning communities along with faculty mentors. Faculty mentors adjust the level of assistance based on the learning needs of the individuals in the groups. Most learning sessions begin with lecture, then learning communities encompassing about six students each work on related activities, and finally the entire group of 24 students meet to attend a follow-up session.

In the second year of the curriculum, students lead most sessions, while faculty mentors approve session topics and give feedback and help with student growth (Elliott et

al., 2009). Students must attend all sessions, complete required activities, and complete course, mentor, and peer evaluations, as well as demonstrate professionalism to successfully complete the course. The evaluation of the course included self-reflection and self-assessment, assessment and feedback from peers, feedback and evaluation from faculty, and a student portfolio. Course and faculty evaluations utilized a five-point Likert scale with an area for comments for suggested improvements. The development of this course over a seven-year period has proven to be successful in meeting course objectives relative to professionalism in the practice of medicine.

Strengths and Limitations of Literature

There is a vast amount of information regarding the use of ARS in nursing academia (Berry, 2009; DeBourgh, 2008; Efstathiou & Bailey, 2012; Fifer, 2012; Heden & Ahlstrom, 2016; Lee & Dapremont, 2012; Meedzan & Fisher, 2009; Patterson et al., 2010; Porter & Tousman, 2010; Stein et al., 2006; Sternberger, 2012; Welch, 2012). Many studies have been conducted regarding student perception of ARS in the classroom (Berry, 2009; DeBourgh, 2008; Efstathiou & Bailey, 2012; Fifer, 2012; Heaslip et al., 2014; Heden & Ahlstrom, 2016, Lee & Dapremont, 2012; Meedzan & Fisher, 2009; Patterson et al., 2010; Porter & Tousman, 2010; Siau et al., 2006; Sternberger, 2012). There are also studies that tie course grades to the use of ARS (Berry, 2009; Patterson et al., 2010; Stein et al., 2006; Sternberger, 2012; Welch, 2012). However, this literature search revealed no studies regarding the use of ARS in nursing classes in an initial onboarding nursing orientation program.

Constructivism is a learning theory that has been the foundation for studies in nursing and medical education (Duane & Satre, 2014; Elliott et al., 2009; Hampton,

2012; Hunter & Krantz, 2010; Josephsen, 2013; Sternberger, 2012). It also fits well with the principles of active learning and ARS usage during lecture (Sternberger, 2012). There have been studies based on constructivism conducted that reveal positive outcomes regarding the use of ARS (Heaslip et al., 2014; Siau et al., 2006; Sternberger, 2012).

CHAPTER III

Methodology

The purpose of this research was to determine nurse perceptions of interactivity during lecture utilizing an audience response system (ARS) in comparison to lecture without this technology in an initial onboarding nursing orientation. Nurses newly hired into the healthcare organization where the research was conducted attended an initial onboarding nursing orientation program consisting of various classes held over several days. ARS had previously been incorporated into some of the mandatory orientation classes in the organization. The researcher wanted to determine whether the nurses perceived an increase in interactivity during lecture when ARS was utilized.

Research Design

Research was conducted utilizing a quantitative, descriptive research design in which a group of initial onboarding nursing orientation participants attended a PowerPoint based lecture without the incorporation of ARS, and another group of initial onboarding nursing orientation participants attended a PowerPoint based lecture with ARS incorporated into the lecture. One 50-minute class was chosen from the initial onboarding nursing orientation curriculum to be utilized in the study. The group without ARS incorporated into the class attended a lecture style class with questioning embedded throughout the lecture. Questions built into the PowerPoint presentation for this class were used to gauge the knowledge of the initial onboarding nursing orientation participants to allow the instructor to build on the class knowledge or to correct any misconceptions based on the answers given. The group of initial onboarding nursing orientation participants that participated in the lecture with ARS incorporated attended

the same lecture style class at a different time with the same facilitator, content, and questions. The use of ARS was the only change made to the lecture. At the end of both sessions, nurses were invited to voluntarily participate in the research by completing an interactivity instrument. The group that attended lecture with ARS also voluntarily completed additional questions regarding the ease of use and usefulness of ARS (Siau et al., 2006).

Setting and Sample

The research was conducted in a large academic healthcare organization in the Southeastern United States. The sample goal size was at least 30 participants for both groups. A convenience sample of nurses required to attend an initial onboarding nursing orientation class was recruited to voluntarily participate in the study after the researcher gave verbal and written information regarding the research. Implied consent was given based upon the voluntary completion and submission of the instrument used in the research. The sample size was based upon the number of nurses who attended the initial onboarding nursing orientation during two orientation sessions. Demographic information of the nurses was not obtained for the research. There were 35 nurses who attended the first research session that did not include the use of ARS during the PowerPoint presentation, with 34 nurses voluntarily participating in the research. Forty-four nurses attended the research session that included ARS during lecture, with 41 nurses voluntarily participating in the research.

Design for Data Collection

Nurses who attended the initial onboarding nursing orientation classes were invited to voluntarily participate in the research and were informed of the research

regarding interactivity in the classroom the day before the class was held. One group of nurses attended components of nursing orientation that included the lecture-style initial onboarding nursing orientation class without ARS incorporated. On the day before the class, the researcher handed out and explained an information sheet describing the research. On the day of the class, the researcher asked participants if they had questions regarding the research before the class began and reminded the group that completion of the instruments was voluntary and could be discontinued at any time. The researcher facilitated the PowerPoint based lecture that included questions with multiple-choice answers for discussion embedded in the presentation. Upon completion of the class not utilizing ARS, the researcher distributed the interactivity instrument and explained that because ARS was not utilized in their class, they were to leave the last two subscales regarding the perceived ease of use and usefulness of ARS blank. After providing participants with time to ask questions, the researcher stepped out of the room to give the participants privacy during the time allotted for completion of the instruments. The nurses were given the opportunity to voluntarily complete the interactivity instrument (Siau et al., 2006) and place it in the locked box in the back of the classroom, whether completed or not. The instrument utilized to obtain this data was coded for the group who attended class that did not use ARS by being printed on green colored paper. At the end of the orientation session, the researcher obtained the instruments from the locked box and entered the data into the IBM® Statistical Package for Social Sciences® (SPSS), Version 22, program for analysis.

The same procedure was followed for the group of nurses who attended the initial onboarding nursing orientation class that included the use of ARS. This class had the

same instructor and the same content, with the only difference being the incorporation of ARS in the class. There were questions with multiple-choice answers embedded in the PowerPoint just as for the previous orientation group; however, this presentation included participant use of ARS to respond to questions. The nurses attending class that incorporated ARS also had the opportunity to voluntarily complete the interactivity instrument, with the addition of the subscales that measure perceived ease of use and perceived usefulness of ARS (Siau et al., 2006). Upon completion of the lecture, the researcher asked if there were questions and stepped out of the room to give the participants privacy during the time allotted for completion of the instruments. The instruments for the group using ARS were printed on blue paper. All nurses were asked to place the instruments, whether completed or not, in a locked box in the back of the classroom. At the end of the orientation session, the researcher obtained the surveys from the locked box and entered the data into the SPSS program for analysis. Since the sample goal of 30 participants had been met for each group, the researcher stopped data collection after obtaining the surveys from the two groups.

Measurement Methods

According to Siau et al. (2006), interactivity is the student's active involvement and participation in the classroom. Nurse perceptions of interactivity in the classroom were measured in this research by instruments established by Siau et al (2006). Nurse perceptions of perceived ease of use and usefulness of ARS in the initial onboarding nursing orientation were also measured by instruments established by Siau et al. (2006). All four instruments were placed on one interactivity instrument by the researcher for administration, and referred to as subscales in this research. Siau et al. (2006) created

items for the instrument measuring classroom interactivity based on, and validated by, their research on the concept of interactivity from the literature. Perception of individual interactivity in the classroom and overall interactivity in the classroom are measured separately because, for example, a person may be interactive in class but the overall class may not be interactive (Siau et al., 2006).

The interactivity instrument was used for this research with permission from the authors. The instrument consists of: *Individual Degree of Interactivity, Overall Degree of Interactivity, Perceived Ease of Use*, and *Perceived Usefulness* (Siau et al., 2006). The two subscales that were utilized to measure perception of individual and overall degrees of interactivity have 10 questions each, and are based on a nine-point Likert scale from: 1 (Strongly Disagree) to 9 (Strongly Agree) (Siau et al., 2006). On the subscales that measure the concept of both individual and overall interactivity in the classroom: items 1 and 2 measure students' classroom involvement; items 3 and 4 measure students' classroom engagement; items 5 and 6 measure the students' class participation; items 7 and 8 measure the feedback received from instructors; and items 9 and 10 measure students' self-assessment. The two subscales that measure the ease of use and usefulness of ARS consist of three questions each and are based on a nine-point Likert scale from 1 (Strongly Disagree) to 9 (Strongly Agree) (Siau et al., 2006).

Validity of the two interactivity subscales was established by Siau et al. (2006) by researching literature on interactivity. The interactivity instrument was found to be reliable during a pilot study, and during a pretest/posttest study by Siau et al. (2006). Reliability of the *Individual Degree of Interactivity* subscale, as measured by Cronbach's alpha coefficient (> 0.70), was 0.86 during the pilot study, 0.86 during the pretest, and

0.91 during the posttest. Reliability of the *Overall Degree of Interactivity* subscale, as measured by Cronbach's alpha coefficient (> 0.70), was 0.90 during the pilot study, 0.90 during the pretest, and 0.94 during the posttest. The *Perceived Ease of Use* and *Perceived Usefulness* subscales were adapted by Siau et al. (2006) from previously used instruments that were shown to be valid. The reliability of the *Perceived Ease of Use* subscale, as measured by Cronbach's alpha coefficient (> 0.70), was (0.73); while the reliability of the *Perceived Usefulness* subscale was 0.96 (Siau et al., 2006).

Data Collection Procedure

Data was obtained from a convenience sample of nurses participating in an initial onboarding nursing orientation regarding nurse perceptions of individual and overall interactivity during lecture. Data was collected from one group of nurses regarding their perceptions of individual and overall interactivity during a PowerPoint based lecture that did not include ARS in an initial onboarding nursing orientation. Data was also collected from another group of nurses regarding their perceptions of individual and overall interactivity during PowerPoint based lecture that included ARS in an initial onboarding nursing orientation. Both lectures were facilitated by the researcher and were identical in content. The group of nurses that utilized ARS during lecture had six additional statements to score concerning the perceived ease of use and the perceived usefulness of ARS. At the end of class the instruments were given to everyone in the class for both groups (group not using ARS and group using ARS) participating in the research sessions. All class attendees were asked to place the instruments, whether completed or not, in the locked box in the back of the classroom. The data was collected from the

instruments by the researcher at the end of each nursing orientation session included in the research and transcribed by the researcher into SPSS.

Protection of Human Subjects

Prior to data collection, the researcher obtained permission to conduct the research from the university's Institutional Review Board (IRB) and the facility's IRB. Class participants were given verbal and written information regarding the research and were provided an opportunity to discuss and ask questions about the research. Participants were informed they had the right to decline participation in the study and the right to withdraw from the study at any time without penalty. Information was given to the participants regarding the research, its purpose, and that participation was voluntary, anonymous, and would not affect their employment status in the organization. Participants were also informed that they would be invited to voluntarily fill out an instrument regarding interactivity in the classroom, which would take them approximately 10 minutes to complete; and by completing the instrument and handing it in, they were giving implied consent. An informational sheet containing details of the research was given to all nurses in the classroom. No demographics were obtained during the study, therefore data collected was completely anonymous and subjects are also anonymous through the dissemination of results.

Data Analysis

Data from both initial onboarding nursing orientation sessions included in this research was entered into SPSS for analysis by the researcher. Using SPSS, the researcher found the means, standard deviations, and distributions for the following: ease of use of ARS, usefulness of ARS, nurse perceptions of individual and overall

interactivity for the lecture without ARS, and nurse perceptions of individual and overall interactivity for the lecture with ARS in the nursing orientation class. Two sample t-tests were completed to compare the lectures and to determine the effect of ARS on nurse perceptions of individual and overall interactivity in an initial onboarding nursing orientation.

CHAPTER IV

Results

The purpose of this research was to investigate if using an audience response system (ARS) increases nurse perceptions of individual and overall interactivity in an initial onboarding nursing orientation classroom. Perceived ease of use and usefulness of ARS in this setting were also investigated. Data obtained during this research was entered into IBM® Statistical Package for Social Sciences® (SPSS), Version 22, for analysis by the researcher.

Sample Characteristics

A convenience sample of nurses newly hired into a large academic health system and participating in an onboarding nursing orientation in the southeastern United States were recruited for this research. Seventy-nine nurses had the opportunity to participate in the research. Thirty-five nurses attended the first research session, and 44 nurses attended the second research session.

Nurses who attended the first research session were asked to voluntarily complete an interactivity instrument in response to a PowerPoint lecture without ARS. Of the 35 nurses in the group without ARS, 34 completed all portions of the *Individual Degree of Interactivity* and *Overall Degree of Interactivity* subscales of the interactivity instrument. These subscales were scored by the nurses from: 1 (Strongly Disagree) to 9 (Strongly Agree). One nurse did not respond to all statements on the instrument, therefore, data from that participant was incomplete and not entered in the research or included in data analysis. The nurses in this group were instructed not to score the statements on the subscales of the interactivity instrument related to the *Perceived Ease of Use* and

Perceived Usefulness of ARS, since they did not attend a research session in which ARS was utilized.

Of the 44 nurses who attended the research session with ARS used as an educational tool during lecture, 41 nurses completed the interactivity instrument in its entirety, including the *Perceived Ease of Use* and *Perceived Usefulness* of ARS subscales. Two nurses did not respond to all statements on the instrument, and one nurse gave two responses for one statement. The responses on these three instruments were not included in data analysis.

Major Findings

IBM® Statistical Package for Social Sciences® (SPSS), Version 22, was utilized to evaluate the data obtained from the interactivity instruments from the group who participated in the research session consisting of a PowerPoint presentation without ARS and the group who participated in the research session consisting of a PowerPoint presentation with ARS. The mean scores for all questions on each subscale were calculated. Then, an independent samples t-test was conducted to analyze the significance related to the use of ARS and nurse perceptions of interactivity in an initial onboarding nursing orientation classroom.

The mean score on the *Individual Degree of Interactivity* subscale for the research session consisting of a PowerPoint presentation without ARS, was 7.33. The mean score on the *Individual Degree of Interactivity* subscale for the PowerPoint presentation with ARS, was 7.94. The mean score on the *Overall Degree of Interactivity* subscale for the research session without ARS was 7.64, and the mean score on the *Overall Degree of Interactivity* subscale for the research session with ARS was 7.99. Refer to Table 1 for

the descriptive statistics calculated for the mean scores on both individual and overall degrees of interactivity for the groups attending a research session with and a research session without ARS.

Table 1

Mean Scores of Interactivity in the Classroom

	Group	Minimum	Maximum	Mean	Std. Deviation
Individual Degree of Interactivity	without ARS	6.65	7.74	7.329410	.3197191
	with ARS	7.10	8.27	7.941460	.3911130
Overall Degree of Interactivity	without ARS	7.29	7.97	7.638230	.2231602
	with ARS	7.56	8.15	7.990250	.1646993

Using SPSS, the researcher analyzed the independent samples t-tests of the two research sessions. Results of the independent samples t-tests indicated there was a significant difference between the responses to the ten items on the *Individual Degree of Interactivity* subscale from nurses who attended lecture without ARS (M=7.33, SD=0.32) and the ten items on the *Individual Degree of Interactivity* subscale from nurses who attended lecture with ARS (M=7.94, SD=0.39); t (18) = -3.83, p = .001. The independent samples t-test also indicated there was a significant difference between the responses to the ten items on the *Overall Degree of Interactivity* subscale for the nurses who attended lecture without ARS (M=7.64, SD=0.22) and the 10 items on the *Overall Degree of Interactivity* subscale for the nurses who attended lecture with ARS (M=7.99, SD=0.16); t (18) = -4.014, p = .001. These results suggested the use of ARS during a PowerPoint

presentation in an onboarding nursing orientation significantly increases both individual and overall interactivity in the classroom.

The 41 nurses who participated in the research session that included the use of ARS also scored statements on the subscales regarding ARS: *Perceived Usefulness* and *Perceived Ease of Use*. The mean response to the three questions regarding perceived usefulness was 8.69, and the mean response to the three questions regarding perceived ease of use was 8.89. Refer to Table 2 for the descriptive statistics calculated for the mean scores on the three questions for both subscales. These subscales were measured on a 9-point Likert scale from: 1 (Strongly Disagree) to 9 (Strongly Agree). The results suggested the participants who utilized ARS during the PowerPoint presentation found them easy to use and useful in the onboarding nursing orientation class.

Table 2

Mean Scores Related to ARS Use

	Minimum	Maximum	Mean	Std. Deviation
Perceived Usefulness	8.63	8.73	8.6910	.05079
Perceived Ease of Use	8.85	8.93	8.8862	.03723

Summary

The data analyzed for this research included a total of 75 nurses who attended an initial onboarding nursing orientation and voluntarily completed an interactivity instrument. The research included data collection from two class sessions. The first research session included 34 nurses who completed the *Individual Degree of Interactivity* and *Overall Degree of Interactivity* subscales of the survey instrument after attending a PowerPoint presentation without the use of ARS. The second research session included

41 nurses who also completed the *Individual Degree of Interactivity* and *Overall Degree of Interactivity* subscales of the interactivity survey instrument after attending a PowerPoint presentation with the use of ARS. Nurses who attended the research session with ARS also completed the *Perceived Usefulness* and *Perceived Ease of Use* subscales which included statements regarding the use of ARS. The results of this research suggested there was a significant increase in nurse perceptions of individual and overall interactivity in an onboarding nursing orientation class with the use of ARS. It also suggested that ARS was perceived to be easy to use and useful in this setting.

CHAPTER V

Discussion

Implication of Findings

The findings from this research supported the hypotheses that ARS increases nurse perceptions of individual and overall interactivity in an onboarding nursing orientation class, and that ARS was easy to use and useful in this setting. Nurses who are newly hired into positions in an organization come from various backgrounds, levels of experience, and circumstances for being hired into the organization. Nurse educators have a responsibility to ensure nurses are engaged in learning during the orientation process. The results from this research supported previous findings of increased individual and overall classroom interactivity in non-nursing students with the use of ARS, as well as perceived usefulness and ease of use of ARS (Siau et al., 2006; Heaslip et al., 2014). It also supported the findings of Porter and Tousman (2010) that suggested there was increased interactivity in the classroom for nursing students with the use of ARS. The researcher found no previous studies regarding the use of ARS and its effect on nurse perceptions of individual and overall interactivity in an onboarding nursing orientation prior to this study.

Application to Theoretical/Conceptual Framework

The theoretical framework for this research was constructivism, which was appropriate for this research. Knowledge is individually constructed based on the person's interpretation of information (Piaget, 1952/1965). This interpretation is affected by interactions with the environment as well as the individual's previous knowledge and experiences (Piaget, 1952/1965). ARS is an educational tool that allows the nurse educator to gauge students' previous level of knowledge or understanding of a subject

while in the process of teaching. This information gives the nurse educator the ability to correct any misunderstandings or expand on the concepts being taught: basing the instruction on the learners' previous level of understanding. The experience of utilizing ARS as an educational tool in an onboarding nursing orientation was shown to significantly increase nurse perceptions of individual and overall interactivity in the classroom versus lecture without this tool.

Limitations

Limitations of this research regarding nurse perception of interactivity in an onboarding nursing orientation included small sample sizes of 34 and 41. There were no demographics obtained during the study, therefore there was no way to compare characteristics of the nurses who participated in the research session without ARS to the nurses who participated in the study session with ARS. Also, the nurses who participated in the research were obtained from a convenience sample of nurses who were required to attend an onboarding nursing orientation. Research was only conducted in one academic health system and results may not be generalizable for other institutions or populations.

Implications for Nursing

Nurse educators working with newly hired nurses have a responsibility to ensure they are utilizing effective teaching methods. ARS has been indicated to increase perceptions of individual and overall interactivity in the classroom. It is important for nurse educators to fully engage nurses in required and necessary education that happens in a variety of settings, with onboarding nursing orientation being one of them. Incorporating ARS is a way nurse educators can increase the interactivity in work-related classrooms. The cost of technology, such as ARS, in the classroom may be justified

based upon research indicating participants perceive increased interactivity in the classroom due to the use of ARS.

Recommendations

A recommendation stemming from this research was to incorporate ARS technology in nursing work-related classrooms, and particularly in onboarding nursing orientation programs to increase interactivity. Also, further research into the use of ARS in these settings in different healthcare organizations and with larger populations of nurses would be beneficial in order to generalize results to a broader population. Studies duplicating this research in different geographical areas would also increase our knowledge base on the use of ARS in initial onboarding nursing orientations. Another recommendation was to correlate the responses on the interactivity instrument with demographics such as age, gender, experience, and previous use of ARS in a classroom setting. Gathering qualitative data from participants in addition to the quantitative data from the instruments would give researchers deeper insight on nurse perceptions of ARS use in this setting. The investigation in knowledge retention based on ARS use in the classroom would also be beneficial.

Conclusion

The majority of research found by the researcher regarding the use of ARS in the classroom was related to academia. The researcher desired to investigate ARS use in work-related classroom environments for nurses. This research was based on the constructivist theory, in which learners construct new knowledge from interactions in the environment based on their previous knowledge. The results of this research suggested that the incorporation of ARS in an onboarding nursing orientation class significantly

increases nurse perception of individual and overall interactivity in the classroom. It also indicated that ARS was viewed by the participants as easy to use and useful in this setting. Nurse educators are constantly looking to improve the educational experiences of nurses. ARS is one interactive tool that can be utilized to engage nurses in the educational setting.

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