

5-2018

The Impact of Quick Response (QR) Technology on Anxiety with First Semester Nursing Students related to the Performance of Psychomotor Skills with Patients in Clinical

Lee-Ann Terri Kenny
lkenny@gardner.webb.edu

Follow this and additional works at: https://digitalcommons.gardner-webb.edu/nursing_etd



Part of the [Nursing Commons](#)

Recommended Citation

Kenny, Lee-Ann Terri, "The Impact of Quick Response (QR) Technology on Anxiety with First Semester Nursing Students related to the Performance of Psychomotor Skills with Patients in Clinical" (2018). *Nursing Theses and Capstone Projects*. 305.
https://digitalcommons.gardner-webb.edu/nursing_etd/305

This Capstone is brought to you for free and open access by the Hunt School of Nursing at Digital Commons @ Gardner-Webb University. It has been accepted for inclusion in Nursing Theses and Capstone Projects by an authorized administrator of Digital Commons @ Gardner-Webb University. For more information, please see [Copyright and Publishing Info](#).

The Impact of Quick Response (QR) Technology on Anxiety with First Semester Nursing
Students related to the Performance of Psychomotor Skills with Patients in Clinical

by

Lee-Ann Kenny

A DNP project submitted to the faculty of
Gardner-Webb University Hunt School of Nursing in
partial fulfillment of the requirements for the degree of
Doctor of Nursing Practice

Boiling Springs, NC

2018

Submitted by:

Lee-Ann Kenny

Date

Approved by:

Dr. Ashley Isaac-Dockery

Date

Approval Page

This capstone project has been approved by the following committee members:

Teresa Gaston DNP, RN, CNE, BC-NI
Committee Member

Date

Kelly Powers, PhD, RN, CNE
Committee Member

Date

Julie Fuselier, MSN, MPH, RN, FCN,
CNE
Committee Member

Date

Cindy Miller, PhD, RN
Chair, Graduate Studies

Date

Abstract

Anxiety seen with first semester nursing students in a clinical setting when performing psychomotor skills can be a root cause of fear, lack of confidence, ill symptoms, and can lead to unsafe practice ultimately causing injury to patients. The learning and practicing of psychomotor skills occur prior to students first clinical experience, and in most cases over a short period of time. Implementation of Quick Response (QR) technology linked to psychomotor skills during didactic, allowed students quick access to review skills prior to performing skills within the clinical setting. In conclusion, a decrease in anxiety was noted by first semester nursing students during their clinical with access to skills learned prior to clinical.

Keywords: first semester nursing students, anxiety, clinical, psychomotor skills, technology, quick response, nursing education.

Acknowledgements

I owe thanks to many people for encouraging me, loving me, standing by me, and guiding me. This journey led to forging new relationships that will be treasured. I give glory to my Lord and Savior for never abandoning me even at times when my faith went weak. My husband Steve who is my constant rock and strong shoulder and my children Stephen, Andrew, and Mary as well as my parents Hank and June Brzoska, all of whom constantly reminded me of how proud they are of me and my accomplishments. My grandchildren Aniston Grace and Maddon, who always gave my spirit a lift.

A special thank you to my DNP project committee members, Dr. Teresa Gaston, Dr. Kelly Powers, and Mrs. Julie Fuselier all of whom stood by me, gave guidance, and emotional support throughout this process. This journey would never have been successful if it were not for my two dearest friends, Sharon Allen and Jamie Brandon whom I thank God every day for bringing you into my life. My project chair Dr. Ashley Isaac-Dockery provided me hope, guidance, and endless encouragement every step of this process. Thank you, you will forever have a place in my heart!

© Lee-Ann Kenny 2018

All Rights Reserved

Table of Contents

SECTION I: PROBLEM RECOGNITION

Problem Recognition	1
Identified Need.....	1
Problem Statement	2

SECTION II: NEEDS ASSESSMENT

Literature Review.....	4
Theory-Practice Gap	4
Interventions Being Utilized.....	5
Mobile Device Learning	6
Point of Care	7
Quick Response (QR) Scanning Technology	8
Population Identification.....	9
PICOT Statement	10
Stakeholders	10
Organizational Assessment.....	11
SWOT Analysis	11
Available Resources.....	13
Desired and Expected Outcomes	14
Team Selection.....	15
Cost/Benefit Analysis	15
Scope of Problem.....	16
Outcome	19

SECTION III: GOALS, OBJECTIVES, AND MISSION STATEMENT

Goals and Objectives	20
Mission Statement.....	20

SECTION IV: THEORETICAL UNDERPINNINGS

Theoretical Underpinnings.....	21
Theory Supporting Project Framework	22

SECTION V: PROJECT PROPOSAL

Design	24
Sample.....	25
Setting	25
Project Management Tools	26
GANTT Chart.....	26
Timeline.....	27

SECTION VI: EVALUATION PLANNING

Evaluation Planning.....	29
Quality Improvement Method.....	33
Plan	33
Do	34
Study	34
Act.....	34

SECTION VII: IMPLEMENTATION

Institutional Review Board (IRB) Process.....	35
Implementation	35

Threats and Barriers	36
Monitoring of Implementation.....	36
Project Closure.....	37
SECTION VIII: INTERPRETATION OF DATA	
Qualitative Data	38
Quantitative Data	41
Process Improvement Data	47
Conclusion	47
REFERENCES	48
APPENDICIES	
A: Quick Response Codes	54
B: State Anxiety	56
C: Trait Anxiety	57

List of Figures

Figure 1: PICOT Diagram	10
Figure 2: SWOT Diagram.....	13
Figure 3: Question 1.....	17
Figure 4: Question 2.....	17
Figure 5: Question 3.....	18
Figure 6: Question 4.....	18
Figure 7: Question 5.....	19
Figure 8: GANTT Chart.....	26
Figure 9: Logic Model	32
Figure 10: Post-Survey Bar Graph.....	39
Figure 11: Positive Trait Anxiety Score	42
Figure 12: Negative Trait Anxiety Scores	42
Figure 13: Histogram	44
Figure 14: Negative Feeling Histogram.....	44
Figure 15: Pre-test State Positive Feelings Bar Graph.....	45
Figure 16: Post-test State Positive Feelings Bar Graph	45
Figure 17: Pre-test State Negative Feelings Bar Graph	46
Figure 18: Post-test State Negative Feelings Bar Graph	46

List of Tables

Table 1: Student Qualitative Questions	30
Table 2: Focus Group Questions.....	31
Table 3: Post-Survey Technology Questions and Response Rates.....	38
Table 4: Focus Group Questions.....	40

SECTION I

Problem Recognition

Anxiety is defined by the English Oxford Living Dictionaries (2017), as “a feeling of worry, nervousness, or unease about something with an uncertain outcome” (para. 1). Nursing students’ number one complaint while in nursing school is the anxiety they feel on a day to day basis, especially during their clinical experiences. Based on casual conversation with faculty and preceptors, this complaint is validated and seen throughout the nursing education process. Students are scared and seldom feel ready or educated enough to walk into a patient’s room with confidence. Anxiety levels increase if the student needs to perform a psychomotor skill on their patient. An example of psychomotor skills also known as nursing skills taught include: blood draw, initiation and management of intravenous, wound care and Foley catheter insertion, and removal (Assessment Technology Institute [ATI], 2016). Many students are fearful they have forgotten how to execute the skills learned during fundamental skills training, in addition to causing harm to patients.

Identified Need

Phillips (2017) recognizes that students often feel unprepared, lack self-confidence, anxious, and feared being asked something they cannot answer during clinical. While the feeling of anxiety may never be eliminated from the rigors of nursing school, decreasing such feelings will allow students to enhance their clinical experience and promote positive learning outcomes. While moderate levels of anxiety can be considered a catalyst to learning, according to Moscaritolo (2009), too much anxiety can be disruptive to clinical learning and patient care. Level of anxiety varies based on

students' past work experiences prior to nursing school. Chesser-Smyth (2005) noted anxiety levels are linked to knowledge, with a decrease in anxiety levels noted with more education. Clinical anxiety in nursing school has been linked to influencing a students' overall well-being. Students may experience headaches, insomnia, lack of appetite, stomach pain, tension, restlessness, crying and menstrual disorders (Sun et al., 2016). During a clinical experience the main focus is patient safety. If nursing students are experiencing anxiety to the level that impedes their ability to practice nursing safety, clinical instructors need to implement strategies to help aid in reducing anxiety during clinical.

Problem Statement

The aim of this DNP project was to evaluate the use of Quick Response (QR) technology in clinical with first semester nursing students and the impact noted on students' anxiety levels related to the performance of psychomotor skills on patients. The technology consists of a QR code which is a two-dimensional barcode linked to information, in addition to a scanner which is the tool used to scan the code allowing a quick connection with information that is stored on a website for students. This technology allows students to have increased self-direction and active participation in their learning. Quick Response (QR) technologies hold the potential to bring needed resources to nursing students' in a timely fashion, allowing them a quick review of vital information prior to performing psychomotor skills on their patients.

Based on the author's experiences of teaching first semester nursing students' fundamentals courses and overseeing their first clinical experience, it has been observed, students would often dodge opportunities to perform skills they learned because they did

not feel prepared. According to Sun et al. (2016), students feared doing harm to their patients if they did not perform a skill correctly during clinical. Access to resources are often difficult for students during clinical because computers are shared with staff and space is limited for students to bring books and other classroom materials. This problem is not only seen with first semester nursing, but at all levels. While simulation has proven to be effective in improving student confidence and anxiety, old technology being used with new ideas can link students to valuable resources. Mobile devices such as smartphones have the capability to bring needed resources, quickly to the bedside.

SECTION II

Needs Assessment

Literature Review

There are several theories and explanations of why anxiety levels are so high in clinical for nursing students. A review of literature was conducted linking the prevalence of anxiety in nursing students with specific attention to first semester clinical students. Regardless of the root cause, faculty response to anxiety and the ability to implement interventions could impact the level of anxiety experience from first year nursing students.

Theory-Practice Gap

Regardless of the preparations given to students through courses, theory, and laboratory time, students experience greater anxiety during clinical (Levitt-Jones, Pitt, Courtney-Pratt, Harbrow, & Rossiter, 2015). Scully (2011), evaluated the theory-practice gap and concluded the gap can be alleviated if adequate instruction is given in the classroom prior to clinical, linking the why and the how with the skill. Clinical instructors need to be cognitive of the theory-practice gap and continue to weave theory into clinical to enhance student learning and decrease anxiety. Clinical experiences not only help students to strengthen their professional nursing skills, but also to develop a stronger sense of research, theory, and principles (Sun et al., 2016). Rajeswaran (2016) stated that the theory-practice gap “creates conflict and influence the students learning negatively” (p. 5). Psychomotor skills are an important part of clinical nursing; however, there has been a stronger emphasis on theory versus preparation for skills in nursing school highlighting some concerns in the theory practice gap (Chesser-Smyth, 2005).

Interventions Being Utilized

There are many interventions being reported though the literature addressing anxiety in student nurses during clinical. Patterson (2016) looks at behavior modification such as emotional freedom technique (EFT), which has the student lightly tap pressure points found in his or her face, neck, hands, chest, and head while reciting a phrase or mantra. According to Gore, Hunt, Parker, and Raines (2011), developing patient care scenarios using simulation prior to a hospital setting will help transition a novice student nurse from a controlled environment in the lab to an acute care setting. Simulation allows for active learning without potential for harm of a patient and supports the students and their level of assurance (Khalaila, 2014). According to Ross and Carney (2017), augmenting confidence through simulation by incorporating the nursing process, safety, psychomotor skills, communication, and clinical reasoning prior to the students' clinical experience can decrease anxiety.

Based on the literature review, there was a significant amount of articles written and studies conducted to substantiate the problem statement of anxiety in first semester clinical nursing students. Furthermore, a greater number of articles have been collected about general anxiety in all nursing students. As stated by Moscaritolo (2009), "High levels of anxiety can affect students' clinical performance, presenting clear threat to success in a clinical rotation. It is crucial for clinical nursing faculty to foster a supportive learning environment" (p. 17). Phillips (2017) summarized fears and anxieties felt by nursing students include the fear of inadequate performance, being unprepared, lack of confidence and knowledge, and simply not having answers.

Mobile Device Learning

Access to resources are often difficult for students during clinical because computers are shared with staff, and space is limited for students to bring books and other classroom materials. This problem is not only seen with first semester nursing students, but at all levels. While simulation has proven to be effective in improving student confidence and anxiety, old technology being used with new ideas are now linking students to valuable resources. Mobile devices such as smartphones have the capability to bring needed resources quickly to the bedside. Smith (2010), as cited in (Bolorizadeh, Brannen, Gibbs, & Mack, 2012), reported mobile access will be used by much of the population, and smartphone ownership will surpass personal computer ownership over the next five to ten years.

Mobile devices include tablets, smartphones, personal digital assistant devices, or any other device that is small, wireless, portable, user friendly, quick, and easily accessible to resources. Several advantages to implementing mobile technology include a decrease in error and improved patient safety during a student's clinical experience (Day-Black & Merrill. 2015). Mobile device learning promotes independence and responsibility to individual learning (Clay, 2011). As society transforms technology into everyday living, the demands have increased for advanced and flexible learning (Clay, 2011).

Personal digital assistant (PDA) devices have long been used in the healthcare field to access patient records, writing prescriptions, billing, and access to resources; however, uses have been limited for nursing (Berglund, Nilsson, Revay, Petersson, & Nilsson, 2007). Personal digital assistant (PDA) is a type of mobile device noted within

the literature to be a useful and supportive tool in the healthcare setting. Along with smartphones, the PDA reinforces knowledge and strengthens confidence while improving the quality and safety of patient care (Day-Black & Merrill, 2015). In a study conducted by Berglund et al. (2007), nurses indicated the value of the PDA for their daily work, but also recognized the importance of the PDA to align with the hospital computer system in order for it to be an accepted supportive tool. Schlairet (2012) found reoccurring themes in their study of PDAs with nursing students in clinical including: “ability to identify the best evidence to support critical thinking and clinical problem solving, and then to reflect on this learning which is paramount to student success and evolving professional development” (p.393). Brubaker, Ruthman, and Walloch (2009), reported PDA provides the bridge of theory and practice (p.392). As technology continues to be incorporated in nursing education and daily practice, “PDAs are proving to be effective educational tools that result in improved efficacy, decreased medical error, and increased professional confidence” (George, Davidson, Serapiglia, Barla, & Thotakura, 2010, p. 375).

Point of Care

Point of care (POC), is the point at which care is given to a patient. Over the years the development of new technology has brought the ability of documenting and decision-making task to the bedside (Eastes, 2001). Personal digital assistant devices are the most common form of technology to provide POC because of the size, low costs and intuitive software (Eastes 2001). Di Pietro, Doran, and McArthur (2010) reported there are several organizational barriers seen by nursing which include access to information and resources to support evidence-based clinical decisions in a timely manner. “Computer decision support tools and case-based reasoning systems have the potential to

increase nurses access to the utilization of evidence-based information to support the clinical decision-making process, in real time at the bedside” (Di Pietro et al., 2010, p. 240). The study conducted by Curran (2008), indicated the students found the PDA technology used for POC was invaluable in their clinical environment. The increase of smartphone Apps and its application to POC in clinical settings are on the rise. According to George and DeCristofaro (2016), barriers to the use of smartphones are minimal. This technology allows students to take what they learn in the classroom and transition it into their clinical experience (George & DeCristofaro, 2016).

Quick Response (QR) Scanning Technology

Recognizing the majority of nursing students are now of the millennial generation, Yoder and Terhorst (2012), identified the need for faculty to explore different learner-centered methods of teaching that resonate with students who are accustomed to technology. Quick Response (QR) technology has potential to bring needed resources to nursing students in a timely fashion, allowing quick review of vital information prior to performing psychomotor skills on their patients. The American Association of Colleges of Nurses (2010), the Institute of Medicine (2010), and the National League of Nursing (2008), recognize and recommend the utilization of informatics in providing patient centered care.

Quick Response technology has opened a new gateway to accessing resources. Libraries have been using QR technology to “equip students with inquiry and trans literacy skills needed to be lifelong learners” (Ahearn, 2014, p.75). Quick Response technology can improve the teaching learning process by linking valuable resources to a two-dimensional bar code that can be read on mobile devices like a smartphone with a

digital camera. According to Zupanovic and Tijan (2012), QR technology will aid with time management and “enable creation, distribution, and use of knowledge in various places at the same time” (p.1793). While this technology began approximately 15 years ago, it was only recently when this technology found its way into education (DeSilets, 2012). With the sky being the limit in how educators use this technology, there are endless possibilities for nursing education to incorporate QR technology to help ease access to needed resources in a timely manner and ultimately creating a safer environment for the patient. Resources for students can be developed by the individual clinical instructors and tailored to meet the needs of the student or clinical unit.

Garrett, Jackson, and Wilson (2015) utilized QR technology in clinical lab as augmented reality mobile learning by linking equipment, simulation scenarios, and videos to QR codes to further nursing student’s clinical education in skills lab. Quick Response technology falls under the description of ubiquitous learning. Tracey, DiStefano, Morris-Hackett, and Steefel (2013) engaged their nursing students in an innovative learning activity linking QR codes to a step-by-step demonstration of nursing skills using QR technology. Tracey et al. (2013) stated the use of QR codes enabled student autonomy by promoting self-directed learning. Student autonomy and self-directed learning are universal goals nurse educators have for their students.

Population Identification

The identified population for this evidence-based project was culturally diverse first semester nursing students enrolled in the baccalaureate nursing program in a public four-year university in North Carolina. The large number of the nursing student population are of the millennial generation and at least 18 years of age. Occasionally,

non-traditional second career older generation students enroll in the nursing program.

The faculty were a diverse population of nursing professionals with a vast range of nursing experience, having a minimum of a master's degree in nursing and able to teach across the curriculum.

PICOT Statement

P	Population: First Semester Clinical Students in BSN program
I	Intervention: How does the use of technology (QR scanning) impact anxiety in clinical when performing psychomotor skills (nursing skills)
C	Comparison: Compared anxiety of students the first few weeks of their clinical rotation not having the availability of technology to the last weeks of their clinical rotation with technology availability.
O	Outcome: Anxiety reduction when anticipating, performing or preparing to perform a psychomotor skill on a client.
T	Time: End of student's clinical experience.

Figure 1. PICOT Diagram

Stakeholders

Key stakeholders include the students whom participated in the project as well as those whom may be impacted in the future based on the outcome of the project.

Additional, stakeholders include faculty, The School of Nursing, College of Health and Human Services, as well as the University. Clinical sites in which the nursing students' practice, future employers of nursing students', and the clients the nursing students cared for are other key stakeholders.

Organizational Assessment

Implementation of the DNP project was conducted at a public North Carolina University's School of Nursing (SON). The university is an urban institute for teaching and learning. The National Center for Education Statistics (2017) reported the total of 31,552 students at the university in the year 2014-2015. The SON offers several degrees and certificate programs and enrolls 50-60 undergraduate students each fall and each spring. The College of Health and Human Services student demographic profile for the school year of 2016 included: white students (72.8%), minority (21.7%), female (90.8%) and males (12.2%) (University of North Carolina-Charlotte [UNCC], 2017a). The SON embraces the core values of integrity, innovation, collegiality, diversity, and scholarship, which are consistent and align with the DNP project values (UNCC, 2017b).

SWOT Analysis

Faculty support in educational advancement, research, and technology is ongoing. There is a diverse faculty and student body set within a diverse campus. The SON has a state of the art simulation lab shared by an interdisciplinary team from several programs within the College of Health and Human Services. The SON offers academic support to all students contributing to high retention rates and high NCLEX pass rate.

Weaknesses are seen within the university and school of nursing as means of improvement. The SON does have some leadership weakness in relation to approachability and visibility to faculty and study body. Faculty educational experiences range from a master's degree to doctoral degrees. Integration of new ideas specifically technology can be difficult to implement on a large scale, as faculty become comfortable in their way of teaching and utilization of new resources or technology may be

uncomfortable. Limited faculty development opportunities are directly affected by a tight budget which appears to be system wide.

Academic technology has provided several opportunities to students including the use of technology including IPAD minis in the event students do not have a smart phone during clinical. The use of free Apps for the QR technology provides enhanced learning opportunities for students within the nursing program. The student body is primarily millennial generation and more inclined to accept new technology as a teaching strategy compared to the older generation students.

There was always the possibility faculty and students would not support the DNP project. Resistance to the change from the students and faculty would have been a threat to the success of the project. Additional threats include technology not working properly and QR scans were not beneficial to students within the clinical setting. (Figure 2).

Strengths	Weakness
<ul style="list-style-type: none"> ❖ Open to new ideas ❖ Student center ❖ Strong, pro-active Dean of Undergraduate students' ❖ Supportive faculty ❖ Academic technology willing to assist ❖ Academic technology has resources for faculty to use ❖ State of the Art Simulation lab ❖ Excellent students' retention ❖ Diverse student and faculty body ❖ Excellent NCLEX pass rate ❖ 4-year BSN program ❖ Diverse campus ❖ Research University ❖ Support of Research University, college and school wide 	<ul style="list-style-type: none"> ❖ Poor integration of technology in nursing program ❖ Faculty morale ❖ Poor leadership ❖ Distinct divides between different levels of faculty (lecturer and tenure) ❖ Tight budget ❖ Over worked ❖ Poor faculty development opportunities
Opportunities	Threats
<ul style="list-style-type: none"> ❖ Predominantly millennial student body ❖ Tech savvy students ❖ Free QR scanning App ❖ Free QR code generator ❖ Majority of student's have smartphone technology ❖ Research University ❖ Use of back up technology- IPAD minis 	<ul style="list-style-type: none"> ❖ Faculty not buying in ❖ Students not buying in ❖ Technology not working smoothly ❖ Student resistance to change ❖ Faculty resistance to change ❖ Technology slow or not working ❖ Not beneficial to students ❖ Extra work for faculty

Figure 2. SWOT Diagram

Available Resources

Resources at the university are plentiful and available to execute a project.

Faculty in the SON have a variety of experiences, expertise, and research interests. The diverse faculty and student community in which the university is comprised of offers a variety of views, thoughts, and needs. Academic Technology with the College of Health and Human Services have been instrumental in researching credible applications for QR

technology and did not pose a threat to the students, faculty, or university. They have also assisted in linking resources to QR codes and housing those codes on a private faculty web page. Lastly, academic technology granted access to Qualtrics, a surveying site in which researchers at the university were able to use free of charge. Qualtrics allowed the doctoral student to administer an anonymous pre and post survey. The university's library set aside six I-Pad minis for use during the implementation of the DNP project for clinical faculty to have in the event students did not have the needed technology or the technology students had fail to work during their clinical day.

Project Mosaic and the college's health informatics department were other university resources utilized for this project. Consultation with Project Mosaic and the Health Informatics department for the DNP project, allowed review of the project, discussion of desired outcomes, surveys, and questions used for pre and post surveys. Upon completion of adding the surveys to Qualtrics, Project Mosaic reviewed the surveys giving feedback on format and flow.

Desired and Expected Outcomes

Benefits expected to be seen with the use of QR technology was the ease of adapting the technology to access useful resources assisting students with patient care while in clinical. Integration of QR technology into nursing students' clinical experience was expected to not only enhance learning outcomes, but also decrease anxieties experienced when performing a psychomotor skill on their patient. Enthusiasm and motivation were seen in the study of Saprudin, Goolamally, and Latif (2014), related to the QR technology. Faculty noticed a difference in their students' anxieties by having the resources readily available to them at any given time during their clinical.

Team Selection

Team selection was built on faculty experience, student centered teaching, and history of integrating technology into nursing courses. Based on the selection criteria, three well rounded and qualified nurse educators at the University were asked to be a part of the DNP project committee. The practice partner, is a doctoral prepared nurse educator with 14 years' experience and is a certified nursing informatics specialist since 2013. She is also involved with article reviews for the Online Journal of Nursing Informatics. The second committee member is a PhD prepared nurse, and has been in nursing education for 10 years, incorporating innovation into her teaching strategies through the use of simulation technology. She has been involved with the development of a SMART notebook used in clinical as a tool to help promote clinical success with all nursing students at the university. The final committee member is an MSN prepared nurse, has been teaching nursing students for 11 years. Recognized for her excellence in teaching, she brings excitement, innovation, and technology into the classroom and clinical. The DNP project chair is a doctoral prepared nurse practitioner with total nursing experience 13 years.

Cost/Benefit Analysis

The project costs were \$162.00 which include a 20% student discount for the State-Trait Anxiety Inventory. This tool was purchased through Mind Garden at the cost of \$50.00 for the instruction manual and \$112.00 for 60 pre-and post-surveys to be uploaded into Qualtrics. Applications and QR Code Generator are cost neutral, free to students and faculty. Use of I-Pad minis, academic technology support, as well as

analysis of data are also cost neutral with no cost to the project. All costs incurred during this project were covered by the DNP student.

Scope of Problem

First semester clinical nursing students seem to be particularly vulnerable to anxiety simply because of lack of experience with patient care, in addition intense learning of theory and skills in which they are expected to apply to patient care fairly early on in their nursing school career. While the term “pump and dump” as it relates to psychomotor skills taught in nursing school is harsh, the connotation it holds is true. Nursing students are often taught basic nursing skills in the first several weeks of their program, then being their clinical experience where they are able under the guidance of their clinical instructor or preceptor, to perform those skills on their client when ordered. Practicing skills in lab is essential for student’s understanding of theory and technique required; however, anxiety levels remain high with the anticipation of having to perform the same skill on a patient. Clinical faculty at the university of implementation school of nursing were surveyed to determine the extent of the perceived problem identified. An anonymous survey was disseminated to 28 clinical faculty using Survey Share asking five questions as seen in Figures 3, 4, 5, 6, and 7. Of the 18 responses, one respondent response was dropped as this faculty member taught a class that did not use psychomotor skills within the class. This was discovered when an email was received explaining the negative responses. Of the 17 responses used, 100% faculty reported anxiety seen in students, and 61.11% reported moderate anxiety seen in their students.

Question 1: Have you ever been a clinical nursing instructor?



Figure 3: Question 1

Question 2: What level of undergraduate nursing students do you or have you taught?

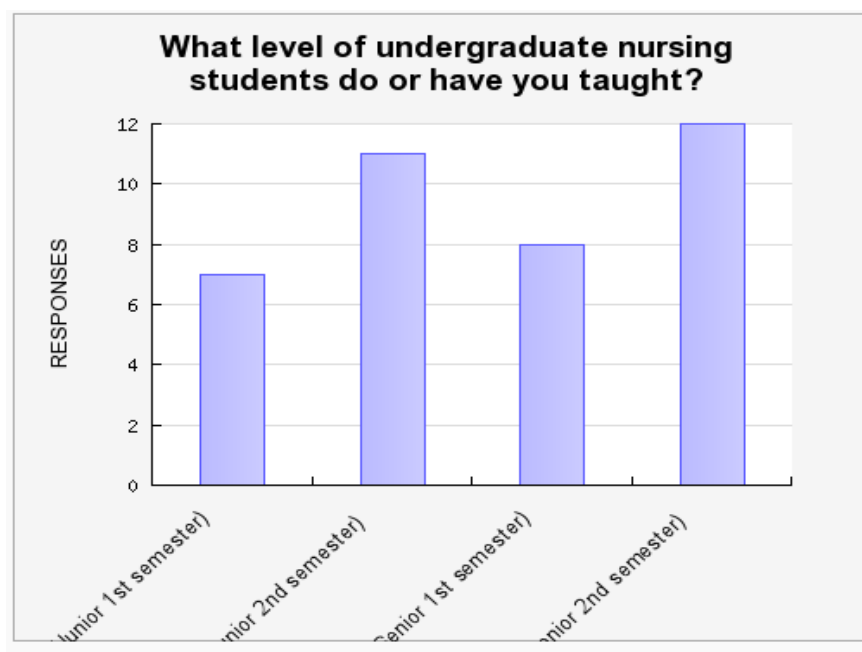


Figure 4: Question 2

Question 3: Have you ever observed anxiety in your students during clinical as it related to performing psychomotor/nursing skills?

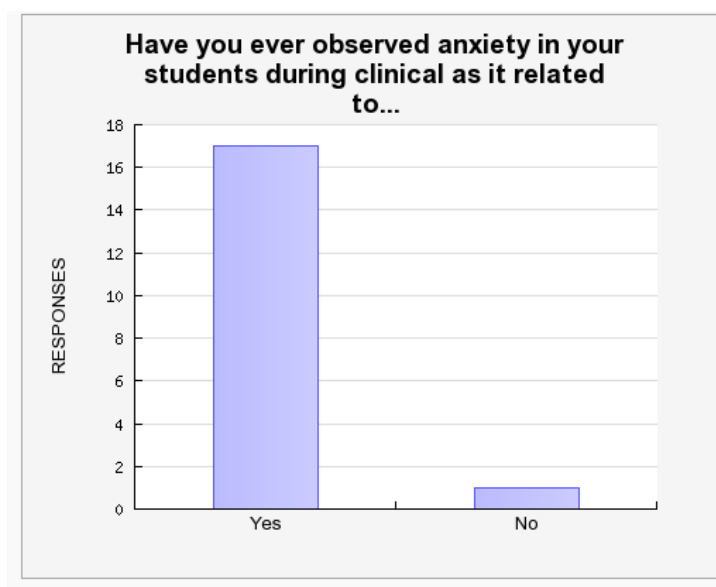


Figure 5: Question 3

Question 4: How would you rate your student's overall anxiety in clinical in regards to performing psychomotor/nursing skills?

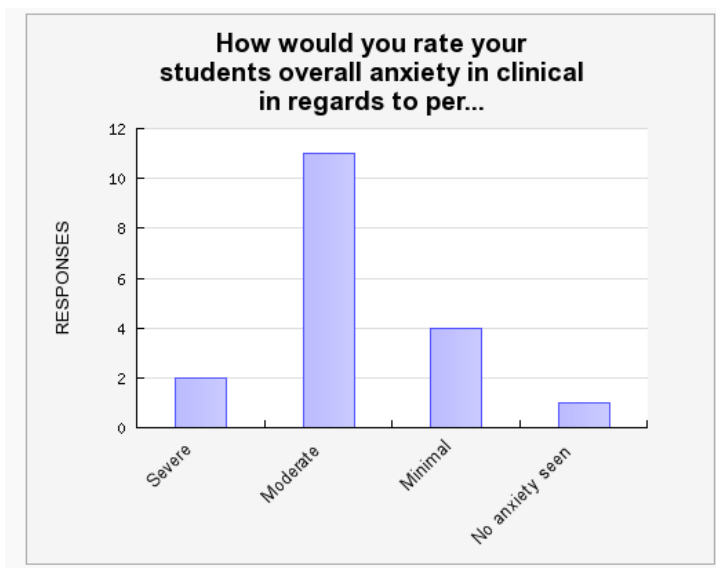


Figure 6: Question 4

Question 5: Do/Did your students have access to review psychomotor/nursing skills prior to performing on a client in a timely fashion?

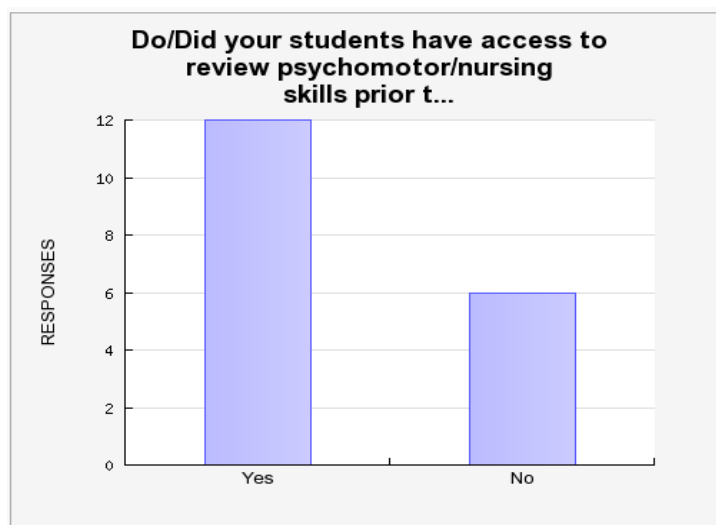


Figure 7: Question 5

Outcome

First semester clinical nursing students enrolled in a 16-week practicum will report a decrease in anxiety with the implementation of Quick Response (QR) technology during their clinical experience. Students will have quick access to review psychomotor skills prior to performing those skills on a patient. The skills linked to the QR technology were the same skills learned in skills lab and aligned with the skills resources used in the clinical setting. Quick Response technology in clinical will serve as a useful free tool for students, allowing participation in self-directed learning, and help ensure a successful outcome of the skills performed.

SECTION III

Goals, Objectives, and Mission Statement

Goals and Objectives

Six goals/objectives were identified for the DNP project. (1) Students learned all pertinent psychomotor skills expected of a novice nurse in skills lab over the course of eight weeks, prior to attending their first clinical experience; (2) Students consented and took a pre-survey of the Spielberger State-Trait Anxiety Inventory (STAI) prior to project implementation; (3) Students were instructed on the use of QR technology and given access to download the free QR scanner on their smartphone; (4) Students used QR technology in clinical prior to performing a psychomotor skill on a patient to review the critical steps of the skill; (5) Students reported a decrease in anxiety during their clinical experience in the post-survey, Spielberger State anxiety inventory; (6) Students reflected on the usefulness and ease of QR technology in the qualitative questions asked in the post-survey.

Mission Statement

The purpose of this DNP project was to decrease anxiety related to psychomotor skills seen in first semester nursing students during clinical. The utilization of free, quick, and easy to use technology gave the students the ability to be self-directed in their learning. Review of already learned materials prior to performing any skill aids in the provision of safe and effective care given to patients in clinical.

SECTION IV

Theoretical Underpinnings

This project was conceptualized using Roger's Innovation-Diffusion Model which refers to the progression that transpires as people adopt to new knowledge (Kaminski, 2011). The first part of this model is broken down into five stages: *Knowledge*, *persuasion*, *decision*, *implementation*, and *conformation* (Kaminski, 2011). The knowledge stage is where the individual is exposed or first learns about the innovation. During the persuasion stage, the individual strengthens their knowledge of the innovation. The decision stage is where the individual decides if the innovation is applicable to their situation and if they will move forward. Implementation is where the innovation is put to use and finally the conformation stage is where the individual adopts the innovation as a practice. (Kaminski, 2011).

It is also important to look at the rate in which the innovation is adopted. Rogers's model categorizes adoption rates and percentage of individuals who adapt to each category as: *innovators* (2.5%), *early adopters* (13.5), *early majority* (34%), *late majority* (34%) and *laggards* (16%) (Kaminski, 2011). Individuals who are considered innovators are those individuals who adopt first to the innovation (Landrum, 1998a) are considered risk takers and those who want to make change. (Kaminski, 2011). Early adopters have characteristics of being role models and trend setters. Early majority tend to avoid risks and collaborate well with peers and are known to be opinion leaders (Kaminski, 2011). Late majority react more to peer pressure, are cynical, and easily swayed by laggards (Kaminski, 2011). Laggards tend to be suspicious and prefer to not make change (Kaminski, 2011). According to Landrum (1998b), understanding the

characteristic of adopters “will reveal ways to strengthen the probability that colleagues will adopt an innovation, and may shorten the time required for this adoption” (p.196).

Lastly, the Innovation-Diffusion model looks at *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability* which are perceived attributes to the innovation. These attributes are very important to consider prior to advancing into the persuasion stage (Landrum, 1998b). According to Lee (2004), acceptance of an innovation is related to the individual’s perceptions of the innovation attributes. The Rogers Innovation – Diffusion Model is a highly regarded model that has been useful in the support of planning and adoption of mobile devices which is a new and innovative technology integrated in nursing schools (Doyle, Garrett, & Currie, 2013). Starkweather and Kardong-Edgren (2008), noted several authors cited Rogers’ Innovation-diffusion model as a useful model that guides innovation in nursing; however, faculty buy-in is necessary.

Integration of technology at the point of care has become a norm in healthcare. Although nurses have been challenged by this change, negative attitudes remain towards this advancement (Lee, 2004). Nurses represent the largest group in healthcare to utilize technology (Hiltz, 2000), and is imperative that nurses realize the significance of their role in these changes. Success in the integration of technology hinges on the individual’s choice to adapt or not to adapt (Lee, 2000).

Theory Supporting Project Framework

The process in which an individual will adopt to new technology is the foundation of Roger’s Innovation-Diffusion Model. First semester nursing students and clinical faculty both needed to adopt to QR technology utilization during clinical. While it was speculated by the author students would have less resistance to the implementation of QR

technology because of their generational fondness and acceptance to technology, it was feared that faculty may be less on board, representing the late majority and laggards in Rogers's Innovation-Diffusion Model.

It was important for students and faculty to see the benefits of QR technology in regard to decreasing student anxiety during clinical. At this point persuasion had occurred and the decision to try or not to try the technology was decided by the individual. Implementation and conformation aided in the decision to continue QR technology as a resource utilized within clinical beyond the DNP project. Finally, the innovative characteristics were considered during the planning phase of this project. It was anticipated that the participants would acknowledge the advantages of the technology used in clinical.

SECTION V

Project Proposal

Design

A one-group pre-and post-survey quasi-experimental design approach was used to evaluate the use of QR codes and scanners in clinical with first semester nursing students to determine the impact on student anxiety levels. An email was sent out by a committee member to all 56 first semester baccalaureate nursing students enrolled in their practicum with directions on how to upload the QR scanner application for their phone. A link to participate in the DNP project was included in the email. The link allowed participants to access Qualtrics which included the consent and the pre-survey for the project. Qualtrics is a web-based survey tool used to conduct surveys and evaluate data collection. Project recruitment, informed consent, and surveys were administered by a committee member who did not have a teaching or supervisory roll with the student participants. At no point was identifying information collected on any participant. The surveys were administered using Qualtrics which is program that is password protected and anonymous. In addition, students were informed their participation was voluntary and they could withdrawal from the project at any time with no penalties. No component of this project was used to evaluate the student performance in the course. Forty-two participants consented and completed the pre-survey, 40 participants completed the post-survey. Group data was collected and analyzed instead of individual responses.

All students were allowed to participate even if they did not complete the consent, or STAI. Each clinical instructor teaching practicum was provided an iPad mini for students to use during clinical if the student did not have a smartphone or compatible

device for the QR technology. Quick response codes were disseminated to each student during the first week of clinical by their clinical instructor (Appendix A). During the week prior to the student's first clinical experience, the doctoral student visited each clinical group during skills lab to provide training on the use of QR scanning to both students and faculty in addition to answer any last-minute questions students and faculty had.

Each student downloaded the free Quick Response Reader App by TapMedia LTD to access resources. The App was a scanning device used to scan codes developed by the doctoral student linking students to familiar resources taught within class. The App came recommended by the academic technology department in the College of Health and Human Services as reliable and credible. The Quick response reader App was compatible with iPhones, Androids, and iPads.

Sample

A convenience sample of 42 first semester baccalaureate nursing students enrolled in their practicum within class were used. All 56 students enrolled in the practicum class were invited to participate. Recruitment was completed via emails sent to all eligible students. A total of five clinical faculty including the doctoral student were the clinical faculty for the students. Four clinical faculty not including the doctoral student were involved in the focus group, post intervention. Clinical faculty were invited to participate in focus group via email.

Setting

The setting is a major university in North Carolina and considered an urban institute for teaching and learning. The National Center for Education Statistics (2017)

reported a total of 31,552 students at the university in the year 2014-2015. The School of Nursing offers several degrees and certificate programs and enrolls 50-60 undergraduate students each fall and each spring having approximately 200-240 undergraduate pre-licensure students at any given time (UNCC 2017a).

The clinical setting in which first semester nursing students attend the last eight weeks of the semester are sub-acute, in-patient rehabilitation centers. There are three sites each being used two days a week by different clinical group of ten students and one clinical faculty. The clinical sites can accommodate up to 30-40 patients and are affiliated with a major hospital system in the Carolinas.

Project Management Tools

GANTT Chart

Impact of QR technology on first semester nursing student anxiety in clinical	Jan-May 2017	June 2017	July 2017	Aug 2017	Sept 2017	Oct 2017	Nov-Dec 2017	Jan 2018	Feb 2018
Research									
Planning									
Design									
IRB Application									
Implementation of Project									
Follow-up Evaluation									

Figure 8. GANTT Chart

Timeline

All 59 students within their first semester of clinical were invited to participate in the DNP project, as well as the four clinical faculty members overseeing these students. Week five of the academic semester students were invited to participate in the DNP project via an email. The email contained a link to the Qualtrics web site to access the consent and STAI pre-survey, from their personal computer. Students were given two weeks and two days to complete the survey and during this time three reminders were sent out. Reminder one was sent out on day four after the initial survey went out, reminder two on day 10, and reminder three on day 15. The survey closed at the end of the day on day 17.

Week seven the doctoral student visited each of the six skills labs to field any questions students had in regards to the use of the QR technology. Training in the use of QR scanning was provided to both faculty and students prior to study implementation. Although students had prior experience with QR technology in another enrolled class, formal instructions were given via email by the doctoral student. Faculty received formal face to face instructions by a committee member as well as the doctoral student as well as email instructions.

During week eight and nine students began clinical and usage of QR codes. Quick Response Codes linked to their skills resources were disseminated to them by their clinical instructor. These codes were given to the students in a protective sleeve and instructed to be kept with their weekly clinical paper work. The students used self-directed learning when they felt a need to review a skill learned prior to clinical. Students used the technology from week 8-15 of their clinical. The State Anxiety Inventory post-

survey and post five questionnaire on the use of QR technology was administered upon completion of the last clinical day during week 15. To evaluate the faculty's perception of the QR technology used by their students, qualitative data was gathered during an on-campus, one-on-one focus group with the clinical faculty at the end of the semester.

Consent of each faculty was obtained prior to the start of the focus group by a committee member and audio taping was done for accuracy. The focus group was conducted by and responses were transcribed and analyzed for themes by two committee members and then analyzed by the doctoral student. Upon completion of the study (December 15, 2017) an email went out to all students and faculty thanking them for their participation in the DNP project.

SECTION VI

Evaluation Planning

The State Trait Anxiety Inventory (STAI) was the tool utilized within the DNP project to measure anxiety of first semester clinical nursing students. The STAI was developed by Charles Spielberger in the 1960's and has been used extensively in nursing education research as seen in a review of literature on anxiety in nursing students especially in clinical. State anxiety measures more of a situational or temporary anxiety that causes characteristic signs of nervousness, worry, fear which are palpable (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The State Anxiety (Appendix B) was measured in both pre-and post-intervention, whereas the Trait anxiety (Appendix C) was measured before intervention. The Trait anxiety measures a person's overall longstanding trait to anxiety (Patterson, 2016), the proneness to anxiety, and how one responds to stressful situations (Spielberger et al., (1983). The STAI is a validated and reliable tool consisting of a 40 item self-reported instrument using a 4-point Likert scale to measure state anxiety and trait anxiety. For state anxiety, reliability was established at 0.92 and for trait anxiety at 0.90 (Speilberger et al., 1983). A person's trait anxiety can be reason for elevated state anxiety. Permission for the use of STAI manual and surveys has been granted by Mind Garden Inc. on September 27, 2017.

Qualitative and quantitative data was collected before and after the implementation of the DNP project to assess anxiety in first semester clinical nursing students as it relates to the performance of psychomotor skills on patients. Student participants took the pre-survey of the STAI at the time the online consent is obtained and during week six of the semester. The post-survey consisted of the State Anxiety

Inventory to assess changes in anxiety during the student's clinical rotation and was administered upon completion of the last clinical day, week 15. Qualitative survey was also included in the post-test for students to reflect on their experience using the QR technology (Table 1).

Table 1

Student Qualitative Questions

Qualitative Questions asked to students in post-survey
1) Did you use the QR technology during clinical?
2) How do you feel this technology affected anxiety?
3) Did you find this resource helpful in helping you to review nursing/psychomotor skills?
4) If you did not use the technology, did you feel less anxious Knowing you had this available to you at any time?
5) Did you find this technology easy to use?

To obtain faculty member insight into the QR technology, a focus group of four clinical faculty members was conducted at the end of the semester. Consent of each faculty was obtained prior to the start of the focus group. During the focus group audio taping was conducted for accuracy of the faculty responses to questions asked (Table 2).

Table 2

Focus Group Questions

Qualitative Questions asked to faculty in focus group
1) Discuss your observation of students using QR technology for review before performing a clinical skill,
2) Talk about any observation of anxiety in your students during the clinical experience.
3) What are some ways that faculty might alleviate student anxiety in the clinical setting?
4) How can faculty better incorporate QR technology in the future?
5) Do you have any further observations or student anecdotes regarding their use of QR technology?
6) How useful was the technology to your students?
7) How would you like to use this technology in the future?
8) What barriers did you see with the use of the QR technology?

Logic Model Development				Outcomes		
Input/ Resources Needed to Implement and Evaluate project	Constraints	Processes/Activities	Outputs	Short Term	Long Term (1 year or more)	Impact
<p><u>Personnel/People:</u> DNP student/project leader 3 Committee Members:</p> <p><u>Facility/ Organizational</u> Students consented and took survey distributed through link via email. Faculty consenting/focus group was conducted at the University. Technology used at the clinical site of each cohort.</p> <p><u>Equipment/ Technology</u> Smart Phones, IPAD Minis and Quick Response Scanning App from the App store on the mobile device. Psychomotor skills were each linked to a Quick Response code.</p> <p><u>Time-</u> Fall 2017</p> <p><u>Materials-</u> Printed QR code sheet laminated in protective covering. <u>Financial:</u> No charge for Quick Response (QR) technology to faculty or students. Use of the evaluation tool cost \$162.00 which includes the tool and the tool manual.</p>	<p><u>Budget</u> Cost neutral</p> <p><u>Physical Space</u> 3 In-patient sub-acute rehabilitation sites used by each cohort two days a week. No foreseeable constraints at the clinical sites. Students utilized technology at the nurse's station.</p> <p><u>Time Frame</u> Fall 9/2017 - 12/2017. intervention</p> <p><u>Existing Culture</u> Majority millennial students 18-22 Junior status in a four-year university.</p>	<p><u>Events</u> Pre-& Post Survey Faculty Focus Group</p> <p><u>Training / Education</u> Use of QR Technology to both faculty and students.</p> <p><u>Meetings</u> A visit made to each skills lab to field any questions prior to implementation.</p> <p><u>Development of Processes</u> <u>Intervention-</u>QR scanning of QR codes were linked to nursing/psychomotor skills.</p> <p><u>Evaluation Plan</u> Anxiety of students related to performance of psychomotor skills was evaluated with a Pre-and Post-Survey using the Spielberger State-Trait Anxiety Inventory tool.</p>	<p><u>Number of Participants:</u> 52 Students enrolled in first clinical course. 42 consented. 4 Clinical Instructors (Focus Group)</p> <p><u>Amount of education Delivered</u> 1 information session for students 1 information session for faculty</p> <p><u>Number of Hours of Service</u> Clinical was 2 days a week for eight weeks from 0700-1300. Fall 2017</p>	<p><u>Knowledge Improvement</u> Pre-and Post-scores on State Anxiety Trait Inventory and qualitative data from technology questions. Focus group themes from clinical faculty.</p> <p><u>Skill Improvement</u> Increased confidence in the performance of psychomotor skills.</p> <p><u>Improved level of functioning</u></p>	<p><u>Behavioral Improvement</u> Decreased anxiety in clinical</p> <p><u>Motivational Improvement</u> Decreased anxiety when executing a nursing / psychomotor skill with a patient.</p> <p><u>Individuals</u> Increase confidence to perform nursing/psychomotor skills on a patient.</p> <p><u>Community</u> Patient safety</p>	<p><u>Long Term Results of Change</u> Improved anxiety in clinical nursing students related to performance of nursing / psychomotor skills, specifically to first semester nursing students.</p>

Figure 9. Logic Model

Quality Improvement Method

The plan-do-study-act (PDSA) is a tool that drives improvement, widely used in healthcare, and helps to make sense of intervention outcomes (Taylor et al., 2014). According to the Agency for Healthcare Research and Quality (2015), the “plan” phase describes what is to be examined. During the “do” phase implementation occurs. Within the “study” phase the results are examined and during the “act” phase a conclusion is developed as well as reflection on if changes should or could be made and then how to disseminate the information learned (Agency for Healthcare Research and Quality, 2015).

Plan

First semester clinical nursing students seem to be particularly vulnerable to anxiety simply because of lack of experience with patient care. Nursing students are taught numerous basic and advanced nursing skills in the first several weeks of their program then are expected to perform the skills in clinical on patients under the guidance of their instructor or preceptor. Anxiety levels remain high with the anticipation of having to perform psychomotor skills on a patient causing a wide range of symptoms including stomach problems, headaches, sleeplessness (Sun et al., 2016), all of which have potential affect patient safety.

The aim of this study is to evaluate the use of QR codes and scanners in clinical with first semester nursing students and determine their effect on student anxiety level when performing a psychomotor skill on a patient.

Do

To accomplish the improvement, changes were needed. The intervention was to implement QR technology during week eight when students begin their clinical rotation and assessing its impact on anxiety in clinical when students perform nursing/psychomotor skills with a client. Comparison was made from student's self-reported anxiety prior to the start of clinical to their self-reported anxiety at the end of their clinical experience. The outcome was to see a reduction of anxiety when anticipating, performing or preparing to perform a nursing/psychomotor skill on a patient.

Study

The desired and expected outcome was students would report a decrease in anxiety based on implementation of QR scans. Data was analyzed at the completion of this project. Wilcoxon rank test and a two-sample t-test were completed to compare anxiety reported by students during their second week of clinical to their anxiety at week eight of their clinical experience.

Act

The final step in the PDSA is act to sustain performance and spread change. The QR technology made valuable and familiar resources at student's immediate disposal. Decrease anxiety allowed students to have a greater clinical experience as well as improve the safety of patient care. This project is highly sustainable in a nursing program based on the ease and accessibility of the technology and the type of resources that can be provided for all levels of nursing students in clinical. Faculty at the site of implementation have requested to have training so they can implement with their students.

SECTION VII

Implementation

Institutional Review Board (IRB) Process

IRB approval was obtained from the organization for which the project was implemented, a state university in North Carolina. Additionally, IRB approval was obtained from the university where the doctoral student attended. Final approval was granted September 2017, and implementation began shortly after.

Implementation

Preparation for implementation began spring 2017, with research of literature on identified practice problem. Open discussions with faculty at the implementation site helped to develop a more valid understanding of others perception of identified problem.

August 2017, clinical faculty met with the doctoral student to go over the project and train on the technology that was used. Each clinical faculty was given an iPad mini to use for the semester with the needed technology uploaded for students to use in clinical. The DNP project was introduced to the students by a committee member during class time, and the technology was implemented in a didactic class taught by the doctoral student to get the students and potential participants comfortable with the technology that was used in the project. Prior to implementation, the project leader attended each clinical group skills lab to answer any questions participants had and to hand out quick response (QR) codes that linked the students to their psychomotor skills they learned during the first eight weeks in class.

Doctor of Nursing Practice committee members communicated on a regular basis with the project leader prior to implementation to review the progress. Two committee

members involved with pre-and post-surveys of students and faculty focus group were given detailed instructions on dates, times and content to convey to the student and faculty participants. September 18, 2017, project consent and pre-survey was disseminated via email, to the first semester nursing students with three email reminders over a two-week period. The project was implemented on October 19, 2017.

Threats and Barriers

A barrier which occurred over half way through the implementation was during a scheduled faculty meeting it was announced “no cell phone usage in clinical effective immediately.” Although approval was granted by the program chair where implementation was occurring, this policy required adjustments to be made during the remainder of the implementation period. All clinical faculty working with project participants were issued iPad minis in the event a student did not have a smartphone or did not want to use their own device.

Monitoring of Implementation

The doctoral student initiated weekly emails and verbal communication with clinical faculty whose students were involved in the project. This communication allowed the doctoral student to troubleshoot any problems or concerns faculty had as well as allowing the doctoral student to check equipment was working properly. During the consenting phase of the project, students were informed to reach out to DNP committee members or the doctoral student if they had any questions or concerns. The doctoral student was able to visit the website where the QR codes were developed and view the number of times each developed code was access.

Project Closure

Upon closure of the DNP project, a thorough evaluation of successes and shortcomings was initiated. Several successes were seen with the project that were based on observation and communication with faculty and student participants. The technology used proved itself to be very user friendly eliminating many stressors related to the use of technology. Both students and faculty seemed very positive and excited to use the technology expressing hope to see continued use throughout their remaining semesters in nursing school. A major shortcoming seen was the policy change with the university where implementation took place regarding student use of cell phones in clinical. While each clinical instructor had an iPad mini with the technology, it was not always at the student's finger tips. Another shortcoming was there may have been greater participation with students consenting and completing the pre-and post-surveys if students were allowed to complete during class time with a DNP committee member compared to them completing at home. Several students did comment on how they forgot, even with the multiple email reminders. Recommendations based on what has been learned in the project is to work with faculty at the implementation site, adding to the codes students have for clinical to incorporate new codes/information students. Researching funding opportunities to allow the purchase of mobile devices in each clinical will benefit all students and faculty and eliminating the concern for the use of personal mobile devices.

SECTION VIII

Interpretation of Data

Qualitative Data

Qualitative data retrieved from the student post-survey asked specific questions related to the use of the QR technology used in clinical (n=40 post). Response rate was 100% on all five questions. Table 3 and Figure 10 represents questions asked and response rates.

Table 3

Post-Survey Technology Questions and Response Rates.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Did you use the QR technology during clinical?	2.50% n=1	10.00% n=4	12.50% n=5	45.00% n=18	30.00% n=12
How do you feel this technology affected anxiety?	0.00% n=0	2.50% n=1	22.50% n=9	47.50% n=19	27.50% n=11
Did you find this resource helpful in helping you to review nursing/psychomotor skills?	0.00% n=0	2.50% n=1	15.00% n=6	50.00% n=20	32.50% n=13
If you did not use the technology, did you feel less anxious Knowing you had this available to you at any time?	2.50% n=1	2.50% n=1	10.00% n=4	40.00% n=16	45.00% n=18
Did you find this technology easy to use?	0.00% n=0	2.50% n=0	7.50% n=3	32.50% n=13	57.50% n=23

Post-Survey Bar Graph

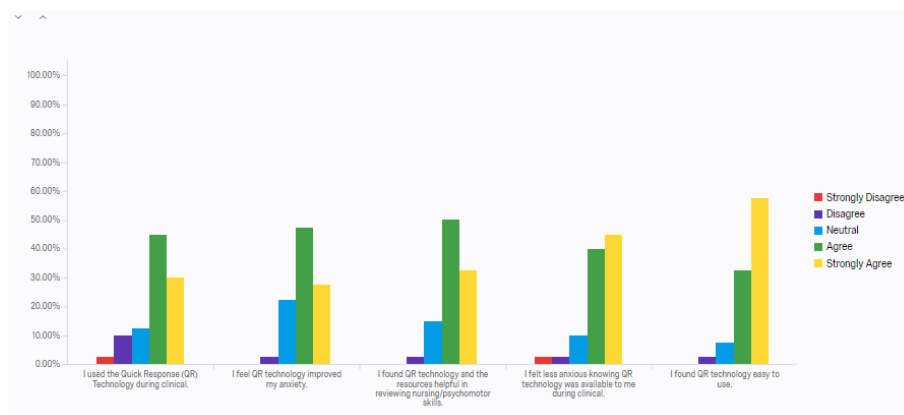


Figure 10. Post-Survey Bar Graph

The faculty focus group consisted of four clinical faculty that over saw students in clinical (n=4). This focus group was conducted at the end of the DNP project to better understand faculty perspective on QR technology and its impact of student anxiety in clinical. A member of the DNP committee conducted the focus group, Table 4 reflects questions asked by interviewer. The focus group lasted approximately 90 minutes and was audio recorded for precise data analysis. Audio recording was transcribed to text, and themes were identified by interviewer and committee member, and reviewed by a second committee member and doctoral student for themes.

Table 4

Focus Group Questions

Sample Focus Group Questions
<hr/> <ol style="list-style-type: none"> 1. Discuss your observation of students using QR technology for review before performing a psychomotor skill. 2. Talk about any observation of anxiety in your students during the clinical experience. 3. What are some ways that faculty might alleviate student anxiety in the clinical setting? 4. How can faculty better incorporate QR technology in the future? 5. Do you have any further observations or student anecdotes regarding their use of QR technology? 6. How useful was the technology to your students? 7. How would you like to use this technology in the future? 8. What barriers did you see with the use of the QR technology? <hr/>

Analysis of the data uncovered four main themes: students are anxious during their initial clinical experience, there was relief from knowing the QR was there, the instructors found it helpful, QR technology should be implemented, but there are challenges that need to be addressed.

- Theme 1: Students are anxious during their initial clinical experience

Student anxiety was a common reflection of the clinical faculty of their students. Faculty reported students were afraid they would forget steps of skills they needed to perform. Other discussion around student anxiety were ways the instructor can help alleviate the anxiety. Introducing the technology earlier in the semester was suggested so students had more time to utilize the technology in skills lab prior to going into clinical.

- Theme 2: There was relief from knowing the QR technology was there

There was “excitement” about having the technology available, “relief” from not having to memorize everything and was noted as a “safety cushion.” Students thought the technology was “really cool.” Faculty noted “students were happy to know this was available to them” and “it relieved anxiety just knowing that these resources were available to them.”

- Theme 3: Instructors found it helpful

Faculty found this technology handy and a “great idea.” They noted “students had plenty of time to utilize technology when reviewing skills.” Faculty felt the technology “helped enhance critical thinking” and allowed student self-directed learning by “utilizing resources and bring those resources to bedside.”

- Theme 4: QR technology should be implemented, but there are challenges that need to be addressed.

It was felt this technology has tremendous application all around and should be utilized at bedside. Faculty felt cell phone usage would be beneficial more than utilizing one iPad per clinical group but was limited due to new school policy. They felt QR scanning would be beneficial to implement throughout all clinical courses and curriculum.

Quantitative Data

In this analysis the pre-survey Trait Anxiety scores from the participants were reviewed. These are scores taken from the self-assessment of an individual’s longstanding trait to anxiety or susceptibility to anxiety. The results of the Trait Anxiety pre-survey are noted in Figures 11 and 12.

Positive Trait Anxiety Scores

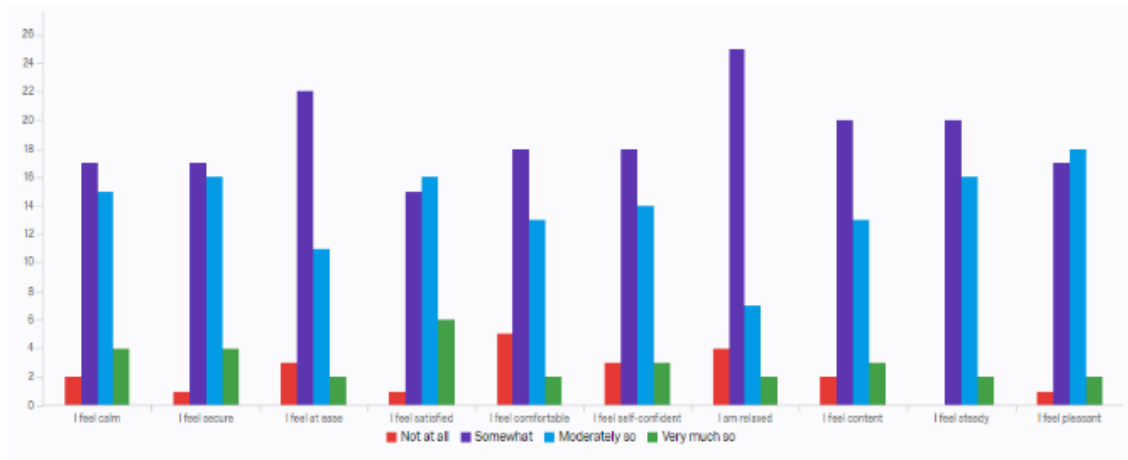


Figure 11: Positive Trait Anxiety Score

Negative Trait Anxiety Scores

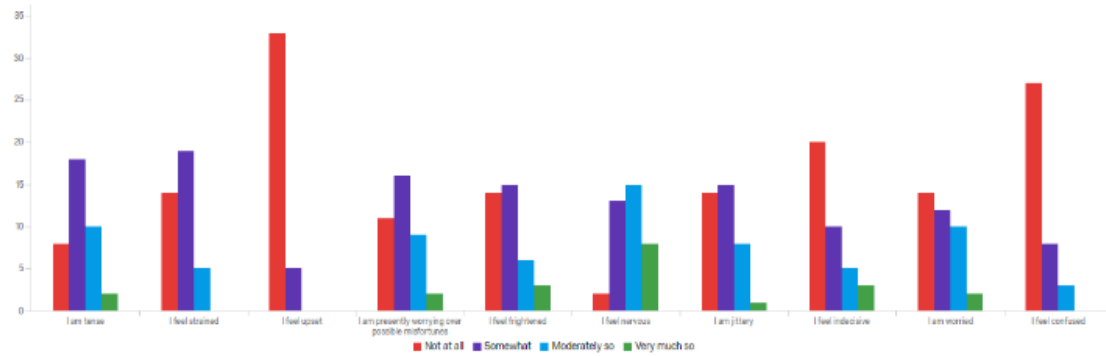


Figure 12. Negative Trait Anxiety Scores

As a result, of the histograms as seen in Figures 13 and 14 showing skewness in the data, a traditional t-test was not used. Having the limitation of individual participant responses being anonymous, a Wilcoxon rank sum test was used to compare the median responses of the group data instead of individual responses. Positive feeling responses in the pre and post surveys and negative feeling responses in the pre and post surveys were compared as seen in the bar graphs in Figures 15, 16, 17, and 18. The tests indicated that the pre-test median of averages from positive feeling questions is significantly lower (p-value ≈ 0) than the post-test median indicating anxiety levels were noted to decrease with the implementation of QR scanning. The pre-test median of averages from negative feeling questions is significantly higher (p-value ≈ 0) than the post-test median of similar questions which also indicates anxiety levels were decreased with the implementation of QR scanning. In conclusion, QR scanning with first semester nursing student in clinical was noted to be significant in reducing anxiety when performing psychomotor skills within the clinical setting.

Positive Feeling Histogram

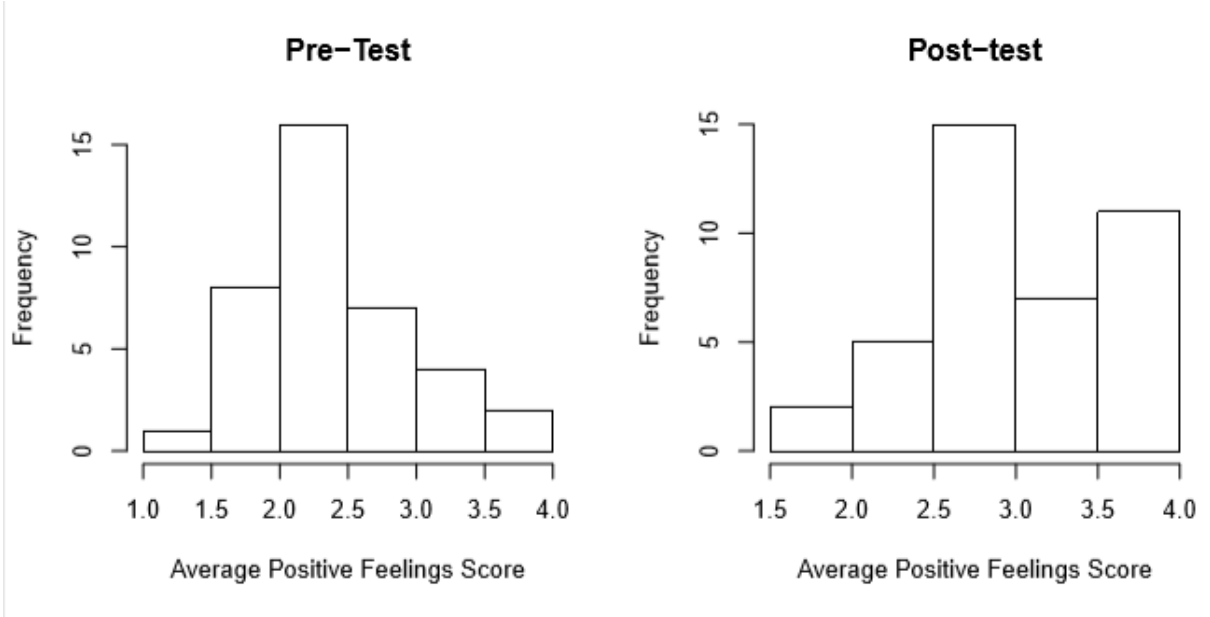


Figure 13: Histogram

Negative Feeling Histogram

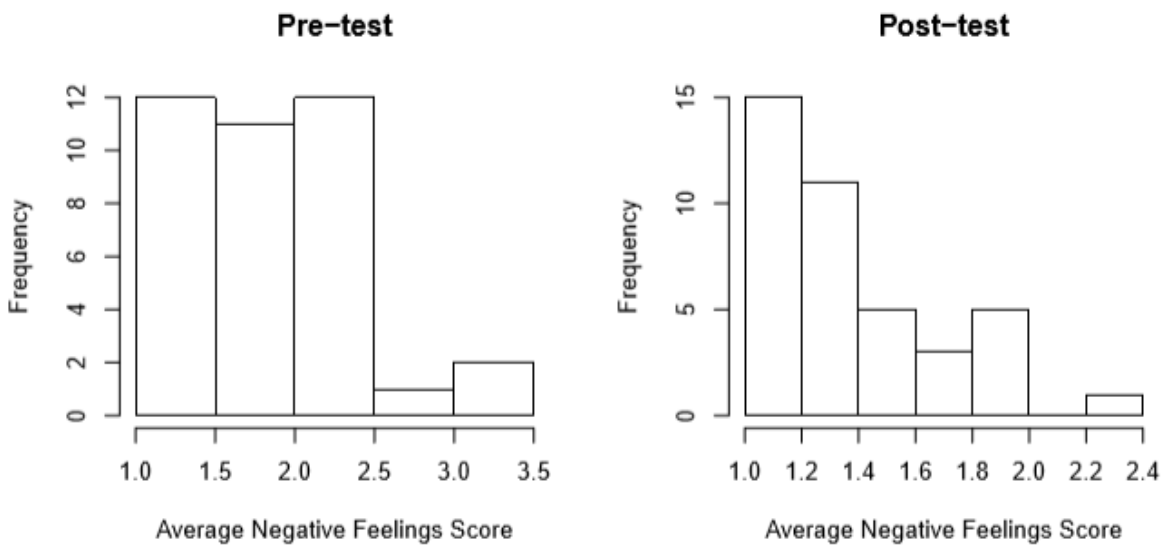


Figure 14. Negative Feeling Histogram

Pre-test State Positive Feelings Bar Graph

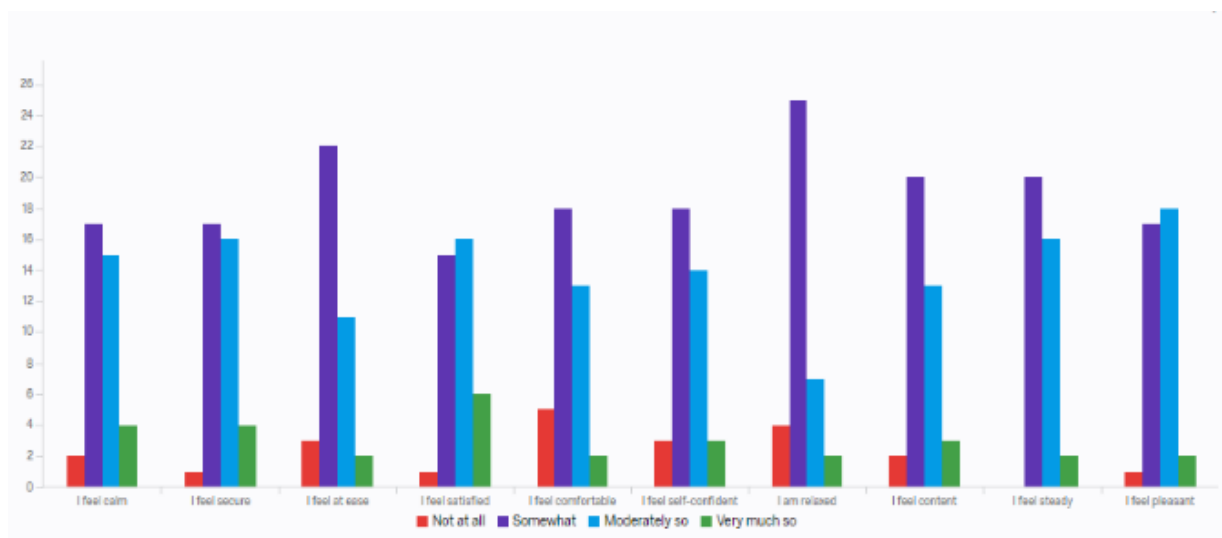


Figure 15. Pre-test State Positive Feelings Bar Graph

Post-test State Positive Feelings Bar Graph

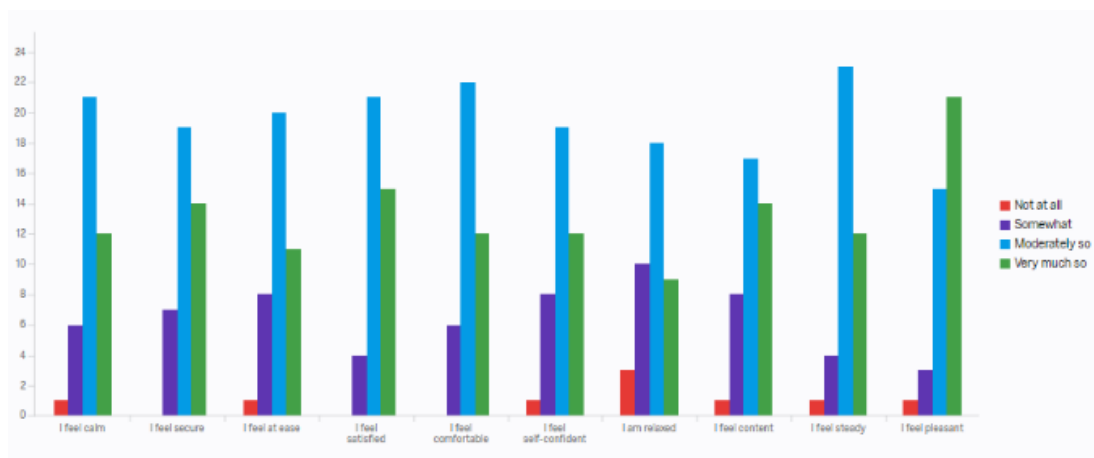


Figure 16. Post-test State Positive Feelings Bar Graph

Pre-test State Negative Feelings Bar Graph

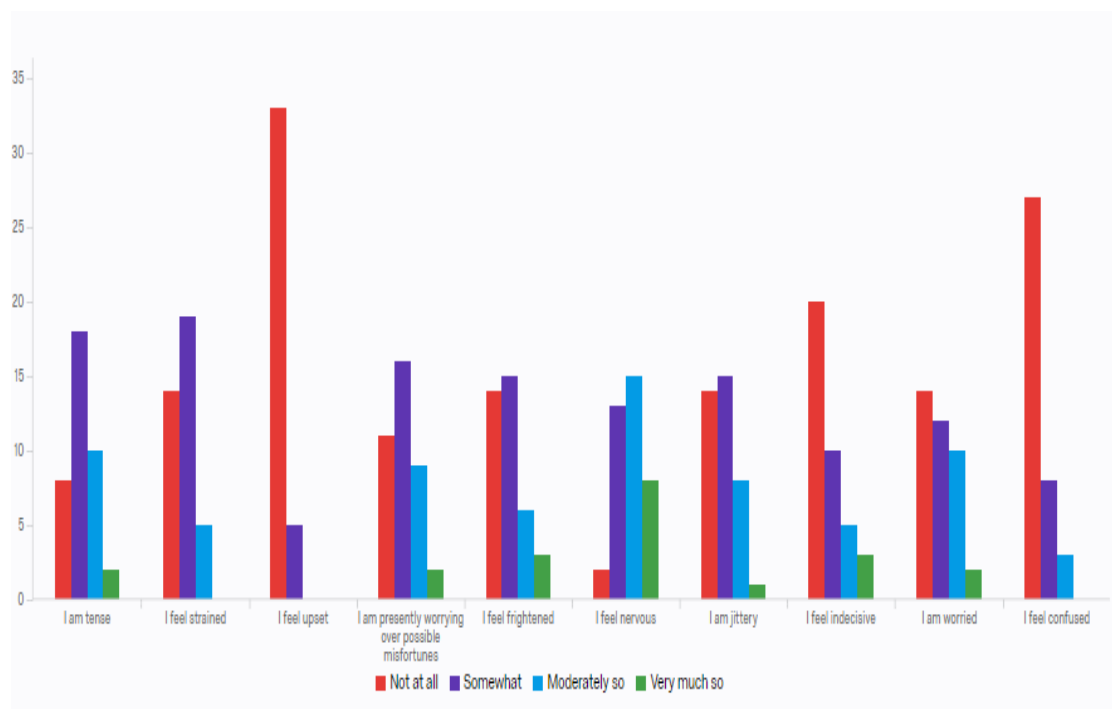


Figure 17. Pre-test State Negative Feelings Bar Graph

Post-test State Negative Feelings Bar Graph

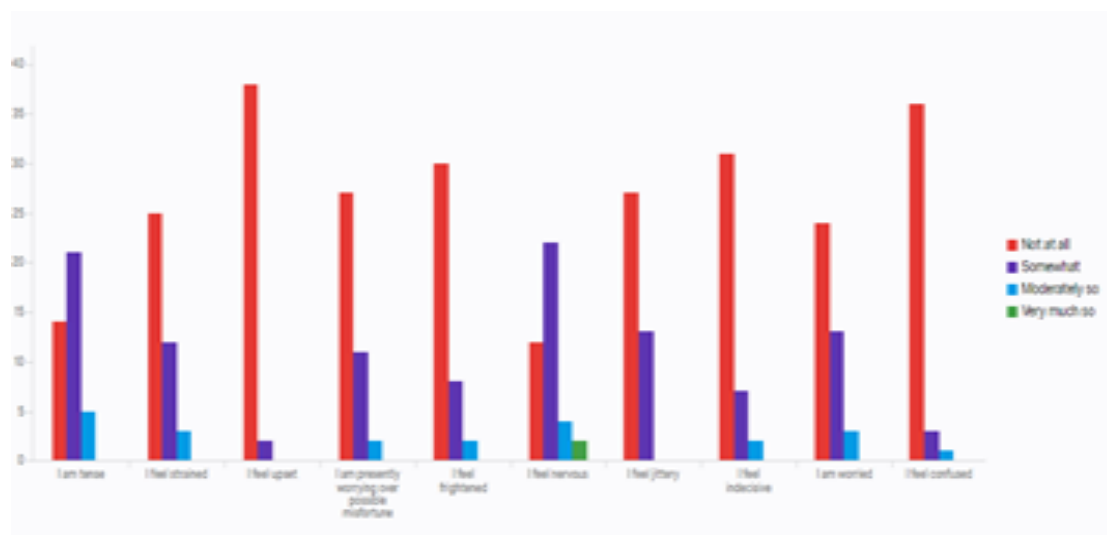


Figure 18. Post-test State Negative Feelings Bar Graph

Process Improvement Data

Quantitative data analysis showed statistical significance for both the pre and post-survey when comparing positive feelings and again negative feelings. Qualitative data analysis also confirmed that anxiety was influenced in a positive way with the use of QR technology and QR technology was viewed favorably by both students and faculty. Based on these findings, the aim of this project was met. There were limitations of this project that affected the type of analysis that was run by the biostatistician. If changes were to be made for this project, a comparison of individual responses for both pre and post-survey would have allowed a simple t-test to be ran instead of Wilcoxon and Welch tests. This project is highly sustainable in a nursing program based on the ease and accessibility of the technology and the type of resources that can be provided for all levels of nursing students in clinical. Faculty at the site of implementation have requested to have training in order to implement additional resources via QR scanning for students.

Conclusion

The aim of this project was to evaluate the use of Quick Response (QR) technology in clinical with first semester nursing students and the impact noted on their anxiety levels related to the performance of psychomotor skills on patients. Quick Response technology linked to valuable resources for students in clinical. Data revealed an improvement in student anxiety. Quick Response technology has the potential to bring needed resources to all nursing students in a timely fashion. This technology allowed students to have increased self-direction and active participation in their learning.

References

- Agency for Healthcare Research and Quality. (2015). *Health literacy universal precautions toolkit, 2nd edition. Plan-do-study (PDSA) directions and examples*. Retrieved from <https://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/literacy-toolkit/healthlittoolkit2-tool2b.html>.
- Ahearn, C. (2014). QR codes taking collections further. *Knowledge Quest*, 42(4), 71.
- American Association of Colleges of Nursing. (2010). *Tri-Council for nursing issues new consensus policy statement on the educational advancement of registered nurses* (Position Statement). Retrieved from <http://www.aacn.nche.edu/education-resources/TricouncilEdStatement.pdf>
- Assessment Technologies Institute (ATI). (2016). Skills Module (2.0 ed.). [Tutorial]. Overland Park, KS: Author.
- Berglund, M., Nilsson, C., Révay, P., Petersson, G., & Nilsson, G. (2007). Nurses' and nurse students' demands of functions and usability in a PDA. *International Journal of Medical Informatics*, 76(7), 530-537.
- Bolorizadeh, A., Brannen, M., Gibbs, R., & Mack, T. (2012). Instruction mobile. *The Reference Librarian*, 53(4), 373-383.
- Brubaker, C. L., Ruthman, J., & Walloch, J. A. (2009). The usefulness of personal digital assistants (PDAs) to nursing students in the clinical setting: a pilot study. *Nursing Education Perspectives*, 30(6), 390-392.
- Chesser-Smyth, P. A. (2005). The lived experiences of general student nurses on their first clinical placement: A phenomenological study. *Nurse Education in Practice*, 5(6), 320-327.

- Clay, C. A. (2010). Exploring the use of mobile technologies for the acquisition of clinical skills. *Nurse Education Today*, 31(6), 582-586.
- Curran, C. R. (2008). Faculty development initiatives for the integration of informatics competencies and point-of-care technologies in undergraduate nursing education. *Nursing Clinics of North America*, 43(4), 523-533.
- Day-Black, C., & Merrill, E. B. (2015). Using mobile devices in nursing education. *Association of Black Nursing Faculty (ABNF) Journal*, 26(4).
- DeSilets, L. D. (2012). The real world is becoming clickable. *The Journal of Continuing Education in Nursing*, 43(2), 53-54.
- Di Pietro, T. L., Doran, D. M., & McArthur, G. (2010). Supportive decision making at the point of care: refinement of a case-based reasoning application for use in nursing practice. *CIN: Computers, Informatics, Nursing*, 28(4), 235-240.
- Doyle, G. J., Garrett, B., & Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' diffusion of innovation model. *Nurse Education Today*, 34(5), 775-782.
- Eastes, L. (2001). Use of the personal digital assistant for point-of-care trauma documentation. *Journal of emergency nursing*, 27(5), 516-518.
- English Oxford Living Dictionary. (2017). Retrieved from:
<https://en.oxforddictionaries.com/definition/anxiety>
- Garrett, B. M., Jackson, C., & Wilson, B. (2015). Augmented reality m-learning to enhance nursing skills acquisition in the clinical skills laboratory. *Interactive Technology and Smart Education*, 12(4), 298-314.

George, L. E., Davidson, L. J., Serapiglia, C. P., Barla, S., & Thotakura, A. (2010).

Technology in nursing education: A study of PDA use by students. *Journal of Professional Nursing*, 26(6), 371-376. doi:10.1016/j.profnurs.2010.08.001

George, T. P., & DeCristofaro, C. (2016). Use of Smartphones with undergraduate nursing Students. *Journal of Nursing Education*, 55(7), 411-415.

Gore, T., Hunt, C. W., Parker, F., & Raines, K. H. (2011). The effects of simulated clinical experiences on anxiety: Nursing students' perspectives. *Clinical Simulation in Nursing*, 7(5), e175-e180.

Hilz, L. M. (2000). The informatics nurse specialist as change agent: Application of innovation-diffusion theory. *Computers in Nursing*, 18(6), 272-278.

Institute of Medicine. (2010). *The future of nursing: Leading change, advancing health*.

Retrieved from:

<http://www.nationalacademies.org/hmd/~media/Files/Report%20Files/2010/The-Future-of-Nursing/Future%20of%20Nursing%202010%20Report%20Brief.pdf>

Kaminski, J. (2011). Diffusion of innovation theory. *Canadian Journal of Nursing Informatics*, 6 (2).

Khalaila, R. (2014). Simulation in nursing education: an evaluation of students' outcomes at their first clinical practice combined with simulations. *Nurse Education Today*, 34(2), 252-258.

Landrum, B. J. (1998a). Marketing innovations to nurses, part 1: How people adopt innovations. *Journal of Wound, Ostomy and Continence Nursing (WOCN)*, 25(4), 194-199.







- Landrum, B. J. (1998b). Marketing innovations to nurses, part 2: Marketing's role in the adoption of innovations. *Journal of Wound, Ostomy and Continence Nursing (WOCN)*, 25(5), 227-232.
- Lee, T. T. (2004). Nurses' adoption of technology: application of Rogers' innovation-diffusion model. *Applied Nursing Research*, 17(4), 231-238.
- Leveitt-Jones, T., Pitt, V., Courtney-Pratt, H., Harbrow, G., & Rossiter, R. (2015). What are the primary concerns of nursing students as they prepare for and contemplate their first clinical placement experience? *Nurse Education in Practice*, 15(4), 304-309.
- Moscaritolo, L. (2009). Interventional strategies to decrease nursing student anxiety in the clinical learning environment. *Journal of Nursing Education*, 48(1), 17-23.
Doi:10.3928/01484834-20090101-08
- National Center for Education Statistics. (2017). Retrieved from:
<https://nces.ed.gov/ipeds/datacenter/InstitutionProfile.aspx?unitId=acb4b4acaeb4>
- National League for Nursing. (2008). *Preparing for the next generation of nurses to practice in a technology-rich environment: An informatics agenda*. (Position Statement). Retrieved from: <https://www.nln.org/docs/default-source/professional-development-programs/preparing-the-next-generation-of-nurses.pdf?sfvrsn=6>
- Patterson, S. L. (2016). The effect of emotional freedom technique on stress and anxiety in nursing students: A pilot study. *Nurse Education Today*, 40, 104-110.






- Phillips, B. C. (2017). Practice pearls: Clinical excursions for prelicensure nursing students. *Teaching and Learning in Nursing*, 1277-78.
doi:10.1016/j.teln.2016.10.009
- Rajeswaran, L. (2016). Clinical experiences of nursing students at a selected institute of health sciences in Botswana. *Health Science Journal*, 10(6), 1,
doi:10.21767/1791-809X.1000471
- Ross, J. G., & Carney, H. (2017). The effect of formative capstone simulation scenarios on novice nursing students' anxiety and self-confidence related to initial clinical practicum. *Clinical Simulation in Nursing*, 13(3), 116-120.
- Saprudin, A. A., Goolamally, N., & Latif, L. A. (2014). Embedding QR codes in the teaching and learning process.
- Schlairet, M. C. (2012). PDA-assisted simulated clinical experiences in undergraduate nursing education: A pilot study. *Nursing Education Perspectives (National League For Nursing)*, 33(6), 391-394.
- Scully, N. J. (2011). The theory-practice gap and skill acquisition: An issue for nursing education. *Collegian*, 1893-98. doi:10.1016/j.colegn.2010.04.002
- Spielberger, C.D., Gorsuch, R.L., Lushene, R.D., Vagg, P.R., & Jacobs, G.A. (1983). *Manual for the state-trait anxiety inventory for adults manual, instrument and scoring key*. Mind Garden Inc. Retrieved from www.mindgarden.com.
- Starkweather, A. R. & Kardong-Edgren, S. (2008). Diffusion of innovation: Embedding simulation into nursing curricula. *International Journal of Nursing Education Scholarship*, 5(1), 1-11.

- Sun, F., Long, A., Tseng, Y. S., Huang, H., You, J., & Chiang, C. (2016). Undergraduate student nurses' lived experiences of anxiety during their first clinical practicum: A phenomenological study. *Nurse Education Today*, 3721-26.
doi:10.1016/j.nedt.2015.11.001
- Taylor, M. J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2013). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety*, 1-9.
- Tracey, D. L., DiStefano, T. P., Morris-Hackett, N., & Steefel, L. (2013). Using quick response codes to facilitate self-directed learning in a nursing skills laboratory. *Journal of Nursing Education*, 52(11), 664-664.
- The University of North Carolina – Charlotte (UNCC) (2017a). *College of health and human services student demographic profile- fall 2016*.
- The University of North Carolina- Charlotte (UNCC) (2017b). *Mission, vision, values*.
Retrieved from: <http://nursing.uncc.edu/about-us>.
- Yoder, S. L., & Terhorst, R. (2012). “Beam me up, Scotty”: Designing the future of nursing professional development. *The Journal of Continuing Education in Nursing*, 43(10), 456-462.
- Županović, I. Č., & Tijan, E. (2012, May). QR Codes as a time management tool in m-learning. *MIPRO, 2012 Proceedings of the 35th International Convention* (pp. 1470-1474).

Appendix A

Quick Response Codes

Airway/Trach Care Skill	Catheterization Skill
	
Enteral Feeding Skill	Injectable Medication Administration Skill
	
Intravenous Medication Administration Skill	Intravenous Therapy Skill
	

Medication Administration Skill (Oral,	NGT insertion and removal Skill
	
Oxygen Therapy Skill	Preparing Medication Skill
	
Wound Care Skill	
	

Skills attached to QR code:

Assessment Technologies Institute. (2016).

Appendix B

State Anxiety

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name _____ Date _____ S _____
 Age _____ Gender (Circle) M F T _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

VERY MUCH SO
 MODERATELY SO
 SOMEWHAT
 NOT AT ALL

- | | | | | |
|--|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I am tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel comfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I am jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

Appendix C

Trait Anxiety

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant.....	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I feel satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be.....	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them.....	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily.....	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content.....	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person.....	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

STAIAD Instrument © 1968, 1977 Charles D. Spielberger. All rights reserved in all media.
Published by Mind Garden, Inc., www.mindgarden.com