Randomized Controlled Study to Determine the Best Teaching Practices in Nurse Practitioner Education

Tonya Rutherford-Hemming, EdD, RN, CHSE
Clinical Assistant Professor, Coordinator of Simulation and Interdisciplinary Practice
UNC Charlotte
School of Nursing/College of Health and Human Services, CHHS 411B
9201 University City Blvd, Charlotte, NC 28223
truther2@uncc.edu
704.687.7959

Katherine Shue McGuffin, DNP, MSN, FNP-C
Doctor of Nursing Practice Program Coordinator
Clinical Assistant Professor, School of Nursing
UNC Charlotte
College of Health and Human Services, CHHS 442
9201 University City Blvd Charlotte, NC 28223
kdshue@uncc.edu
704-687-7958

Abstract

The purpose of this two-year study is to evaluate best practices in teaching Nurse Practitioner (NP) students to assess, recognize, and manage patients with nonmalignant versus malignant skin lesions through simulation versus traditional lecture at the University of North Carolina at Charlotte. NP students entering into primary care practice currently demonstrate low levels of knowledge related to skin cancer assessments, history taking, and recognition of skin lesions. The curriculum in advanced practice programs should provide a proper foundation for practice. Simulation allows students to practice skills in a realistic environment, which will enhance their knowledge of dermatologic assessments. This study uses a randomized controlled crossover design with repeated measures. The data analysis consists of descriptive statistical techniques and inferential statistical methods. Student-centered outcomes including an improvement in knowledge and confidence level will be measured. The sequencing of simulation and traditional lecture will also be measured. The results of the study will provide essential information to NP faculty, simulation faculty, and general providers regarding the best method of incorporating dermatologic education into NP curricula. This study will add to the body of knowledge, guide dermatologic and simulation education, and address the healthcare needs of the greater Charlotte region and beyond. Increasing efficacy of skin assessments and recognition of nonmalignant and malignant lesions in NP curricula may enhance early detection and treatment of skin cancer, thereby improving patient outcomes.

Budget Request Page
January 15, 2019 to May 30, 2020

BUDGET: *Request by budget category. Joint proposers must select one PI to be the lead and one department to receive this allocation.*

Lead Principal Investigator: Tonya Rutherford-Hemming, EdD, RN, CHSE

Principal Investigator 800#: 801056147

Title of Project: Randomized Controlled Study to Determine the Best Teaching Practices in Nurse Practitioner Education

Allocate operating budget to Department of: Nursing

Fiscal Year One (January 15, 2019 to May 30, 2019)		
Faculty Stipend	Paid directly from Academic Affairs fund on May 15, 2019	$7700
911250	Graduate Student Salaries	
911300	Special Pay to Faculty other than Grantee	
915000	Student (Undergraduate or Graduate) Temporary Wages	
915900	Non-student Temporary Wages	
920000	Honorarium (Individual(s) not with UNCC)	
921160	Subject Incentive Fee	
925000	Domestic Travel	
926000	Foreign Travel	
928000	Communication and/or Printing	
930000	Supplies	
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Contracted Services	
Year One Subtotal		$7700

Lead Principal Investigator: Tonya Rutherford-Hemming, EdD, RN, CHSE		
Fiscal Year Two (July 1, 2019 to May 30, 2020)		
Faculty Stipend	Paid directly from Academic Affairs fund on May 15, 2020	
911250	Graduate Student Salaries	$2400
911300	Special Pay to Faculty other than Grantee	
915000	Student (Undergraduate or Graduate) Temporary Wages	
915900	Non-student Temporary Wages (see PD-17)	
920000	Honorarium (Individual(s) not with UNCC)	
921160	Subject Incentive Fee	
925000	Domestic Travel	$1500
926000	Foreign Travel	
928000	Communication and/or Printing	$195
930000	Supplies	$500
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Contracted Services	$5140
Year Two Subtotal		$9,735
	TOTAL FUNDS REQUESTED (Year One + Year Two)	$17,435

SoTL Proposals that do not receive SoTL funds may be eligible for support from the Office of Assessment and Accreditation. If your SoTL proposal is not recommended for funding, would you like for your proposal to be shared with the Office of Assessment for review and consideration for funding from that office? YES____X_____
NO_____

Budget Justification Narrative

This proposal seeks a total of $18,935 from the Scholarship for Teaching and Learning (SoTL) grant. This grant is for two years and funds will be allocated as followed:

Fiscal Year One (January 15, 2019 to May 30, 2019)

- **Faculty Stipend**
  $7700.00 is requested for faculty stipends.

  Dr. Rutherford-Hemming and Dr. McGuffin hold a full time 9-month appointment and therefore and are not employed during the summer months. Faculty will spend year one of the grant developing and validating measurement instruments for the research project. Faculty request a summer stipend to continue the work that is started in year one and facilitate the study moving forward in year two. The following is a description of the measurements instruments for this study.

  1) Knowledge Pre-Posttest: A 20 item multiple-choice test will be developed to assess competency of the simulation content. The pre-test and post-tests will have the same 20 identical questions. Currently a validated instrument related to this content is not available; therefore, the investigators will spend the first months of the project developing the tool, sending it out to experts across the country for validation, receiving feedback, and making revisions as necessary. The instrument will be validated when a content validity index (CVI) of at least 0.8 is obtained (Lynn, 1986).

  2) Simulation Scenarios: Validated simulation scenarios will be written for use with this project. Currently validated simulation scenarios are not in the literature; therefore, the co-PI (TRH) will write the scenario and send it out to experts across the country for validation in the same manner as the Knowledge Pre-Posttest. The simulation scenario will be validated when a CVI of at least 0.8 is obtained (Rutherford-Hemming, 2015).

Fiscal Year Two (July 01, 2019 to May 30, 2020)

- **Graduate Student Salaries**
  $2400.00 is requested for graduate research assistants.

  We will hire 2 graduate research assistants to work approximately 5 hours per week each on the project during the Spring semester 2020. These graduate research assistants will serve as objective project liaisons as all involved faculty will be actively participating in the simulations and collecting data as needed. A nursing project of this magnitude requires payment of $15.00 per hour for a Registered Nurse Graduate Assistant as opposed to the usual $ 9.00 for non-licensed GA's.

  The graduate research assistants responsibilities will include coordinating faculty and student schedules for simulation scenarios; coordinating, setting up and operating audiovisual recording; assisting faculty with prebriefing and debriefing, setting up and prepping standardized patients for the simulation scenarios including dressing and moulage; loading patient information/charts into a laptop computer, coordinating the observation schedule, collecting structured observational data, and overseeing data entry and analysis.

  The following is how the budgeted amount for the graduate student salaries was calculated:
  5 hrs/week x 16 weeks x $15/hr x 2 graduate students = $2400

- **Domestic Travel**
  $3000 is requested for domestic travel to disseminate findings to a national audience at professional conferences. The PI plans to disseminate findings in a podium presentation format at the International Meeting of Simulation in Healthcare or the National League for Nursing Education Summit; both of these are teaching and learning based conferences. The co-PI plans to disseminate findings in a podium presentation format at the National Organization for Nurse Practitioner Faculty (teaching and learning based conference) or the American Academy of Nurse Practitioners. Registration at each conference is approximately $600; the remaining funds will be used to cover travel and lodging.

- **Communication and/or Printing**
  $195.00 is requested for printed copies of the informed consent, demographic questionnaire, and Knowledge Pre-Posttests. Color pictures will be used in some of the questions throughout the Knowledge Pre-Posttest so students can clearly view the skin lesions and determine the diagnosis and treatment plan.

  The following is how the budgeted amount for printing was calculated:
  13 pages/test x $0.30/page (Repros Cost) x 50 tests = $195

- **Supplies**
  $500.00 is requested for moulage (casting and modeling equipment) in order to simulate mock nonmalignant and malignant skin lesions on the standardized patients (actors).

- **Other Contracted Services**
  $5140.00 is requested for the use of standardized patients in this project. Standardized patients are individuals who take on the characteristics of a patient in a clinical setting. Some people refer to standardized patients as actors. These individuals will be given scripts to memorize and trained to cue and answer student questions during the simulation scenario. It is crucial in this project that nurse practitioner students have face-to-face contact with a live person with whom they can communicate as well as a person with actual skin to assess malignant and nonmalignant skin lesions; therefore, standardized patients are being used as opposed to a mannequin simulator.

  The following is how the budgeted amount for the standardized patients was calculated:

  Standardized Patients: (4 individuals)
  Training Days: 4 individuals x 4 hours x $25/hr = $400
  Parking on Training Day: 4 individuals x $10/day = $40

  Simulation Days: 4 individuals x 45 hrs x $25/hr = $4500
  Parking on Simulation Days: 4 individuals X 5 days x $10 day = $200

UNC CHARLOTTE
College of Health and Human Services
School of Nursing
9201 University City Blvd, Charlotte, NC 28223-0001
T704/687.7952 www.nursing.uncc.edu

October 25, 2018

Dear SoTL Grant Selection Committee:

I write to offer my support for the 2018 Scholarship of Teaching and Learning (SoTL) proposal submitted by **Drs. Tonya Rutherford-Hemming** and **Katie McGuffin**. Their proposal, **A Randomized Controlled Study to Determine Best Teaching Practices in Nurse Practitioner Education**, seeks to determine if altering the traditional sequencing of didactic and clinical content improves knowledge and skill acquisition.

Historically, students receive theory content in a traditional classroom setting, followed by the opportunity to apply concepts in a simulated clinical environment. This proposal seeks to examine if a change in sequencing will enhance knowledge and skill acquisition of Family Nurse Practitioner students. Specifically, does simulation, followed by a presentation of theoretical content, result in improved skill acquisition. Skill acquisition theory (Benner, 1982) supports that knowledge development occurs through experiential learning, such as simulation and that reflection, which is achieved through simulation debriefing, can be used to bridge the gap between theory and practice.

The American Association of Nurse Practitioners estimates there are over 200,000 Nurse Practitioners (NP) in the United States and 60% are FNP. The School of Nursing has a rigorous program that aims to prepare FNPs to provide primary care to individuals and families across the lifespan. Over 90% of graduates from the FNP program, will practice in the Charlotte region. Therefore, determining the best evidence-based approach to enhance knowledge and skill acquisition of these students, has a direct impact on the health of the communities served by our graduates.

Sincerely,

Dena Evans, EdD, MPH, MSN, RN, CNE, CNL-BC
Director, School of Nursing

Aims, Purpose and Objectives

Purpose

The **purpose** of this study is to determine **best practices in teaching** Nurse Practitioner (NP) students to assess, recognize, and manage patients with nonmalignant versus malignant skin lesions. The study will also investigate the knowledge and skills NP students' use in a simulation and if the sequencing of traditional lecture versus simulation makes a difference in NP's knowledge and skills.

Objectives

The **objectives** of this study are to:

1. Determine if simulation compared to traditional lecture is a better teaching methodology for NP students to assess, recognize and manage patients with nonmalignant versus malignant skin lesions.

Research Question: Do NP students who participate in a simulation demonstrate higher mean scores on a knowledge pretest-posttest compared to NP students who participate in a traditional lecture?

2. Determine NPs knowledge and skills during a simulation

Research Question: Do NP students in a simulation demonstrate the knowledge and skills to obtain a history (risk factors and sun protective behaviors), perform a skin assessment, recognize, and manage patients with nonmalignant versus malignant skin lesions?

3. Determine if the sequence of instruction (traditional lecture and simulation) makes a difference in NP students' knowledge and skills

Research Question: Which group of NP students, those who participate in a simulation ***prior*** to a traditional lecture or those who participate in a simulation ***after*** a traditional lecture, demonstrates better knowledge and skills on a knowledge post-test related to nonmalignant versus malignant skin lesions?

Rationale for the Project

To prepare NP's for dermatologic exams in primary care settings, the curriculum in NP programs programs should provide a proper foundation for practice (Lucas, Loeshcer, & Pacheco, 2016; Woodmansee, Turnage, & Loerzel, 2018). Currently, there are no set standards for dermatologic education in NP programs (Shelby, 2014). Previous studies have illustrated the lack of dermatologic

education in graduate programs (Lucas et al., 2016; Woodmansee et al., 2018). NP students entering into primary care practice currently demonstrate low levels of knowledge related to skin cancer assessments, history taking, and recognition of lesions. To improve patient outcomes, reduce healthcare costs, and potentially reduce the incidence of skin cancer in the United States, early detection and treatment is essential (American Cancer Society, 2017; Gordon, 2014; "Skin Cancer Facts", 2018). Increasing efficacy of skin assessments and recognition of nonmalignant and malignant lesions in NP curricula may enhance early detection and treatment of skin cancer, thereby improving patient outcomes (Lucas et al., 2016; Woodmansee et al., 2018).

This educational research study aligns with the objective of the University of North Carolina in Charlotte's (UNCC) NP program to "provide care to individuals and families across the lifespan, promote wellness and disease prevention, and meet tomorrow's healthcare challenges" such as the rising trend in skin cancer rates. The objectives of this study tie to the UNCC mission related to community engagement and addressing the health needs of the greater Charlotte region.

Literature Review

Introduction and Background

Skin cancer.

Skin cancer is the most commonly diagnosed form of cancer in the United States (US) and is more prevalent than all other cancers combined (American Cancer Society, 2017). One in five Americans will develop skin cancer during their lifetime and approximately 9500 people are diagnosed with skin cancer daily ("Skin Cancer", 2018). Despite preventative guidelines on sun protective behaviors, programs related to risk of indoor tanning, and educational counseling, the incidence of skin cancer continues to rise (American Cancer Society, 2017; Dyson & Cowdell, 2014; Woodmansee et al., 2018). If detected early, most skin cancers can be treated successfully (American Cancer Society, 2017; Shelby, 2014; "Skin Cancer Facts", 2018). Nurse practitioners are at the forefront in primary care offices and urgent care centers and have the first opportunities to inspect and assess skin lesions. Early detection is imperative to increasing treatment options, decreasing disfiguration and the spread of cancer to lymph

nodes, improving overall patient outcomes, and reducing the healthcare costs associated with nonmalignant and malignant skin cancers (American Cancer Society, 2017; “Skin Cancer Facts”, 2018; Woodmansee et al., 2018).

There are three main types of skin cancer: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma. BCC is the most common form of skin cancer; it is nonlethal (yet disfiguring) and is easily treated with early detection (“Skin Cancer Facts”, 2018). SCC is the second most common form of skin cancer and can cause extensive damage, often resulting in death if not detected early. Melanoma is the least common, yet the most deadly form of skin cancer (American Cancer Society, 2017; “Skin Cancer Facts”, 2018). Primary care providers, including nurse practitioners, are often the first to assess patients when they enter the healthcare system. In fact, patients visit a primary care provider 9 times more than a dermatology office (Gordon, 2014). Nurse practitioners must have the knowledge and skill to conduct skin assessments and understand the various characteristics of nonmalignant and malignant lesions which include size, color (brown, black, tan, red), presence of irregular borders, nodules or crusting, elevation as well as assess, follow, and document a skin map of new growths and moles. Therefore, it is essential that nurse practitioners have the proper education and training for assessing skin lesions, thereby enhancing early detection, diagnosis and treatment of skin cancer, and benefiting the community served (Lucas et al., 2016; “Skin Cancer Facts”, 2018; Woodmansee et al., 2018).

Simulation.

Pilcher and colleagues (2012, p.32) defined simulation as “An array of structured activities that represent actual or potential situations in education and practice. These activities allow participants to develop or enhance their knowledge, skills, and attitudes, or to analyze and respond to realistic situations in a simulated environment.” There is a lack of empirical evidence supporting the use of simulation within NP education (Rutherford-Hemming, Nye, Corum, 2016), specifically in the area of dermatologic assessments. Wingo and Baker (2018) described an innovative simulation for teaching debridement for NP students, a process of removing decayed skin from ulcers or wounds. While the feedback from students was positive, it was anecdotal in nature. Hernandez, Mermelstein, Robinson, and Yudkowsky

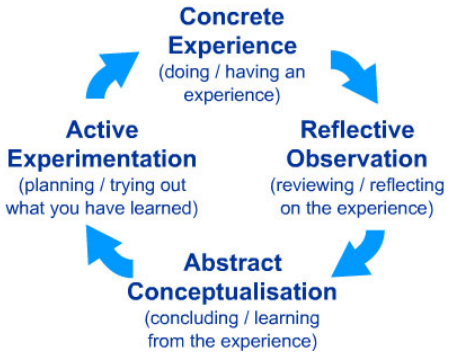
(2013) assessed medical students' clinical decision making skills and ability to detect melanomas using standardized patients ("actors") and moulage (casting or molding to simulate a disorder or injury). The authors reported 29% noticed the moulage and 22.6% identified the lesion as atypical and in need of further investigation. This study used medical students and not NP students, but both groups of healthcare providers work within the same scope of practice. More studies of this nature are needed to determine if NP students possess the necessary knowledge and skills to diagnose and manage individuals with abnormal skin lesions.

There are also questions regarding the sequence of teaching methodologies such as traditional lecture and simulation. Two studies demonstrated that post knowledge assessment scores were significantly greater in groups of learners who received simulation prior to lecture (Stefaniak & Turkelson, 2014; Zendejas, Cook & Farley, 2010). However, both studies were limited by relatively small sample sizes and a lack of valid measures to assess learners' knowledge. Neither study included NP students. Therefore, questions of sequencing related to a traditional lecture and simulation, and the effects it has on learner competency, remain unanswered.

Conceptual Framework

The conceptual framework that underlines this study is Kolb's Experiential Theory of Learning (1984). Kolb's Theory is appropriate for this study because NP students are provided new information and new situations (stage one), provided time to reflect (stage two), placed in a contextual learning situation (simulation) (stage three), and allowed to apply and test their new knowledge and skills (stage four). Figure 1 is a pictorial representation of Kolb's four-stage learning cycle.

Figure 1: Kolb's Learning Cycle



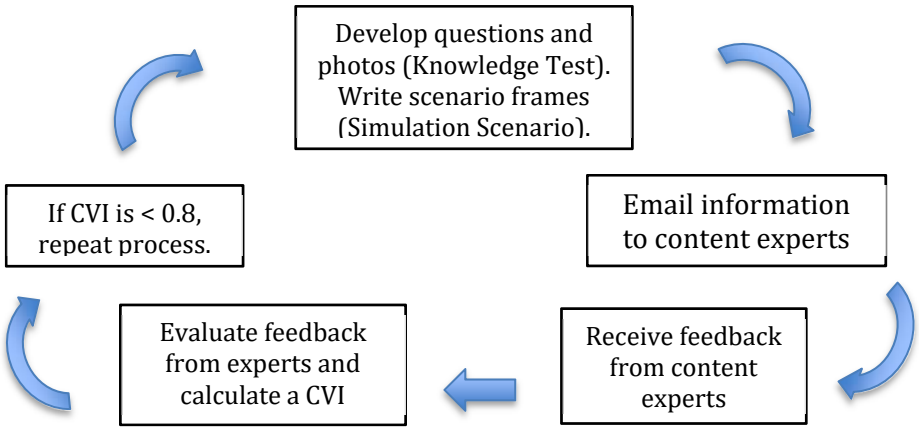
Methods

Year One (January 15, 2019 to May 30, 2019)

The goal of year one is to validate the measurement tools, the Knowledge Pre-Posttest and the Simulation Scenarios. Since no validated Knowledge Pre-Posttest or Simulation Scenario exists in the literature, this is an **important** and **crucial first step** of the research process. Validating a measurement tool is a complex process. Without a validated tool, the results could be meaningless, and at the very least, must be interpreted cautiously.

Content validity will be obtained by sending the questions on the Knowledge Pre-Posttest (and steps of the Simulation Scenario) to experts across the country (or internationally). Experts will provide feedback and rate the question using the content validity index (CVI) developed by Lynn (1986). A CVI of 0.8 must be obtained in order for the measurement instrument to be valid. Figure 2 shows the process the researchers plan to take to validate the necessary instruments for this project.

Figure 2: Content Validity Process



Year Two (July 01, 2019 to May 30, 2020)

Year two goals are to obtain reliability statistics on the validated questions in the Knowledge Pre-Posttest and implement the research study.

Research Design.

This study uses a randomized controlled crossover design with repeated measures.

Setting, Sample and Recruitment.

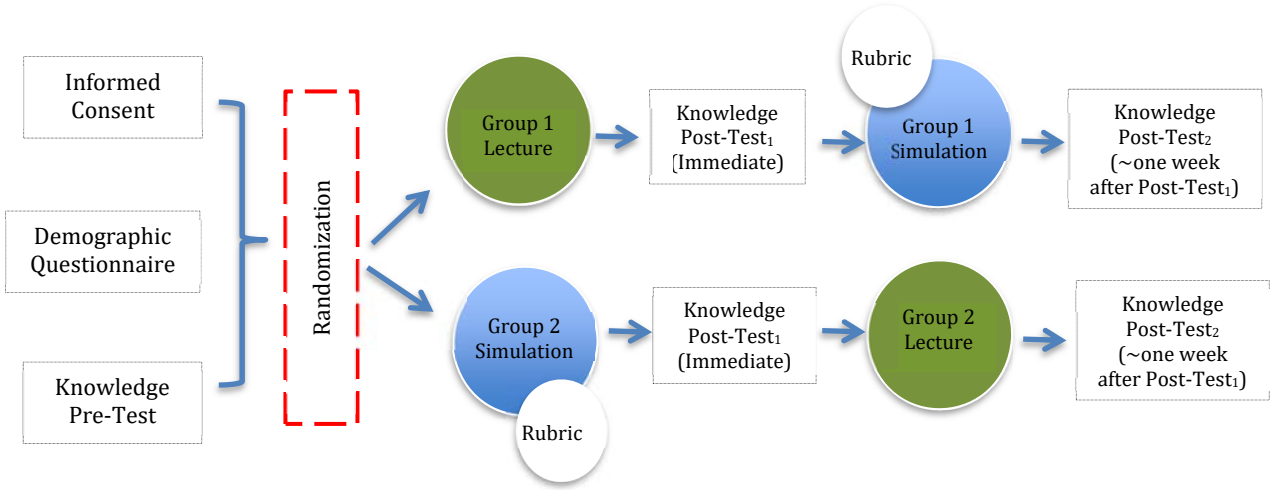
The setting is a large university in the Southeastern US. Following Institutional Review Board () approval, a convenience sample of 20 NP students, currently enrolled in NUNP 6250 will be approached to participate in the study in the Fall 2019. NUNP 6250 generally has 30 students in the course, making the sample possible to attain.

The sample size for the crossover design was calculated based on data on midterm exam from course NUNP 6250 and using proc power procedure of SAS 9.4 software. The correlation between two transformed measurements of the same subject is assumed to be 0.5 (moderate value). The level of significance and the desired power level were set at 0.05 and 0.8, respectively. Sixteen students are necessary to achieve the desired power level. A sample size of 20 will be recruited to account for 10-15% attrition during the study.

Data Collection Procedures.

Participants will complete an informed consent, demographic questionnaire, and Knowledge Pre-Test. Participants will be **randomized** into two groups. Participants in Group 1 will receive a traditional lecture, complete the Knowledge Post-Test$_1$, participate in a simulation, and complete the Knowledge Post-Test$_2$. Participants in Group 2 will participate in a simulation, complete the Knowledge Post-Test$_1$, receive a traditional lecture, then complete the Knowledge Post-Test$_2$. There will be approximately 10 days between simulation and lecture interventions. During each simulation performance data will be collected related to knowledge and skills. Data collection will take approximately 2 weeks total time. Figure 3 shows a pictorial image of the data collection procedures.

Figure 3: Data Collection Procedures



Evaluation Methods

Instrumentation

1. Knowledge Pre-Posttest: A 20 item multiple-choice test will be developed to assess

competency of the simulation content. The pre-test and post-tests will have the same 20 identical questions.

2. Simulation Rubric: A 10-item rubric will be used to determine NP students' knowledge and skills during the simulation [i.e obtain a history (risk factors and sun protective behaviors), perform a skin assessment, recognize, and manage patients with nonmalignant versus malignant skin lesions]. Students will score 1 point for each item completed correctly. The total score will be the number of correct items out of the 10 items listed on the rubric.

3. Simulation Scenarios: Validated simulation scenarios will be used with this project.

Educational Interventions

All students will attend a traditional lecture lasting approximately 90 minutes (current education standard). Students will also participate in 3 simulations. Each simulation will provide an active case scenario of a patient in a clinical setting with a complaint. Students will assess, recognize, and manage the patient's complaint. Students will receive a prebriefing, or orientation session, prior to the start of a simulation. At the end of the simulation, students will participate in a debriefing session.

Data Analysis

The data analysis plan consists of descriptive statistical techniques and inferential statistical methods for students' scores on the Knowledge Pre-Posttest at three points in time: Time 1, before the intervention (i.e. pre-test), Time 2, after the initial intervention of traditional lecture or simulation (i.e. Post-test$_1$), and Time 3, after the second intervention of traditional lecture or simulation (i.e. Post-test$_2$). For all the scores, the descriptive statistical techniques will include numerical summaries, histograms, and checking for Gaussian distribution assumption through Shapiro-Wilk test (Shapiro and Wilk, 1965). If data exhibit skewness, transformation of variables will be considered (Yeo and Johnson, 2000).

The inferential statistical techniques will include one-sample T-test, two-sample T-test, 95% Confidence Intervals, and mixed models for 2 × 2 crossover design (Siyasinghe and Sooriyarachchi, 2011). Two sample T-test with pre-intervention test scores will be used to check whether there is any

significant difference in Groups 1 and 2. However, necessary statistical measures will be taken if there exists any systematic bias.

Research question 1 will be answered through a two-sample T-test using the exam scores after first stage of intervention. The null hypothesis would be no difference in average test scores. The one-tailed alternative hypothesis would be that average test score for Group 2 is higher than that of Group 1.

Research question 2 will be answered using a 10-point rubric developed by the researchers. Students will score 1 point for each item completed correctly. The total score will be the number of correct items out of the 10 items listed on the rubric. A score greater than 75% will demonstrate adequacy of the knowledge.

Finally, research question 3 will be answered using a two-sample T-test along with a mixed linear model (Siyasinghe and Sooriyarachchi, 2011). This model will include an overall mean term, fixed effects due to teaching methods, fixed effects due to the order they receive simulation based training and lecture based training, random effects that take into account subject specific effect, sequencing of the training, and teaching methods, and random error terms. Hypothesis testing using the mixed effects model parameters will enable us to assess whether the sequencing of traditional lecture and simulation makes a significant difference.

Knowledge Dissemination

The investigators will present findings on campus in a venue designated by the Center for Teaching and Learning and in the School of Nursing and/or College of Health and Human Services. The investigators will disseminate the findings at two national conferences: a conference for nurse practitioners such as the American Association Practitioner conference, and a simulation conference such as the International Meeting for Simulation in Healthcare. Three manuscripts will be published in peer-reviewed journals: 1) one in a journal interested in the development of the measurement instrument (Knowledge Pre-Posttest), 2) one in a nurse practitioner journal such as *The Journal for Nurse Practitioners* and 3) one in a teaching and learning journal such as *Simulation in Healthcare*.

Timeline

Timeline Months (January 01, 2019- May 31, 2020)

Activity	01-02	03-04	05-06	07-08	09-10	11-12	01-02	03-04	05-06
Instrument Development (Validation)	x	x							
Instrument Development (Reliability)	x	x	x						
IRB Approval			x	x					
Hire and Train Standardized Patients				x					
Recruitment of Participants				x					
Data Collection					x	x			
Data analysis							x	x	
Prepare final report								x	x

References

Adamson, K. A., Gubrud, P., Sideras, S., & Lasater, K. (2012). Assessing the reliability, validity, and use of the Lasater Clinical Judgment Rubric: Three approaches. *Journal of Nursing Education, 51*(2), 66-73. doi:10.3928/01484834-20111130-03

American Association of Colleges of Nursing. White paper: Current state of APRN clinical education. 2015. Retrieved from http://www.aacn.nche.edu/APRN-White-Paper.pdf/

American Cancer Society. (2017). In *Skin Cancer*. Retrieved from https://www.cancer.org/cancer/skin-cancer/prevention-and-early-detection/what-is-skin-cancer.html

Bandi, P., Cokkinides, V. E., Weinstock, M. A., & Ward, E. M. (2010). Physician sun protection counseling: Prevalence, correlates, and association with sun protection practices among US adolescents and their parents, 2004. *Preventative Medicine*, *51*, 172-177. doi:10.1016/j.ypmed.2010.05.003

Box, G.E.P., and D.R. Cox. (1964). An Analysis of Transformations (with Discussion). *Journal of the Royal Statistical Society, Series B* 26(2), 211–252.

Bradley, H. B. (2012). Implementation of a skin cancer screening tool in a primary care setting: A pilot study. *Journal of the American Academy of Nurse Practitioners*, *24*(2), 82-88. doi:10.1111/j.1745-7599.2011.00669.x

Cottrell R. D., McClamroch L., & Bernard, A. (2005). Melanoma knowledge and sun protection attitudes and behaviors among college students by gender and skin type. *American Journal of Health Education*, *36*(5), 274-278. doi: 10.1080/19325037.2005.10608196

DiStefano, A. D., Sincek, B. L., & Stieler, J. D. (2014). Effective skin cancer prevention methods for young adults. *Journal of the Dermatology Nurses' Association*, *6*(4), 171-175. doi:10.1097/JDN.0000000000000052

Dyson, J., & Cowdell, F. (2014). Development and psychometric testing of the 'Motivation and Self-Efficacy in Early Detection of Skin Lesions' index. *Journal of Advanced Nursing*, *70*(12), 2952-2963. doi:10.1111/jan.12436

Gordon, R. A. (2014). Skin cancer: Increasing awareness and screening in primary care. *The Nurse Practitioner*, *39*(5), 48-54. doi:10.1097/01.NPR.0000446024.75947.16

Hernandez, C., Mermelstein, R., Robinson, J. K., Yudkowsky, R. (2013). Assessing students' ability to detect melanomas using standardized patients and moulage. *Journal of the American Academy of Dermatology, 68*, e83-e88. doi:10.1016/j.jaad.2011.10.032

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development (Vol. 1). Englewood Cliffs, NJ: Prentice-Hall.

Lin, J., Eder, M., & Weinmann, S. (2011). Behavioral counseling to prevent skin cancer: a systematic review for the U.S. Preventive services task force. *Annals of Internal Medicine*, *154*(3), 190-201.

Lucas, A. M., Loescher, J., L., Pacheco, L., C. Nurse practitioners' knowledge of prevention guidelines and counseling practices related to primary prevention of skin cancer among adolescents in Arizona. (2016).*Journal of the Dermatology Nurses' Association*, *8*(6), 378–379. doi:10.1097/JDN.0000000000000288

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382-385.

Pilcher, J., Goodall, H., Jensen, C., Huwe, V., Jewell, C., Reynolds, R., & Karlsen, K. A. (2012). Special focus on simulation: Educational strategies in the NIC U: Simulation-based learning: It's not just for NRP. Neonatal Network: NN, 31(5), 281-287. doi: 10.1891/0730-0832.31.5.281; 10.1891/0730-0832.31.5.281

Rutherford-Hemming, T. (2015). Determining content validity and reporting a content validity index for simulation scenarios. *Nursing Education Perspectives, 36*(6), 389-393. doi: 10.5480/15-1640

Rutherford-Hemming, T., Nye, C., & Corum, C. (2016). Using simulation for clinical practice hours in Nurse Practitioner education in the United States: A systematic review. *Nurse Education Today*, 37, 128-135. http://dx.doi.org/10.1016/j.nedt.2015.11.006

Shelby, D. M. (2014). *Knowledge, attitudes, and practice of primary care nurse practitioners regarding skin cancer assessments: Validity and reliability of a new instrument* (Doctoral dissertation, Graduate Theses and Dissertation). Retrieved from http://scholarcommons.usf.edu/etd/5124

Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, *52*(3/4), 591-611.

Siyasinghe, N. M., & Sooriyarachchi, R. (2011). Guidelines for calculating sample size in 2x2 crossover trials: a simulation study. *J.Natn.Sci.Foundation Sri Lanka*, 39 (1), 77-89

Skin cancer. (2018). In *American Academy of Dermatology Association*. Retrieved October 28, 2018, from https://www.aad.org/media/stats/conditions/skin-cancer

Skin cancer fact and statistics. (2018). In *Skin Cancer Foundation*. Retrieved September 16, 2018, from https://www.skincancer.org/skin-cancer-information/skin-cancer-facts

Stefaniak, J. E., & Turkelson, C. L. (2014). Does the sequence of instruction matter during simulation? *Simulation in Healthcare, 9*(1), 15-20. doi: 10.1097/SIH.0b013e3182a8336f

Wingo, N. P., & Baker, N. R. (2018). An innovative simulation for teaching debridement to nurse practitioner students. *Journal of Nursing Education, 57*(3), 190. doi:10.3928/01484834-20180221-14

Woodmansee, R., Turnage, D., & Loerzel, V. (2018). Nurse practitioner student knowledge and attitudes toward skin cancer assessments. *Journal of the Dermatology Nurses' Association*, *10*(2), 115–119. doi:10.1097/JDN.0000000000000385

Zendejas, B., Cook, D. A., & Farley, D. R. (2010). Teaching first of teaching last: Does the timing matter in simulation-based surgical scenarios? *Journal of Surgical Education, 67*(6), 432-438. doi: 10.1016/j.jsurg.2010.05.001