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The Use of Peer Video via M-Learning to Teach Essential Nursing Skills

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The Use of Peer Video via M-Learning to Teach Essential Nursing Skills

by

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Approval Page

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Abstract

The purpose of this project was to compare adding an additional educational intervention (the use of an instructional peer video on a mobile device) to standard practice in the skills lab to teach the skill of male and female urinary catheterization and the removal of a urinary catheter. The project had a quasi-experimental design, without control, and utilized a convenience sample of 31 pre-licensure nursing students. Failure rates at skills evaluation were compared between the previous semester A (fall 2014) and semester B (spring 2015). Semester B was subdivided into two groups, with approximately half in the traditional instructional B1 (n=15) and the remaining in traditional plus mobile peer video instruction B2 (n=16). Measures of perceived competency, actual competency, satisfaction, confidence, and open-ended subjective responses to questions on mobile learning and peer learning were evaluated in both groups. Descriptive statistics were calculated, and comparative analyses were conducted using the Wilcoxon rank sum test, the Wilcoxon signed rank test and Fisher's exact test. Results indicated that the intervention of peer video via mobile technology was perceived overall as positive to the learner. Although not statistically significant, there was an overall decrease in the percentage of skills evaluation failures from semester A to B.

Keywords: peer learning, competency, nursing, expert assisted learning, blended instruction, and mobile learning

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TABLE OF CONTENTS

List of Figures

List of Tables

CHAPTER I

Introduction

In 2003, the National League for Nurses (NLN) issued a position statement on the importance of innovation of nursing education. Although this statement was made over a decade ago, the relevance remains. The call was for dramatic reform for nursing education to become more flexible, student-centered, collaborative, and to integrate technology into curricula (NLN, 2003). Nursing is a practice-based discipline and the proficient performance of nursing skills is essential in providing competent, safe patient care (Öztürk & Dinç, 2014). Developing basic psychomotor skills is a significant part of nursing curricula and is often a stressful experience for students (Brannagan et al., 2013). In order to ensure learner needs are met for acquiring these skills, evidence-based teaching models should be employed.

Problem Statement

As one would expect, students often experience increased levels of stress leading up to and during their skills evaluations. During the first year of nursing school, stress and anxiety can be due to their lack of experience, fear of making mistakes, and fear of being evaluated by faculty (Sharif & Masoumi, 2005). The goal of the learner in new skill acquisition is to be able to proficiently demonstrate a series of steps outlined in a procedure checklist within the allotted time-frame. Students are typically evaluated in a skills check-off by faculty one student at a time. Unfortunately, some students are unsuccessful in demonstrating proficiency with their first attempt at performing required skills, which can impact self-confidence and cause students to doubt their abilities. At the project site, in the fall of 2014, five of 33, students failed to perform the skill of

urinary catheterization proficiently on their first attempt at skills evaluation. Remediating and re-evaluating students' performance increases faculty workload and decreases learner self-confidence and satisfaction.

Justification of Project

Innovative teaching methods are essential to meet the needs of today's student nurse (Adams, 2014). Video instruction enables students to learn at their own pace, independently and asynchronously, without instructor interaction. Students are able to pause and repeat content to meet their learning needs and maximize retention (Whatley & Ahmad, 2007). Most college students have interacted with technology daily for their entire lives (Vogt, Schaffner, Ribar, & Chavez, 2010). Personal, portable, wireless technologies have become ubiquitous in the lives of today's learner. Using a mobile device such as a smartphone, tablet, laptop, or google glass to teach new nursing skills in video format would offer the learner flexibility, portability, opportunity for repetition, and content consistency. Given the prevalence of mobile device use in our culture, it is unlikely that many students would need to purchase equipment to implement mobile instruction as a standard. Peer learning can result in increased learner self-confidence (Erikson, 1987). Performing psychomotor skills proficiently is a significant part of the nursing school curricula. Utilizing a peer to demonstrate the necessary steps to pass the skills evaluation in a video removes the uncertainty of what to expect in a skills evaluation. This could lead to more confident, competent students who are more satisfied with the psychomotor portion of their nursing education.

The goals outlined in 2003 by the National League for Nursing (NLN) in their position statement on the importance of innovation in nursing education have the

potential to be met through the learning strategies applied in this project. Mobile learning offers flexibility and integrates technology while the use of video achieves a student-centered focus and peer teaching creates a collaborative learning environment.

Purpose

The purpose of this project was to apply best practices in instructional methodology to maximize self-confidence, satisfaction, and perceived and actual competence of student nurses learning to perform the insertion of a male and female urinary catheterization and the removal of a urinary catheter. The goal was to increase nursing skill competency and improve the learner's experience through the use of innovative technology and creative instruction.

Project Questions

This project leader sought to answer the following questions: Compared to students not receiving the peer video intervention, will students who receive the peer video intervention on a mobile device in the skills practice lab have higher:

a. Perceived competence?
b. Competence?
c. Self-confidence?
d. Change in perceived confidence?
e. Satisfaction?

Definition of Terms

The following essential terms were defined by the literature:

- *Electronic Learning (E-Learning)* is electronically-mediated learning via the Internet and computer-based technologies (Bloomfield & Jones, 2013).

- *Computer-Assisted* Learning (*CAL)* is learning from the use of a computer-based teaching module (Bloomfield, Roberts, & White, 2010).
- *Mobile Learning (M-Learning*) is a form of e-learning mediated by a mobile device (Kearney, Schuck, Burden, & Aubusson, 2012).
- *Peer-Assisted Learning (PAL)* is the development of knowledge through active help among status equals or matched companions (Topping, 2005).
- *Expert-Assisted Learning (EAL)* is learning from expert-led training (Walsh et al., 2011).

Summary

Evaluation of skill competency in nursing education is essential; some level of performance anxiety is unavoidable. Minimizing performance anxiety and maximizing consistency should be priorities when developing nursing skills lab curricula. Nursing faculty should foster a creative, flexible, technologically-enhanced environment to serve today's student population while meeting their learning needs. Students view flexibility and self-managed learning as positive (Kelly, Lyng, McGrath, & Cannon, 2009). Being able to access information remotely anytime is a major benefit (Everett & Wright, 2012). Potential benefits to peer teaching in nursing students include: a reduction in anxiety, an increase in self-efficacy, and access to a cost-effective education (Brannagan et al., 2013). This evidenced-based project could improve student outcomes, reduce faculty workload, maintain cost neutrality, and answer the call for innovation in nursing education.

CHAPTER II

Research Based Evidence

A review of the literature was conducted by searching the following electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline via PubMed, and Google Scholar. Key terms used were multimedia, competency, peer assisted learning, and computer assisted learning. Additional key words were nursing, expert assisted learning, video modeling, blended instruction, and best practice.

Review of Literature

Systematic Review

A systematic review of the literature was performed by Button, Harrington, and Belan (2014) to examine primary research articles since 2000 on e-learning in preregistration nursing programs. Twenty-eight peer-reviewed articles were analyzed and recommendations were made in order to enable students to progress and be equipped with the skills required to provide safe evidence-based care. Three themes emerged from the review: issues relating to e-learning, using information communication technology, and staff development relating to e-learning for educators. Two studies reported student frustration with unreliable computer systems and lack of technical support. Seven articles reported nearly all students are embracing mobile technology. Information communication technology allows students to access their educators rapidly and receive responses in a timely fashion. Three studies stated that nursing students felt the online learning environment was a way to get to know students outside the classroom, so students reported feeling more motivated to work collaboratively. The third theme, staff

development, was found in nine of the 28 reviewed studies. The lack of time for faculty and staff to develop e-learning resources in addition to the gross underestimate of the time it should take to develop e-learning materials are barriers to creating online resources. One article suggested partnering with a librarian to facilitate material development. Information literacy is an essential skill for the nurse and educators have highlighted the importance of staff development that meets the needs of increasing role technology has on the nursing profession (Button et al., 2014).

Peer Assisted Learning

In a systematic review of the literature, Stone, Cooper, and Cant (2013) examined various methods of peer learning and their effectiveness in undergraduate nursing education. A large body of evidence, 1,813 peer-reviewed studies published between 2000 – 2010, was screened, with 18 selected for review with a variety of research methods. These were chosen using the Critical Appraisal Skills Program (CASP), incorporating an assessment of the methodology, validity, sample types, selection methodology, levels of evidence, and attrition rates. Of the selected studies, eight used qualitative methods, six used quantitative methods, and four used mixed methods. Overall findings from the literature were that peer learning:

1. encourages independent study, critical thinking, and problem–solving skills,
2. gives students a sense of autonomy when responsibility for learning is assumed,
3. is associated with improved cognitive and motor skills,
4. is mutually advantageous, peers gain leadership and it reinforces prior learning, and

5. is associated with improved confidence and decreased anxiety in some situations.

Satisfaction and confidence were found to be overall positive outcomes of peer learning. Although some students prefer classroom lecture, overall satisfaction was rated higher when peer learning was used. Confidence levels of students in four of the studies increased with peer learning when completing clinical skills, problem solving, and critical thinking. Findings were contradictory on the effects of learning with peer interaction on anxiety. Peer coaching showed a decrease in student anxiety while peer learning showed an increase in student anxiety. A peer coach understands the learning objectives and motivates the learner, while peer learning involves being taught by a person with a similar level of knowledge (Broscious & Saunders, 2001). The additional role of the motivator may be the contributing factor for decreased learner anxiety. The researchers suggested the need for future studies on peer learning and coaching using complex nursing skills (Stone et al, 2013).

Use of Videos for Instruction

A quasi-experimental study with a pretest-posttest design was carried out to examine the effects of using an instructional video (produced by faculty) to teach nursing students how to access and manage central line access ports (Cardoso et al., 2012). The researchers noted that the literature did not identify increased levels of anxiety with the use of a video for instruction when compared with lecture (Lee, Boyd, & Stuart, 2007). Anxiety was measured using the Zung (1971) self-rating anxiety scale, a 20-question instrument, using a four-item Likert scale (range, 20-80, stronger symptoms scored higher). Cognitive knowledge was evaluated with a 17-item question and answer test

developed by the researchers. In lieu of faculty instruction, the students viewed a 13-minute skill video three times (back-to-back) prior to being evaluated on simulating the procedure. Post-procedure anxiety and cognitive knowledge measures were taken, along with an unspecified learner experience evaluation. The results showed no significant difference in anxiety scores between the pre- and post-procedure measures (p=0.509). Conversely, the cognitive knowledge test results were significantly higher after watching the educational video (p<0.0001). An overwhelming 100% of the participants would recommend watching a video prior to skill simulation, and 87% would like another course to use the same strategy. A study limitation is that there was no comparison group. Conclusions were that learning with video did not induce anxiety, it was effective, and learners were satisfied (Cardoso et al., 2012).

E-Learning and EAL

Mehrpour, Aghamirsalim, Motamedi, Larijani, and Sorbi (2013) researched using a blended teaching model, combining expert-assisted learning (EAL) and e-learning, with 474 medical students from three university hospitals. Two days after a lecture on splinting and casting, half were randomized to view an additional 26-minute instructional video and given a copy on DVD to take with them. Six months later, faculty (blinded to group assignments) evaluated students on splinting and casting skills. Student performance was evaluated using the standardized Objective Structured Clinical Examination (OSCE) created by Harden and Gleeson in 1979 to assess clinical competency through a combination of observation and objective testing, (range 0-10) where higher scores indicated better performance. Students in the group receiving the supplemental e-learning video (mean = 7.6) significantly outperformed students in the

traditional lecture-only group (mean = 2.0) ($p < .001$). Findings showed using a blended teaching model (e-learning and EAL) enhances psychomotor skill retention. Practice with a video can provide sustained improvement in technical performance (Mehrpour et al., 2013)

In a mixed-methods, prospective study by Holland et al. (2013), the use of an online video (e-learning) as an adjunct to hands-on clinical skills sessions (EAL) was tested. Two cohorts of first semester undergraduate nursing students participated in the study. There were 243 students in the control group who received standard EAL teaching content (traditional lecture) and 266 students in the intervention group who received EAL and unlimited access to an online video of a best practice in the administration of oral medication. The researchers provided no further details of the video. Standard teaching content consisted of three hours of lecture, three hours of skills sessions, and up to six hours of instructor-facilitated open laboratory sessions during the student preparation timeframe. Students were evaluated based on their performance of administering oral medication in the laboratory setting using the Objective Structured Clinical Examination (OSCE). Evaluators were blinded to group assignments. Student performances were stratified as high (passed all eight stations), medium (seven stations passed), or low (six stations passed). Students were given a failing grade if five or fewer stations were passed. Researchers adapted the National Student Survey (Ipsos MORI, 2011) to reduce the number of questions and decrease overlap in content. This tool has proven reliability and internal consistency. Students were asked to rate their opinion on the 21 items using a five point Likert scale. Two open-ended questions were asked about positive and negative aspects of the teaching of the skill. The Pearson chi-square test was significant

(p =.021) providing evidence of a significant association between group and skill performance scores. There was a 34.5% failure rate in the control group, while there was a 20.8% failure rate in the intervention group. In the low pass group, there was 17.3% of the control group, while 27.9% in the intervention group. Similar proportion of students achieved medium and high passes in each of the two groups (about 50% of each group). These findings implied that the addition of the e-learning instructional video may have had more of a positive effect on the performance of borderline students. Satisfaction scores were as good as or better in the intervention group than in the control group. Focus groups were comprised of 16 students from the control group and 20 from the intervention group. Qualitative data supported the utilization of the online video. Students commented on feeling more confident and more at ease with the skill having viewed the video. They remarked about how the video offered fewer inconsistencies and that being able to view it just prior to their evaluation helped solidify their learning. Recommendations were made for further research to evaluate the use of online video for teaching skill retention (Holland et al., 2013).

Lee et al. (2007) conducted a prospective, randomized, controlled trial to determine the efficacy of using an e-learning (DVD-based) video to teach the clinical skill of intraosseous needle insertion compared to EAL. Thirty-six learners made up of doctors, medical students, and nurses were randomly assigned into two groups. One group (e-learning) was shown a 10-minute instructional DVD (n = 18) and then allowed 10 minutes to practice the skill on a mannequin (no instructor interaction). The other group (EAL) was given 20 minutes of face-to-face teaching and one-on-one instructor training (n = 18). Subjective perceptions of the learning experience (Likert scale, 0-5)

were measured. They responded to the following statements: " I was satisfied with the teaching experience", "I felt anxious about the teaching experience", and "I felt confident the teaching experience prepared me for the test". There were no significant differences between the groups for satisfaction (both median scores of 5), anxiety (both median scores of 2), or confidence (median score of 4 for interventional and 5 for control) levels. Competency was scored on a skills evaluation form by faculty with each step quantified (overall range 0-11). The mean score for the EAL group was 6.00 and the e-learning group was 7.56. Therefore, the use of the instructional DVD-based video resulted in improved learning outcomes ($p < .01$). Limitations of the study included the small sample size (N=36) and data for satisfaction, anxiety, and confidence were single-item statements (Lee et al., 2007).

Fifty-eight medical students viewed a video on suturing and then, without further instruction, performed the skill on a mannequin (Shippey et al., 2011). Their performances were video recorded and evaluated (pretest) using a standardized eight-item rating scale, the Subcuticular Suturing Assessment Form (SSAF), with global and task-specific subscales. This scale was modified from a previous scale, the Observed Structured Assessment of Technical Skills, to measure the desired procedural steps in this skill (Swift & Carter, 2006). Afterwards, students were randomized into one of three groups: skills practice guided (e-learning) by a faculty-created instructional video (group A, n=17), skills practice with instructor supervision (EAL) and guidance (group B, n=20), and independent practice (group C, n=16). Students practiced the skill for 30 minutes using the mannequin and a posttest, identical to the pretest measure, was administered. The following week, the test was repeated a third time to measure

retention. Significant performance improvement was measured from pretest to post-test for the EAL group (B), but only those who viewed the instructional video in the e-learning group (A) maintained their improved performance at the one-week retention (p = .024). These results suggested that instructional video is an effective tool for teaching and help retain skills (Shippey et al., 2011).

Kelly et al. (2009) conducted a quasi-experimental, post-test design study comparing EAL (hands-on expert instruction) to e-learning (online modules). Three key nursing skills were taught: how to use a peak flow meter, how to teach the use of the incentive spirometer, and how to use the pulse oximeter. Only 14 students (n=14) volunteered for the outcomes evaluation phase of this study, out of 204. The students were randomized into two groups, but four students withdrew from the study. This left only four students in the EAL group and six in the e-learning group. The following week, both groups were assessed for performance using the Objective Structured Clinical Examination (OSCE), and knowledge using a 15-question multiple-choice quiz. The findings indicated no significant difference between the control and experimental groups on knowledge or performance, but the sample size was inadequate to make valid inferences. Once this phase of the study was over, all students were given access to the e-learning modules to supplement the EAL. Of the 204 students in the course, only 134 students completed a 16-question learning attitude questionnaire (developed by the researchers using a five-point scale) after receiving both EAL and e-learning instruction for these skills. Overall, the findings supported the use of videos for teaching clinical skills to teach student nurses in conjunction with, not instead of, lecturer demonstration. The results of the questionnaire revealed that more than half of the 134 responses were

favorable toward learning via video. Students felt prepared after viewing the video (66.1%), felt motivated to learn the skills through the video (54.4%), and felt they would use the video in the future to revise their skills (81.4%). On the other hand, the majority of students could not download the videos onto their home computers (68.1%). This limitation of the study likely impacted student learning satisfaction compared with EAL. This blended instructional model retains the benefits of flexibility with online learning along with the expert feedback offered with traditional instruction. The results from the open-ended questions supported the findings from the close-ended questions. Positive themes from the open-ended questions were: repetition helped to ensure understanding (54.1%), they can watch it on their own time (35.4%), and it gave them an idea of what to expect in class (21.5%). Some negative themes were: student cannot ask questions (18.5%), it was difficult accessing from home (17.7%), and some preferred demonstration (13.8%) (Kelly et al., 2009).

Bloomfield et al. (2010) employed a two-group randomized controlled design (N = 245) to study the effect of using e-learning with a computer assisted module (n = 116) versus EAL (n = 107) to teach hand washing to nursing students. Skill performance was measured in both groups with an OSCE assessment by trained examiners along with a 20-item multiple-choice test to test knowledge. Findings showed equal knowledge growth in both groups across time. There were no significant differences found in skills performance assessment when group scores were compared at the week two follow-up (p = 0.415). However, at the eight week follow-up, the e-learning group outperformed the EAL group (p = 0.024). E-learning was determined to be an effective strategy for both learning and retention (Bloomfield et al., 2010).

Öztürk and Dinç (2014) performed a quasi-experimental study examining the effect of e-learning on nursing students' urinary catheterization knowledge and skills. A convenience sample of 111 first-year nursing students from two universities participated. The experimental group (n = 59) was taught using e-learning (online video, lecturing, and testing) along with EAL (faculty-observed lab practice). The control group (n = 52) received traditional face-to-face instruction, a classroom knowledge test, and EAL (faculty-observed practice time). Findings showed no difference between the groups in knowledge (p = 0.153), but the e-learning group performed better on the skills evaluation (using a checklist) (p < .001). Researchers recommended that e-learning be used as a supplement to traditional classroom instruction (Öztürk & Dinç, 2014).

Salyers (2007) conducted a semester-long, quasi-experimental post-test only study to examine web-based instruction for attaining new psychomotor skills. A convenience sample of 36 nursing students were randomized to either the control group (n=14) receiving traditional lecture format, or the e-learning experimental group (n=22) receiving 13 self-paced online modules by CONVENE™. Both groups received a three-hour weekly session with instructor skill demonstration, and guided practice (EAL). At the end of the semester, competency was measured using scores from a 60-item multiple-choice comprehensive final exam, and skill performance was measured by a re-evaluation of their skills performance. Learner satisfaction was measured using the student rating for "overall satisfaction with the course" response from their course evaluations. Results showed that mean competency scores were significantly higher in the e-learning group (p < .01). There was no significant difference in skill performance between the e-learning and traditional lecture. Although no statistically significant difference was found

between the groups, the e-learning group was overall "somewhat dissatisfied" with the course, while the control group was "somewhat satisfied" with the course. Many students in the e-learning group reported problems with technology and cited software and hardware incompatibility issues requiring them to work from desktop computers. Also, students reported difficulty with downloading PowerPoint® files from the Internet and communicated that many of their technical support needs were not met. A limitation of this study was that responses from the course surveys were applied to answer specific study questions. The researchers used the overall course satisfaction rating to measure satisfaction with the method of instruction. There are many factors that are involved in overall satisfaction, especially information technology hindrances. Comprehensive final exam scores were used to measure competency, but this study compared instructional methods for teaching psychomotor skills (Salyers, 2007).

Bloomfield and Jones (2013) performed a mixed methods study exploring first-year nursing students' perceptions of e-learning when used to supplement traditional methods to learn clinical skills. Of the 83 students in the study, 15 agreed to be in the two focus groups to help develop a tool to evaluate e-learning. The 28-item tool that was developed utilized a five-point Likert scale and was divided into three sections. Section A had ten items aimed at gathering data related to accessibility, navigation, and flexibility of e-learning. Section B had eight items focused on skill development. Section C included questions related to computer experience, demographics, and previous e-learning experience, along with two free-text boxes for comments. Eight nursing skills were taught using online modules followed by a 90-minute skills class (EAL). Results of the questionnaire showed that 86% of the students felt e-learning was useful, but only

14% found e-learning more useful the class (EAL). When asked to identify which part of the e-learning resource was most useful, 50% of the students identified the online video clips. Qualitative results from the focus groups showed that although e-learning was viewed as overall positive by nursing students, the students favored a blended approach of combining e-learning and conventional teaching methods (Bloomfield & Jones, 2013).

Kavevivitchai, Chuengkriankrai, Thanooruk, and Panijpan (2009) conducted a randomized, experimental study with 117 students from two nursing schools. Students were randomly assigned to three groups: (1) e-learning and lecture (n = 37), (2) e-learning, lecture, and EAL (n = 40), or (3) lecture and EAL (n = 40). The e-learning multimedia was developed through the application of knowledge of anatomy and physiology onto the skill of collecting vital signs. All students (groups one through three) were given a knowledge-level pretest, before a traditional one-hour lecture. Then students in groups one and two were allowed to study the e-learning modules individually for 90-minutes in the computer laboratory. The following day, groups two and three were provided skills demonstrations in the laboratory. The posttest on factual knowledge and 30-minute skills evaluation (using the 29-item performance checklist and Teacher Guide for Vital Signs) was administered to all groups. Additionally, an interview was conducted on ten students from the e-learning groups (one and two) to determine the effects of e-learning multimedia on student achievement and knowledge. Student attitudes were evaluated by a semi-structured interview and a 20-item assessment using a five-point Likert scale with additional space for comments (Cronbach alpha coefficient of 0.89). The tool was used specifically to evaluate user satisfaction and quality of instruction. Responses ranged from “poor” to “excellent” with a range in score from 20-

100. User satisfaction in groups who utilized e-learning (groups one and two) was high in the study, with a mean score of 91.20 (n = 77). Results from the vital signs assessment showed that all three groups significantly gained knowledge from the pretest to the posttest ($p < .001$). There was no significant difference in the mean pretest to posttest scores and knowledge gain scores among the groups ($p > .05$). The e-learning supplement improved learning outcomes more than lecture; however, the most effective learning occurred with e-learning, lecture, and EAL combined (group 3) ($p < .001$) (Kavevivitchai et al., 2009).

M-Learning as a Form of E-Learning

In a prospective, randomized study by Hansen et al. (2011), 21 medical students were enrolled in a study to determine if m-learning via instructional videos would increase student confidence and/or enhance skill performance of urinary catheterization. Before being randomized, all students completed a nine-item questionnaire developed by the researchers on previous exposure to the skill and self-confidence. All students watched faculty demonstrate the skill and then practiced, and were immediately evaluated by faculty using an assessment rubric. After the evaluation, they did a post-course questionnaire on skill confidence levels. At the end of the course, the intervention group received iPods with videos of male and female urinary catheterizations to use to for practice in the following months; the control group did not receive any technological intervention. Three months later, both groups repeated the confidence questionnaire and skills evaluation. The results indicated a decline in skill competency over time in the control group for both male and female catheterizations, while the competency level remained stable among the intervention group. Confidence levels for female

catheterization increased for both groups over time while it decreased for male catheterization ($p < .001$). One possible explanation is that the male catheterization may have been more challenging for the female medical students, who made up the majority of the sample. If gender is a factor in skills retention or confidence, more research needs to be done in this area (Hansen et al., 2011).

A randomized, controlled pilot study examining the effects of using m-learning via on-demand videos for skill acquisition was reviewed (Hibbert et al., 2013). Twenty-two medical students were randomly assigned to watch a mobile video on diabetes and lower limb assessment ($n = 10$) or thyroid assessment ($n = 10$). The videos were available for download onto smartphones and were professionally designed, to meet their program outcomes. In the lab, stations were set up and student performances were evaluated. Also, the students were given a global score rating of satisfactory, non-satisfactory, or borderline. At the diabetic station, there were 22 criteria, the thyroid station had 25 criteria, and the lower limb station had 18 criteria. Students in the group with access to the mobile online videos performed significantly better in the history taking and lower extremity assessment stations. However, there was no significant difference between the two groups with regard to the thyroid assessment station. Both groups demonstrated a high level of competence in the thyroid station (90% of the video and 100% of the non-video group was satisfactory). Ninety-one percent of the people in the lower extremity task group performed competently compared to 40% who had not viewed the video ($p = 0.024$). In the diabetic history group, 83.3% of video group performed satisfactorily, while 20% in the control group (no video) performed proficiently ($p = 0.007$). Students reported that the videos were helpful in being able to

observe the correct technique. The study concluded that on-demand mobile video allows flexibility and portability of content, along with cost-effective access (Hibbert et al., 2013).

A comparative study of m-learning via podcasting verses traditional lecture examined nursing student performance on specific exam questions for performance variance (Vogt et al., 2010). The content was related to health promotion, growth and development, and immunizations. The control class (n = 63) received the content via traditional lecture presentation. The subsequent semester, the experimental class (n = 57) received the identical content delivered via mobile podcast. Both groups were given class time to ask questions. Nine multiple-choice questions were placed on the exam in both semesters. Comparative results showed no significant difference in performance on the exam questions between the two groups (p = .06, 0.11, 0.22). Students were slightly satisfied overall with the podcasted lectures via mobile technology and commented favorably on the flexibility, repetition, and portability that it afforded students. One bias of the satisfaction results is that the all students were queried about satisfaction with the podcasts (regardless of whether they were randomized to view the podcast), so the satisfaction percentages are potentially skewed. With 61% of the respondents agreeing to the statement "I was satisfied with the podcasting experience", a portion of the control group agreed to this statement. If students are satisfied, even without a measurable increase in learning, educators should consider adopting new technologically and advanced methods of instruction. (Vogt et al., 2010).

In a mixed methods study by Jang and Kim (2014), students from 31 medical schools were given access to online clinical skills videos. The videos were available for

viewing from any computer, including a mobile device. The number of times the skills videos were viewed was correlated to the students' self-ratings of self-efficacy, anxiety, and preparedness for the pending skills evaluations. Overall, a total of 411 students were surveyed with a 30-item questionnaire developed by the researchers. The majority of students perceived the videos as useful in learning clinical skills (68%). There was a positive correlation between both self-efficacy and preparedness for skills evaluations with the number of videos viewed ($p < .05$). No correlation was found between the number of video views and anxiety about being evaluated ($p = 0.24$). Of the 17,000 monthly hits received on the videos, 37% of them were from mobile devices. All (100%) students who viewed the videos on a mobile device either agreed or strongly agreed that mobile applications were more convenient to access ($p < .01$). Barriers for some were a slow Internet connection in mobile settings and the need for further faculty development on integrating mobile e-learning technology (Jang & Kim, 2014).

Looi et al. (2010) reviewed the literature for ways in which m-learning could offer seamless learning environments, bridging formal and informal learning. Previous research focused on either formal or informal settings but there is not much written on exploring the synergistic effects of linking the two environments. The portability of mobile devices has significantly impacted the pedagogical shift from didactic (teacher-centered) to active (student-centered) learning. This has engaged the learner and changed the role of the teacher to the facilitator. It is the challenge of the educator to embrace the evolution of technology-enhanced learning. The authors reviewed the literature on the potential of mobile learning to create 'seamless learning spaces' that allow learning to

occur at the point of curiosity. Mobile technology links learning in the classroom or lab to learning in the field or patient room (Looi et al., 2010).

EAL, PAL and E-Learning

Walsh et al. (2011) compared the effectiveness of a variety of learning strategies. Sixty students, medical (n = 35) and nursing (n = 25), were randomized to one of three groups: expert-assisted learning (EAL), peer-assisted learning (PAL) or e-learning to perform a urinary catheterization in the simulated setting. Participants viewed a 10-minute video on urinary catheterization and practiced the skill once on a mannequin. Next, participants practiced while students in the EAL group received feedback from an instructor, those in the PAL group worked in pairs, and the e-learning group used an instructional video on a computer in a self-directed manner. Effectiveness of training was evaluated with a previously validated, 25-item task-specific checklist and global rating scale (GRS). The GRS assessed five dimensions of performance using five-point Likert scales and the number of breaks in aseptic technique was quantified. After instruction, an immediate posttest skills evaluation was measured and then again one-week later (retention). All groups performed similarly on the pre-post and retention tests. The findings showed the number of breaks in aseptic technique was significantly reduced and catheterization checklist scores improved significantly in all groups from pretest to posttest, and from posttest to retention ($p < .05$). After the retention test, students were evaluated with the same measures during a simulated urinary catheterization. Results showed the e-learning and EAL groups outperformed the PAL group ($p < .05$). Therefore, researchers concluded that e-learning and EAL would be better learning strategies to facilitate skills transfer into practice (Walsh et al., 2011).

Gaps in Literature

Research has shown how technology has changed the educational climate, but more studies are needed to determine the effects of technology on the development of psychomotor skills of nursing students. More research is needed in the simulated clinical environment using complex combinations of learning strategies. There is a gap in the literature on the combination of m-learning and PAL as a blended method of instruction. There are only a limited number of studies using m-learning as a teaching strategy in nursing.

Strengths and Limitations in Literature

The literature supported using a blended teaching model (more than one) to teach psychomotor skills. Also, it is widely accepted that using a video to teach a skill can provide sustained improvement in technical performance and help with retention of the skill. The use of EAL and e-learning are widely accepted as effective methods of instruction and both have been proven effective when used in combination. The role of the nurse educator is changing as a result of the rapid growth in technology and the technologically savvy learner; more empirical research is needed to facilitate the adoption of nursing faculty. Also, more research is needed on integrating mobile and e-learning technology into the classroom and skill lab. Additionally, there is a further need for future studies on using PAL and coaching while teaching complex nursing skills.

Theoretical Framework

The Self-Determination Theory centered on human motivation and was based on the premise that people have an innate tendency towards personal growth and vitality (Ryan & Deci, 2000). Motivation is defined as a process that starts with a physiological

or psychological need that activates behavior or a drive aimed at a goal. According to the theory, there are three psychological needs that must be met in order for individuals to become self-determined to pursue their interests: autonomy, competence, and relatedness (Ryan & Deci, 2000).

Autonomy is the need to feel in control of your own behaviors and goals and will be demonstrated by students being able to customize their learning with the added flexibility and portability of m-learning. Competence is the need to gain mastery of tasks and learn different skills and will be measured through the skills evaluation. Relatedness is the need to experience a sense of belonging and attachment to other people and will be evident in peer learning and measured in the subjective questions. Ryan and Deci (2000) postulated that it is essential to meeting all three of these to facilitate optimal functioning, growth, and social development. Therefore, nurse educators should take note of this theory; it speaks to the human conditions that promote the integration of knowledge and behavior regulation. Figure 1 illustrates the conceptual, theoretical, and empirical (C-T-E) linkages for the Self-Determination Theory showing how each of the psychological needs will be measured.

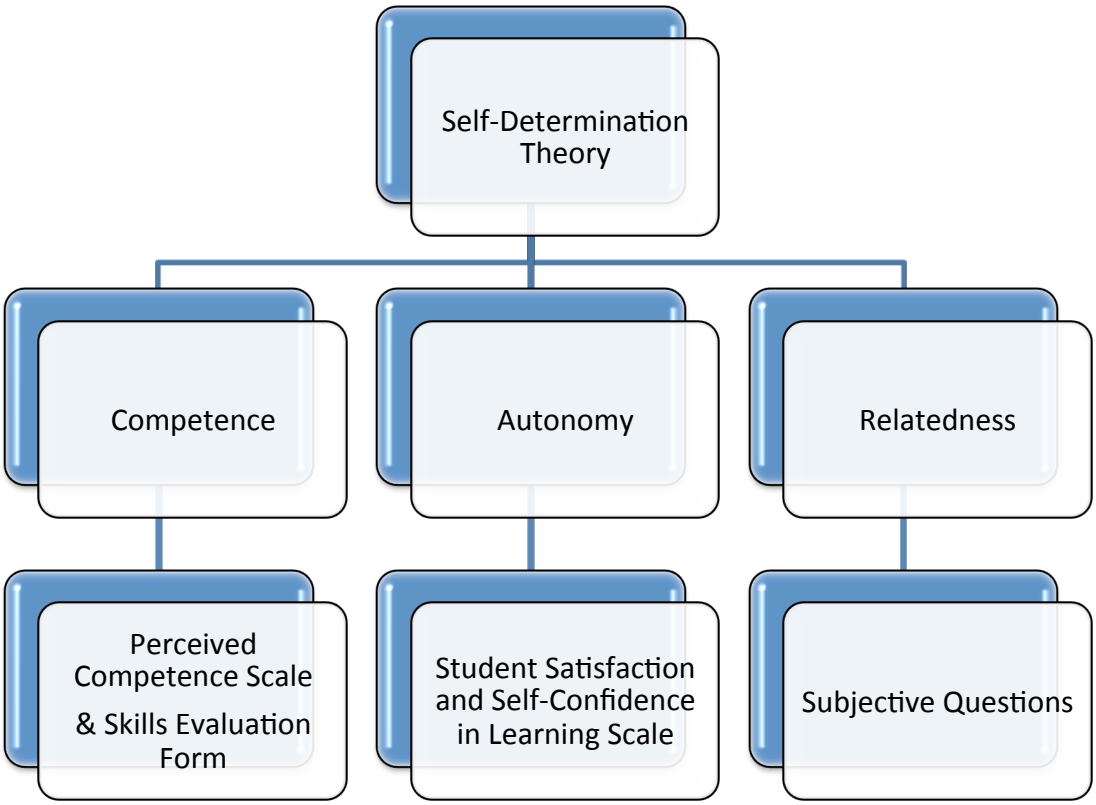

Figure 1. Theoretical, Conceptual, Empirical Chart: Self-Determination Theory

Summary

There are multiple strategies that have been proven effective in teaching new skills to nursing students. Best practice is to use a blended model, with more than one instructional method. One common blended approach supported in the literature is the combination of e-learning and EAL. One example of this type of blended instruction would be having students complete an online module prior to a traditional lecture class. The Self-Determination Theory outlines the three psychological needs of the learner and the importance of meeting those needs to maximize learning. The blended approach of e-learning and EAL does not foster a sense of belonging (relatedness) or give the learner control over their own learning (autonomy) which could affect skill competency. The

addition of m-learning and peer learning to the instructional method could lead to increased learner competence, autonomy and relatedness, leaving learners more self-determined.

CHAPTER III

Project Description

Nursing students are under a tremendous amount of stress to demonstrate competency with newly learned psychomotor skills. This project was designed to increase nursing skill competency and improve the learner's experience through the use of innovative technology and creative instruction. The project description will explain key parts of the capstone such as the design, the measurement tools used to determine the effectiveness of the intervention, and the data analysis.

Setting

This project took place at a private, pre-licensure nursing school in the southeastern region of the United States. It is a diploma program with a concept-based curriculum four semesters in length, after prerequisite courses are complete. The skills lab setting is an eight bed simulated nursing unit with mannequins located in each bed.

Sample

A convenience sample of 31 pre-licensure nursing students in a medical-surgical nursing course participated in this project. The students had never participated in a nursing school skills evaluation. Data on prior experience with urinary catheterization was not collected, it was not an exclusion criteria. To maximize faculty-student ratio in the skills lab setting, each clinical group of approximately eight students is subdivided into two lab groups (group B1 and group B2) that meet at separate times. This provided an approximate ratio of four students to each faculty member. Faculty taught each skills lab twice to their own clinical group, divided evenly into groups B1 and B2. The group assignment was not random; faculty used objective data such as grades and previous

patient-care experience, along with subjective data such as personality characteristics described by previous instructors, to divide students, with the goal of monochromatic grouping.

Design

This project had a quasi-experimental design, implementing a blended model for instructing nursing students. Two groups (B1 and B2) were compared; one with standard instruction and the other with standard instruction plus the use of a peer video (PAL) accessible using mobile technology (m-learning) during the practice lab. Both groups were given access to the mobile peer video for the following week leading up the skill evaluation. The failure rate for skill evaluation from the previous semester cohort (group A) was used for comparing the failure rate of group B1 and compared to the failure rate of group B2. Additional measures of perceived competency, confidence, and learner satisfaction were measured and compared between groups.

Implementation

Thirty-one nursing students from a small, private diploma nursing school in the southeastern United States participated in this project. All students were enrolled full-time in the second of four semesters in nursing program. Two weeks prior to the skills practice lab, students were provided lab guidelines with preparatory directives. This included the skills checklist with step-by-step instructions for the urinary catheterization procedure (male and female) with key mandatory safety steps in bold print. They were also given access to an e-learning online module which included a video demonstration of a urinary catheterization being performed on an actor (Mosby's Nursing Skills, 2012). Students were able to access the module with full audiovisual privileges while using

campus desktop computers. If they accessed the module from a remote computer, often the connection was unsuccessful, or the audio portion of the file would not play, resulting in video with no sound.

Students were divided into two groups, group B1 was asked to complete the Perceived Competency Scale (PCS) at the beginning of the skills practice lab. This group of students received the same learning resources as the previous semester (group A), e-learning prior to the lab and expert assisted learning (EAL) during the lab. After the lab, they were asked to complete a post-lab PCS and the Student Satisfaction and Self-Confidence in Learning Questionnaire (SSCL).

Group B2 was notified one week prior to the lab by email to bring a mobile device to lab and if students did not have one, an iPad from the library would be provided for them. Group B2 completed the PCS at the beginning of the skills practice lab and received the same learning resources, e-learning and EAL, plus an instructional peer video (PAL) from a mobile device (m-learning) during lab. The peer video was approximately eight minutes long, depicting a peer from the school demonstrating the proper steps of a urinary catheterization. Group B2 had access to the video for the duration of the skills practice lab. At the end of lab, group B2 completed a post-lab PCS and SSCL. The following comparisons were made:

- Pre and post PCS scores in group B1
- Pre and post PCS scores in group B2
- Post group B1 PCS scores compared to post group B2 PCS scores
- Post group B1 SSLC scores compared to post group B2 SSLC scores

After both groups completed the lab, access to the peer video was given to all students (group B1 and group B2) to serve as a model or resource for practicing the skill. In order to make the video accessible to all students, notification with a link to the video was sent via email to group B1 after their lab.

Approximately one week later, both groups returned for the skill evaluation. At the time of skills evaluation, students were asked to respond to two open-ended questions regarding their opinion on the use of PAL and m-learning. Instructors evaluated each student individually, using the skills checklist as a guide to critique their skill performance. Failure was defined as the omission of a safety step (bolded items on the checklist) or an unsafe maneuver without student acknowledgement. The following comparisons were made:

- Percentage of failures in group B1 compared to semester A's percentage (15%)
- Percentage of failures in group B2 compared to semester A's percentage (15%)
- Percentage of failures in group B1 will be compared to percentage in group B2

The population, intervention, comparison, and outcome (PICO) format is used to explain the project (Melnyk & Fineout-Overholt, 2010).

(P)	Problem	Persistent failures with skills evaluation and stress
(I)	Intervention	Addition of mobile peer video in skills practice lab
(C)	Comparison	Standard education in skills practice lab
(O)	Outcome	Fewer failures, higher satisfaction, higher confidence, improved perceived competence and actual competency

Planning

Second-year nursing students were recruited to make a peer video of a proficient urinary catheterization (male, female, and removal) skills check-off. The peer actor was instructed to use the skills evaluation tool as a guide when making the video. Faculty at the site as well as faculty at the University reviewed the video for content accuracy and quality. The skills evaluation tool was reviewed and minor revisions were approved by the course. These revisions included simplifying the procedural wording and bolding key safety steps for consistency in evaluation (omission or error without correction would result in failure). The project leader met separately with the faculty of the course, the site curriculum committee, and the director of the program prior to implementing the project.

Protection of Human Subjects

Prior to implementing this Capstone project, Institutional Review Board (IRB) approval was obtained from both the University and the project site. Since this was the introduction of a new teaching strategy, students were asked, but not required, to complete the questionnaires and/or view the peer video. Confidentiality of the students was maintained during the administration of the questionnaires, and no student names were written on project source documents. All completed questionnaires were collected and sealed in an envelope in an area separate from the project leader. Data will be maintained by the University for 10 years.

The project leader is a member of the faculty at the site and teaches in the course participating in this project. In an effort to reduce influence, the project leader did not participate in the instruction or evaluation of participants on urinary catheterization (male, female, and removal).

Instruments

Perceived Competence Scale

Perceived competence is one's feelings of competence when engaging in a particular behavior or domain being studied (Williams & Deci, 1996). The Perceived Competency Scale (PCS) was developed to measure perceptions of competence in relation to a particular behavior on a seven-point Likert scale (See Appendix A) (Deci & Ryan, 1985). The PCS can be modified to answer specific questions in a variety of disciplines. The alpha measure of internal consistency for the perceived competence items has been demonstrated to be greater than 0.80 (Williams & Deci, 1998). For this project, the PCS was used to measure perceived competence of nursing students both before and after the skills lab where groups either received the standard instruction (e-learning and EAL) or the intervention (e-learning, EAL, PAL, and m-learning). Permission was obtained to use and modify the tool for this project (See Appendix B).

Student Satisfaction and Self-Confidence in Learning Scale

The National League for Nursing (NLN) developed the SSCL in 2006. It is a 13-item instrument (range of 13-65) that includes two sub-tests scored on a five point-Likert scale (See Appendix C). When the term "simulation" is used in the tool, it is referring to the urinary catheterization lab. The satisfaction subscale consists of five items asking about teaching method effectiveness, the variety of activities, if the experience was motivating and if the presentation of the content was suitable (range 5-25). These relate back to the project question of whether or not students who receive the mobile peer video will have a higher satisfaction with learning. The self-confidence subscale of the SSCL consists of seven items asking about learner confidence in areas such as content mastery,

skill development, and task performance (range 8-40). This portion of the tool answers the project question about measuring the change in self-confidence. Jeffries and Rizzolo (2006) reported reliability of the scale using Cronbach's alpha to be 0.94 for satisfaction and 0.87 for self-confidence. Fountain and Alfred (2009) also found the tool to be reliable; Cronbach's alphas were 0.91 for satisfaction and 0.84 for self-confidence. Permission was received from the NLN to use the scale (See Appendix D).

Open-ended Subjective Questions

In order to learn about student perceptions on using mobile peer videos as a resource for learning skills, project-specific questions were developed. The following subjective questions were asked of all students at the end of the project, when students returned for the evaluation of skill competency:

- How did having a peer demonstrate the skill on the video impact your learning?
- How did having the video accessible on a mobile device impact your learning?

It is anticipated that answers to these questions would provide insight into the student experience with the blended effects of combining peer-assisted learning and mobile learning. The perception of how the learning resources affected students' opinion of the learning process could be meaningful information for the future, when implementing this blended approach to teaching nursing skills.

Data Collection

Students attended the urinary catheterization lab in their regularly assigned sections, divided into two approximately even groups by the course coordinator at the beginning of the semester. The first group (B1) attended the first lab, while the second group attended the second lab (B2). The labs occurred consecutively, without overlap.

The project leader gave students paper copies of the questionnaires to complete and students were told to fill them out anonymously. They were informed that completion of the questionnaires were optional, and were asked to turn them in facedown in an area separate from the project leader and placed in a sealed envelope. It was explained that their responses would be kept confidential. Both student groups (B1 and B2) completed a pre and post-PCS measuring their perceived competence as well as a post- SSCL rating that measured their satisfaction with the learning and self-confidence. After the students in B1 completed the practice lab, the video was shared with all of the students through an emailed link. Students were encouraged to practice with the video before returning for skills evaluation. They maintained continuous access to the video online and it could be accessed with their mobile devices for the entire week leading up to skills evaluation (Table 1).

Table 1

Schedule of Project Events

Timeframe	Group B1	Group B2
Skills practice lab	Pre PCS Intervention: Mosby module (e-learning) Instructor demo (EAL)	Pre PCS Intervention: Mosby module (e-learning) Instructor demo (EAL) + *Peer video (PAL)* + *mobile device (m-learning)*
	Post PCS Post SSLC	Post PCS Post SSLC
After lab	All students access *Peer video (PAL) + mobile device (m-learning)*	
Evaluation *(One week later)*	% Failures 2 Open-Ended Questions	

One week later, faculty evaluated the performance of all students using the Skills Evaluation Form (See Appendix E). Students received either a pass or fail for the evaluation and failure rates were to be compared to semester A. Written open-ended subjective questions were asked of all students upon arrival to their skills evaluation appointment and collected prior to skills evaluation.

Data Analysis

Descriptive statistics were calculated for all variables. The data were divided into two groups by teaching method. The primary analysis compared the two groups on change in PCS score (i.e., posttest minus pretest score) and on SSLC posttest score using the Wilcoxon rank sum ("WRS") test. A secondary analysis compared the two groups on failure rate in the skills check-off evaluation using Fisher's exact test. Finally, the PCS

pretest score and posttest score were compared in each group separately using the Wilcoxon signed rank ("WSR") test. Nonparametric statistical methods (i.e., the WRS test and WSR test) were used because the survey data were ordinal and not normally distributed. SAS® Enterprise Guide® 6.1 was used for all analyses. Each p-value in the primary analysis was Bonferroni-corrected for multiple comparisons by multiplying it by two (i.e., the number of comparisons in the primary analysis). For all other analyses, a p-value of 0.05 was considered statistically significant.

To assess baseline differences between groups B1 and B2, they were compared on pre-session scores of the PCS. The primary analysis was comparisons of post-session PCS and SSLC scores between B1 and B2. In addition, pre-session PCS was compared to post-session PCS for B1 and B2 using the Wilcoxon signed rank test. Data from the SSLC subgroups of satisfaction and learner confidence was assessed. To compare the percentage of failures at skills evaluation between the previous semester (A) and each of the current semester subgroups B1 and B2, and between B1 and B2, the Fisher's exact test was employed. Content analysis was used to identify themes from the subjective questions.

Timeline

The project was reviewed by the site curriculum committee in September of 2014. The video was filmed in October 2014 with revisions made in December of 2014. The site IRB determined the project as an exempt review and the University IRB approved the project in December. The project data collection took place in January of 2015 and analysis was complete in February of 2015.

Limitations

One limitation of the project is the use of a small, convenience sample. The homogeneous sample consisted mostly of young white females with not much diversity within the groups. The project leader is an instructor in the course that the participating nursing students were enrolled. The utilization of one academic setting is limiting, it would be ideal to conduct the project as a multi-site project.

For both groups, the post-PCS was given first and then the SSLC. In order to minimize order effects, counterbalancing the administration of the questionnaires would have been optimal. It would have been optimal for some students to receive the post-PCS first while others got the SSLC first. This limitation could have potentially influenced the responses.

When group B2 arrived to lab, the project coordinator verified that all students had a mobile device (they would otherwise be provided one). As part of the explanation of the project when group B2 was asked to complete the pre-PCS, they were told they would be using their mobile device to access a video of a peer performing the skill during lab. Anticipation of the additional learning resource, even without having interacted with it, could have inflated the baseline PCS item number two, "I feel capable of learning how to insert a urinary catheter safely using the provided learning resources".

Summary

This project examined the utilization of innovative instructional methods for skill acquisition. It was designed to examine the impact of using a peer-taught instructional video on a mobile device to teach urinary catheterization. The results may help future educators integrate innovative instruction and technology into nursing education.

CHAPTER IV

Results

The purpose of this project was to compare a novel learning strategy to standard practice in instructional methodology on the measures of self-confidence, satisfaction, and perceived and actual competence of student nurses learning to perform the skill of male and female urinary catheterization and catheter removal. The novel learning strategy included the addition of a mobile instructional video of a peer performing a urinary catheterization skills evaluation proficiently.

Sample Characteristics

Demographic data of the class was collected and grouped according to the teaching method received: B1 had traditional lab instruction and B2 had traditional lab instruction plus the use of the PAL and m-learning. The overall sample consisted of mostly white females, between 18 and 35 years of age (Table 2). The groups were similar demographically.

Table 2

Student Frequency Distribution of Demographic Variables

Demographics	Group B1 % (*n=15*)	Group B2 % (*n=16*)
Gender		
Male	26.7% (4)	6.2% (1)
Female	73.3% (11)	93.8% (15)
Ethnicity		
White	93.0% (14)	87.5% (14)
Black	0	12.5% (2)
Hispanic	7.0% (1)	0
Age		
18-25	60% (9)	50% (8)
26-35	40% (6)	25% (4)
>35	0	25% (4)

Major Findings

This project implemented a blended model for instructing nursing students on skill acquisition. Two groups (B1 and B2) were compared, B1 had traditional lab instruction and B2 had traditional lab instruction plus the use of PAL and m-learning. The pretest and posttest PCS scores were compared in each group separately and the means were compared. The project questions were answered using data from the PCS scores, the SSCL posttest scores, and the subjective question responses.

Project Question: Perceived Competence

Compared to students not receiving the peer video intervention, did those receiving the peer video intervention have higher perceived competence? The post PCS mean scores for B1 and B2 were not s significantly different (p = .480) (Table 3). The PCS pretest score was not significantly different between group B1 (mean = 19.4, s.d. = 2.9) and group B2 (mean = 21.6, s.d. = 2.8) (p = 0.058, WRS test) (Tables 4 and 5). The PCS score, on average, increased from pretest to posttest by 5.9 for group B1 and 3.9 for group B2 (Table 6). The PCS posttest score was significantly higher than the PCS pretest score for group B1 (p < .0001, WSR test). The PCS posttest score was significantly higher than the PCS pretest score for group B2 (p < .0001, WSR test). The change in PCS score was significantly different between groups (p = .025, WRS test) (Table 6).

Comparing individual statements, only one PCS statement had a significant difference in mean values between groups (Table 7 and 8). The statement, "I now feel capable of learning this skill using the provided resources" had a significantly lower mean pre PCS score for B1 (5.3) than B2 (6.1) (p = .008), but post PCS scores were similar (B1 = 6.5, B2 = 6.8) (p = .224). One explanation for the higher baseline B2 scores about the resources is that the project was explained prior to the lab and the group knew they would be watching a mobile peer video in their lab when they completed the pre PCS. This anticipation could have inflated the baseline score for this statement.

Table 3

Mean PCS Scores with Standard Deviations, and p-Values

Variables	B1 (*n*=15)		B2 (*n*-16)		Sig.
	M	*SD*	*M*	*SD*	*p-value*
Pre-PCS	19.4	2.85	21.63	2.78	.058
Post-PCS	25.27	1.71	25.56	1.9	.480

Table 4

PCS and SSLC Statistics for group B1 (N=15)

Variable	Mean	Standard deviation
PCS pretest score	19.4	2.9
PCS posttest score	25.3	1.7
SSLC posttest score	58.3	12.4

Table 5

PCS and SSLC Statistics for Group B2 (N=16)

Variable	Mean	Standard deviation
PCS pretest score	21.6	2.8
PCS posttest score	25.6	1.9
SSLC posttest score	61.8	4.9

Table 6

Group Comparisons on PCS Score Change (Post Minus Pre) and NLN Posttest Score

Variable	Group B1 mean (s.d.) (n=15)	Group B2 mean (s.d.) (n=16)	p-value*
PCS score change (post minus pre)	5.9 (2.1)	3.9 (2.0)	0.025
SSLC posttest score	58.3 (12.4)	61.8 (4.9)	0.970

*P-values are Bonferroni-corrected by multiplying them by 2.

Table 7

Pretest PCS Means and Standard Deviations

	Group B1		Group B2		Sig.
	M	*SD*	*M*	*SD*	
I feel confident in my ability to learn to perform the steps of this skill from memory.	4.4	1.2	5.0	1.2	.184
I now feel capable of learning this skill using the provided learning resources.	5.3	0.7	6.1	0.7	.008
I am able to maintain a sterile field while performing patient procedures.	5.5	0.7	5.5	1.0	1.00
I feel able to meet the challenge of demonstrating competency on my first attempt at skills evaluation	4.1	1.4	5.1	1.2	.085

Table 8

Posttest PCS Means and Standard Deviations

	Group B1		Group B2		Sig.
	M	*SD*	*M*	*SD*	
I feel confident in my ability to learn to perform the steps of this skill from memory.	6.4	0.5	6.4	0.5	.853
I now feel capable of learning this skill using the provided learning resources.	6.5	0.5	6.8	0.5	.224
I am able to maintain a sterile field while performing patient procedures.	6.1	0.6	6.2	0.7	.823
I feel able to meet the challenge of demonstrating competency on my first attempt at skills evaluation	6.2	0.8	6.2	0.8	1.00

Project Question: SSLC scores

Compared to students not receiving the peer video intervention, did those receiving the peer video intervention have higher self-confidence and/or higher satisfaction? The SSLC posttest score was not significantly different between groups B1 (mean = 58.3, s.d. = 12.4) and B2 (mean = 61.8, s.d. = 4.9) (p = 0.970, WRS test) (Table 6). The mean scores for both groups B1 and B2 on the sub-tests for satisfaction and confidence were not statistically different either (p = .536, .271).

Table 9

SSLC Scores with Means, Standard Deviations, and P-Values

Variables	B1 (*n*=15)		B2 (*n*-16)		Sig.
	M	*SD*	*M*	*SD*	*p-value*
SSLC Satisfaction Sub-test	23.0	4.9	23.6	1.7	.536
SSLC Confidence Sub-test	35.3	7.5	37.2	3.1	.271

Project Question: Higher Competence

Compared to students not receiving the peer video intervention, did those receiving the peer video intervention have higher competence? The percentage of failures was 13.3% for group B1 and 6.3% for group B2. The difference in these percentages was not statistically significant (p = 0.600, Fisher's exact test). However, the percentages of failures were reduced from 15.5% in semester A to 9.7% in semester B with the peer video intervention, resulting in less time needed for remediation and skill re-evaluation.

Table 10

Frequency Distribution of Skills Evaluation Results

Semester A (*n*=33)		Group B1 (*n=15*)	Group B2 (*n=16*)
Failed	15.2% (5)	13.3% (2)	6.3% (1)
Passed	84.8% (28)	86.7% (13)	93.8% (15)

Project Question: Perceived confidence

Compared to students not receiving the peer video intervention, did those receiving the peer video intervention a have higher change in perceived confidence? There was no significant difference found between the mean pre PCS confidence scores in groups B1 and B2 (p = .184) or in the mean post PCS confidence scores (p = .853) (Table 11). Post PCS scores for the statement "I feel confident in my ability to learn to perform the steps of this skill from memory" had the exact the same mean score for group B1 as group B2 (6.4). Confidence levels were affected similarly in each group by the practice lab, regardless of the learning resources.

Table 11

Confidence Statement Response Means and Standard Deviations

	B1 (n=15)		B2 (n-16)		Sig.
	M	*SD*	*M*	*SD*	*p-value*
Pre PCS Confidence Score	4.4	1.2	5.0	1.2	.184
Post Confidence Score	6.4	0.5	6.4	0.5	.853

Subjective Questions

Students from both groups B1 and B2 had access to the videos for the week after the practice lab, leading up to the skill evaluation. At the skill evaluation, students were asked to complete responses to two subjective questions. When asked about the experience with mobile technology and peer learning to gain mastery of the skill of urinary catheterization, students responded overwhelmingly favorable. There was a 100% response rate of feedback on subjective questions.

How did having a peer demonstrate the skill on the video impact learning?

Students felt overall that having a peer teaching the material created an environment of comfort. The checklist-like script facilitated students' ability to acclimate to the role of the student nurse during skills evaluation. Students wrote about how helpful it was to gain familiarity with what behaviors are expected during a skills evaluation (Table 12). One student said, "Having an upper-level student perform the skill exactly as I was supposed to perform it, with my same equipment, in my uniform, following my checklist, was extremely helpful." Another student said, "If she can do it, I can do it" and it "motivated me knowing that one of my peers had mastered it, making it easier to see myself mastering it."

Table 12

Theme Frequency of Subjective Question #1

Common Themes	Frequency
Clear expectations for evaluation	10
Peer role modeling	8
Anxiety decreased	3
Familiarity with the skill	3

How did having the video accessible on a mobile device impact your learning?

One student said, "I had on-demand viewing for exactly what I needed to know." Another student said, "I practiced more because I could access it from anywhere, at any time."

Evidence of these common themes was not surprising, as these are reflective of what is found in the m-learning literature. Students liked being able to rewind and repeat steps on their mobile device while practicing virtually anywhere (Table 13).

Table 13

Theme Frequency of Subjective Question #2

Common Themes	Frequency
Mobility	15
Flexibility	14
Consistency	6
Repetition	4

Two students expressed an interest in having all of the required skills for the course available by mobile peer video. There were no negative comments; however, two students did not watch the video, one watched it, but not on a mobile device, and two students preferred interactive learning to e-learning. Another student wondered if it was actually the peer in the video that made a difference, or if just having access to any video of the skill on their mobile device would have been equally as helpful.

Theoretical Concepts

Utilizing a peer video on a mobile device to teach an essential skill to nursing students operationalized the Self-Determination Theory. To optimize learning the three psychological needs that must be met, according to Deci and Ryan (1985), are competence, autonomy, and relatedness. Competence was measured through the PCS and the skill evaluation form. Autonomy was demonstrated through mobile learning, where students are able to view the video of the skill anywhere and at any time, giving

themselves autonomy over their learning. This was measured using the SSLC. Relatedness was demonstrated through the use of peer-assisted learning helping them relate to the student role and know the expectations. Subjective questions confirmed all three psychological needs were met in the blended method of instruction. Students commented that the video helped in preparation for skills evaluation by showing exactly what was needed to be known (competency). Students commented favorably on having the ability to watch the video without restriction of time and place and that it was helpful and increased the likelihood for skill practice (autonomy). Students also appreciated having a peer role model the expected behaviors of what a successful skills evaluation would be like (relatedness), stating that it made the content less intimidating and decreased their anxiety.

Summary

This capstone project examined the use of a peer-led instructional video on a mobile device in addition to standard instruction in the lab to support urinary catheterization skill acquisition. The groups did not differ after the lab in perceived competence, confidence, or satisfaction. However, when given a week to practice with the mobile peer teaching videos, students performed similarly on their skills evaluation and overwhelmingly preferred this method of learning.

CHAPTER V

Discussion

Nursing students are faced with having to learn a vast amount of knowledge and skills during their nursing program. Technology continues to grow and many students may require and expect different methods to accommodate their learning needs (Vogt et al., 2010). The use of mobile technology, beyond the use of peer videos to learn new skills, can and should be used by nurse educators to facilitate instruction.

This technology may be expanded into other areas of the nursing curriculum. In addition to being used to teach new skills in the lab, peer teaching videos available through mobile technology, could be used to orient students to nursing school, to introduce students to on-campus groups, or provide a mock simulation for students in their first semester. Any point of contact where a peer could potentially ease anxiety, share insight, or role model positive behaviors this blended instructional method would be of use.

Implication of Findings

The purpose of this project was to apply best practices in instructional methodology to maximize self-confidence, satisfaction, and perceived and actual competence of student nurses learning to perform the insertion of a male and female urinary catheterization and the removal of a urinary catheter. This project added two instructional strategies (peer learning and mobile learning) to the already blended approach (e-learning and expert assisted learning) through the use of a peer video on a mobile device in the nursing skills lab. Although learning outcomes between the two groups were equal (no significant difference in PCS or SSLC scores), students were

overwhelmingly more satisfied with the addition of the mobile peer video. The results of this project mirrored the literature; blended instruction is best practice in teaching new skill acquisition. Educators should consider higher satisfaction of the learner as an important factor when comparing strategies and begin to integrate innovative teaching methods into curricula to meet the needs of today's student nurses.

Application of Theoretical Framework

According to The Self Determination Theory, motivation is centered on three basic needs of competence, autonomy, and relatedness. The interventional instructional methodology, utilizing a peer video on a mobile device to teach skills, supports the student's ability to achieve these goals. Autonomy was demonstrated by students being able to customize their learning with the added flexibility and portability of m-learning. This was evident in the student subjective comments, with an overwhelming majority of students commenting on flexibility and portability as positive outcomes from PAL and m-learning. Competence was measured through the skills evaluation (fewer overall failures in group B). Relatedness was evident in the subjective questions with eight students commenting that they liked the opportunity to have a role model perform the skill.

Implications for Nursing

Nursing is a practice-based discipline and the proficient performance of nursing skills is essential in providing competent, safe patient care (Öztürk & Dinç, 2014). Developing basic psychomotor skills is a significant part of the nursing curricula and is often a stressful experience for students. Potential benefits of mobile peer teaching in nursing schools included decreased performance anxiety at skills evaluation and

increased self-efficacy (Brannagan et al., 2013). This type of innovative instruction could improve student outcomes, reduce faculty workload, maintain cost neutrality, and answer the call for innovation in nursing education.

Professional development may be needed for some nursing faculty in order to seamlessly integrate innovative technology into their teaching strategy. Differences in technology comfort levels in faculty must be considered when adopting m-learning. Also, developing a skills video may require additional resources and time, it is important to have the full support of academic leadership.

Recommendations

Peer instruction on mobile technology could be used in other areas of nursing education. When it is used, the focus should be on convenient access to learning dexterous skills. An example of this could be the use of a mobile peer video during a simulation to remediate skills in the moment. Students could be given a "time out" to practice and return to repeat that part of the procedure and then continue to move through the scenario. Another way to use this technology is to have senior nursing students create unfolding case studies for underclassmen that are shared by video clips (adding more assessment data with each "patient interaction") and have a pre-recorded debriefing. Future studies are needed to determine the greater impact of the use of peer video via a mobile device in other content areas and with students in other disciplines. Studies with larger sample sizes and over longer periods of time would provide more evidence of the effectiveness of different types of blended instruction.

Conclusions

In order to meet the needs of today's technologically savvy learner, educators need to try innovative strategies. With the increased access to technological resources on mobile devices, nursing schools should integrate this technology into the curriculum. There would not be a cost associated with this, as most students have at least one mobile device with them at all times.

Mobile peer instructional videos allow students the benefit of portability, flexibility, and content accuracy to guide their skill practice. A peer video was perceived as a useful supplemental learning tool to both nursing B groups. Although there was no statistically significant difference in the failure rates among semesters A and B, the overall percentage of failures was lower in the B group. Students who used m-learning and PAL perceived themselves as more competent after the lab experience. Future utilization of videos should be studied with respect to nursing education. Using a peer-led instructional video via a mobile device has the potential to modernize learning in the skills lab while elevating student motivation and engagement.

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APPENDIX A

Original and Modified Perceived Competence Scale

Original Perceived Competence Scale Root Statements:

1. I feel confident in my ability to…
2. I now feel capable of…
3. I am able to…
4. I am able to meet the challenge of…

Modified Perceived Competence Scale Statements:

1. I feel confident in my ability to commit the procedural steps of the urinary catheterization to memory.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Disagree Somewhat	Undecided	Agree Somewhat	Agree	Strongly Agree

2. I feel capable of learning how to insert a urinary catheter safely using the provided learning resources.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Disagree Somewhat	Undecided	Agree Somewhat	Agree	Strongly Agree

3. I am able to maintain a sterile field while performing patient procedures.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Disagree Somewhat	Undecided	Agree Somewhat	Agree	Strongly Agree

4. I am able to meet the challenge of demonstrating competency on my first attempt at skills check-off for the urinary catheterization.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Disagree Somewhat	Undecided	Agree Somewhat	Agree	Strongly Agree

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APPENDIX B

Permission to Use the Perceived Competence Scale

Deci, Edward <deci@psych.rochester.edu>
Sun 8/3/2014 9:38 PM
To: Elizabeth H. Carver;

You have our permission to use the PCS-A, and you may put it in digital format.

Ed Deci

Elizabeth H. Carver
Sun 8/3/2014 7:59 PM
Sent Items

Dr. Deci,
I am a doctor of nursing practice (DNP) student at Gardner-Webb University. I would like to use the Perceived Competence Scale (PCS-A) in my project evaluating instructional methods for nursing students in the skills lab. May I have your permission to use the instrument, with a scale (Range: 1=strongly disagree to 7= strongly agree) for quantifying responses?

Also, if needed, may I type the tool into an electronic format for ease of tool administration?

Thank you in advance for your consideration,

Libby Carver, MSN, RN, CNE

APPENDIX C

Student Satisfaction and Self-Confidence in Learning

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your simulation activity. Each item represents a statement about your attitude toward your satisfaction with learning and self-confidence in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually. Mark:

1 = STRONGLY DISAGREE with the statement
2 = DISAGREE with the statement
3 = UNDECIDED - you neither agree or disagree with the statement
4 = AGREE with the statement
5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	**SD**	**D**	**UN**	**A**	**SA**
1. The teaching methods used in this simulation* were helpful and effective.	1	2	3	4	5
2. The simulation* provided me with a variety of learning materials and activities to promote my learning.	1	2	3	4	5
3. I enjoyed how the content was taught during the simulation*.	1	2	3	4	5
4. The teaching materials used in this simulation* were motivating and helped me to learn.	1	2	3	4	5
5. The way the content was presented to me in the simulation* was suitable to the way I learn.	1	2	3	4	5
Self-Confidence in Learning	**SD**	**D**	**UN**	**A**	**SA**
6. I am confident that I am mastering the content of the simulation* activity that was presented to me.	1	2	3	4	5
7. I am confident that this simulation* covered critical content necessary for the mastery of this skill.	1	2	3	4	5
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation* to perform necessary tasks in a clinical setting.	1	2	3	4	5
9. My instructors used helpful resources to teach the simulation*.	1	2	3	4	5
10. It is my responsibility as the student to learn what I need to know from this simulation* activity.	1	2	3	4	5
11. I know how to get help when I do not understand the concepts covered in the simulation*.	1	2	3	4	5
12. I know how to use simulation* activities to learn critical aspects of these skills.	1	2	3	4	5
13. It is the instructor's responsibility to tell me what I need to learn of the simulation content during the activity.	1	2	3	4	5

*The term “simulation” is defined as urinary catheterization skills lab

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APPENDIX D

Permission to Use the Student Satisfaction and Self-Confidence in Learning Scale

Amy McGuire <amcguire@nln.org>

Fri 10/31/2014 9:22 AM

Dear Libby,

Thank you for your request.

It is my pleasure to grant you permission to use the "Student Satisfaction and Self-Confidence in Learning" NLN/Laerdal Research Tool.

In granting permission to use the instrument, it is understood that the following caveats will be respected:

1. It is the sole responsibility of (you) the researcher to determine whether the NLN questionnaire is appropriate to her or his particular study.

2. Modifications to a survey may affect the reliability and/or validity of results. Any modifications made to a survey are the sole responsibility of the researcher.

3. When published or printed, any research findings produced using an NLN survey must be properly cited. If the content of the NLN survey was modified in any way, this must also be clearly indicated in the text, footnotes and endnotes of all materials where findings are published or printed.

I am pleased that material developed by the National League for Nursing is seen as valuable and that we are able to grant you permission to use the "Student Satisfaction and Self-Confidence in Learning" instrument for your study.

Regards, Amy

Amy McGuire | Administrative Coordinator, NLN Chamberlain Center |National League for Nursing | www.nln.org|

amcguire@nln.org| Tel: 202-909-2509 | The Watergate | 2600 Virginia Avenue NW, 8th Fl, Washington, DC 20037

APPENDIX E

Skills Evaluation Form (Urinary Catheterization)

S = Satisfactory | **U** = Unsatisfactory

Insertion	S	U	Comments
Verified order	☐	☐	
Assessed for latex allergy	☐	☐	
Gathered supplies	☐	☐	
Performed hand hygiene	☐	☐	
Verified patient using 2 identifiers	☐	☐	
Provided privacy	☐	☐	
Raised bed to waist, lowered side rails	☐	☐	
Female: In dorsal recumbent position *Male: Supine with thighs abducted*	☐	☐	
Covered patient with a bath blanket	☐	☐	
Donned clean gloves	☐	☐	
Placed waterproof pad under patient	☐	☐	
Assessed anatomy	☐	☐	
Cleansed perineal area	☐	☐	
Performed hand hygiene	☐	☐	
Opened sterile kit without contamination (open first flap away)	☐	☐	
Placed waterproof drape	☐	☐	
Donned sterile gloves	☐	☐	
Applied the fenestrated drape as needed	☐	☐	
Secured prefilled syringe to port	☐	☐	
Lubricated approx. 5 cm catheter tip	☐	☐	

Poured antiseptic solution on cotton, or Lay swab sticks out on sterile field	☐	☐	
Visualized urethral meatus using non-dominant hand *(Male: Retract foreskin)*	☐	☐	
***Female*: Cleansed top to bottom. Far labial fold first, near fold, then over meatus** ***Male*: Circular motion from meatus down**	☐	☐	
Maintained stable hand placement on patient throughout procedure	☐	☐	
Inserted catheter into urethral meatus until urine is visualized	☐	☐	
Female: Advance catheter 2.5cm to 5cm **Male: Advance to bifurcation**	☐	☐	
Inflated the balloon with 10ml syringe	☐	☐	
Gently pulled catheter until resistance met	☐	☐	
Replaced foreskin (when applicable)	☐	☐	
Anchored catheter to patient's thigh	☐	☐	
Secured drainage bag below bladder level on stationary part of bed	☐	☐	
Discarded supplies, removed gloves	☐	☐	
Performed hand hygiene	☐	☐	
Assisted patient to comfortable position	☐	☐	
Lowered bed, and positioned rails	☐	☐	
Documented the procedure	☐	☐	