



## Effects of a skill demonstration video delivered by smartphone on facilitating nursing students' skill competencies and self-confidence: A randomized controlled trial study



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### ABSTRACT

**Background:** The correct and appropriate performance of nursing skills by students can ensure patient safety and care quality. However, developing appropriate teaching and learning strategies to enhance nursing students' nursing skills and knowledge are challenging tasks for nursing faculty members. Nowadays, smartphones are popular mobile devices that are used on campuses by students and could be considered a potential tool to deliver learning materials to nursing students.

**Objectives:** This study aimed to examine the effects of a skill demonstration video delivered by smartphone on facilitating nursing students' nursing skill competency and confidence.

**Design:** A randomized controlled trial study design was used.

**Settings and participants:** A convenience sample of nursing students at a university was recruited.

**Methods:** After receiving a regular nursing skills lab demonstration, pre-test data were collected from nursing students in an intervention group ( $n = 44$ ) and a comparison group ( $n = 43$ ). Then, students in the intervention group downloaded the skill demonstration video onto their smartphones, while the comparison group did not. Post-test data were collected at 2 weeks after the intervention.

**Results:** There were significant differences in students' urinary catheterization knowledge ( $F = 4.219, p = 0.04$ ) and skills ( $F = 6.739, p = 0.013$ ), but there was no difference in students' confidence level ( $F = 2.201, p = 0.142$ ) between the two groups after the intervention. Furthermore, the average score of the satisfaction level regarding the intervention was 4.46 (SD = 0.43) on a scale of 1–5.

**Conclusions:** This study found that delivering learning materials through smartphones to nursing students is suitable. Although there was no significant difference in students' self-confidence level, students' knowledge and skills were improved by the intervention. Smartphones can serve as a supplemental tool for learning nursing skills.

### 1. Introduction

One attribute of a “good nurse” recognized by patients is the possession of necessary professional knowledge and skills to care for them (Catlett and Lovan, 2011; Gastmans, 2012; Rchaidia et al., 2009). Having adequate knowledge and performing correct and appropriate nursing skills can ensure patient safety, and also increase students' self-confidence while providing care for patients (Wright et al., 2008). When nursing students have a higher level of self-confidence with their skills, they are more likely to identify these skills as important in nursing care and have a greater willingness to apply them (Clark et al.,

2004). Therefore, it is necessary for nursing students to have adequate knowledge and good skills training before commencing their clinical practicum not only for patient safety but also to build their own self-confidence and good relationships with patients. Identifying and developing proper teaching and learning strategies to enhance nursing students' nursing skills and knowledge are must-do challenges for nursing faculty members. Not only are the contents and structures of learning aids important, but also the flexibility and accessibility of the materials are essential to allow students to rehearse and review them at any time and place.

Learning materials through both auditory and visual modes is

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beneficial for teaching and learning based on Mayer's theory (Mayer, 2014). Using more than one sensory mode and stimulation, Mayer (2014) believed that learners' limited capacity might be expanded to some degree, and it might result in better learning outcomes. Therefore, a skills demonstration video is a good format for learning material, and actually it is very commonly used to learn nursing skills. In addition, videos can be consistent in terms of nursing skills compared to skills being taught by different instructors or teachers (Corbally, 2005). There are several ways to deliver a video and watch it, such as DVD players, computers, iPods, smartphones, etc.

iPods were released over a decade ago, and podcasts (a combination of the words "iPod" and "broadcasts"), digital audio or video files or recordings which can be downloaded from the Internet (Oxford English Dictionary, 2016), were once a trend in academic settings. Podcasting can provide an asynchronous learning channel and can be used in long-distance education. Students can download lecture podcasts or related podcasts and listen to or watch them at any time and place, even without an Internet connection. Several studies demonstrated positive satisfaction with podcasting among nursing students (Maag, 2006; Strickland et al., 2012; Vogt et al., 2010). In addition, one study found that there were no differences in nursing students' exam scores between traditional classroom teaching in a Child Health Clinical course and podcasting lectures through the voice-audio mode of the same course (Vogt et al., 2010). Greenfield's (2011) study revealed that six nursing students for whom English was a second language in a Medical-Surgical Nursing course significantly improved their exam scores after listening to the lecture again with an iPod using the voice-audio mode. Another study conducted by Maag (2006) found that 79% of nursing students who took a Medical-Surgical didactic course reported that listening to podcasts assisted their learning.

Through innovations of new technologies, smartphones and tablet PCs have gradually replaced iPods in teaching and learning (Strickland et al., 2012). Smartphones have obviously become a popular mobile device on campuses and can be a potential presentation medium for students' effective learning (Phillippi and Wyatt, 2011). Therefore, this study aimed to examine the effects of a skills demonstration video delivered by smartphones on facilitating nursing students' nursing skill competencies (knowledge and performance) and confidence. Three hypotheses were as follows: (1) students who access the skills demonstration video through their smartphone will have higher scores on female retention urinary catheterization knowledge than students who do not; (2) students who access the skills demonstration video through their smartphone will have higher scores on female retention urinary catheterization skills performance than students who do not; and (3) students who access the skills demonstration video through their smartphone will have more confidence performing female retention urinary catheterization than students who do not.

## 2. Methods

### 2.1. Research Design

A randomization controlled trial study design was used.

### 2.2. Research Setting and Samples

A convenience sample of nursing students at a university in northern Taiwan was invited to participate in this study. The inclusion criteria were students who: (1) were 20 years old or over; (2) had enrolled in the Fundamentals of Nursing Practicum course; (3) had their own personal smartphone onto which they could download learning materials; and (4) agreed to participate in this study. The exclusion criteria were students who withdrew from the Fundamentals of Nursing Practicum course or dropped out of school.

Ninety-five students met the inclusion criteria, but five students refused to participate. Ninety students were randomly assigned to the

intervention group and comparison group using a simple drawing, in which a number written on a slip of paper was assigned to each participant. Then the papers were drawn from a sealed box by one person who was not involved in this study, and the first, third, etc. slips drawn were assigned to the intervention group, while the second, fourth, etc. slips were assigned to the comparison group. During data collection, one student in the intervention group had technical problems watching the video via their smartphone, and two students in the comparison group did not complete the questionnaires. Therefore, ultimately, there were 44 students in the intervention group and 43 students in the comparison group. The post-hoc power was 0.99 and the effect size was 0.304 in the current study.

### 2.3. Learning Materials (Skill Demonstration Video)

The reason we selected retention urinary catheterization in the current study was that this skill requires knowledge of comprehensive theories and principles, and it is frequently performed in clinical settings. In a literature review paper, McNett (2012) summarized that the most frequent skills selected in past studies were blood pressure measurement, followed by retention urinary catheterization, intramuscular injection, and sterile dressing.

After reviewing three university affiliated hospitals' nursing skills standard operating procedure (SOP) booklets, nursing textbooks, and related literature, a step-by-step evidence-based SOP for urinary catheterization was developed by the researchers. The script of the demonstration video for catheterization was written by the researchers based on the SOP, and was revised based on comments from three experts. The contents of the demonstration video included a demonstration of the skills, simulated clinical settings and characters, scenarios, interactions of a physician, patient, and nurse, and patient education. The film was shot in the hospital in January 2014 by a professional filmmaker. After cutting, dubbing, and editing, the completed film was reviewed by three experts. Based on the experts' comments, some acts and scenes were changed. The final version of the recording file (MP4) was converted into a compatible file format (3GPP). Students could download the demonstration skill video to their smartphone with either the Android or iOS system and could watch the video at any time and place using their smartphone. The same film was also burned onto a DVD.

### 2.4. Instruments

The instruments included demographic information, a catheterization skills and knowledge quiz, a confidence scale, a skill performance evaluation for catheterization, and a satisfaction questionnaire. Demographic information included participants' age, gender, living status, months of using a mobile phone, working hours at part-time jobs, interest in being a nurse, and grade point average (GPA) score (1: < 60, 2: 60–69, 3: 70–79, 4: 80–89, 5: ≥ 90).

The 25-item catheterization skills and knowledge quiz included 10 true-false and 15 multiple-choice questions and was developed by researchers. Each item was scored 1 point for a correct answer and 0 for an incorrect answer. The score range was 0–25. A higher score indicated that participants had a greater grasp of catheterization skills and knowledge. The content validity of this tool was evaluated by seven experts including four faculty members who had experience teaching nursing skills in the lab, one head nurse, and two nurses in the hospital, and had an average content validity index (CVI) of 1.0. In addition, the test-retest reliability coefficient of the catheterization skills and knowledge quiz was acceptable ( $r = 0.7$ ) (Vaz et al., 2013).

A five-item confidence scale (C-scale) developed by Grundy (1993) was used to measure a student's confidence level related to a specific skills performance, and permission to use this tool was obtained. The C-scale was translated into Chinese by researchers following adaptation of Brislin's (1986) instrument translation guidelines by Jones et al. (2001).

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