ORIGINAL RESEARCH

Using students' smartphones to learn a nursing skill: Students' perspectives

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Received: July 4, 2018 **Accepted:** October 23, 2018 **Online Published:** January 1, 2019
DOI: 10.5430/jnep.v9n5p24 **URL:** https://doi.org/10.5430/jnep.v9n5p24

ABSTRACT

The increase in nursing students' enrollment in post-secondary education, hospital restructuring and limited clinical placements have shifted nurses' education to require more e-learning platforms. E-learning uses information and communication technologies to support interactions with content, learning activities and with others; and to facilitate self-reflection. Using smartphones' video applications in a hybrid course can support learning. Most nursing students own smartphones and use them to create videos, however, their perspectives on using their smartphones to support learning a nursing skill is limited. This mixed method pilot study explored undergraduate nursing students' perspectives on using their smartphones to record, and later receive feedback from their peers and faculty when learning a nursing skill. Twenty-six students completed questionnaires and seven students participated in a follow-up focus group. Two overarching themes emerged: (a) technical and (b) adaptive challenges. Students identified technical challenges in using their devices and how this influenced knowledge application. Others highlighted that the activity helped them to reflect and relate to self, others and their environments. The clinical, educational, ethical and research implications of this teaching-learning strategy will be discussed.

Key Words: Smartphones, Nursing student, Skill, Teaching, Learning

1. BACKGROUND AND LITERATURE REVIEW

Nursing students are required to perform individual, objective, and measurable tests to demonstrate their skill competencies. Additionally, they are required to learn how to relate and build relationships with others in ever-changing environments.[1] Yet the increase in nursing students' enrollment in post-secondary education, limited availability of clinical placements and advances in technology have shifted nurses' education to require more technology enhanced learning resources, including e-learning platform courses.[2–4] E-learning refers to the use of information and communication technologies for the development of knowledge and skills to support interactions with content, learning activities and with others;[5] and to facilitate self-reflection. In reference to undergraduate students and information technology, Dahlstrom[6] concluded that educators and institutions "need to balance strategic innovation [using technology] with solid pedagogical practices and to know students well enough to understand which innovations students value the most". Several authors highlight the value of reflection as a teaching tool to learn how to be attuned to self and others in ever-changing healthcare environments.[7–10] According to Caldwell and Grobbel[11] reflection is integral to learning and to the development of critical and autonomous nurses. Supporting students reflective practice is also associated with improved understanding of one's actions, stronger clinical and non-clinical skills, as well as improved patient care.[11,12]

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Over the last two decades mobile technology has increased in usage both in general education environments, and in healthcare institutions to support information management and clinical practice.[13] Smartphones which are palm pile (hand held) mobile phones with computerized functional capabilities (the ability to run software applications [apps]) can be used as e-learning tools. The video app of smartphones can be used without internet connectivity, and thus makes it more accessible and available to students and faculty. According to Statistics Canada[14] 94% of 15- to 34-year olds own a smartphone, and 77% reported that smartphone technology helped them to communicate with others. The challenge then is with more online interactions, how can faculty support students' learning and reflection abilities in an e-learning environment? Thus, the aim of this paper is to evaluate undergraduate nursing students' perspectives on using their smartphones' video apps to reflect on a nursing skill, in particular, the skill of *how to assess clients' readiness to learn*.

Nurses and other healthcare practitioners and patients have been using their smartphones in healthcare in diverse ways. For example, there are several studies reporting how personal digital assistants (PDAs) allow practitioners to handle point-of-care resources which helped to promote patient safety and improve clinical outcomes.[15–20] Clinicians use smartphone video apps to communicate, monitor and teach patients.[21] Drug resource apps, such as Epocrates and Lexi-Comp Online were the type most often listed as essential for advanced practice nurses.[22] Access to high-quality and readable websites such as uptodate.com have been linked to increased ability to provide patients with reliable information required for informed decision-making.[23] Aungst and Belliveau[24] outlined the benefits of mobile smart devices in facilitating interdisciplinary communication. Additionally, they identified that this technology can be used to guide the creation of curricular interprofessional activities.[24] Also, smartphone apps have been used in clinical practice as memory aids for children, adolescents and adults with brain injury rendering them more independent.[25–28]

In post-secondary education, the use of smartphone technology is increasing. While most undergraduate students own smartphones;[14] many are also comfortable using the technology.[29,30] George and DeCristofaro[31] discussed how smartphone apps with real time data can successfully engage nursing students with health assessment scenarios, foster the development of interview skills and enable students to utilize technology to support patient screening. For example, BMI and ePSS (electronic preventative services selector) apps were used by students to recommend specific screening based on patients' demographic information. Similarly, Raipaul and Acton[32] developed an extensive video app for a wound care continuing education course, which included content on risk assessment, management and prevention of pressure ulcers. Nurses reported that in using the app they could readily access information when needed, and it promoted knowledge retention.[32] The video recording feature of the smartphone is an emerging and cost-effective strategy to support students to learn and work collaboratively.[33,34] Therefore, it is important that they begin to become familiar with the varied and useful capabilities of the smartphone to support learning and clinical practice.

While, some studies highlight the value of students using the smartphone video app feature to learn psychomotor skills in nursing, midwifery and medicine.[34–39] Some faculties and managers resist the use of smartphones among nursing students in the classroom and during clinical practice, and further describe it as being addictive;[40] rude;[41] distracting;[42,43] creating a physically present but mentally absent user;[44] unprofessional, unethical and time-wasting.[45] However, other studies demonstrate that with appropriate technical and pedagogical support from faculty, the use of the smartphone in the classroom and as an e-learning tool not only improves students' engagement, but also prepares them for ever-changing technologies in delivering healthcare.[30,46,47]

2. METHOD

2.1 Description of the smartphone video recording assignment

Thirty-five third year undergraduate nursing students enrolled in a nursing elective hybrid course titled: Nurses as Teachers and Learners at a university in Canada were required to complete a smartphone video assignment. As a hybrid course 50% of the course was delivered online. In order to better engage and support students' reflection skills, the assignment was described in the form of a "recipe" (see Figure 1). During the first two weeks of the course students were introduced to readings and resources on different theories and concepts related to assessing clients' readiness to learn. Clients demonstrate readiness to learn when they are receptive, willing and able to actively participate in the teaching-learning process.[48] Before teaching can occur, educators need to assess for the four types of readiness to learn: physical, emotional, experiential and knowledge (PEEK) readiness.[48] This smartphone video activity was worth 20% of students' total grade in the course.

2.2 Design

A mixed method sequential explanatory pilot study with two data collection points was used which included a questionnaire followed by a focus group.[49] Paper-based question-

naires were distributed by the research assistant the last week of the course and included: a) demographic information, b) three open-ended questions about the smartphone video assignment, particularly, "what students found useful, what was not useful and for suggestions to improve the video assignment" and c) Likert scale questions where "0 = never, 1 = occasional, 2 = often, and 3 = always" to rank certain experiences, (for instance, "how comfortable do you feel using the video feature of the smartphone"). Twenty-six students anonymously completed the questionnaires. Then the questionnaires were analyzed which generated broad questions to be further verified. In the questionnaires, students were also asked to identify if they were interested in participating in a follow-up focus group to be conducted four weeks after the course was completed. Seven students agreed to participate in the focus group. The focus group was recorded and responses transcribed and coded. In order to maximize rigour, a consensus was used to corroborate the key overarching themes.[49]

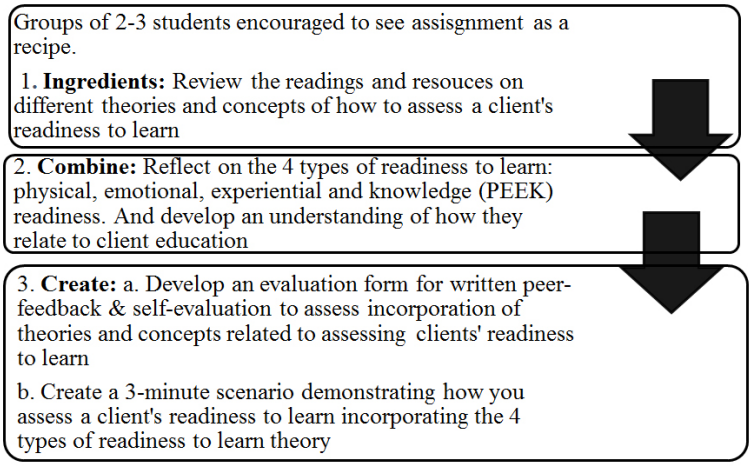

Figure 1. Description of smartphone video assignment using the format of a recipe

2.3 Ethical considerations

Ethical approval was obtained from the university ethics committee prior to recruitment. A research assistant introduced the study to the class participants, provided study information and obtained informed consent. Both the completion of the questionnaires and the focus group session took place after the course ended, so students were reassured that refusal to participate would not affect their grades in the course.

2.4 Data analysis

Descriptive statistics, such as means and percentages, were used to analyze the demographic data. Miles, Huberman and Saldaňa[50] guided the data analysis in an iterative process between thinking and organizing, generating codes, and using various analytical strategies. Deductive analysis as one method of creating codes, was used to "create a start list".[50] Therefore, in the questionnaire and focus group, students were first asked what they believed to be the advantages and disadvantages of videotaping themselves while interacting with a client. The start list was used to guide analysis. After reading and re-reading the start list, more inferential and explanatory themes were developed.[49] Miles et al.[50] offered several techniques to verify conclusions from the data. For example, while the questionnaire provided the percentage of students that felt comfortable with the smartphone technology, the focus group enabled elaboration and further characterization of the themes. In the focus group, the facilitator (author IE) used a semi-structured interview to guide the discussion and to ensure questions were answered. A smartphone was used to record the discussion, while another researcher took field notes about key points discussed. At the end, the researchers verified that the questions were addressed. Furthermore, the literature was used to label and better characterize the overarching themes. Specifically, the concepts of technical and adaptive challenges were adopted from Doane and Varcoe.[8]

3. Results

In total, 11 scenarios were developed by the 35 students who completed the video assignment. Some examples of students' creative scenarios on how to assess readiness to learn included skills such as, how to: (a) shave a senior who is receiving anticoagulation therapy; (b) administer insulin injection to a child newly diagnosed with diabetes; (c) provide mouth care to a teenager receiving palliative care; and (d) use a blood pressure monitoring machine at home for a refugee client who speaks minimal English. (See Table 1 for participants demographic information). All students

(100%) believed that using their smartphones to record their performance for the assignment would help them to become competent nurses and good team members. Seven of the female students further agreed to participate in the focus group. After data analysis two themes emerged from students' perspectives on using the smartphone video assignment to assess clients' readiness to learn: (a) technical challenges: how to apply theoretical knowledge and (b) adaptive challenges: how to relate to self, others and environments.

3.1 Technical challenges: How to apply theoretical knowledge

Students' perspectives on the technical challenges of applying the smartphone video assignment included discussions on how best to record and show others their video performances. While most students (84%) in the study said that they were "comfortable with smartphone video technology" and "appreciated the flexibility of the video assignment to be completed in their homes", 34% discussed the technical challenges of completing the video recording. The focus group further revealed students' descriptions of some of the technical challenges encountered. Students explained that the screen size, sound and lighting of their smartphones influenced the quality of the videos produced, particularly when recording a group role-play. One student said:

> "I am used to recording things but recording a group interacting and trying to capture facial expressions was not easy. It would be helpful to have instructions."

Several students explored how manipulating the portrait orientation of the smartphone (tall, thin, rectangle) distorts landscape orientation images:

> "...honestly, I use my smartphone but for school it is different...because the teacher will watch it, one of our group members was very technical so we were lucky."

Others identified technical issues with the uploading of videos. One student said:

> "The sound was not that great particularly when you upload your video from your phone to YouTube so you could not always hear what was said when we uploaded it."

Some students discussed the technical challenge of interpreting how to connect theory to practice in their video performances. For example, one student in the focus group said:

> "We were focusing on teaching a very sick teenager mouth care with the mother watching us in the room ... we were not sure which PEEK theory to focus on first in the video. The P is for physical readiness; he was physically able to do it but had bad past experiences."

Another student explained:

> "We forgot some of the injection skills so some of us had to go back to our insulin injection skills checklists from last year. It was great to watch ourselves teaching the child how to administer insulin...I think when you teach someone you really learn the skill better yourself."

3.2 Adaptive challenges: How to relate to self, others and environments

The majority of students described how this assignment, and in particular, watching themselves, and receiving feedback from their peers created opportunities to learn how to relate and collaborate with others when conducting client education. The adaptive challenges focused on how students' perspectives on using their smartphones' video feature to record a skill helped them to see how they relate to self, others and their environments; and to move beyond the technical aspects of the assignment. For instance, some students (20%) identified the challenges of working together as a group. Ten percent discussed finding a common time to meet difficult because many students worked, or lived far away from the university. One student said:

> "We wanted to book the simulation lab to record our videos, but it has strict hours. We could not find a common day for all of us to meet; some of us work full-time and others live far. We ended up improvising with only two students acting in the video...we liked the fact that we could email each other the video."

Additionally, students described how developing a scenario and watching themselves interact with their peers allowed them to see how their bodies moved, and what clothes was best to be worn to appear "as an expert nurse". This activity also provided them with insight as to how they should feel and perform when interacting with the clients and peers. The term "performance" appeared 37 times in both the focus group and questionnaires. Students described how power differences between them and their 'patients' accentuated even more during disagreements. One student said:

> "I was not used to seeing myself talking to a patient. Usually you focus on what you will

> say to the patient and the family. I was in the nurse manager role in our scenario and I was not sure how I am supposed to act when a patient asks me a question I do not want to answer. The patient sat on the chair and I stood and wore a white coat so the patient would know I was the manager [emphasize word]. I laugh at my performance when I saw the video. . . the video allows you to look from the outside in. . . I could see I was so nervous answering the patient."

Another student said:

> "Our group focused on teaching an 80-year-old dying patient who is on blood thinner how to shave. We wanted to show how knowledgeable and creative we were with our teaching so we used pictures and cards, but we realized after watching our video performance that we forgot to include the patient's opinion on his shaving routines. . . he was a barber for 50 years."

Some students addressed the power differences and ethical issues between the student and the professor, and how their videos would be viewed by the professor and, thus required special attention to perform in a way that reflected the competencies of a nurse. One student said:

> "We made sure the nurse in our video to always be kind to the patient and followed the doctor's order. I [a male student] played the doctor, we knew what the nurse should say, but not always sure how to say it when the nurse disagreed with the doctor...we had to record this part several times to get it right."

As shown in Table 1 the ages and gender of students who completed the questionnaire.

Table 1. Demographic data of students

Age	Male	Female	Total (n = 26)
21-22	4	19	23
23-24	0	3	3

4. DISCUSSION

With the increase use of smartphone technology, there is a need for further research and pedagogical support for its use as an e-learning platform in nursing education. The aim of this paper is to explore undergraduate nursing students' perspectives on using their smartphones' video feature to record the skill of assessing clients' readiness to learn in an undergraduate elective course. Technical and adaptive challenges were the two overarching themes that emerged from our study.

The majority of the participants were female who rated themselves as comfortable with using technology. Our findings revealed that 34% of the participants expressed that they encountered technical difficulties with creating and uploading the videos. Some identified during the focus group that they had forgotten specific clinical skills (injections) required to develop their video scenario, and needed to review previous coursework. Despite the technical challenges, students also discussed the benefits of the assignment in improving their nursing communication skill. The findings are consistent with other studies in which students identified technical challenges with student-generated online videos, but admitted they improved in both technological and competencies as a result of using video to learn a skill.[10] Furthermore, students completing self-assessment videos has reported benefits including: improved creativity, analytical and communication skills;[51] knowledge retention; development of critical thinking;[52] practical application of knowledge and improved patient care[8,53] Although students in this study found solutions and were able to improvise for several technical issues, faculty using this teaching-learning strategy can provide students with written guidelines and support on how to use the smartphone to record skills. Moreover, faculty need to provide students with guidelines on privacy and confidentiality when students use their smartphones for video-recording in the context of teaching and learning a skill. Guidance and inform consents should address who students are allowed to record, and where (private versus public spaces), who will have access to the recordings, and what should be done with the video recordings at the end of the course.[20]

Students described adaptive challenges including time management and connecting with their group members. Students suggested using the video assignment in the later part of the course so students had the opportunity to get to know their peers. According to Doane and Varcoe (2015) "Adaptive challenges lie in the stomach and the heart of an interaction and to solve them, [one] must change people's values, beliefs, habits, ways of working, or way of life." (p.401)[8] In order to address adaptive challenges learners must reflect on their actions and behaviours. Reflective practice is associated with enhanced clinical and ethical reasoning.[11] According to the students participating in this study the video assignment enabled them to recognize and reflect on issues that arose between them (while playing the role of a nurse) and the client. For example, one group's scenario demonstrated a nursing student entering a client's room to perform morning care. The goal for the nursing student was to teach the client,

who was on anticoagulation therapy, how to shave. After the class watched the video performance, a fellow student asked the reason for not discussing the blood test results with the client. A member from the group responded that although they knew the client's blood test results, they did not think it was their role to share the results with him. Therefore, watching themselves in the video they realized how they focused only on teaching him how to shave ignoring clients queries about the blood tests results. These students' reflection and peer feedback highlighted some of the ethical issues encountered in healthcare, and allowed for further discussion of those issues during the peer feedback session. Also, students recognized that watching their videos allowed them to express their feelings when learning how to relate to others. For example, one group discussed feeling anxious when they were required to teach a crying child how to perform wound care in the presence of the child's parents. McNaughton and LeBlanc[54] described the importance of students expressing their emotions during health professionals' training sessions. They emphasized that the role of emotion in clinical decision-making needs to be further explored in health professionals' education, and asking students about their emotion is paramount.[54] We believed that asking students to video record themselves provides opportunity to express emotion. Faculty using students smartphone recording should dedicate debriefing time so as to provide participants with an opportunity to share their feelings, and the meaning of their experiences.[54–56] When students have the opportunity to record themselves performing and practice clinical or non-clinical skills, and receive feedback, those skills are enhanced (p. 401-405).[57] Doane and Varcoe[8] argue that while it is possible to teach the technical aspect of a skill; the adaptive challenges need to be considered as well to demonstrate the relational dimensions of learning a skill.

5. Conclusion

The development of skills (clinical and non-clinical) is an integral part of nursing education, but with more e-learning courses being utilized, it becomes challenging to facilitate students' reflection and provide feedback on those skills. This study highlights an innovative, creative and cost-effective strategy using students' smartphones to assist them in learning a nursing skill. Our results demonstrated that students' perspectives on using their smartphones to record themselves, and receive feedback from their peers about how they assessed clients' readiness to learn involved both technical and adaptive challenges. Thus, faculty and nurse educators must provide students with technical support and explore ethical concerns when using smartphones to record skills. Further research studies are needed to increase knowledge regarding the impact of pedagogical underpinnings on content and processes when using students' smartphone. In particular, studies should examine the use of students' smartphone video features with diverse student populations (including students who identify with disabilities, and students with English as a second language) in learning various skills; and the resources required for support in using this strategy. Finally, prospective studies should be done to assess the effectiveness of this strategy for knowledge retention and skill performance.

Acknowledgements

The authors would like to thank the students who participated in this study.

Conflicts of Interest Disclosure

The authors declare that there is no conflict of interest.

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