

Using Real-Time Data to Develop and Improve Teaching of Clinical Skills in Virtual Nursing Simulation Laboratories During COVID-19 Pandemic

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Abstract. During COVID-19 pandemic public health measures, face-to-face simulation laboratories were cancelled. A rapid transition to online teaching environments required staff and students to rapid upskilling in digital literacy. The purpose of this article is to describe a model of virtual nursing simulation laboratory implemented in graduate entry to practice Master's nursing program to teach clinical skills. The model used cloud-based communication app Zoom and real time feedback data to improve content delivery, student engagement and confidence in skill development. This model was co-designed with the student cohort to ensure students, as stakeholders, had a voice in having their education needs met during these challenging times.

Keywords. Real-time data, information, nursing simulation laboratories

1. Introduction

When face-to-face clinical simulation laboratories were cancelled as part of public health measures during COVID-19 pandemic, the educators faced the challenge of how to prepare nursing students for clinical practice and to transition into a graduate registered nurse role [1]. This was important to address as absence of clinical placements meant that the development of the competent graduates to enter the nursing workforce was compromised. Many tools have been developed to facilitate asynchronous development of performance, competencies of clinical skills in relation to psychomotor skills, critical thinking and reasoning and decision making [2]. However, what is novel in this paper is that it presents a co-design model developed in collaboration with the student cohort using a real-time data from an observer and student attendees to quickly respond to student needs. The model used cloud-based app Zoom, whose most attractive feature is the capacity to use breakout rooms which permit educators to create small groups and provide a safe, personalized learning environment. The content delivered was underpinned by the constructivist paradigm of health education, where students are

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active learners who construct their own learning in collaboration with those around them (peers and educators) [3]. The model used ‘talk out loud pedagogy’ [4].

2. Methods

2.1. *Teaching Plan for Virtual Simulation Laboratory*

Each virtual simulation laboratory teaching session was delivered as three components: pre-laboratory, laboratory, and post-laboratory sessions. The whole approach was underpinned by a detailed, tightly scripted, timed and peer-reviewed teaching plan. Here, the learning outcomes and teaching methodology were defined, and relevant resources developed. The roles for facilitators (demonstrators) and participants (students) were also scripted. Each session was allocated one observer whose role was to identify areas for improvement, obtain participant feedback and synchronously feedback both inputs to the teaching team. The teaching plan was released to the student cohort two weeks before the session delivery for voluntary feedback. Student participation this early in the design aimed to alleviate student anxiety surrounding virtual laboratories and ensure the teaching plan met student needs as active learners/participants in their education [3,4]. The teaching plan was also used to determine what contents should be packed in the student’s clinical pack, then mailed to each student’s home. The pack’s contents facilitated the student’s participation in the virtual session from their home environment and enabled the practice of skills once offline. As this model reports a teaching approach in which students provide feedback as part of a systematic improvement to teaching practice, our institution does not require ethics approval for this process.

2.2. *Pre-laboratory Session*

The pre-laboratory session comprised a pool of resources prepared by the educators to meet the teaching plan needs and uploaded to the learning management system two weeks before the scheduled virtual simulation laboratory session. Resources included in-house educator-developed videos of clinical skills that reflected national evidence-based guidelines, accrediting body guidelines and the teaching plan. The session aimed to introduce the student to the process governing the correct application of the planned clinical skill. Furthermore, the teaching team supported the students with computer technology, digital literacy needed to use the learning management system effectively, and the ability to use Zoom.

2.3. *Laboratory Session*

The laboratory session was delivered via Zoom with a maximum of 20 students per session. An independent observer was allocated to each session. Students were informed of the observer’s presence at the start of the virtual session. The observer had no role in teaching students but could respond to student needs with managing digital technology. The observer took notes on teaching team-student interactions and content delivery. The observer also collected student feedback, which was provided to the teaching team post-session (see Section 2.4). Each week, four to six virtual laboratory sessions were run to demonstrate a specific set of clinical skills. The session started with a PowerPoint

presentation linking the theory behind the clinical skill, followed by a live demonstration of the skill. With an assistant demonstrator, the chief clinical demonstrator then demonstrated the skill directly from the simulation laboratories and used a ‘talk-out-loud pedagogy’ [4], which was broadcasted via Zoom to the students at home. After that, students were allocated to Zoom breakout rooms into smaller demonstrator-led student subgroups. Each subgroup had 4-6 students. Some of the demonstrators were also working from home. The skill was re-demonstrated to highlight the step-by-step processes. The demonstrators also shared their past experiences in mastering the relevant skill, taking the role of a mentor. The demonstrator then reviewed and assessed each student’s skill, done from the student’s home, and provided instructions on correcting the skill. All students had an opportunity to practice skills utilizing ‘talk out loud’ pedagogy [4] and receive personalized feedback. During this time, an observer visited each of the groups and, without interruption noted the session’s rapport.

2.4. Post-laboratory Session

After each demonstrator-led component, students were invited to provide anonymous feedback via Microsoft Forms. The link to feedback questions was provided via Zoom chat at the end of the session and before the student-staff debrief. Students were asked to comment on four items: 1) Describe the best or most useful aspect of simulation; 2) Describe the least useful aspect of simulation; 3) Describe the part(s) of simulation experience you would change and why; and 4) Describe your overall satisfaction with the virtual simulation as a learning experience. After that, students and staff debriefed as a group, reviewed simulation learning objectives and how these related to the student’s expectations and the subject’s learning objective. After the debrief, the students logged off. The observer then provided feedback on the overall session, including the student survey data. This feedback was implemented before the new session started, usually scheduled an hour after the previous session.

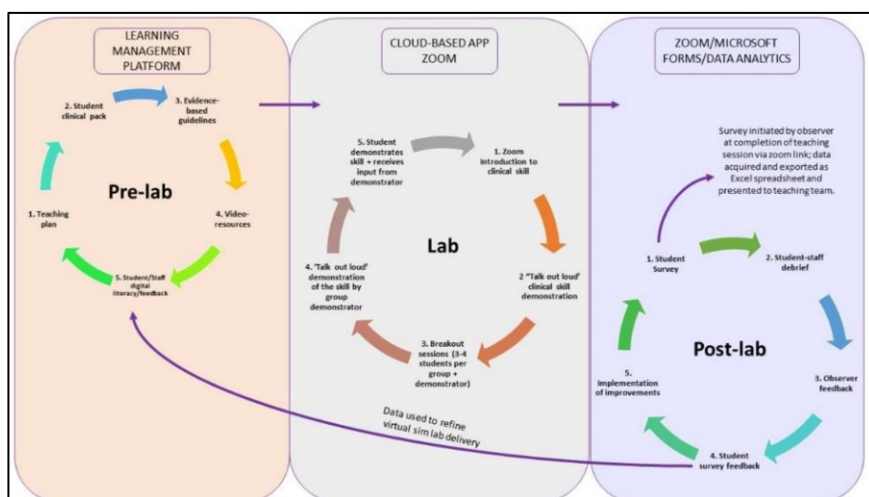


Figure 1. Model of virtual simulation laboratory delivered to nursing graduate entry to practice students during COVID-19 pandemic.

3. Results

3.1. Pre-lab Session

Development of the teaching plan with students as co-designers provided educators with an opportunity to address student concerns about delivering the virtual learning experience. While students understood that rapid deployment of simulation laboratories in the virtual environment was necessary to ensure COVID-19 safe clinical training. However, the most common concern was that the virtual experience could not replace ‘hands on’ face-to-face clinical simulation training. Other concerns raised before virtual lab sessions related to the speed of internet connectivity. All students’ clinical packs arrived at their destinations. However, some students reported missing some equipment, which was addressed separately. Other comments related to the educator-developed videos and lack of clear vision of the skill being demonstrated. This was related to the 360° videos, where some students reported experiencing motion sickness when viewing them.

3.2. Lab Session

Students reported feeling that the most valuable time of the simulation was spending time in the small break out rooms in Zoom with the demonstrator delivering individualized feedback. Students asked that the PowerPoint introduction be reduced, as they felt that pre-lab sessions were sufficient to understand the theoretical underpinnings of the clinical skill. Students highly valued their demonstrators sharing their personal experiences during the sessions, particularly when the demonstrator shared a complex scenario from their practice and the problem-solving skills used to manage that scenario and what they learnt from that situation. Indeed, in response to student feedback, the PowerPoint sessions were reduced to provide more time with the clinical demonstrator.

3.3. Post-lab Session

Real-time surveys enabled the teaching team to optimize the teaching delivery within two sessions. The information further led to optimized student engagement and to identify teaching methods most conducive to student-led enquiry. Students’ survey comments were disclosed to the next group of students who benefited from those inputs. This was employed to close the feedback loop to the students who earlier provided feedback aimed at improving virtual laboratory sessions. The most challenging aspect observed was the teaching team’s attitude to accepting the real-time data. Some teaching team members found that receiving this type of feedback was out of their comfort zone. This was particularly evident when the demonstrators felt the component delivered was of high quality, but the student feedback and observer’s feedback were not congruent with this opinion.

4. Discussion

Connectivity allowed by cloud-based technologies, such as Zoom, permitted real-time demonstration of clinical skills, and permitted students to receive high-quality

supervision during simulation practice, ensuring competent skill is gained. Notably, this type of simulation was continuously refined by implementing feedback by obtaining real-time student data and observer data. Co-designing the virtual simulation laboratories provided an opportunity for students and staff to work together to alleviate existing student anxieties. All participants recognized that COVID-19 has created an extraordinary situation and that it was necessary to find ways to deliver high-quality virtual simulation education to prepare for an uncertain future. As a team, we learned the importance of collective input from staff and students who designed the virtual simulation laboratories and learned that receiving rapid real-time feedback can be challenging. However, when the teaching team objectively considered data, receiving this feedback became easier.

The model presented here is transferable to any setting where connectivity exists and where Zoom (or similar technology) and electronic survey tool are available. However, before its implementation, the students and staff pre-existing digital literacies must be addressed to ensure all are on an equitable level when participating.

5. Conclusion

Virtual simulation laboratories are necessary where face to face teaching is not permitted. The most significant value of this model is the real-time intervention to correct the teaching delivery plan to meet student learning needs. The model requires trust between staff and the student cohort that the quality of the virtual simulation will be high and that all feedback is collegial with the aim to improve the virtual simulation. The long-term benefit for both staff and students also includes new digital literacy skills associated with the digital technologies

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We apologize to authors whose work we could not cite due to constraints with the journal page limit.

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