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Skills, community, and rapport: Prelicensure nursing students in the virtual learning environment

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ABSTRACT

Introduction: The coronavirus-19 (COVID-19) pandemic forced changes in program delivery across nursing education. This article describes the innovative virtual lab sessions designed and implemented for Foundations and Pediatrics courses in an Accelerated Baccalaureate Science in Nursing program. The objectives of this quality improvement project were to (1) ascertain student perceptions of learning in virtual lab environment (2) identify benefits and barriers to planning and implementing virtual learning experiences, and (3) explore student attitudes and perceptions regarding group dynamics and the sense of community provided by virtual lab sessions.

Methods: A cross-sectional approach was employed with two cohorts (Cohort 1, n = 71; Cohort 2, n = 86). Students completed a survey and responded to open-ended questions regarding their virtual clinical lab experiences.

Results: The four themes of small group dynamics, resource availability, hands-on activities, and sense of community emerged as the characteristics students liked most about virtual lab sessions with 95% of students reporting the virtual lab sessions were engaging. Overall student survey responses were favorable to the virtual labs.

Discussion: This project demonstrates that nursing educators were able to design and implement innovative teaching and learning strategies in a virtual environment to promote knowledge, skills, and attitudes while nurturing a sense of community.

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Introduction

Because nursing is a very personal and intimate profession, it is critical that teachers develop a safe and comfortable learning environment in which students can build a rapport with one another that will reflect in their interactions with patients during their future practice. The coronavirus-19 (COVID-19) pandemic forced nursing education programs to transition quickly from traditional face-to-face teaching to a virtual platform in which clinical skills are simulated (Fogg et al., 2020; National Council of State Boards of Nursing, 2020). Nurse educators have had to design, develop, and implement virtual learning activities to support learners in meeting course and clinical outcomes. For prelicensure nursing students, an essential component includes not only knowledge and skills but attitudes that are usually developed interpersonally in didactic courses, patient care environments, and simulation laboratories. Nursing students learn many of their skills through hands-on training using deliberate practice, a methodical and purposeful approach to learning that uses repetitive practice and immediate feedback to improve performance (Gonzalez & Kardong-Edgren, 2017; Oermann et al., 2015; Yeh et al., 2019). However, nursing educators must create a virtual environment that allows deliberate practice as well as opportunities for nursing students to observe others and reflect on their actions. The purpose of this project is to discuss our school of nursing’s innovative virtual lab sessions in response to the changes in education caused by COVID-19. The objectives of this quality improvement project were to (1) evaluate student learning in virtual lab sessions compared to the traditional, face-to-face environment, (2) identify benefits and barriers to planning and implementing virtual learning experiences, and (3) explore student attitudes and perceptions regarding group dynamics and the sense of community provided by virtual lab sessions.

Theoretical framework

Kolb’s Experiential Learning Theory (Kolb, 1984) and deliberate practice principles guided the development of the virtual lab sessions. The theory consists of four stages: (1) concrete experience, (2) observation and reflection, (3) formation of abstract concepts, and (4) teaching in new situations. We created concrete experiences in which students observed classmates and participated in guided reflection in a virtual environment.
Although our Accelerated Baccalaureate Science in Nursing (ABSN) students utilized an online learning management system for their courses before COVID-19, online learning was minimal, as the ABSN curriculum was not considered an “online” or “hybrid” curriculum. Our ABSN students attended classes on campus. Also prior to COVID-19, our school incorporated the International Nursing Association of Clinical Simulation in Learning (INACSL) standards for simulation-based learning and open lab sessions. Additionally, our simulation center is accredited by the Society for Simulation in Healthcare, our nurse educators have training in simulation and many are Certified Healthcare Simulation Educators.

Methods

We used a cross-sectional approach with two cohorts (Cohort 1, \( n = 71 \); Cohort 2, \( n = 86 \)) enrolled in a first-semester Foundations course followed by a second-semester Pediatrics course in an ABSN program. Cohort 1 began the first-semester Foundations course in spring 2020 (Fig. 1) as a face-to-face experience; however, due to COVID-19, the course transitioned to a virtual environment (Zoom) for the last 3 weeks. The following semester, Cohort 1 progressed to the second-semester Pediatrics course offered predominately online with the exception of a single 2-hour preclinical preparation experience. In comparison, Cohort 2 began the Foundations course in the fall 2020 semester with 3 weeks of virtual activities, and then transitioned to face-to-face learning for the remainder of the 9-week semester as the school reopened for on-campus learning.

Using Kolb’s Experiential learning theory as an overarching framework, we used a variety of innovative teaching and learning strategies to create virtual activities that developed students’ cognitive, affective, and psychomotor skills in an online environment via Zoom, and we added components designed to nurture a sense of community and promote a comfortable environment for learning. For example, each virtual activity began with a “check-in” and/or ice-breaker inquiry (e.g., sharing one good thing, identifying preferences...
breakout rooms to learn about manual blood pressure checks, pulse palpation, respiratory rates, temperature, and pulse oximetry. For example, students learned the mechanics of applying a blood pressure cuff by wrapping it around a water bottle or rolled towel, then practiced inflating and deflating the cuff.

Students were taught virtually to perform the general survey, level of consciousness, musculoskeletal, and head and neck assessments. They practiced the assessments with a partner via the camera, verbalized their assessment results, performed a return demonstration, and received immediate constructive feedback from instructors.

Pediatrics course. Students practiced communication skills with the nurse educator using role-play. As they engaged in unfolding case studies, they practiced using two standardized mnemonic communication tools for reporting patient information: SBAR (Situation, Background, Assessment, Recommendation) and ISHAPED (Introduction, Situation, History, Assessment, Plan, Error Prevention, Dialogue). After interacting for 15 to 20 minutes in breakout rooms, a spokesperson from each group verbalized their group’s SBAR report. Students compared similarities and differences between the handoff reports. Observation and immediate feedback and other conceptual underpinnings were used to support the theory of deliberate practice.

Students learned the following psychomotor skills: drawing up fluids from a vial, priming IV tubing, and administering IV push medications in a safe virtual home environment. They practiced skills using their supplies with objects within their homes (i.e., lamp fixtures, clothes hangers, cabinet knobs). In addition, syringe mechanics were taught using needleless syringes with a focus on dexterity while using a syringe (i.e., holding the syringe, angle of injection, plunger, Z-track injection). Students viewed skills videos and live virtual nurse educator demonstrations. The virtual format allowed the nurse educator to pause, review, and replay key elements of the skills, so students could reflect on the skills and receive immediate feedback.

Critical thinking skills were taught by incorporating delegation and prioritization into the case studies, medication administration scenarios, and communication training activities. Students determined what information was necessary and conveyed it to the health care provider (role-played by a nurse educator) using SBAR. Students practiced prioritizing nursing interventions before and after new orders were received. They discussed the ISHAPED handoff framework and critically analyzed what assessment data were pertinent to share during a handoff report. In some medication administration scenarios, students had to prioritize which medication to give first when multiple IV meds were due simultaneously.

Attitudes

Foundations course. Therapeutic communication is an affective nursing skill that involves active listening and empathy. To enhance affective learning, Cohort 1 students, as a large group, viewed a prerecorded simulation about the death of a simulated patient and end-of-life care that included the patient’s family. Immediately following the simulation, students were assigned to small virtual breakout groups to debrief their experience. This virtual end-of-life session included a chaplain and a social worker as guest speakers, which allowed students to experience interdisciplinary perspectives and approaches to care. For a session on the nurse-patient relationship and therapeutic communication, Cohort 2 students were given prompts and instructed to role-play appropriate nurse responses. To elicit the sense of privacy during the nurse-patient interaction, student observers were asked to mute microphones and turn off their cameras during the scene. Students provided constructive feedback to their classmates about their performance and suggested alternate responses.

To further encourage development of affective change and improve their situational awareness, students were shown a commercial that displayed racial biases encountered by an African
American male in his everyday life. Students were asked to use their inspection skills to assess the actors’ facial expressions and to reflect on their personal biases and social justice concepts.

**Pediatrics course.** Although the virtual activities primarily focused on teaching communication skills such as SBAR and shift-to-shift handoff report, the use of therapeutic communication at an age-appropriate level to establish rapport and trust with children and their family members was emphasized.

**Results**

The end-of-semester survey was completed by 23 (31%) of the Cohort 1 second-semester Pediatrics course students. This survey was also completed by 36 (41.8%) of the Cohort 2 first-semester Foundations course students, but only by 3 (0.04%) of the Cohort 1 first semester Foundations course students. Fig. 1 shows the survey results. Students indicated they had been initially skeptical about participating in virtual activities, but by the end of the semester, they were pleasantly surprised and convinced that nursing skills could be taught successfully and comfortably in a virtual learning environment. Learners noted that the virtual activities were engaging and helpful, and recommended them for future learners. Although all of the Cohort 2 respondents reported having felt skeptical, 86% agreed or strongly agreed that the virtual lab sessions had been helpful.

Open-ended responses were examined qualitatively using thematic analysis. All responses were reviewed in their entirety and systematically coded by the co-authors, initially by the first author then reviewed and discussed with the remaining co-authors. The co-authors affirmed overarching themes, ideas, and topics. Table 1 illustrates the four themes that emerged from the students’ open-ended feedback to the survey: (1) small group dynamics, (2) resource availability, (3) hands-on activities, and (4) sense of community.

An additional survey question asked the students what they had liked least about the virtual labs. There were very few student responses from Cohort 1. Most of the students from Cohort 2 reported that they disliked being taught to take blood pressure virtually.

Students offered suggestions for improvement. They expressed that the PowerPoint slides were helpful and therefore should be provided for every virtual activity. Several students from Cohort 2 reported that they had disliked learning how to take blood pressure in a virtual environment and suggested devoting this time to discussion and therapeutic communication skills rather than to psychomotor skills. Although the method for teaching vital signs varied and students reported some dissatisfaction, comparison of the pass rates revealed minimal difference between the cohorts. Although Cohort 1 received face-to-face vital signs training and Cohort 2 received virtual vital signs training, their check-off pass rates were 75% and 77% respectively.

**Discussion**

Overall, students had favorable reactions to learning nursing knowledge, skills, and attitudes in a virtual environment. The small group dynamics and community themes were reflected in comments in which they expressed having enjoyed engagement and interaction with their peers as well as with their clinical instructors. This highlights the importance of placing an emphasis on student attitudes and comfort as well as on effectiveness. Creating a safe and comfortable learning environment is consistent with best practices in simulation ([INACSL Standards Committee, 2016]). Students stated that they enjoyed hearing other students’ perspectives and creating bonds. Small group discussions and interactive virtual activities helped to mitigate and/or overcome barriers related to isolation and diminishing mental well-being. This was especially important as many students were quarantined away from family and friends. Nurse educators consistently used “check-ins” at the beginning of each virtual session to assess students’ mental and physical well-being. As the semester continued, students further enhanced their sense of community through increased engagement and

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**Table 1**

Survey Comments.

| Themes                  | Open-Ended Responses Prompt: “What did you like most about the virtual lab session?” |
|-------------------------|--------------------------------------------------------------------------------------|
| Small group dynamics    | Pediatrics course: “Working through problems as a group. Small groups”              |
|                         | “I benefited from the small group size and focused attention.”                      |
|                         | Foundations course: “The discussion groups really helped me during labs. I enjoyed hearing everyone’s thoughts and feedback we received during virtual labs. It helped re-enforce what we covered in class and was a good intro to nursing school!” |
|                         | “Being able to interact in the small breakout rooms were helpful. I get very nervous over zoom in interacting with people, so it was helpful for me to be in a smaller setting where I felt more comfortable to speak up and ask questions.” |
| Resource availability   | Pediatrics course: “Having the tool kit sent to us, so we could manually do a few of the skills.” |
|                         | “Liked having the materials mailed to me so I could actually follow along live and ask questions if I got stuck.” |
|                         | Foundations course: “The fact that I had roommates to practice the skills on was helpful! Great to have the supply kits.” |
| Hands-on activities     | Pediatrics course: “The drawing up meds from a vial.”                               |
|                         | “Psychomotor activities”                                                            |
|                         | Foundations course: “Having them be in small groups, adding “hands-on”/active portions, and rotating among the educator were aspects that helped.” |
|                         | “Being guided through actual hands-on activities using our own stethoscope, for example, and going through the motions together.” |
| Sense of community      | Pediatrics course: “Human conversation.”                                            |
|                         | “The collaboration.”                                                                |
|                         | Foundations course: “I really appreciated the virtual lab sessions and believe they were one of the few precious opportunities to connect with our cohort early in the semester. The ice breakers and supportive atmosphere that educator provided was SO incredible.” |
|                         | “I really appreciated the ice breakers and the educator were always present and helpful. As the first few weeks of school were pretty lonely, it was nice to have smaller groups of students to interact with in breakout rooms.” |
affirmations during the check-ins. The use of icebreakers helped students build rapport quickly with their classmates and teachers. This exercise was beneficial because it equipped students to develop interpersonal and communication skills to use in various health care environments including telemedicine.

We learned some beneficial lessons along the way including:

- Students valued having access to resources such as vials of saline, syringes, and IV tubing. Prior to the virtual learning sessions, it is helpful to provide a detailed list of needed supplies and PowerPoints so students can efficiently perform the virtual activity with minimal interruptions.
- Table 1 highlights how much students enjoyed hands-on activities. We found that student engagement in psychomotor activities and group discussions promoted more attentiveness to the lesson.
- Careful consideration of the content of each virtual learning session was essential. Educational scaffolding, an approach where learners gradually gain independence while being supported along their learning continuum, was key to students being able to cognitively stretch from each topic to the next (Coombs, 2018; Franklin & Blodgett, 2021; Herrington & Schneiderreith, 2017).
- We found that learning in a virtual environment while at home presents learners with unique distractions; therefore, it is essential to keep students actively engaged as they learn new concepts in a virtual environment.
- We noticed minimal difference in the cohorts’ vital signs pass rates, supporting that teaching vital signs virtually can be an effective pedagogical approach when face-to-face learning is not possible.
- We identified a few barriers such as there was a steep learning curve for nurse educators which was heightened by the need for a rapid turnover of new educational content to keep students engaged throughout the virtual sessions.

Limitations

One limitation to this quality improvement project was our use of a cross-sectional approach. A longitudinal approach may have given further insight into the changes over time. Another limitation was a low response rate for the surveys. This may have been due to survey fatigue at the end of the semester and there was no incentive for completing the surveys. Due to the low response rate, not all student perspectives may have been represented in our results. Further longitudinal research is needed to determine the effectiveness of virtual activities designed to build knowledge, skills, and attitudes for nursing students. In addition, we need to explore the virtual learning’s impact on postpandemic student readiness for practice.

Conclusion

This project demonstrates that nursing educators were able to design and implement innovative teaching and learning strategies in a virtual environment to promote knowledge, skills, and attitudes while nurturing a sense of community and helping students to develop rapport with one another and with their instructors. We evaluated the virtual learning environment and found it to be a helpful approach. In addition, we were able to identify benefits such as increasing dialogue, building a sense of community, and nurturing rapport during virtual learning. Our findings showed that our learners valued small group discussions, having educational resources readily available, performing hands-on activities, and building a sense of community. Despite a few challenges, our prelicensure nursing students adjusted to this new pedagogical approach. Nurse educators have made every attempt to lessen the impact of COVID-19 on student learning, and the shift to virtual environments may be a natural progression in nursing education.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Coombs, N. M. (2018). Educational scaffolding: Back to basics for nursing education in the 21st century. Nursing Education Today, 68, 190–200 https://doi.org/10.1016/j.nedt.2018.06.007.

Fogg, N., Wilson, C., Trinka, M., Campbell, R., Thomson, A., Merritt, L., Tietze, M., & Prior, M. (2020). Transitioning from direct care to virtual clinical experiences during the COVID-19 pandemic. Journal of Professional Nursing, 36(6), 685–691 https://doi.org/10.1016/j.profnurs.2020.09.012.

Franklin, A., & Blodgett, N. P. (2021). Simulation in undergraduate education. Annual Review of Nursing Research, 39(1), 3–31 http://dx.doi.org/10.1891/0739-6686.39.3.

Gonzalez, L., & Kardong-Edgren, S. (2017). Deliberate practice for mastery learning in nursing. Clinical Simulation in Nursing, 13(1), 10–14 http://dx.doi.org/10.1016/j.ecns.2016.10.005.

Herrington, A., & Schneiderreith, T. (2017). Scaffolding and sequencing core concepts to develop a simulation-integrated nursing curriculum. Nurse Educator, 42, 204–207 https://doi.org/10.1097/NNE.0000000000000358.

INACSL Standards Committee. (2016). INACSL Standards of Best Practice: Simulation™. Simulation Design. Clinical Simulation in Nursing, 12, 55–512 https://doi.org/10.1016/j.ecns.2016.09.005.

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

National Council of State Boards of Nursing. (2020). Changes in education requirements for nursing programs during COVID-19. https://www.ncsbn.org/Education-Requirement-Changes_COVID-19.pdf.

Oermann, M. H., Molloy, M. A., & Vaughn, J. (2015). Use of deliberate practice in teaching in nursing. Nurse Education Today, 35(4), 335–336 https://doi.org/10.1016/j.nedt.2014.11.007.

Yeh, V. J.-H., Sherwood, G., Durham, C. F., Kardong-Edgren, S., Schwartz, T. A., & Beeber, L. S. (2019). Online simulation-based mastery learning with deliberate practice: Developing interprofessional communication skill. Clinical Simulation in Nursing, 32(C), 27–38 https://doi.org/10.1016/j.ecns.2019.04.005.