

Research Brief

Applying the Flipped Classroom Model to Psychomotor Skill Acquisition in Nursing

Georgia Ann Dinndorf-Hogenson, Carrie Hoover, Jodi Lisbeth Berndt, Bethany Tollefson, Jennifer Peterson, and Nichole Laudenbach

Abstract

This descriptive study aimed to examine baccalaureate student psychomotor skill performance when given different methods of pre-skill lab preparation materials in a flipped classroom environment. Students utilized either a narrated video demonstration of the skill or a skill instruction sheet with photographic images as lab preparation materials. Psychomotor skill performance of insulin pen administration was evaluated. Results suggest the type of preparation methods used with the flipped classroom pedagogy does not significantly affect student performance on psychomotor skill acquisition.

KEY WORDS Flipped Classroom – Laboratory Preparation – Nursing Education – Psychomotor Skill

Although the use of a flipped classroom model in higher education has grown in popularity, questions remain about its effectiveness (Bishop & Verleger, 2013; Mikkelsen, 2015). Research related to the flipped classroom model has addressed student perceptions, student performance, and staff satisfaction with variable results (Mikkelsen, 2015). According to Mwale and Kalawa (2016), students that have previous experience may have decreased motivation to attain knowledge, which may affect class or lab preparation and psychomotor skill acquisition. Although various pre-skill lab preparation methods have been suggested, gaps exist in distinguishing which methods best train students for psychomotor skill performance (McGowan, Balmer, & Chappell, 2014; O’Flaherty & Phillips, 2015).

The purpose of this study was to examine baccalaureate students’ psychomotor skill performance when given different methods of pre-skill lab preparation materials in a flipped classroom environment. Bandura’s social cognitive theory supported the theoretical foundation for this study. Social cognitive theory offers support of observational learning, imitation, and modeling for sequence of events promoting behaviors for medication administration.

About the Authors *The authors are faculty in the Nursing Department, College of St. Benedict/St. Johns University School of Nursing, St. Joseph, Minnesota. Georgia Ann Dinndorf-Hogenson, PhD, RN, CNOR, Carrie Hoover, PhD, RN, and Jodi Lisbeth Berndt, PhD, RN, CCRN, PCCN, CNE, are associate professors. Bethany Tollefson, DNP, RN, is an assistant professor. Jennifer Peterson, DNP, RN, CNOR, and Nichole Laudenbach, MSN, RN, are adjunct instructors. For more information, contact Dr. Dinndorf-Hogenson at ghogenson@csbsju.edu.*

The authors have declared no conflict of interest.

Copyright © 2019 National League for Nursing
doi: 10.1097/01.NEP.0000000000000411

METHOD

The institutional review board approved the study. A convenience sampling was used within a junior-level baccalaureate nursing course at a private liberal arts university in the Midwest that uses flipped classroom pedagogy for classroom and skill lab experiences. The psychomotor skill of insulin pen administration was selected for the study based on the multiple sequential step processes with no variation. Consent was obtained from students prior to sending out pre-skill lab preparation materials; students were informed that the performance on the skill would not influence grades, and 42 students agreed to participate in the study.

Students were randomized into two groups (media or reading pre-skill lab preparation) by the department administrator using random.org. Faculty developed a short video of the skill demonstration for the media group and a three-page instruction sheet with photographic images for the reading group. A 30-point rubric was developed to evaluate students’ skill performance and verified for content validity by six nursing faculty. The rubric included a systematic point range (from 0 to 3) for each skill element. Elements measured on the skill performance rubric included a) handwashing, b) choosing correct equipment, c) swabbed pen with alcohol before attaching needle, d) attached needle without contamination, e) primed needle with 2 units of insulin, f) selected correct dose on pen by dialing (2 units), g) swabbed the subcutaneous injection practice pad, h) administration angle, i) inserted needle without pressing the pen button during the needle insertion, j) pressed the administration button on insulin pen to deliver insulin, k) held finger down on administration button for 10 seconds after dose initiated, l) and proper sharps disposal. Participants completed a demographic questionnaire prior to skill performance that included gender, age, current cumulative grade point average, years in college, ACT score, previous exposure to flipped classroom teaching approach, and class standing at university.

In a video-recorded simulation experience, students were directed to administer a specific dose of insulin using an insulin pen; dosage calculation was avoided to strictly evaluate the skill performance. Students were provided instructions prior to entering the simulation room (faculty were not present). The appropriate supplies were set up in the rooms for student use. A single evaluator, blinded to the pre-skill lab method of preparation, used the rubric to score all subjects' skill performance from the video recordings. To establish interrater reliability, a second faculty scored 10 performances; an acceptable Cohen's kappa of 0.51 was calculated.

Students completed a 5-point Likert-type survey following the skill performance activity. Eight stem questions were developed: a) perception of feeling prepared for the skill, b) confidence to complete the skill, c) if additional resources were used to help the student understand the content, d) contributed to the student's understanding, and e) whether the type of assignment is a good way to prepare for the skill. Students were asked to provide a range of minutes spent on preparation for skill performance and the percentage of lab material assignments completed.

RESULTS

Results from the skill performance rubric, demographic questionnaire, and survey were coded and entered into IBM Statistical Package for the Social Sciences software version 24. Analysis of the variables included descriptive statistics, independent sample *t* tests, chi-square, and bivariate correlations.

Of the 42 students who participated in the study, all were white and between the ages of 20 and 23; 86 percent were women. There were no significant differences between the two groups in any of the demographic variables.

Analysis of the survey revealed students in the reading group agreed with the statement, "I used additional resources" ($M = 3.0$, $SD = 1.08$); students in the media group were less likely to agree with the statement ($M = 2.19$, $SD = 1.18$). The results were significant; the reading group was more likely to report use of additional resources, $t(40) = -2.32$, $p = .026$. Students in the media group were more likely to agree with the statement, "I would recommend this type of preparation" ($M = 4.67$, $SD = .66$) when compared to the reading group ($M = 3.62$, $SD = .74$), $t(40) = -4.85$, $p = .001$.

There were no differences in the time spent on preparation or the percentage of completion of work assigned. Both groups performed well on skills performance: reading group, range 20 to 30 points ($M = 27.48$, $SD = 2.38$); media group, range 22 to 30 ($M = 28.19$, $SD = 2.71$). There was a positive correlation between the variables "contributed to my understanding" and the students' recommendation of their type of preparation and skill performance score ($r = .425$, $p = .005$; $r = .319$, $p = .040$, respectively). There was a negative correlation between the two variables "I had previous experience with the insulin pen" ($n = 5$) and skill performance score ($r = -.414$, $p = .006$). Students with previous experience had a mean rubric score of 25 versus 28.22 in the nonexperienced group.

DISCUSSION

This was the first study to examine the effectiveness of two types of pre-skill lab preparation methods in a flipped classroom environment on student perceptions and performance for a nursing psychomotor skill. In this study, all students indicated experience with the flipped classroom pedagogy in previous nursing courses and preferred media for pre-skill lab preparation method. Previous literature suggests

students perceive the video instruction to be at least as good if not better than lecture (Bishop & Verleger, 2013; Mikkelsen, 2015), but no studies have examined perceptions of nursing students preparing for a psychomotor skills lab or the impact on performance. Preference for media could relate to Bandura's social cognitive theory of observational learning and imitation.

Mikkelsen (2015) described potential advantages of the flipped classroom pedagogy as "actively engaged in the learning process" and "a collaborative and cooperative pedagogy" (p. 29). In the laboratory environment, learner objectives focus on psychomotor skills acquisition and retention. Despite students' preferences for media preparation, our study results indicate that, regardless of type preparation, a high percentage of students (86 percent) were able to demonstrate the skill satisfactorily (25.5 points/30). Laboratory time could begin immediately with the application of the skill for increased repetition as well as demonstration of skill proficiency. To preserve laboratory time for more interactive learning strategies, faculty demonstration of the skill may not be necessary.

Although the millennial learners in this study preferred the video preparation, this did not translate to higher performance on the skill demonstration. They preferred engaging and interactive learning, similar to previously reported studies (Phillips & Trainor, 2014), and were more likely to seek additional resources when given a video demonstration, indicating they might prefer both preparation methods. A significant amount of faculty time is spent on developing assignments in preparation for the flipped classroom, and tailored videos can be created to demonstrate skills using institution-specific equipment, but skill demonstration videos are widely available through purchase or YouTube. The preference for demonstration videos did not translate to improved performance on the psychomotor skill, and faculty should be mindful of the time allocated for the development of new videos.

A small subset of five students in this study (two in media, three in reading group, 12 percent) had previous experience with the insulin pen as medication administrators at nursing homes; they performed significantly worse than the students with no previous experience. Mwale and Kalawa (2016) reported student motivation and knowledge gap as factors affecting psychomotor skill acquisition. Students with prior experience in performing a skill may be less motivated to prepare than students who are learning the information for the first time. This finding has implications for psychomotor skill acquisition and education for nursing students with previous experience.

Limitations of this study were related to the small sample size from one institution and the limited diversity of the sample. All participants reported previous experiences with the flipped classroom model in previous courses but had varied levels of experience, which may have affected how they performed in the study and used the preparation methods. Students were informed that their skill performance would be videotaped, which also may have contributed to their level of preparation.

IMPLICATIONS AND SUGGESTIONS

This study adds to the literature on the use of the flipped classroom model regarding pre-skill lab preparation methods for learning psychomotor skills in nursing education. Further research is needed with a larger and more diverse sample to determine which type of pre-skill lab preparation material is most effective for both experienced and nonexperienced nursing students when learning a psychomotor skill.

REFERENCES

- Bishop, J. L., & Verleger, M. A. (2013). *The flipped classroom: A survey of the research*. Retrieved from American Society for Engineering Education website: <https://peer.asee.org/22585>
- McGowan, B. S., Balmer, J. T., & Chappell, K. (2014). Flipping the classroom: A data-driven model for nursing education. *Journal of Continuing Education in Nursing, 45*(11), 477-478. doi:10.3928/00220124-20141027-11
- Mikkelsen, T. (2015). Nursing students' experiences, perceptions and behavior in a flipped-classroom anatomy and physiology course. *Journal of Nursing Education and Practice, 10*(5), 28-35. doi:10.5430/jnep.v5n10p28
- Mwale, O. G., & Kalawa, R. (2016). Factors affecting acquisition of psychomotor clinical skills by student nurses and midwives in CHAM Nursing Colleges in Malawi: A qualitative exploratory study. *BMC Nursing, 15*, 30. doi:10.1186/s12912-016-0153-7
- O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *Internet and Higher Education, 25*, 85-95. doi:10.1016/j.iheduc.2015.02.002
- Phillips, C., & Trainor, J. (2014). Millennial students and the flipped classroom. *American Society of Business and Behavioral Studies, 21*(1), 519-530. Retrieved from [http://asbbs.org/files/ASBBS2014/PDF/P/Phillips_Trainor\(P519-530\).pdf](http://asbbs.org/files/ASBBS2014/PDF/P/Phillips_Trainor(P519-530).pdf)
-