

Original Research Article

Evaluation of the effects of a flipped classroom model versus lecture method on BSc nursing students' knowledge in a health assessment course

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ABSTRACT

Background: Conventional teacher-centred pedagogy has dominated nursing education. However, these methods have been associated with passive learning, inability to develop problem-solving and critical thinking skills among nursing students, and an increasing theory and practice gap. Adoption of innovative student-centred teaching methods such as the flipped classroom has been proposed as a strategy to bridge this gap. The study aimed to evaluate the effect of a flipped classroom model versus the lecture method on knowledge acquisition among second-year BSc. nursing students undertaking a health assessment course at a Kenyan University.

Methods: A mixed-method study consisting of a non-equivalent control group pre-test post-test quasi-experimental design was adopted. Forty-one students received training through the lecture method, while 39 were exposed to the flipped classroom approach over consecutive academic years. A knowledge test was administered pre-course and post-course. Data were analyzed using descriptive and inferential statistics, including the chi-square test and paired and independent t-tests.

Results: There was a significant difference in post-test health assessment knowledge mean scores, with the flipped classroom group attaining higher scores compared to their traditional lecture counterparts ($p=0.004$).

Conclusions: The flipped classroom had a positive effect on nursing students' knowledge of health assessment. This student-centred pedagogy can be recommended for teaching foundational nursing courses.

Keywords: Flipped classroom, Health assessment, Knowledge, Nursing students

INTRODUCTION

The role of undergraduate nursing education is to produce competent nurses with problem-solving and critical thinking skills, who can act as independent members of the healthcare team in providing safe and efficient care to patients and clients.¹ This is especially important for the 21st-century nurse who is practicing in a challenging and dynamic healthcare environment.² The quality of education appears to be largely dependent on instructional methods used to deliver knowledge to students, which subsequently relies on expected course learning outcomes outlined in curricula.³ Traditionally in nursing education,

both globally and locally, lecture has predominantly been utilized as the primary teaching method.^{4,5} This method, also referred to as the transmittal model of teaching, is considered a teacher-centred approach as students are perceived to be passive participants in learning. Lecturers are viewed as 'sage on stage' and their role is to transmit knowledge to students who simply memorize and reproduce it without actively engaging with the content.² Although still considered effective, the lecture method has been criticized for restricting teacher-student interaction and being a poor facilitator of deep learning and development of problem-solving and critical thinking among students, thus highlighting the need for innovative

and evidence-based teaching methods that may address this gap.²

An active learning strategy that has been a subject of much attention recently and has been adopted for professional health education, including nursing, is the flipped classroom model.⁶ It is a blended learning approach in which the classroom is essentially inverted. Students receive instructional content that is traditionally reserved for class outside the classroom as homework, while the face-to-face classroom is reserved for active learning activities to enhance deeper understanding. In the pre-class phase, content is delivered via online platforms and may include PowerPoint slides with voice-over, pre-recorded video, or selected text readings that students are expected to complete before coming to class. The focus of this phase is the transmission of foundational knowledge that focuses on lower cognitive skills such as understanding and recall. During the physical class, the emphasis is on assisting students to comprehend and apply difficult concepts through collaborative learning, case studies, and skills demonstrations. The focus of this phase is the enhancement of higher cognitive skills such as application, evaluation, and analysis.⁶⁻⁸ Literature has reported numerous benefits of flipping a classroom in nursing education, including better knowledge retention, increased interactivity, self-paced learning, as well as improved clinical judgment skills among students.^{9,10}

Despite highlighted benefits of the flipped classroom, there appears to be a dearth of literature reporting utilization and outcomes of this pedagogy in the African nursing education context.¹¹ Hence, this study aimed to evaluate the effects of a flipped classroom model versus the lecture method in a nursing course among BSc. Nursing students at a Kenyan university. The following hypothesis was tested:

H₀: There is no significant difference in mean knowledge scores of BScN students in a health assessment course instructed using the flipped classroom method and those in a traditional lecture class.

METHODS

Study design

The study utilized a non-equivalent control group pre-test post-test quasi-experimental design to evaluate the effect of the flipped classroom among nursing students.

Participants and setting

The study was conducted at the School of Nursing, Meru University of Science and Technology during the September-December semesters of the 2021/2022 and 2022/2023 academic years, respectively. Participants consisted of second-year undergraduate nursing students registered for the health assessment course. The

researcher used the census method as all eligible candidates were included in the study. There were 39 participants in the experimental group and 41 in the control group.

Study tool

To evaluate knowledge, a standardized multiple-choice examination consisting of thirty items that were representative of course content covered during the semester was developed by the researcher. The first part of the tool collected demographic information such as gender and age. Each item had four choices, with a correct response accounting for one point, for a maximum of 30 total points. Interpretation of the knowledge scores was translated based on the BSc. nursing curriculum grading rubric. An A (23 and above) represented very good knowledge, while B (20-22) and C (15-19) represented good and moderate knowledge, respectively. A score of less than 15 represented poor knowledge. The content validity index (CVI) was 0.96 based on five nursing experts' feedback, and the internal consistency (Cronbach's α) was 0.81.

Intervention

The intervention consisted of flipping a second-year health assessment course. The course consisted of two three-hour classes per week, for 12 weeks. One of the two sessions comprised a skills laboratory practical. Content covered was per the approved BSc Nursing curriculum. The course was chosen as it consists of key theoretical and practical competencies required for a graduate nurse.¹² The flipped model has been shown to be appropriate and effective for procedural learning.¹³

The experimental group was exposed to the flipped classroom method. Pre-class learning activities included: PowerPoint slides sent to the class email, relevant readings from the nursing council procedure manual, and other e-health assessment textbooks. Links to health assessment videos were also given. Students were expected to review the material before attending the physical classroom session.

In-class learning activities included an introductory session for clarification of concepts and addressing students' queries arising from pre-class activities. Additionally, researcher-developed case studies, with accompanying questions, were presented, and students were expected to discuss in groups consisting of five to six participants and present the findings to the larger class. The lecturer interacted with participants in their small groups as they attempted questions from the case study. Skills lab demonstration and return demonstration of procedures were conducted by a clinical instructor during the second session. For the post-class session, students were encouraged to review and reflect on the content that had been shared.

The control group had the course presented using the lecture method. Content was delivered through PowerPoint presentations, and questions were addressed to the participants to evaluate understanding. Similar to the experimental group, skills lab demonstration and return demonstration were conducted thereafter.

Data collection procedure

Participants were recruited at the beginning of the semester. Having obtained consent from participants in both control and experimental groups, pretests to assess students' baseline knowledge were administered during the first week of the course. The pen-and-paper questionnaires were self-administered and took approximately 45 minutes to complete. To prevent contamination between the two groups, copies of the test papers were retained by the researcher following administration. Post-tests consisting of the same tool were administered in the 13th week of the semester for both groups. Questions from the knowledge test were scrambled to limit testing bias.

Data analysis

Data were coded, cleaned, and entered into an Excel spreadsheet. Statistical Package for Social Sciences version 27 was utilized for analysing the data. Descriptive statistics, including percentages, means, and standard deviation, were applied for demographic characteristics and knowledge scores. Chi-square was applied to determine group differences in knowledge scores based

on demographic variables of age, gender, and first-year average score. The Kolmogorov-Smirnov test was performed to evaluate the normal distribution of the data. A paired t-test was used to evaluate knowledge scores between baseline and post-test. The independent t-test was applied to determine group differences in mean knowledge scores. The level of significance was set at $p < 0.05$.

Ethical considerations

Ethical approval was obtained from Kenya Methodist University (KEMU/SERC/EXT/56/2021). Permission to collect data and gain access to the study site was given by the National Commission for Science, Technology and Innovation (NACOSTI, reference number 832111) and the institution's office of the vice chancellor through the dean, School of Nursing, respectively. A participant consent form explaining the study procedures was issued to participants. Participants were informed that participation in the study was voluntary and that failure to participate would not affect their present or future grades. Further, the knowledge test results were excluded from the final semester grade.

RESULTS

The mean age for the control group was 20.32 ± 2 . The majority of the participants, 28 (68.3%), were aged between 20 and 24 years. Among the experimental group, the mean age was 19.95 ± 1 , with the majority of the participants, 26 (66.7%), aged between 20 and 24 years.

Table 1: Demographic characteristics of participants.

Variables	Intervention group (n=39)			Control group (n=41)			Statistics	P value
	Mean	SD	Median	Mean	SD	Median		
Age (years)	19.95	0.99	20	20.32	2.05	20	W	0.528
Previous academic year average score	63.83	4.30	63.75	64.19	4.53	64.10	t	0.719
Gender	N	%		N	%		χ^2	0.673
Male	21	53.8		24	58.5			
Female	18	46.2		17	41.5			
Total	39	100		41	100			

Table 2: Descriptive analysis of participant's knowledge test scores.

Groups	Variables	Categories	Frequency	Percentage
Control	Pretest	Poor	23	56.1
		Moderate	16	39
		Good	2	4.9
	Posttest	Moderate	13	31.7
		Good	17	41.5
		Very good	11	26.8
Intervention	Pretest	Poor	31	79.5
		Moderate	8	20.5
	Posttest	Moderate	4	10.3
		Good	14	35.9
		Very good	21	53.8

Table 3: Group comparison of pre-test and post-test knowledge test scores.

Variables	Flipped classroom			Lecture			df	t	P (between groups)
	N	Mean	SD	N	Mean	SD			
Pre-test Knowledge score	39	12.69	2.35	41	13.17	2.78	78	0.83	0.408
Post-test knowledge score	39	23.31	3.24	41	21.02	3.58	78	2.98	0.004
P (within groups)		<0.001			<0.001				

Male participants accounted for the majority of participants in both groups, 45 (55%). The age variable violated assumptions of normality in both groups ($p=0.000$). Both groups were homogeneous with regard to age, gender, and first-year average score (Table 1).

A descriptive analysis of the knowledge test scores revealed that in both groups, the majority of the participants had poor performance at baseline. On the post-test, however, more than half in the flipped classroom group had very good performance compared to only 26% of their lecture group counterparts (Table 2).

The mean health assessment knowledge score at pre-test was 13.17 ± 2.78 and 12.69 ± 2.35 for the lecture and flipped group, respectively. There was no statistically significant difference between the means of the two groups at baseline ($t=0.83$, $p=0.408$). On post-test, the flipped classroom group had a higher mean score (23.31 ± 3.24) compared to that of the lecture group (21.02 ± 3.58).

The difference in mean scores between baseline and post-test was significant for both groups; $p<0.001$, $t=-11.38$ for the lecture group and $p<0.001$, $t=-15.54$ for the flipped group. Additionally, the differences between knowledge mean scores when compared for the two groups at post-test were found to be statistically significantly higher for the flipped group ($p=0.004$, $t=2.98$). Cohen's d was 0.67, indicating a medium effect size (Table 3).

DISCUSSION

The researcher sought to determine the effects of a flipped classroom when compared to lecture pedagogy on nursing students' knowledge in a health assessment course. Results indicate that although both groups showed an increase in knowledge mean scores compared to baseline, there was a statistically significant difference in post-test health assessment knowledge mean scores, with the flipped classroom group attaining higher scores compared to their traditional lecture counterparts ($p=0.004$). Hence, flipped classroom pedagogy was more effective in improving students' health assessment mean knowledge scores. The null hypothesis was therefore rejected.

Findings are consistent with those from previous studies of flipped classroom in undergraduate nursing courses. In an immunology course, researchers found that learners

enrolled in the flipped classroom had statistically significantly higher average test scores compared to those in the lecture group. Unlike the present study, however, the difference between baseline and post-test scores in the lecture group was not significant.¹⁴ Researchers in a Moroccan study similarly found that students undertaking a community health course using the flipped pedagogy had a significantly higher academic achievement compared to those in the lecture group. The authors attributed these results to intrinsic motivation among learners prompted by a new pedagogic method as well as exposure to video vignettes as part of the pre-class learning activities.¹⁵ In a Turkish study, researchers found that the flipped classroom group had higher mean achievement test scores in a patient safety course compared to the group in which traditional teaching methods had been applied.¹⁶ Findings of a Nigerian study revealed that nursing students performed significantly better in a flipped classroom compared to those who were taught using lecture in a research methods course. Researchers attributed this success to the student-centred approach of the flipped pedagogy.¹⁷ Findings supporting the flipped classroom effect on knowledge have also been reported in other courses, including leadership in nursing and Medical-surgical nursing.^{18,19}

In the present study, the success of the flipped classroom could be attributed to a multipronged approach to learning. For example, the design included prior interaction with learning material, hence enabling students to assimilate knowledge before attending class. The instructor assumed a supervisory role rather than 'sage on stage', hence allowing students to take responsibility for their learning, but was present to assist students in problem solving. Additionally, there was emphasis on collaborative learning through group case-study analysis and presentation as an in-class activity, which may have increased participants' attention and active engagement in learning. Active learning models such as the flipped classroom hinge their success on the ability to foster higher cognitive abilities through multifaceted approaches, making learning more dynamic and student-centered.^{11,20}

In contrast to this study's findings, researchers did not find any significant difference between flipped classroom and lecture groups in a fundamentals of nursing course.²¹ Similarly, a study investigating the impact of flipped classroom in an evidence-based practice course found that despite an increase in knowledge scores from baseline, the difference between the flipped and lecture groups was

not statistically significant.²² Both studies concluded that non-significant findings may have been due to the flipped classroom design where only a portion of the course content was assessed rather than the entire course.

This study has several strengths. To the researcher's knowledge, this is the first evaluation of a flipped classroom approach in a nursing program in Kenya. The findings therefore add to the growing body of knowledge regarding flipped classrooms in resource-limited settings. Secondly, the intervention was applied for an entire thirteen-week semester; hence, learners were exposed to the pedagogies for an extended time period as compared to other reported studies where only certain portions of a course were flipped. Additionally, the quasi-experimental nature of the research design lends to the methodological strength of the study. The tools used in the study were valid and demonstrated high reliability.

Several limitations are acknowledged. This study was conducted within a single public tertiary learning institution and in one course. Findings may not be generalizable. While efforts were made to prevent bias by utilizing two different cohorts of learners in different academic years, non-contamination may not have been guaranteed.

CONCLUSION

Flipped classroom as an active learning strategy is effective in increasing nursing students' health assessment knowledge scores compared to those in a traditional lecture classroom. Flipped classroom is therefore recommended for consideration for adoption and use by policymakers and nursing educators in this setting. There is a need for more research on the effect of the flipped classroom with larger samples and more robust methods. Further, studies examining the longitudinal effects of the flipped classroom on knowledge retention should be conducted.

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REFERENCES

- Bvumbwe T, Mtshali N. Nursing education challenges and solutions in Sub-Saharan Africa: an integrative review. *BMC Nurs*. 2018;17(3):1-11.
- Naing C, Chellappan D.K, Shew-Fung W, Riegelman A, Whittaker MA. The effects of flipped classrooms to improve learning outcomes in undergraduate health professional education: a systematic review. *Campbell Syst Rev*. 2019;15:e1041.
- Bristol T, Hagler D, McMillian-Bohler J, Wermers R, Hatch D, Oermann M. Nurse educators' use of lecture and active learning. *Teach Learn Nurs*. 2019;14:94-6.
- Amtamwa MO, Gatere R, Mutinda A. Assessment of classroom teaching strategies at Kenya Medical Training College Vihiga Campus. *J Health Med Nurs*. 2019;3(3):31-44.
- Makata NE, Ewunonu NC, Makanjuola OJ, Ilo CI, Okonkwo OG, Ndubuisi SF. Perception of the utilization of teaching methods by student nurses in south-east Nigeria: a cross-sectional study. *Int J Nurs Educ Res*. 2023;11(4):275-0.
- Hew KF, Lo CK. Flipped classroom improves student learning in health professions education: a meta-analysis. *BMC Med Educ*. 2018;18(38):1-12.
- Bergmann J, Sams A. *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International; 2012.
- Mary AJ. Blended and flipped: exploring new models for effective teaching and learning. *Int J Emerg Trends Sci Tech*. 2016;3(11):4784-7.
- Tan C, Yue W, Fu Y. Effectiveness of flipped classrooms in nursing education: systematic review and meta-analysis. *Chinese Nurs Res*. 2017;4:192-200.
- Ward M, Knowlton MC, Laney CW. The flip side of traditional nursing education: a literature review. *Nurs Educ Pract*. 2018; 29:163-71.
- Youhasan P, Chen Y, Lyndon M, Henning MA. Exploring the pedagogical design features of the flipped classroom in undergraduate nursing education: a systematic review. *BMC Nurs*. 2021;20:50.
- Nursing Council of Kenya. Bachelor of Science in Nursing Students Training File, Nairobi: NCK: Nursing Council of Kenya; 2014
- Kraut AS, Omron R, Caretta-Weyer H, Jordan J, Manthey D, Wolf SJ. et al. The Flipped Classroom: A Critical Appraisal. *West J Emerg Med*. 2019; 20(3):1-10.
- Mohseni S, Motlagh MK, Ashrafiard H, Rasti A. The effectiveness of the technology-enhanced flipped class on the learning and satisfaction of nursing students in the immunology course: A quasi-experimental study. *Nurs Educ Today*. 2024;141:106314.
- Naciri A, El Hajji M, Radid M, Kharbach A, Chems G. Exploring student motivation and performance in the flipped classroom: a case study of nursing students. *Electron J Gen Med*. 2022;19(3):em364.
- Sarıtaş E, Baykara ZG. The effect of flipped learning approach on nursing students' learning of patient safety: a randomized controlled trial. *Nurse Educ Pract*. 2023;72:103742.
- Chikeme PC, Ogbonnaya NP, Ihudiebube-Splendor C, Abonyi EO, Madu O, Okoronkwo I. Self-directed learning readiness and learning achievements of a flipped classroom model approach in research methods class: a quasi-experimental study. *Nurs Educ Pract*. 2024;77:103968.

18. Öz GÖ, Abaan S. Use of a flipped classroom “leadership in nursing” course on nursing students’ achievement and experiences: a quasi-experimental study. *J Prof Nurs*. 2021;37:562-71.
19. Al-Mugheed K, Bayraktar N. Effectiveness of a venous thromboembolism course using flipped classroom with nursing students: a randomized controlled trial. *Nurs Forum*. 2021;56:623-29.
20. Fan J, Tseng YJ, Chao LF, Chen SL, Jane SW. Learning outcomes of a flipped classroom teaching approach in an adult-health nursing course: a quasi-experimental study. *BMC Med Educ*. 2020;317:1-11.
21. Joseph MA, Natarajan J, Labrague L, Al Omari O. Paradoxical effect of flipped classroom on nursing students’ learning ability and satisfaction in a fundamental of nursing clinical course: a quasi-experimental study. *J Profess Nurs*. 2025;57:112-20.
22. Ruzafa-Martínez M, Molina-Rodríguez A, Pérez-Muñoz V, Leal-Costa C, Ramos-Morcillo AJ. Effectiveness of the flipped classroom methodology on the learning of evidence-based practice of nursing students: quasi-experimental design. *Nurse Educ Today*. 2023;128:105878.

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