Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5, 624-632
2024
Publisher: Learning Gate
DOI: 10.55214/25768484.v8i5.1727

The learning effects of flipped classroom on nursing student's vital signs knowledge, skill, and satisfaction: Post-test only control group study

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Abstract: The Traditional lectures optimize the passive learning, where students attend passively, however, lacking a deep understanding of the lecture material. Consequently, an innovative teaching approach is necessary to develop student engagement, active learning, and critical thinking skills. The aim of the study is to evaluate the effect of flipped classroom on knowledge, skill, and satisfaction about vital signs nursing procedure. A post-test only control group design study was carried out in College of Nursing, Muhayil. King Khalid University, Kingdom of Saudi Arabia, during May 2024. The study population consisted of 63 second year Baccalaureate nursing students. A Simple random sampling technique was adopted to recruit samples in an experimental and control group. An Experimental group received flipped class model teaching and the control group received traditional method of teaching about vital signs nursing procedure. Knowledge was assessed using self-reported questionnaire, and skill by checklist also Satisfaction about the teaching method was assessed using 5-point likert scale. It is shown that there is a significant difference in the scores for skill (M=9.87, SD=.42), Knowledge (M=7.68, SD=2.24) and satisfaction (M=43.07, SD=5.65) among traditional and Flipped class students. This study suggests that the teachers can be implement flipped classroom technique along with the traditional method of teaching.

Keywords: *Flipped classroom, Knowledge, Nursing students, Satisfaction, Skill, Vital signs.*

1. Introduction

The desire for educational reform that can better prepare students for this era, from elementary school to doctorate programmes, has grown in recent years. The intention is for the students to absorb the content, which is very important in the medical field. The report from the medical institute stated that medical workforce is well-equipped to handle the demands of a patient population that is expanding and becoming more diverse. The essential skills that every member of the healthcare team should have been covered included knowing how to effectively apply technological advancements to enhance patient care as well as how to convert evidence into practice. Meeting the above conditions can be difficult for traditional educational systems. Experts define critical thinking as the ability for people to think critically in a healthcare context[1]. Researcher also stated knowledge generated by observation, experience, reflection, reasoning, or communication can be obtained through "actively and skilfully conceptualising, applying, analysing, synthesising, and/or evaluating" methods[2] .

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It is difficult for nurses to adapt to the quickly changing demands and situations of their patients in the ever-changing healthcare environment. To deliver safe and effective nursing care, nursing graduates must modify their approaches and perspectives[3].The traditional lecture style of teaching facts and material is no longer effective in creating graduates with critical and creative thinking skills in most disciplines, especially those linked to healthcare and nursing education. "The Teacher should tell me what I need to know to pass the test syndrome" requires a paradigm change towards flipping the classroom.[4]

The flipped classroom model, often called the inverted classroom, is a pedagogical technique that emerged primarily from flexible, personalised, and engaging instructional practices. The flipped classroom is a teaching style that is a continuation of the blended learning approach.[5] In the following aspects, the flipped learning model imitates the blended learning paradigm's strengths. First, traditional lecture training can now be accessed through online learning environments thanks to technological affordances. Second, shifting lecture instruction online can lessen the amount of material covered in a classroom setting and encourage possibilities for students to engage in active and collaborative learning. The goal is for students to use what they have already learned in the classroom—from the online platform—to improve their conceptual grasp of the subject matter and also their academic performance.[6]

The foundation of flipped classroom tactics is the well-established idea of active learning. These include peer-to-peer and teacher-to-student learning through collaborative projects and assignments and instant feedback two Colorado high school chemistry professors invented the phrase "flipped classroom." "That which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class," is how they defined the flipped classroom[7,8]. A medical surgical class where students were expected to watch a brief movie and listen to a lecture on the subject at home and participate in "active learning in class using case studies, labs, games, simulations, or experiments" is an example of a flipped classroom for nurses. [9]

Recently, K–12 education has given rise to the flipped classroom paradigm. Most flipped classroom descriptions advise recording multimedia lectures so that students can watch them at their own leisure and outside of class (homework). This method of learning is asynchronous, which frees up class time for student-centre, synchronous instruction. K–12 advocates suggest a variety of in-class exercises, such as solo practice (doing arithmetic problems, for example) that allows the instructor to subsequently offer individualised assistance or large-scale inquiry projects. It has been proposed that class time in higher education courses concentrate on applying information. Additionally, it might give the instructor a better chance to spot thinking flaws.[10,11,12.]

One may argue that the flipped classroom has been around for a while in the larger educational community since it requires students to do preliminary work before class so that they can examine subjects more deeply.[13] In flipped classrooms, teacher-led instruction—which was previously the focus of the class—is replaced with homework—which is now completed in the classroom.[14] Furthermore, by having students complete assigned readings and participate more actively in class, the flipped classroom encourages student ownership of their education. Flipped classroom proponents contend that there are several benefits to this pedagogical approach, including: letting students learn at their own pace and giving them flexibility in when to use electronic resources; freeing up actual class time for in-depth discussion and related problem-solving exercises pertaining to the resources mentioned above; and letting students, not teachers, start these discussions. This model places a greater emphasis on their own learning, in order to work towards material mastery. The significance of the flipped learning strategy is in its ability to provide students and working adults with the necessary abilities to tackle issues connected to other disciplines or health care in the twenty-first century.

1.1. Purpose of the Research

The purpose of the present study was to investigate the effect of flipped learning on vital signs knowledge and skill. Checking vital signs is important skill for nurses, the student nurses should develop skill and thus helps the students to be confident while performing this procedure in future.

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1.2. Objectives

1. To assess the effect of flipped and the traditional learning on knowledge and skill of vital signs procedure.
2. To assess the satisfaction level between flipped and traditional learning method

2. Methodology

A posttest only control group design was adopted to measure student's skill performance and perceptions such as knowledge and satisfaction on flip classroom learning. This study has been conducted among second year- Level 3 nursing students who was taking the fundamentals of nursing course at the college of nursing, Tehama branch king Khalid university. The total 63 study participants were second year nursing students who registered in four different sections of fundamentals of nursing course were included in the study. The students' four sections randomly assigned into treatment group (two sections) and control group (two sections) equally by simple random sampling method. In this study, vital sign nursing procedure lecture specifically checking respiration and pulse was incorporated in both flipped and traditional learning group of students in the nursing laboratory. The following the vital signs lecture, the participants were provided an identical assessment to measure learning perceptions such as knowledge, skill, and satisfaction for both flipped classroom (FC) and traditional group students in the nursing lab. A structured self-reported knowledge questionnaire, observational skill assessment check list and 5-point satisfaction rating scale were utilized during the data collection phase in May 2024. The knowledge questionnaire comprises 20 MCQ questions and subsequently self-reported 5 -point satisfaction rating scales from "strongly satisfied to strongly disatisfied' with 10 items response set was delivered to both the learning group of students. A week later, due to time constraints, the skill was evaluated using observational check list with the score of 10 by two different evaluators in the nursing lab. The total score of Knowledge 10 categorised into poor (1- 4), Fair (5-7) and good (8-10). The skill score 10 were classified as novice skill (1- 4), Advanced beginner skill (5-7) and Competent skill (8-10). In addition, the satisfaction was characterized in to Low 1-30, moderate 31-40, and High 41-50. The computed Cronbach alpha value has shown the internal consistency of the Knowledge questionnaire was acceptable level ($\alpha = 0.734$) and Satisfaction rating scale ($\alpha = 0.894$) good level, which is sufficient to measure the study variables. The data were computed in SPSS version 16.0 for windows to run the independent t-test analysis and for plotting the graphs. A probability of 0.05 or less was taken as statistically significant. The ethical approval obtained from the ethical committee, King Khalid university.

Table 1.
Characteristics of the respondents (n = 63).

Item	Frequency	Percentage
2nd Year nursing students	31	48%
Flipped class Traditional class	32	52%
Gender: Female	63	100%

Table 2.
Reliability statistics: Knowledge questionnaire and satisfaction scale (n=63).

Knowledge questionnaire regarding vital signs lecture		Satisfaction scale regarding Teaching mode	
Cronbach's alpha	**N of items**	**Cronbach's Alpha**	**N of items**
0.734	10	0.893	10

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Table 3.
Traditional class versus Flipped class study variables (n=63).

Scores	Method of teaching	N	Mean	Std. deviation	Std. error mean
Skill	Traditional	32	9.87	.42	0.07
	Flipped	31	9.41	.95	0.17
Knowledge	Traditional	32	7.68	2.24	0.39
	Flipped	31	9.22	1.17	0.21
Satisfaction	Traditional	28	43.07	5.65	1.06
	Flipped	31	47.25	3.68	0.66

Table 3 depicts that there is a significant difference in the scores for skill (M=9.87, SD=.42), Knowledge (M=7.68, SD=2.24) and satisfaction (M=43.07, SD=5.65) among traditional and Flipped class students.

Table 4.
Differences between Traditional class and Flipped class students (n=63).

Variables	Levene's test for quality of variance		t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
	F	Sig.						Lower	Upper
Skill	24.65	.000	2.45	61	.017*	.455	.185	.083	.82
			2.43	40.89	.020	.455	.187	.07	.83
Knowledge	9.81	.003	-3.38	61	.001*	-1.538	.454	-2.44	-.62
			-3.41	47.06	.001	-1.538	.450	-2.44	-.63
satisfaction	5.78	.019	-3.40	57	.001*	-4.186	1.231	-6.65	-1.72
			-3.32	45.65	.002	-4.186	1.257	-6.71	-1.65

3. Results

In Table 4, the test findings reveal that there is difference in the skill score t (61)=2.45, p = 0.17, Knowledge score t(61)=-3.38, p = 0.01, and satisfaction score t(57)= -3.40, p = 0.01. Hence the results suggest that Flipped classroom really does an effect on students' Skill performance and knowledge and satisfaction. Specifically, our results propose that when flipped classroom facilitated to the students, their skill, knowledge, and satisfaction level increases.

Table 5.
Association between demographic variables and students knowledge, skill, and satisfaction.

Variables	Knowledge			Skill			Satisfaction		
1. Teaching method • Flipped Class • Traditional Class	chi-square (X2)	df	sig	chi-square (X2)	df	sig	chi-square (X2)	df	sig
	7.31	2	0.026*	2.132a	1	0.144	6.547a	2	.038*
2. Instructor's Explanations • Understood • Somewhat understood. • Not understood	3.83	4	0.428	0.768	2	0.683	10.851	4	0.028*
1. Learning (laboratory) environment	4.67	4	.322	1.451a	2	.484	30.78	4	0.00*

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• Suitable • Somewhat suitable • Un favourable									
2. Student's - English Language proficiency • High • Moderate • Low	2.04	4	.727	.645a	2	.724	3.897a	4	.420

In these results, the Pearson chi-square statistic of Teaching method and knowledge is 7.31, p-value = 0.026 and the likelihood chi-square statistic of Teaching method and satisfaction is 10.85 and the p-value = 0.038. Therefore, at a significance level of 0.05, we conclude that the association between the variables is statistically significant.

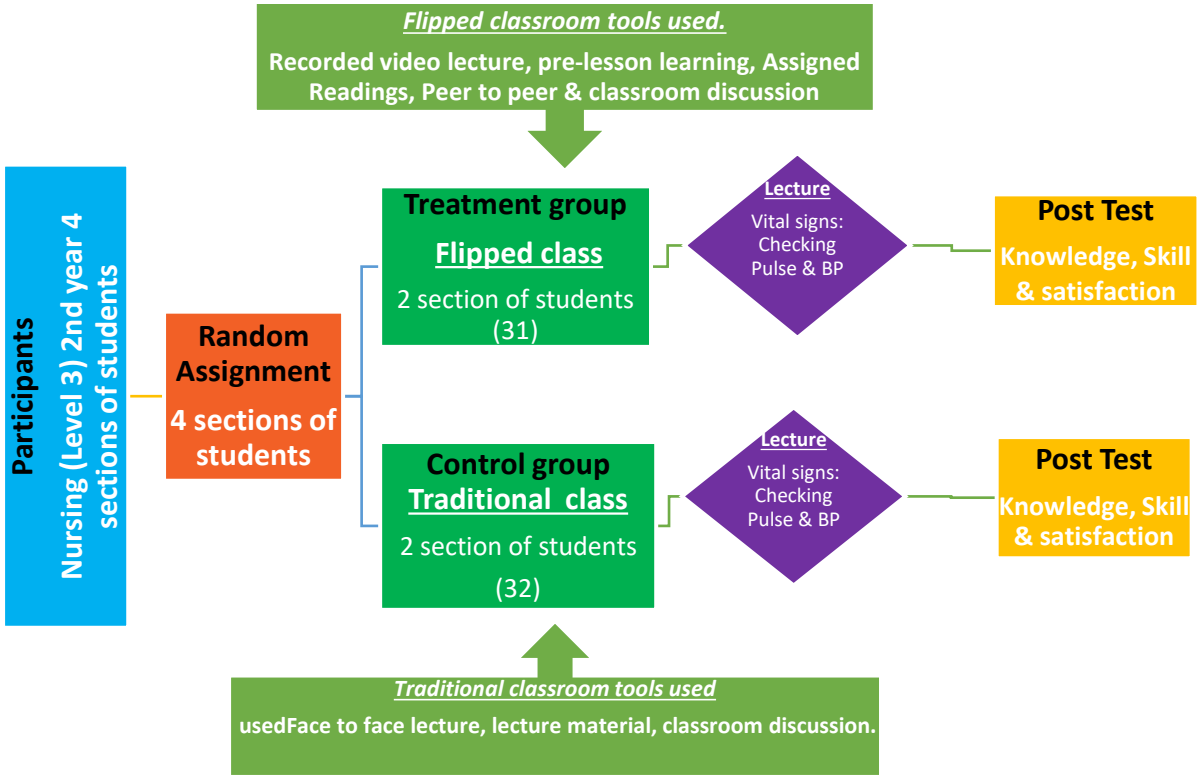

Figure 1.
Study design.

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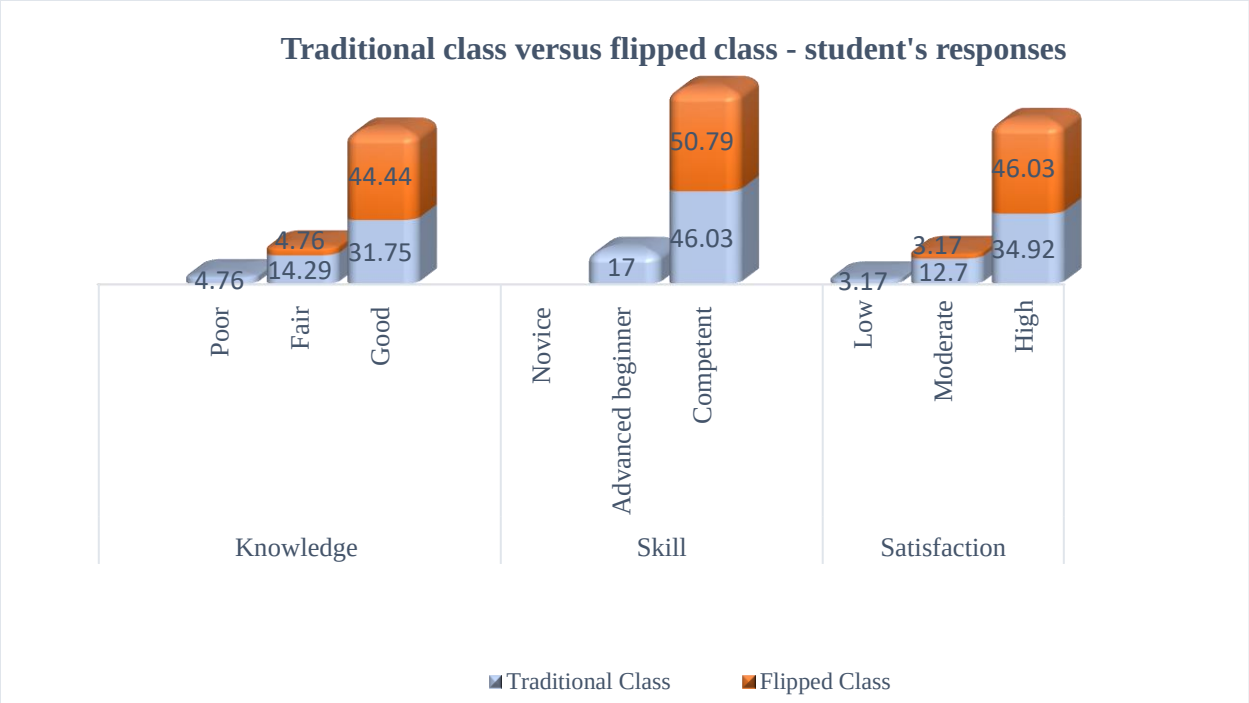

Figure 2.
Traditional class versus flipped class efficacy.

4. Discussion

Flipped classroom models have been popular in nursing education, where the flipped classroom flips the traditional style, rather than passive lectures in class and homework done solely. The present study found that the flipped class students expand their skill, knowledge, and satisfaction.

The findings aligned with the outcomes of study conducted on post-test experimental studies of nursing students (n=60). The experimental group (e-learning methods) and control group (traditional learning approach) registered significantly high satisfaction level. While the satisfaction level of the e-learning as part of flipped classroom was higher than traditional classroom, the course instruction supplemented the clinical skills of the nursing students.[15] The findings further reflect the assertions of a literature review by researcher on the traditional classroom enhancing active engagement with the learners and increasing their time commitment to the learning process. Further cited a flipped classroom as viable alternative to the traditional classroom as emphasised in this study since it enhanced satisfaction through critical thinking as well as problem solving skills. Both flipped and traditional classroom environments are meaningful options for the nursing students seeking efficacy while the different aspects of nursing course.[16]

This study further established the effectiveness of flipped classroom in building the knowledge level, satisfaction, and skill performance of the students on pulse and respiration checking. Past studies link flipped classroom to skill performance, knowledge, and satisfaction of nursing or medical students. The outcomes aligned with the findings of another study conducted as a quasi-experimental study of Oman nursing students. Online videos and active learning approaches of the flipped classrooms developed the anatomy and physiology skills of experimental group (n=53) better than control cohort (n=59) that underwent the same course but through traditional lecture approach. The students self-reported a higher satisfaction level with the flipped classroom than with the traditional lecture on anatomy and physiology at an Oman university.[17] Another systematic and meta-analysis of studies (n=29) confirmed the efficacy of flipped classroom pedagogy in improving critical thinking, problem-solving, attitude, and overall satisfaction level with the learning experience. Flipped classrooms are the most effective way of

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ISSN: 2576-8484
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teaching skills and increasing learning response in the nursing education environment since they maintain interactions and collaboration with the instructors. [18]

The study further found that flipped classrooms registered higher efficacy than traditional classrooms despite both teaching methods enhancing knowledge, skill, and satisfaction. The flipped classrooms used recorded video lecture, reading materials, classroom discussions, peer-to-peer, and pre-lesson learning to teach pulse and respiration assessment. The findings were congruent with the outcomes of study on a mixed methods study to establish the effects of flipped classroom approach on the psychomotor skill instruction of nursing students. The quantitative study found the active and passive learners improved their performance in psychomotor skills in flipped classroom than traditional laboratory class. Flipped classroom reduced the learning satisfaction of passive students ($P < 0.05$) but elevated the learning satisfaction of active students ($P= 0.07$). The qualitative aspect further reflected the findings of the current study by finding positive attitudes towards flipped classroom in active learners. However, researcher noted that flipped classroom was more favourable to the active learners than passive learners, who preferred the traditional learning environment to gain psychomotor skills. [19]

The findings further indicated the effective role of flipped classrooms in enhancing active student participation and engagement, which assisted in learning the skill of pulse and respiration evaluation. The outcomes concur with the findings of another study conducted on a mixed methods study of a convenient sample of nursing students ($n=22$). The quiz and case study-based learning in flipped classroom generated more engagement and academic performance than the traditional teaching methodology did.[20] Similarly, another researcher linked flipped classroom to high engagement level of students ($n=142$) in two undergraduate nutrition courses. The faculty and students emphasised the need for adopting the multifaceted flipped classroom than using traditional pedagogy due to increased rate of student engagement and subsequent skill performance.[21]

The study noted the role of incorporating multimedia resources such as videos and animations in enriching learning experience on pulse and respiration assessment better than the theory-based traditional classroom did. The fusion of different resources and their role in optimising learning experiences addressed the findings of their systematic review and meta-analysis of studies (n=22) involving nursing students increased teamwork, skills score, and confidence with nursing education. The Chinese nursing students learned more through the flipped classroom resources than traditional methods, which increased participation level, critical thinking, problem analysis, resolution, resilience, and overall skill competence than traditional teaching.[22] Another researcher findings from a review of articles ($n=13$) revealed the role of flipped classrooms in improving the skill performance and implementation of coursework. The different interventions used by the nursing educators enabled the nursing students to examine the different aspects of the course as well as think critically to practice or theoretical scenarios.[23]

The present study noted the outstanding advantages of flipped classroom leading efficacy of pulse and respiration assessment. The analysis found collaboration, interactions, flexibility, and adaptability during the learning process. Past studies established different advantages of flipped classrooms but concurred with the overall view of the pedagogical approach being effective in enhancing skills, knowledge, and satisfaction. For instance, the information gathered from a systematic review of different studies ($n=12$) found that the self-directed learning aspect flipped classroom enhanced learning readiness and competency better than traditional teaching model did. [24]

Another experimental study found the engaging and satisfactory learning of flipped classrooms as the process utilised digitally recorded lectures and face-to-face workshops. The students learned critical thinking skills through the flipped teaching set up at a better rate than independent learning before the intervention.[25] Similarly, another researcher found from a survey of students under flipped learning ($n=60$) and normal learning ($n=60$) that the former led to better motivation, engagement, and educational skill in information systems. Therefore, flipped classrooms are more applicable methods in the modern nursing teaching environment than traditional classroom since it aligns with the different circumstances as well as situations of the nursing students.[26]

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5. Conclusion

The flipped classroom helps students to grow and become responsible, self -regulating learner. Research evidence also suggests that the flipped classroom is an active learning strategy that can improve critical thinking skills. The healthcare field, specifically nursing students needs to consider broader implementation of this style of education.

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Edelweiss Applied Science and Technology
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