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Transforming Education: Enhancing Student Performance and Satisfaction through the Flipped Classroom Method

Sija Binoy[1*]

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ABSTRACT

The flipped classroom, a form of blended learning, has gained popularity in higher education due to its potential to improve student engagement and performance. This approach addresses limitations in traditional teaching methods, such as didactic lectures and passive learning methods, by moving content delivery outside class and utilizing in-person sessions for active learning activities. This study aimed to assess the effectiveness of the flipped classroom as a teaching-learning strategy and to gather students' opinions of the idea. A second-year undergraduate nursing class (n = 96) was split into two groups, one of which used the flipped classroom technique and the other the conventional approach in a quasi-experimental design. Questionnaires on a Likert scale were utilized to assess students' opinions of the flipped classroom, and pre-and post-test results were evaluated. A variety of statistical analyses were used to compare mean scores and evaluate the efficacy of the flipped classroom, including paired and independent t-tests. A quasi-experimental study involving a second-year undergraduate nursing class showed a statistically significant improvement in student performance and a positive perception of the flipped classroom approach with $P<0.001$. The flipped classroom in nursing education allows students to learn at their own pace through pre-class work, with an instructor as a facilitator. This personalized approach uses technology like online platforms and collaborative tools to deliver lectures and facilitate in-class activities, potentially improving student engagement, critical thinking, and clinical reasoning abilities.

INTRODUCTION

The ongoing intellectual revolution places high importance on higher education (Ye *et al.*, 2019). The COVID-19 epidemic has created new educational opportunities despite its difficulties (Sari & Nayır, 2020). By updating the curriculum with program learning outcomes that prioritise outcome-based learning and skill growth, innovative methods and strategies for instructional delivery, teaching, and learning have the potential to revolutionise education (Singh *et al.*, 2021). Worldwide, blended learning programmes that combine traditional classroom instruction with online education have been implemented due to technological improvements. These programs are now acknowledged to be increasing influence on how current health professions students study in classroom settings and acquire knowledge (Singh, 2021). Blended learning has been suggested to increase student engagement and instructor productivity, cater to a broader student body and improve retention rates. The flipped classroom has become popular as a blended learning strategy in recent years (Dakhi *et al.*, 2020).

The preparation of future healthcare professionals who can deliver high-quality patient care is greatly aided by nursing education. As the healthcare landscape changes, teachers work to improve student performance and happiness in nursing programmes (Tang *et al.*, 2010). The flipped classroom concept is one creative strategy that shows promise in reaching these objectives. This essay examines how the flipped classroom strategy might enhance student engagement and performance in nursing courses. Nursing education has traditionally been taught in the classroom using a combination of didactic lectures, textbook readings, and hands-on training (Deng, 2019). Although this paradigm has laid a basis for information, it frequently fails to actively engage students and foster the critical thinking abilities required for successful nursing practice. Various degrees of student performance and satisfaction, a passive learning environment, and little possibilities for involvement have all been ongoing issues in nursing education. The flipped classroom paradigm can help educators overcome the drawbacks of the conventional method and foster student-centred learning, active participation, and critical thinking abilities. The flipped classroom promotes independence and self-directed study habits by encouraging students to take responsibility for their education (Hessler, 2019).

Additionally, the interactive format of in-class exercises improves students' comprehension and recall of challenging nursing topics and fosters cooperation and teamwork, which are essential abilities for future healthcare workers (Kim *et al.*, 2019). A regular learning environment and its activities are changed, or at least reconfigured, in the "flipped classroom," a pedagogical concept (Youhasan *et al.*, 2021). In a Western university setting, for instance, the typical lecture and follow-up learning activities may be flipped, with the instructional lecture content being supplied online before class time, and in-class time is used for more active group learning

[1] Gulf Medical University, UAE
[*] Corresponding author's e-mail: sija_2000@yahoo.com

exercises than those conducted in traditional lectures. Like any new curriculum design, flipped approaches aim to improve student learning; for example, Khan Academy has adopted the flipped classroom model as a fundamental component of its educational approach. Students can access pre-recorded video lessons on the Khan Academy platform, which cover various subjects like math, science, humanities, and more. These video lessons are the primary source of content delivery outside the classroom. However, in these tight budgets, the promise of more effective resource management is also likely to be mentioned, along with the potential advantage of using new digital tools. In recent years, the traditional classroom paradigm has come under increasing fire for its shortcomings in encouraging student engagement, active learning, and individualised instruction. Alternative instructional strategies have drawn attention as educators work to improve student performance and happiness (Hessler, 2019). The flipped classroom is one such strategy, which flips the conventional educational paradigm by moving content delivery outside of class and enabling more engaging and student-centred learning experiences in the classroom (Nja *et al.*, 2022). This essay examines how the flipped classroom strategy might enhance student engagement and performance. For many years, the foundation of education has been the traditional classroom model, which is characterised by a teacher-centred approach with lectures, textbook readings, and in-class activities. Undoubtedly, it has given clear instructions and a well-organized framework for learning. However, this approach frequently fails to actively engage pupils, foster critical thinking, and meet each student's unique learning needs (Barbour & Schuessler, 2019). The traditional classroom paradigm has long been hampered by passive learning, little possibilities for engagement, and uneven levels of student performance and satisfaction (Cheng *et al.*, 2019).

LITERATURE REVIEW

Flipped Classrooms

Over the past few years, the notion of "flipping" the classroom has gained popularity in the educational community. The flipped classroom method seems an alluring new tactic for the driven teacher. Teachers are expressing interest, numerous courses have been produced, and technology usage in the classroom has risen (Galindo-Dominguez, 2021).

Universities worldwide are adopting the flipped classroom strategy as a teaching strategy to improve academic achievement, active learning, and student engagement. Here are some instances of universities from various nations using the flipped classroom model:

United States

Harvard University in the US has adopted the flipped classroom format across various subject areas. For instance, the Harvard Medical School instructs medical students using the flipped classroom strategy, enabling them to work together on problems during in-person sessions. Similarly, Harvard Business School uses the flipped classroom format in its MBA programmes to promote case-based debates and active learning (Talbert, 2023).

Canada

The University of British Columbia (UBC) has incorporated the flipped classroom strategy into several academic programmes. The Faculty of Science at UBC has used the methodology in classes like biology and chemistry, giving students pre-class materials and utilising in-class time for practical experiments, group work, and debates (Petillion & McNeil, 2020). The Faculty of Education at UBC also uses the flipped classroom approach to prepare future teachers.

Australia

The University of Queensland (UQ) has incorporated the flipped classroom approach into numerous courses across multiple faculties in Australia. Pharmacy students at UQ's School of Pharmacy benefit from the flipped classroom strategy, which encourages critical thinking and active learning. Before class, students participate in pre-class activities, including watching video lectures, and then during class, they work together to solve problems (Reinke, 2019).

United Kingdom

The University of Nottingham has applied the flipped classroom approach in several academic fields. For instance, the School of Medicine at the University of Nottingham uses the strategy to help medical students improve their clinical reasoning abilities (Durrani *et al.*, 2022). Case discussions, simulations, and interactive exercises take up most of the class time as students examine pre-recorded lectures and materials in preparation for live sessions.

Singapore

As part of its instructional strategy, Nanyang Technological University (NTU) in Singapore have adopted the flipped classroom concept (Rajaram, 2019). NTU's College of Engineering uses the flipped classroom format in several engineering courses, allowing students to obtain pre-class materials online and use in-person sessions for collaborative learning, problem-solving, and design projects.

The flipped classroom inverts traditional teaching methods by delivering video instruction outside the classroom and moving homework into the class day" (Electronic Education Report, 2019). Instead of lecturing, the teacher can use the limited class time to reinforce concepts through experiments, projects, and other cooperative learning activities (Colomo-Magaña *et al.*, 2020). The flipped classroom concept presents an innovative strategy in response to the demand for a more student-centred and interesting learning environment.

Students were introduced to the material outside of class in a flipped classroom through pre-recorded lectures, online resources, or readings (Barbour & Schuessler, 2019). With the help of this pre-class work, students may learn the fundamentals at their own pace and get ready for in-depth discussions and group projects in the classroom. In this method, the teacher facilitates group work, discussions, problem-solving, and individualised instruction during class (Colomo-Magaña *et al*., 2020). By encouraging active learning, raising student involvement, and offering chances for individualised education, the flipped classroom method has the potential to overcome the shortcomings of the conventional classroom paradigm. The flipped classroom promotes critical thinking, problem-solving abilities, and active involvement by moving the emphasis from knowledge delivery to application and deeper understanding.

Additionally, it provides the opportunity to modify instruction to meet the needs of each student and promotes more fruitful interactions between students and teachers. Although the flipped classroom strategy has grown in acceptance, evaluating its effects on pupil performance and satisfaction is crucial. By examining the efficiency of the flipped classroom approach in enhancing student results, this research seeks to add to the body of existing literature (Zheng *et al*., 2020). The present study intends to offer useful insights and suggestions for educators and policymakers by examining pertinent research studies, examining the experiences of students and teachers, and assessing the effects on performance and satisfaction.

Flipped Classroom in Nursing Education

The usual educational sequence is reorganised using the flipped classroom approach, commonly called the inverted classroom or reverse teaching. Using class time for active learning, collaboration, and knowledge application entails switching from in-class lectures to independent learning outside the classroom. The flipped classroom paradigm is intended to improve student engagement, critical thinking, and clinical reasoning abilities in the context of nursing school (Özbay & Çınar, 2021).

Core Components of the Flipped Classroom Approach in Nursing Education

Pre-Class Work

Students are given pre-class work in the flipped classroom, often accessing pre-recorded lectures, online modules, reading materials, or other multimedia resources related to the addressed topic. Before participating in the in-person class sessions, students are asked to review and interact with this material (Choi *et al*., 2021).

In-Class Activities

The flipped classroom paradigm turns class into a collaborative and interactive learning environment. Students participate in numerous activities promoting active learning, such as discussions, case studies, simulations, hands-on exercises, and group projects, instead of passively taking in lectures (Ha *et al*., 2019). Students can use their pre-class knowledge in these tasks and practise critical thinking, problem-solving, and clinical reasoning.

Facilitator Role of the Instructor

The instructor's function in a flipped classroom changes from that of the single knowledge source to that of a facilitator or guide. The instructor's job is to foster an encouraging and engaging learning environment, enable dialogues, offer direction and feedback, and encourage greater comprehension of the material (Al-Samarraie *et al*., 2020). The instructor may also conduct in-class tests or formative evaluations to determine whether students have understood the material and pinpoint areas needing more explanation or attention.

Technology Integration

Technology is crucial to adopting the flipped classroom model in nursing education. Pre-recorded lectures or instructional resources are distributed through online platforms, learning management systems (LMS), or video-sharing websites. Technology tools like online discussion boards, collaborative platforms, or simulation software may promote communication, cooperation, and active learning during in-class activities (Wawan *et al*., 2022).

Personalised Learning and Individualised Instruction

The flipped classroom paradigm allows more individualised instruction and personalisation. The pre-class materials are flexible enough for students to work through at their own pace and return to them as necessary. The ability of the instructor to address unique student requirements, offer individualised advice, and customise feedback depending on each student's progress and comprehension is made possible by in-class activities (KOPPAD).

Beginning of Flipped Classroom

The Flipped Learning Network states that in 2004, teachers Jonathan Bergman and Aaron Sams started working at Woodland Park High School in Woodland Park, Colorado, where they were appointed as the new chemistry department for the institution. They were eager to discover a means to reach more of their pupils after realising that their students frequently missed class due to prolonged travel for sports and other activities. The team started by turning their PowerPoint slides into a voice-over and annotation-enhanced video file. By the spring of 2007, they employed screen capture software to record live lectures and upload them online for easy student access (Oudbier *et al*., 2022). Aaron used the flipped technique while teaching, and Jonathan used the conventional approach. Both teachers have received the Presidential Award for Excellence in Math and Science Teaching. In addition, they assert that "many teachers from around the world have adopted the model and are using it to teach

Spanish, Science, Math, elementary, middle, high school, and adults" in addition to "changing their classrooms." Additionally, the two collaborated on the 2012 book Flip Your Classrooms: Reach Every Student in Every Class Every Day (Webb & Doman, 2020).

Implementation of a Flipped Classroom

As more blogs, articles, and social networks have been created to share ideas and compare data, teachers have indicated an increasing interest in flipping the classroom. According to Greg Toppo, who wrote an article for USA TODAY, "Flipped classrooms have even attracted the attention of funders like the Bill & Melinda Gates Foundation, which has become a major backer of Khan Academy, a non-profit repository of nearly 2,400 free instructional videos" (Plota & Karalis, 2019).

Traditional Classroom

In traditional classroom instruction, the instructor frequently acts as the principal source of knowledge by giving direct instruction. Students must take notes, which are then used in a guided practise activity and a formative evaluation to determine how much homework will be given on a particular topic. Other tasks or projects might be given if students demonstrate mastery of the material. If not, the teacher might take time to explain misunderstandings and respond to questions from pupils who want to ask them (Serrano *et al.*, 2019).

Strengths of the Traditional Classroom Model

Direct Instruction

The conventional paradigm enables the teacher to impart knowledge directly to the pupils, clearly outlining concepts and topics.

Structure and Organization

The model often adheres to a well-structured curriculum with clear learning objectives, lesson plans, and assessments.

Teacher Expertise

The teacher's skills and experience are essential to the classroom since they enable pupils to gain from their expertise and leadership.

Classroom Management

The traditional approach offers a structured classroom management setting and defined expectations for the student's duties.

Limitations of the Traditional Classroom Model

Limited Student Engagement

The traditional approach frequently prioritises passive learning, when students primarily serve as consumers of knowledge rather than active contributors to the learning process. This insufficient involvement may cause apathy and decreased motivation.

Passive Learning

The traditional paradigm, which emphasises lectures and teacher-led activities, may not promote critical thinking, problem-solving, or self-directed learning because students are primarily expected to learn and retain knowledge.

Varying Levels of Student Performance

Students with diverse learning requirements, abilities, and interests may find it difficult to stay up or may not be sufficiently challenged due to the one-size-fits-all approach. The performance and accomplishment of students may differ as a result.

Lack of Personalisation

As instruction and activities are not adjusted to meet the requirements, learning preferences, or interests of each student, the traditional model frequently falls short of personalization and differentiation.

Limited Feedback and Interaction

The teacher-centred method may restrict opportunities for fruitful student-teacher communication and prompt feedback, impeding students' capacity to get direction and explanation.

These limitations underline the demand for educational strategies that address these issues and improve student engagement, active learning, and specialised instruction. One such strategy is the flipped classroom method, which seeks to get around these restrictions by giving students more chances for student-centred learning, collaboration, and critical thinking.

Flipped v/s Traditional Classroom

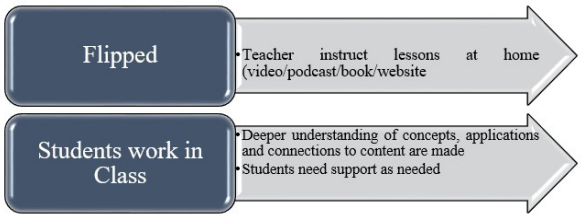

Figure 1: Students work approach in the flipped classroom

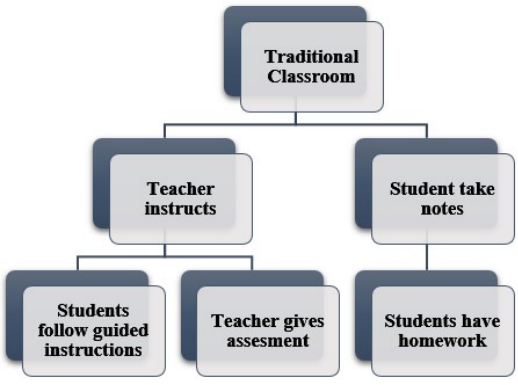

Figure 2: Students' work approach in the traditional classroom

Why Flip Classroom Instruction?

An AP Calculus teacher, Stacey Roshan, advocates for a method where students watch lessons at home and replay confusing sections. If they still struggle, they ask a friend or Roshan the following day. This approach encourages students to find solutions instead of giving up. However, some students dislike flipping because it requires active involvement in their learning process, making the content more challenging if students are not intrinsically motivated. Policymakers, scholars, and advocacy groups are seeking more evidence that students are truly learning in college (Hang).

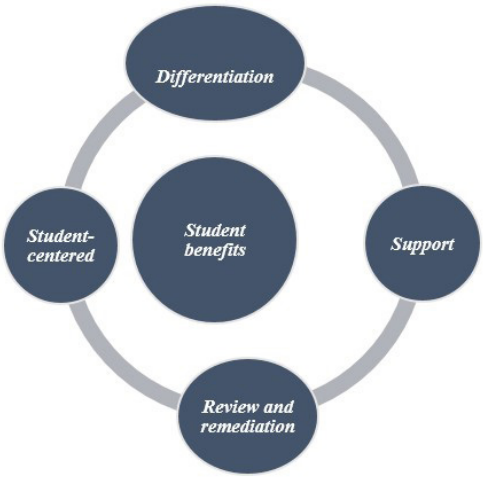

Figure 3: Student benefits over flip classroom

Stacey Roshan's Flipped Classroom Method in AP Calculus

Emphasises the method that AP Calculus teacher Stacey Roshan promotes, in which students view classes at home and seek clarification on murky passages the following day. Roshan's approach places a strong emphasis on problem-solving and self-directed learning.

Encouraging Students to Find Solutions through Active Involvement

It emphasises the value of problem-solving, asking for peer assistance, and growing a sense of ownership over one's education.

Challenges of the Flipped Classroom Approach

Possible drawbacks of the flipped classroom approach. It recognises that the method calls for active participation from students, which can be more difficult if they lack intrinsic desire or have difficulty with self-directed learning.

Seeking Evidence of Student Learning in College

relates to the ongoing search for proof that college students are learning using the flipped classroom strategy. It implies that decision-makers, academics, and advocacy organisations are actively looking for facts and research to confirm the efficacy of this pedagogical approach.

Perspectives of Policymakers, Scholars, and Advocacy Groups

highlights the opinions of academics, policymakers, and advocacy organisations regarding the flipped classroom strategy. In terms of student learning and overall educational success, it suggests that these stakeholders have a stake in evaluating the impact and results of this educational technique.

MATERIALS AND METHODS

A pre-test and post-test questionnaire with a quasi-experimental design was created to determine the degree to which the study's goals have been met. The student's perspective of their flipped learning process was investigated using a quantitative methodology. The participants were given evaluation tests before and after the flipped classroom learning approach. With the aid of the statistical software packages Epi Info version 5.0 for Windows and Statistical Package for Social Sciences version 17.0, the sample size was calculated for a finite population. The 96-person second-year undergraduate nursing class was the subject of the study. It was conducted in a chosen nursing college for three months, from September to November 2021. The institutional ethical committee granted permission after receiving ethical clearance. The students in the current study were split into two groups using a practical sampling technique. The 48 people in each batch were sorted into two groups using the odd-even number method. Batch I was a group that participated in flipped learning, whereas Batch II was a traditional group. Each student in both batches provided their informed permission. The themes chosen for this study were taken from the adult health nursing course, including digestive system illnesses, circulatory system disorders, and respiratory system problems. A "Flipped Class" folder was initially made and distributed among the students in Batch I on Google Drive. That folder had three topic folders where learning objectives, recorded webinars, videos, learning content, and reading recommendations were shared a week earlier. Access instructions were posted inside the folder for the participants to access the information for that week. A discussion forum was also developed to allow students to post their queries and doubts for discussion with the facilitator or teacher. The subjects were to be discussed for thirty minutes. The students completed the worksheet after discussing the subject. The facilitator/teacher led Batch II's traditional instruction in this manner. Following the completion of each topic, multiple choice questions of the same type were provided for the pretest and posttest. After 10 days of finishing all three topics, a test was given. The surveys are useful since they quantify nature and make it simple for researchers to gather data from many respondents.

A 10-item opinion survey was distributed to Batch I students to ascertain their opinions on the flipped classroom idea. The evaluations were made using a Likert

scale, where one represents "strongly dissatisfied" and five represents "strongly satisfied." Data was gathered, coded, and entered into an Excel sheet. Before data analysis, the tool's level of validity and reliability was approximately estimated. For comparing the means of the pre-and post-tests for each topic, a paired t-test was computed. Additionally, using an independent t-test, the results of the summative exams for Batch I (flipped classroom) and Batch II (traditional technique) were compared. The student perception of the flipped classroom concept was calculated from the 5-point Likert scale scores and expressed as a percentage.

RESULTS

The study's objectives were to assess the effectiveness of the flipped classroom as a teaching-learning strategy and to gather students' opinions of the idea. Both indices of central tendency and variability (standard deviation) measurements were quantified using descriptive statistics. When the mean scores from the pretest and posttest for each topic were compared, it was discovered that the mean difference in the scores was statistically significant.

Table 1: Comparison of the pretest and posttest mean scores for the adult health nursing course's three chosen themes using the flipped classroom (Batch I) and traditional approach (Batch II)

Groups	Topic 1		Topic 2		Topic 3	
	Pretest Scores	Posttest Scores	Pretest Scores	Posttest Scores	Pretest Scores	Posttest Scores
Flipped classroom (Batch I) n = 48	9.57	12.61	9.67	12.85	9.51	13.19
Conventional method (Batch II) n = 48	7.65	10.10	5.59	09.89	5.87	10.01

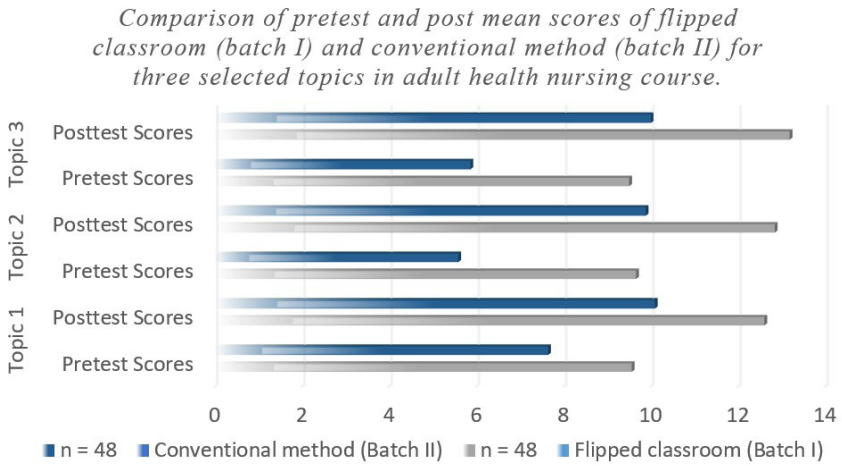

Figure 4: Comparison of pretest and post-mean scores of the flipped classroom (batch I) and conventional method (batch II) for three selected topics in adult health nursing course
Source by Author

Table 2: Compares mean test scores for the traditional approach (Batch II) and the flipped classroom (Batch I) (n=96)

Groups	Batch I n = 48		Batch II n =48	
Mean scores	**Mean**	**SD**	**Mean**	**SD**
	15.51	3.75*	9.59	3.89

*SD=Standard Deviation, Independent t-test * P<0.0001*

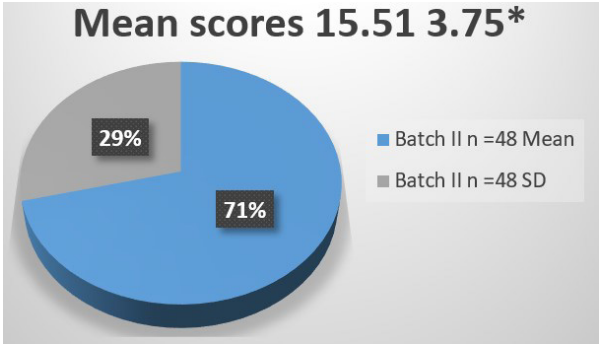

Figure 5: Compares mean test scores for the traditional approach (Batch II) and the flipped classroom (Batch I).
Source by Author

Table 3: Students' perceptions of the flipped classroom concept as a teaching-learning process are quantified by frequency and percentage (n = 48)

SN	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
1.	Learning objectives of the topic are clearly defined one week prior to the actual session	30 (62.5%)	16 (33.33%)	2 (4.17%)	-	-
2.	Learning foundational content before the actual session enhances my comprehension of the material.	29 (60.42%)	13 (27.08%)	1 (2.08%)	5 (10.42%)	-
3.	Viewing webinars and videos and taking notes helped me better understand the content.	27 (56.25%)	17 (35.42%)	-	4 (8.33%)	-
4.	Felt well prepared to perform worksheets after going through the learning material.	29 (60.42%)	18 (37.5%)	1 (2.08%)	-	-
5.	Attention is drawn to the learning and teaching process and promotes collaborative learning.	27 (56.25%)	16 (33.33%)	1 (2.08%)	4 (8.33%)	-
6.	Flipping the classroom allows me to ask more questions during the discussion.	27 (56.25%)	15 (31.25%)	2 (4.17%)	4 (8.33%)	-
7.	The flipped classroom also promotes self-directed learning.	32 (66.67%)	15 (31.25%)	-	1 (2.08%)	-
8.	The flipped classroom did not refrain from my interaction with teachers.	28 (58.33%)	16 (33.33%)	2 (4.17%)	2 (4.17%)	-
9.	The flipped classroom allows me to practice my critical and creative thinking skills.	29 (60.42%)	15 (31.25%)	2 (4.17%)	2 (4.17%)	-
10.	The teacher was able to engage during the flipped classroom session.	35 (72.92%)	11 (22.92%)	1 (2.08%)	1 (2.08%)	-
11.	This method of instruction is more engaging than the conventional method.	39 (81.25%)	7 (14.58%)	2 (4.17%)	-	-
12.	It is an enjoyable method of learning.	33 (68.75)	12 (25%)	-	3 (6.25%)	-

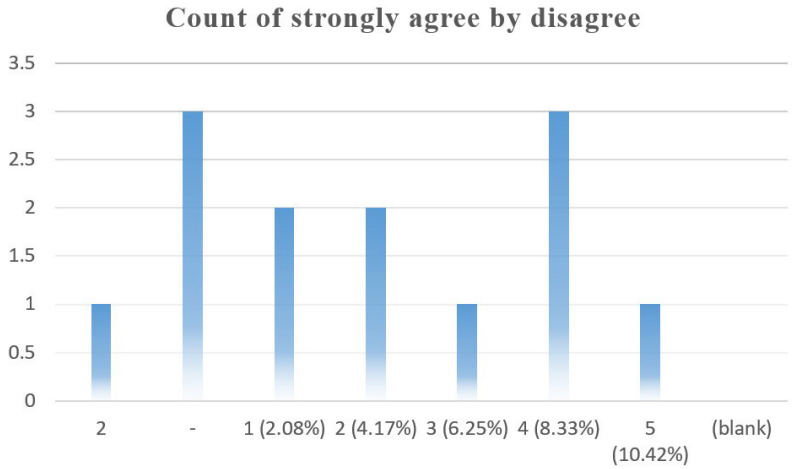

Figure 6: Students' perceptions of the flipped classroom concept as a teaching-learning process are quantified by frequency and percentage
Source by Author

Findings revealed favorable perceptions of the teaching-learning process concerning the second objective. Responses from students who filled out the opinion survey were compiled. 96% of students said the flipped classroom approach was more engaging than the traditional approach. Ninety-eight percent of respondents said that using a flipped classroom helped students study on their initiative, and 92% said it helped them develop critical and creative thinking skills.

DISCUSSION

Increased Participation in Educational Activities

The flipped classroom approach, sometimes called the inverted classroom paradigm, has been adopted by various academic disciplines and learning contexts worldwide. The author reviewed the factors that contributed to the success of the flipped classroom (Hew & Lo, 2018). The six main factors that affected the effectiveness of the flipped classroom were student characteristics, teacher characteristics, implementation, task characteristics, outside-of-class activities, and inside-of-class activities. The level of learner autonomy, the role and motivation of the teacher, the method of evaluation, and prompts or feedback for self-study are all mediating factors. These factors may be strengthened by structuring the learning process and concentrating teacher preparation on competencies and learning-and-teaching strategies essential in the flipped classroom. After conducting a meta-analysis of comparative studies about traditional teaching methods, Hew and co-investigators found that the flipped classroom strategy in health professions education considerably enhances student learning.

Furthermore, the flipped classroom method worked better when instructors gave assessments at the beginning of each in-class period. Most respondents preferred flipped courses over regular classrooms (Limniou *et al.*, 2018). This study determined whether flipped classrooms effectively taught important concepts in adult health nursing and how the students perceived them. The design includes interactions between students, involvement with the facilitator, and active learning through group discussions on a forum. The flipped class approach dramatically increased the mean post-test scores and overall scores. Based on the findings from the student's perception of the flipped classroom, it can be concluded that the students generally had positive views of their learning experiences. According to studies by Limniou and Lyons, students had similar preferences, and noticeable differences were seen in the students' responses to questions about the teacher's role in the teaching approach, the improvement of higher-order thinking abilities (HOTS), and the choice of instructional resources. These results demonstrate the critical interdependence between selecting educational resources and activities, teachers' participation in the flipped classroom strategy, and their attitudes and behavior toward technology (Barkley, 2015). The outcomes were consistent with what was discovered in the recent investigation. Barkley claims that instructors who participated in flipped class design considered the experience "exalting," with good student learning and engagement. The design and implementation phases improved student learning and were enjoyable and enlightening experiences. The ability of the teachers to provide at-risk students with extra encouragement and attention was the biggest benefit (Oliveira-Kumakura *et al.*, 2018). Accordingly, Hee-Jung and Sun-yen conducted a pre-post-experimental study and found that integrating blended learning into nursing education can significantly increase nursing students' critical thinking (Tørris *et al.*, 2022).

Better Comprehension of Concepts and Academic Success

A scoping review conducted by Leidl, Ritchie, and Moslemi expressed the increased utilization of blended learning in writing nursing instructions, extending to decentralized and adaptable learning styles in nursing education (Oh & Yang, 2019). Another study in consensus with implementing the blended instruction method for integrating evidence-based practice into nursing core courses depicted enhanced nursing students' competence in self-directed learning, cognition and expertise in utilizing evidence (Kiviniemi, 2014). The impact of the blended learning approach was found to be statistically significant in health services education irrespective of the students preceding year's academic achievement and success (Yang *et al.*, 2021). The flipped classroom represents an ongoing paradigmatic shift in education from passive teacher-centered instructional strategies to active student-centered learning strategies. The study was conducted to understand the efficacy of flipped classroom concepts in teaching nephrology compared to traditional lecture-based teaching. 62 medical students were involved. The results suggest that flipped classroom was beneficial compared to the traditional method for comprehending concepts, critical thinking, management and teamwork (Zhu *et al.*, 2020). Zhu, Lian and Ergstorm conducted a quasi-experimental design with 200 students undergoing nursing, dental and medical ophthalmology course. The study's findings suggested that students' self-rated learning ability improved significantly, and the three factors that drastically improved were 'learning goals', 'self-efficacy & social learning' and 'problem-solving'. The students performed very well in the skill examination, indicating a positive impact and improved cognition (Martínez-Jiménez & Ruiz-Jiménez, 2020). Another set of authors also suggested that summative-formative assessment improved with flipping courses compared to traditional lectures (Unal & Unal, 2017). Unal and Unal also stated that the flipped classroom model demonstrated higher student learning gains, more positive student perception, and higher teacher satisfaction than the traditional model. This study added evidence to the current literature that, if the conditions are properly set, the flipped classroom could be an extremely effective learning style (Clark *et al.*, 2022).

Personalized Learning Approach

As suggested by the studies conducted by Clark *et al.*, flipped classrooms encouraged adaptive learning by students, which brought positive changes in the perception of the classroom environment, preference for instruction, independent learning and self-motivated learning. The emerging literature in medical education has also suggested that adaptive learning and flipped classrooms will be vital in post-pandemic instruction

(Nouri, 2016). According to Nouri, a flipped classroom is a supporting tool that positively changes students' attitudes, motivation and effective learning. Even the low achievers perceived this mode of instruction as interesting and effective (Wang & Jou, 2023). Wang and Jou reflected that flipped classrooms allowed self-directed learning and cognitive flexibility. The study results laid a foundation for designing the classroom environment with differentiated instruction (Moffett, 2015).

CONCLUSION

The flipped classroom approach offers individualized learning experiences by assigning pre-class work, allowing students to engage with content at their own pace and revisit it as needed. This flexibility allows students to cater their learning to their unique needs and styles, improving academic performance. The model promotes active learning and higher-order thinking skills through in-class activities, fostering deeper understanding and transferability of knowledge to real-world contexts. The flipped classroom method facilitates collaboration and teamwork, fostering social interaction, communication skills, and a sense of community. Technology, such as online platforms, learning management systems, and video-sharing websites, facilitates self-paced learning and, communication and interaction, even outside traditional class hours.

LIMITATION

The study's limitations include peer influence on the student's response and the data collected from two groups; one was a traditional classroom, and another form was a flipped classroom. One of the study's major limitations was that the approach was applied to three systems only, limiting the scope and impact of the study. Furthermore, teachers need to be provided with more training for smoother implementation of the flipped course. Also, including a larger sample size would help improve the statistical significance.

Novelty of Research

The study explored the use of a flipped classroom model in adult health nursing education, focusing on developing clinical reasoning and critical thinking skills for future medical professionals. It used objective metrics and qualitative surveys to assess students' experiences and incorporates practical information on digital resources and technological tools. Comparing the approach with conventional teaching methods offers a nuanced perspective on the benefits of each method. The research contributed to the growing body of information on cutting-edge pedagogical approaches in healthcare education.

Contribution to Knowledge

This study investigated the flipped classroom model's impact on adult health nursing education, focusing on its effectiveness in improving critical thinking and clinical reasoning skills. It used quantitative and qualitative methods to understand students' perceptions and learning objectives. Furthermore, key themes in adult nursing were identified, and digital resource development and application were analysed.

Research Gap

This research focused on the implementation of the flipped classroom model in adult health nursing education, aiming to fill a knowledge gap by analysing students' perspectives and experiences and offering customised insights for creating unique curricula and instructional tactics.

Ethical Considerations

Concerning 11/01/2021, the ethical committee approved this research project under number PCN/9628/2021. The ethical concerns of both the qualitative and quantitative investigations were taken into account by the researchers. Participants in this study were free to leave the study at any time.

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