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NURSING STUDENTS' PERCEPTIONS AND PERFORMANCE IN A FLIPPED PHARMACOLOGY COURSE

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ABSTRACT: This study investigates the perspectives and academic outcomes of nursing students participating in a flipped pharmacology course to foster active, student-centered learning. This pilot study investigated the impact of pre-class digital content, in-class problem-based exercises, and group discussions on students' comprehension, engagement, and confidence in applying pharmacological principles. Data was collected via performance assessments, surveys, and reflective comments. The data indicate that most students perceived the flipped technique as enhancing their comprehension, motivation, and engagement. The evaluation's findings indicated that, relative to conventional lecture formats, performance exhibited only marginal improvement. Conversely, pupils indicated a necessity for continuous mentoring and expressed the need to allocate additional time for preparation. The study illustrates the efficacy of flipped learning in pharmacology education. It underscores the importance of effectively organizing lessons, providing students with a cordial reception, and offering them assistance.

Keywords: *Flipped classroom, Traditional classroom, Likert item, Quantitative analysis.*

1. INTRODUCTION

The primary objective of teaching is to facilitate successful learning (Haghani, Rezaei et al., 2016). According to several studies (Whiffin and Hasselder 2013, Johan 2024, Mujiono, Weganofa et al. 2024, Penelitian, Ipa et al. 2024), most youngsters fail to develop critical thinking, writing, and analytical skills. Certain research attribute these outcomes to the concept of traditional classroom learning (Lattuca, Bergom et al. 2014, Laursen, Hassi et al. 2014, Rico and Ertmer 2015). Consequently, educators must modify their instructional methods.

A technique for transformation is the flipped classroom model. In 2000, the term "flipped classroom" was defined as the scenario in which conventional classroom activities occur outside the classroom, while external activities are conducted within the classroom (Lage, Platt et al. 2000; Northrup and Burke 2015; Triantafyllou, Timcenko et al. 2016; Algayres and Triantafyllou 2019). This paradigm enables students to access previously delivered classroom material, including in-person lectures, prior to the actual class.

The lecture material is delivered using various media, audio recordings, or alternative written formats (Herreid and Schiller 2013, Presti 2016). Group problem-solving, case studies, discussions, and experiments occur in the presence of the instructor (Herreid and Schiller 2013, Presti 2016).

Liu, Ripley et al. (2016) assert that the flipped classroom model represents a mixed learning approach that transforms learning by integrating formal (conventional classroom) and

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informal (online courses) methods. The term "flipping" derives from the concept of switching homework and classwork (Ash 2012).

In a flipped classroom, students must review lecture videos or study materials prior to attending class. Subsequently, students can implement their classroom knowledge through discussions, problem-solving, role-playing, case studies, and several other educational activities. This may lead to increased focus, engagement, and enthusiasm among students during class (Kurt 2018).

According to Tune et al. (2013), flipped learners are generally more prepared for the course material. This environment typically enhances learners' entertainment, engagement, and enthusiasm (Tune, Sturek et al., 2013; Davies, Dean et al., 2013; Butt, 2014; Kazanidis, Pellas et al., 2018).

Numerous research indicate that flipped learners generally achieve superior results on examinations (Tune, Sturek et al. 2013; Findlay-Thompson and Mombourquette 2014; Al-Zahrani 2015; El-Banna, Whitlow et al. 2017; Thai, De Wever et al. 2017; Chun and Heo 2018; Kazanidis, Pellas et al. 2018). This may arise from children having increased time to prepare for class, engage in activities, and interact with their peers. The pupils are likely to do better due to having additional time to study the content before to class. The data, while not totally conclusive, indicates support for the approach.

To gain a comprehensive understanding of the flipped classroom idea, we examined the impact of our pilot study on nursing students. The results of this study will facilitate subsequent research endeavors.

2. DESIGN AND METHODS

Quasi-experimental design

This research utilized a post-test-only control group design inside a quasi-experimental framework (Campbell and Stanley 1963). A post-test was implemented to assess nursing students' learning results and evaluate their viewpoints after experiencing the flipped classroom model in a pharmacology course.

This research technique was selected as it enables us to examine the influence of the flipped classroom model on students' learning results and overall impact, in contrast to the regular classroom environment.

Study setting

The proposed study was conducted in the Faculty of Nursing of KAU, situated in the eastern district of Jeddah, Kingdom of Saudi Arabia. The study occurred in the spring of the 2017–2018 academic year, around the conclusion of the second semester.

The classroom in the study is equipped with an LCD projector, an interactive whiteboard, a sound system, and a primary desktop computer with internet access limited to the teacher.

Participants

The current study comprised 116 third-year female nursing students who were consistently engaged in the pharmacology (PHAN-312) course during the 2017–2018 academic year.

PHAN-312 is a sixth-level pharmacology course mandatory for students in the Bachelor of Nursing program. This is a 15-week course encompassing 15 distinct concepts under two credit hours.

A flipped classroom was chosen to deliver a two-hour lesson on general anesthesia.

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The 116 students were methodically categorized into two groups:

- Section A (No = 55) — control group, traditional class
- Section B (No = 61) — experimental group, flipped class

Instructional strategies in traditional and flipped classrooms

Tables 1 and 2 in the supplementary section illustrate the methodologies employed in both classrooms.

Satisfaction questionnaire

This research employed closed-ended questions to get quantitative data. The subsequent items were incorporated in the Supplementary Questionnaire 1:

- demographic information
- learning materials
- classroom arrangement
- scheduled time
- group activities
- pre-class time
- flipped class effects

The Department of Medical Education revised the survey questions to maintain their relevance to the study questions.

Upon completion of the questionnaire, each question was analyzed individually, and the results were aggregated to generate a score for a set of questions. We analyzed data scaled from 1 to 5 utilizing IBM SPSS Statistics V26.

Post-test

The objective of the post-test evaluation was to evaluate the impacts of the regular classroom approach with those of the flipped classroom method on learning outcomes.

The test had 23 multiple-choice questions from the pharmacology course (Supplementary Questionnaire 2).

Each question was aligned with the course goals and forwarded to additional faculty members for review to guarantee that the rating was unbiased.

Ethical considerations

The study proposal received approval from the Unit of Biomedical Ethics at King Abdulaziz University's Faculty of Medicine (Reference No-674-19).

Statistical analysis for closed-ended questions of the questionnaire, rated on a Likert scale

The median and mode, both nonparametric methods, were employed to analyze the data. The median was calculated by arranging all scores in order and identifying the central score using version 26 of the Statistical Package for the Social Sciences (SPSS) software. The median is the average of the two central scores in a distribution with an even quantity of scores. The value that occurs with the highest frequency in a distribution is referred to as the mode (Cohen and Swerdlik 2005).

Statistical analysis of the post-test assessment

We analyzed the post-test results of both groups to evaluate the disparities in student learning between flipped and traditional education. An independent sample t-test was employed to

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evaluate the significance of the differences in post-test mean scores between the flipped class and the standard class. The significance level was established at an alpha value of 0.05.

Questionnaire analysis

A series of Likert scale questions reflecting the five factors for quantitative analysis were presented. Each theme was addressed with a minimum of two items. The survey of twenty closed-ended questions. The data was utilized to answer the study questions once the validity and reliability of the questionnaire were confirmed. Descriptive statistics were employed to summarize the participants' characteristics, students' perceptions of various aspects of the flipped teaching sessions, and their post-test evaluation scores.

3. RESULTS

This study aimed to assess the perceptions of third-year female nursing students at KAU on the flipped classroom technique and its efficacy in enhancing learning quality, as opposed to conventional lecture-based instruction in their pharmacology course.

The quantitative results offered a fundamental comprehension of the perspectives of the students who engaged in the survey. The instructor, the duration of engagement in a flipped classroom, the educational resources, the learning atmosphere, and the students' prior knowledge constituted the five principal characteristics utilized to classify the outcomes. Each factor comprises a collection of Likert items.

Survey Factors

Instructor performance factor

The primary objective of this element was to evaluate student satisfaction about the instructor's presentation of pre-class learning materials, student engagement, and assistance in recognizing areas of difficulty.

Students were posed three inquiries regarding their perceptions of the educators' efficacy in the flipped classroom (Supplementary-Questionnaire-1). The numbers are 1, 17, and 18. The first item elicited the most robust response from students, stating, "Learning materials (video and handout) were available before the flipped classroom (FC) activity (Likert item 1)." The results indicated that 47 out of 61 surveyed students (77%) strongly concurred that the learning materials were provided prior to the flipped classroom activity. Furthermore, only two students (3.3%) expressed uncertainty, whereas 12 students (19.7%) concurred that the learning resources were accessible. Significantly, there were no students who opposed this subject. Consequently, the findings clearly indicate that most students were satisfied with the availability of course materials before class. The median and mean scores reflect a substantial consensus among the responders (Figure 1).

The variable "Instructor's ability to engage students in the flipped classroom (FC) activity" (Likert item 17) was the subsequent aspect to analyze. Ten students (16.4%) expressed uncertainty, twenty-five students (41%) strongly concurred, eighteen students (29.5%) concurred, and four students (6.6%) opposed and strongly disagreed on the lecturer's involvement in the lesson.

Students concurred with this assertion, as indicated by the median and mode scores (Figure 1). The kids exhibited a moderate reaction rate to this feature, suggesting that future implementation of the flipped classroom approach will necessitate further instructor involvement.

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Ultimately, we assessed the criterion "The instructor effectively elucidated the challenging concepts during the flipped classroom" (Likert item 18). Statistics indicate that 16 students (26.2%) concurred with the statement, while 22 students (36.1%) expressed strong agreement. Additionally, 14 students (23%) indicated ambiguity about this component, representing the largest proportion of neutral comments concerning the instructor aspect.

Furthermore, three students (4.9%) indicated strong disagreement, whereas six students (9.8%) voiced disagreement. The students' inadequate response to this question illustrated that in a flipped classroom, the instructor must exert additional effort to facilitate the students' comprehension of challenging subjects. The students' comprehension of the lecture topic influences the efficacy of the FC arrangement in addressing the preceding item (Figure 1). The average score for total instructor satisfaction is 4.15 out of 5.00, signifying a commendable level of satisfaction. Furthermore, 86.9% of respondents express satisfaction with the teacher, as indicated by the new satisfaction measure.

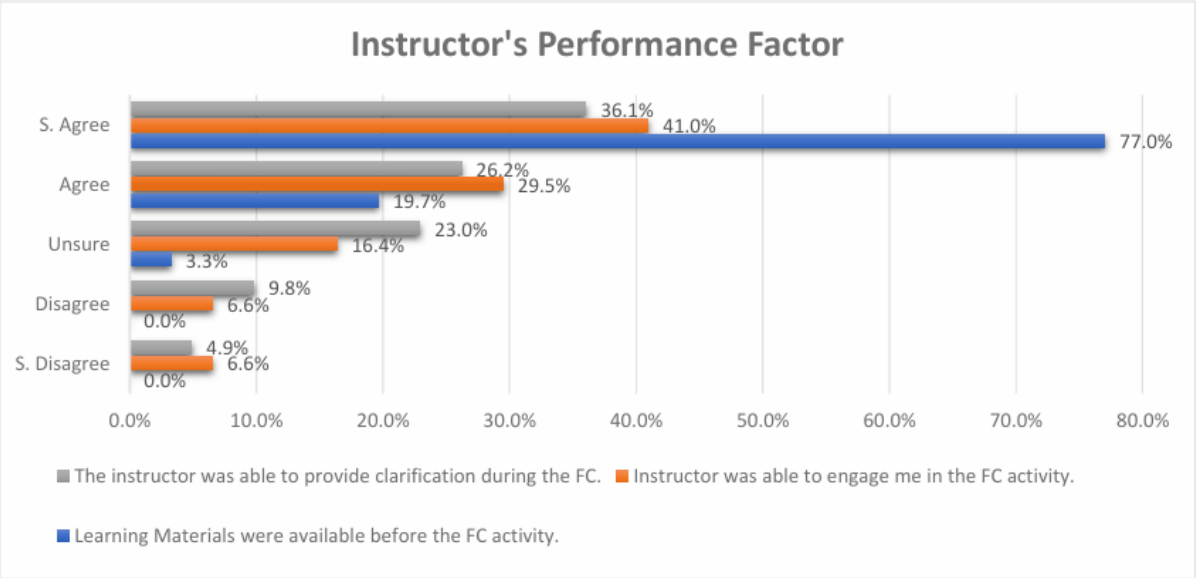


Figure 1: Students' Attitudes Regarding the Instructor's Performance Factor

Time Factor

The primary objective of this component was to evaluate student satisfaction about (1) the pre-class duration designated for comprehending uploaded materials prior to the flipped classroom (FC), (2) their individual study time, and (3) the in-class duration allocated for the FC session. Items 2, 5, and 7 of the questionnaire inquired about students' perspectives on the temporal issues associated with the flipped classroom model.

Before the flipped classroom activity, sufficient time for learning was available, as per the second criterion (Likert Item 2). Over half of the respondents (31 or 50.8%) strongly concurred that they received adequate time for learning prior to the FC, 14 (23%) agreed, while just six (9.8%) disagreed. The statistics indicated that the most prominent reaction from the students pertained to the time aspect (Figure 2). The majority of students expressed significant agreement, as indicated by the median and mode evaluations.

The students were subsequently inquired whether they learnt more well independently when afforded time for solitary study (Likert Item 5). A total of 60 replies were received for this question. It is significant to observe that 22 students (36.7%) either strongly concurred or concurred, as illustrated in Figure 2. Conversely, one student (1.7%) expressed disagreement,

three students (5%) strongly disagreed, and twelve students (19.7%) were uncertain. The majority of students concurred, as indicated by the median and mode scores.

Ultimately, Likert Item 7 inquired whether the students judged the duration of the FC session to be suitable. Twenty-three students (37.7%) concurred, while twenty-eight students (45.9%) expressed great agreement. Seven students (11.5%) were uncertain about their response, however only two students (3.3%) expressed disagreement.

The mean score for the overall time satisfaction component is 4.13 out of 5.00, signifying elevated levels of satisfaction. Furthermore, based on the newly established satisfaction variable, 88.5% of respondents express satisfaction with the temporal aspect.

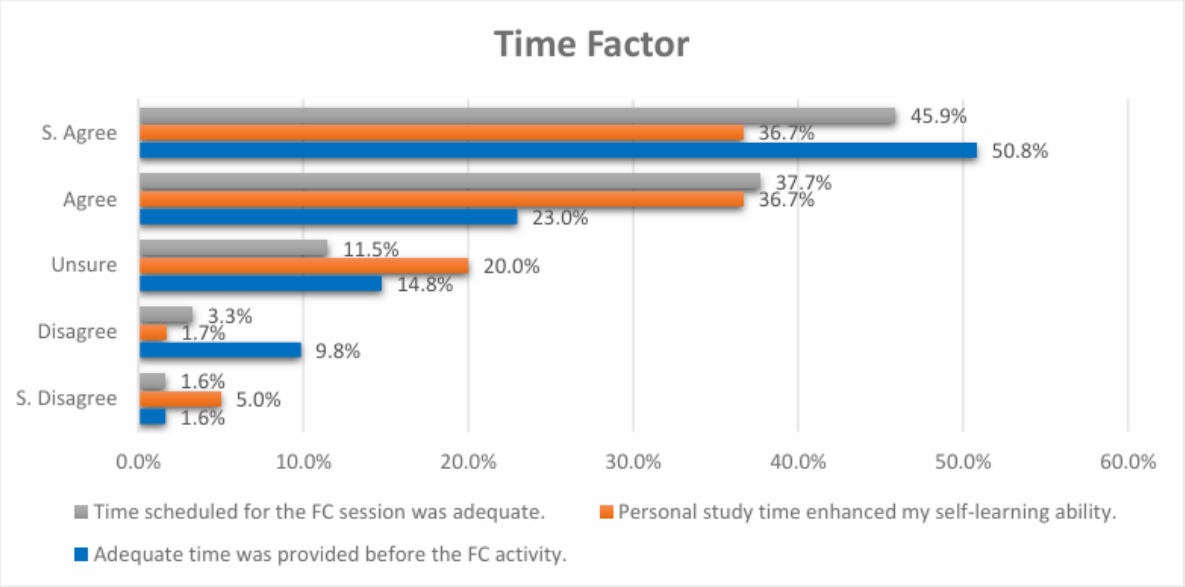


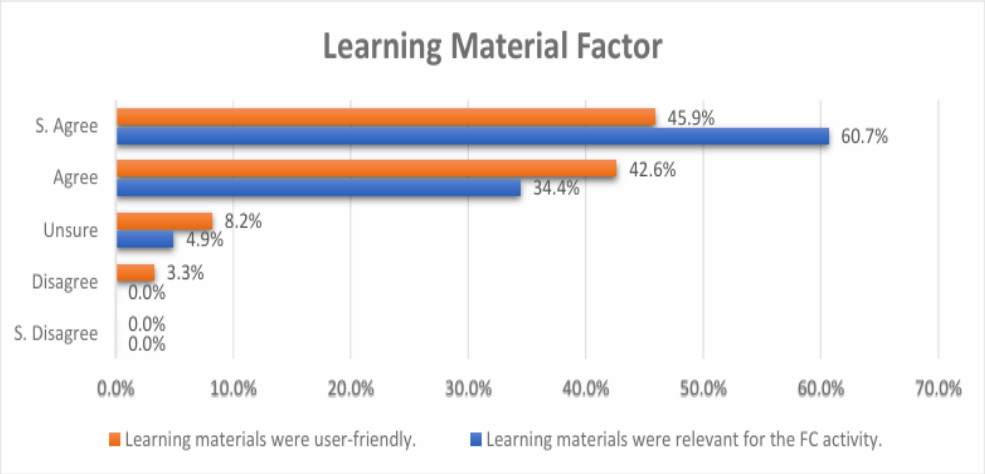
Figure 2: Students' Attitudes Regarding the Time Factor

Learning Material Factor

This component assessed the students' satisfaction with the course materials provided to them. The instructional materials were beneficial for the flipped classroom activity, as evidenced by Likert Item 3. The findings indicated that merely three students (4.9%) were uncertain, while 21 students (34.4%) concurred, and 37 students (60.7%) strongly concurred with the issue. It is essential to acknowledge that there was unanimous consensus among the students regarding this issue. The students' consensus was further evidenced by the median and mode scores.

Students were subsequently requested to evaluate the use of the educational tools (Likert Item 4). Among the pupils, two (3.3%) expressed disagreement, five (8.2%) were uncertain, 26 (42.6%) concurred, and 28 (45.9%) strongly concurred. The majority of students concurred that the learning tools were user-friendly, as indicated by the median and mode scores.

The average score of 4.43 out of 5 indicates a high level of satisfaction with the learning materials. In total, 95.1% of the students reported high satisfaction with the study materials (Figure 3).



Learning Environment Factor

This component evaluates students' happiness with the flipped classroom (FC) setting. The assessment of individuals' contentment with the classroom arrangement, activity sessions, motivation, and engagement was conducted utilizing Likert Items 6, 8, 19, and 20.

Figure 4 indicates that 19 (31.1%) students agreed, 18 (29.5%) strongly agreed, 11 (18%) were uncertain, seven (11.5%) disagreed, and six (9.8%) strongly disagreed with the sixth Likert item, "Classroom arrangements (positioning of the chairs for group activity, audio-visual facilities, etc.) were conducive to flipped classroom activity." This significant topic elicited a notable response from students across all scales.

The subsequent item analyzed was Likert Item 8, stating, "Group activities during FC sessions were organized." Among the students, 45 (73.8%) concurred or strongly concurred, whereas 8 (13.1%) opposed or strongly opposed, and 8 (13.1%) remained uncertain. The majority of students perceived the group activities as well-executed, based on the median and mode assessments.

The pupils were subsequently inquired whether they felt inspired to learn due to the flipped classroom (Likert Item 19). The study indicated that 20 students (32.8%) strongly agreed, whereas 23 students (37.7%) agreed. Three students (4.9%) expressed extreme disagreement, whereas five students (8.2%) indicated disagreement. The majority of students concurred that they were motivated, as indicated by the median and mode scores.

Finally, Likert Item 20 inquired whether the students perceived the flipped classroom (FC) as more engaging than the conventional classroom. It was positive that 48 participants (78.7%) concurred or strongly concurred that the flipped classroom was more engaging than conventional classroom training. Simultaneously, three individuals (4.9%) expressed disapproval or severe disagreement, and ten participants (16.4%) remained uncertain. The preponderance of respondents perceived the flipped classroom as more engaging, as indicated by the median and mode scores.

Individuals exhibit a high level of satisfaction regarding the overall learning environment, as evidenced by a mean score of 3.89. Furthermore, 78.7% of participants expressed pleasure with the learning environment, as indicated by the new satisfaction variable (Figure 4).

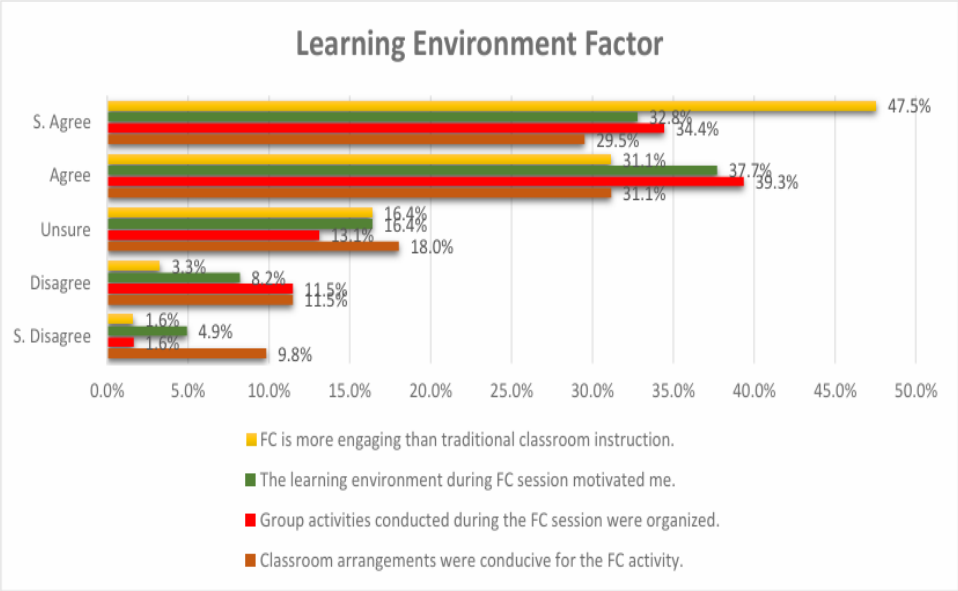


Figure 4 Students' Attitudes Regarding the Learning Environment Factor

Understanding Factor

The concluding element of this investigation is encapsulated in Figure 5. We analyzed the students' perceptions on their understanding of the flipped classroom and its impact on their performance. The questionnaire addressed these subjects in items 9 through 16.

Twenty-eight students (46.7%) strongly concurred with the ninth Likert item, "The flipped classroom method provided an engaging learning experience." Nineteen students (31.7%) expressed agreement with this assertion. Ten students (16.7%) expressed uncertainty, whereas only three students (5.0%) voiced disagreement. The findings of the commendable agreement also correspond with the median and mode ratings.

The students were also queried regarding the efficacy and educational value of the flipped classroom (Likert Item 10). A total of 18 students (29.5%) concurred and 33 students (54.1%) strongly concurred that the flipped classroom was advantageous and educational. This signifies that 83.6% of students agreed. Eight pupils (13.1%) expressed uncertainty, while only two students (3.2%) disagreed. Furthermore, there was a significant concordance between the mode and median scores.

We subsequently analyzed Likert Item 11: "The flipped classroom (FC) method facilitated my comprehension and application of the topic." Among the respondents, 22 (36.1%) strongly agreed, 21 (34.4%) agreed, and 14 (23%) expressed uncertainty.

The fourth question of this factor inquired if the flipped classroom facilitated increased subject comprehension among students (Likert Item 12). Among the pupils, 13 (21.3%) expressed agreement, while 24 (40%) indicated strong agreement. In a manner akin to the last inquiry, five students (8.3%) expressed disagreement, but 17 students (27.9%) remained uncertain.

Subsequently, the pupils were inquired whether they believed the flipped classroom methodology would enhance their comprehension of the subject by augmenting their propensity to attend (Likert Item 13). The statistics indicate that 16 individuals (26.2%) concurred, whereas 21 individuals (34.4%) strongly concurred. Nonetheless, three individuals (4.9%) expressed disagreement, while four individuals (6.6%) indicated strong disagreement.

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Notably, almost one-third (27.9%) expressed uncertainty. The majority of students seemed to concur, as indicated by the median and mean scores.

The second significant point in this component was Likert Item 14: "The flipped classroom method may enhance my performance in examinations." Among the students, 20 (32.8%) agreed and 17 (27.9%) strongly agreed that flipped classroom sessions will assist them in achieving higher scores. While 24.6% of students expressed uncertainty, nine students (14.7%) disagreed or strongly opposed.

Students were subsequently inquired whether they considered the flipped classroom methodology aligned with their learning preferences (Likert Item 15). In this case, 19 (31.7%) expressed strong agreement, while 22 (36.1%) indicated agreement. Two individuals (3.3%) emphatically expressed disagreement, whereas seven individuals (11.7%) indicated disagreement.

Likert Item 16 said, "There should be an increased number of lectures utilizing the flipped classroom method." A majority of students, 39 (64%), concurred that more lectures should be delivered in this format. A total of 17 respondents (27.9%) expressed agreement, while 22 respondents (36.1%) indicated strong agreement. Thirteen individuals (21.3%) were uncertain, five (8.2%) strongly opposed, and four (6.6%) opposed.

The comprehension aspect of the flipped classroom concept demonstrated a significant level of student satisfaction (83.6%).

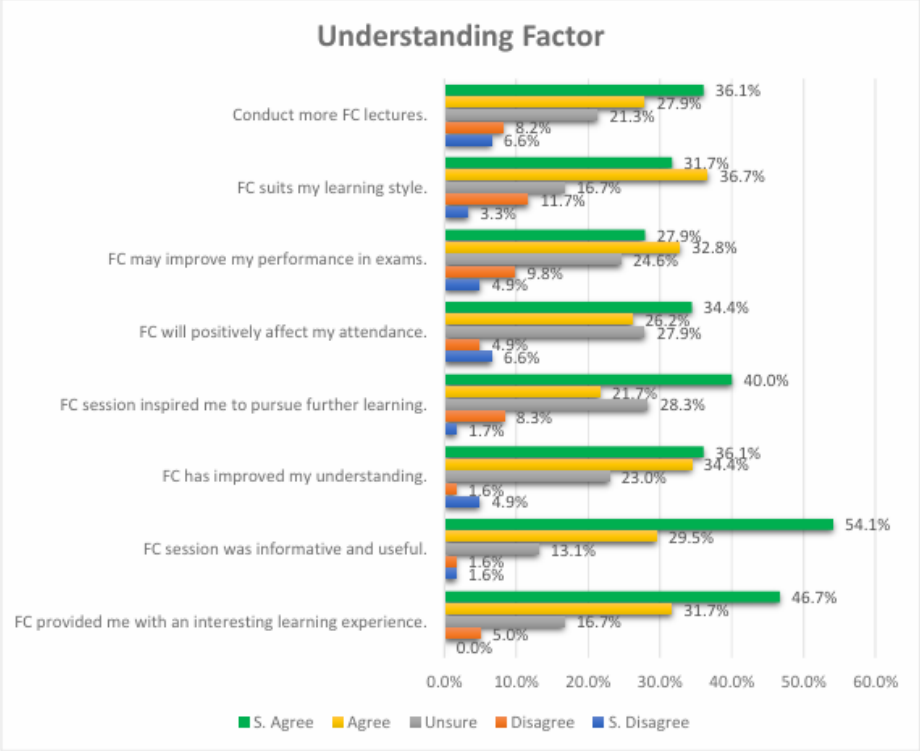


Figure 5: Students' Attitudes Regarding the Understanding Factor

Post-Test Analysis

The review sought to examine the disparities in learning outcomes between students in traditional and flipped classrooms by comparing the post-test findings of both groups. A t-test was employed to assess the significance of the variations in exam scores between the flipped and traditional classrooms based on the post-test findings. The independent-samples t-test evaluates the differences between the means of two groups.

The post-test achieved a total score of fifteen points. The traditional class attained an average score of 12.17, whereas the flipped class achieved an average score of 11.68 (Table 1). At the 95% confidence level, the independent-sample t-test indicated no significant difference (P = 0.07) between the post-test outcomes of the flipped classroom and the traditional classroom. According to Tables 2 and 3, the computed range of students' scores was 5.85 for the conventional class and 6.50 for the flipped class.

Table 1: Descriptive statistics of flipped class (N=61) and traditional class (N=55). The actual exam grade was 15.

Class type	Number	Mean	Std. Deviation	Std. Error Mean
Flipped classroom	61	11.68	1.543	0.198
Traditional classroom	55	12.17	1.361	0.184

Table 2: The range of the flipped class group and the 95% confidence interval for the mean.

Exam Grade (15)	Mean		11.6787
	95% Confidence Interval for Mean	Lower Bound	11.2836
		Upper Bound	12.0738
	Minimum		7.80
	Maximum		14.30
	Range		6.50

Table 3: Presents the 95% confidence interval for the mean and range of the conventional class group.

Exam Grade (15)	Mean		12.1727
	95% Confidence Interval for Mean	Lower Bound	11.8047
		Upper Bound	12.5408
	Minimum		9.10
	Maximum		14.95
	Range		5.85

4. DISCUSSION

The flipped classroom is an innovative method for delivering knowledge to students that can enhance their advantages and increase engagement (Berdiyorova 2021, Köpeczi-Bócz 2024, Zeng 2024). This study aims to compare the learning outcomes of the flipped classroom model with those of the traditional lecture-based teaching method. To ascertain if we accomplished this objective, we utilized a student poll designed explicitly for this purpose.

Limited research has been undertaken on flipped classrooms in higher education, with even fewer studies assessing their significance in nursing education (Schlairet, Green et al. 2014; Yensen 2014; Mikkelsen 2015; Njie-Carr, Ludeman et al. 2017). This study aimed to examine students' perceptions of the flipped classroom model. The post-test assessment findings were analyzed to identify any significant differences in the learning outcomes of the two groups.

The pilot study's results indicated that nursing students were satisfied with the flipped classroom model as an innovative pedagogical tool. The questionnaire comprised five sections: comprehension, learning materials, learning environment, time factor, and instructor. Subsequent research indicated that most students were content with the recommendations provided to assist teachers in enhancing their proficiency in managing interactive classrooms, addressing scheduling difficulties, and employing class time more efficiently and creatively.

The details of this pilot study formed the foundation for the students' answers to these closed-ended questions. The elements encompassed the educational environment, the time of flipped classroom deployment, the teacher's capacity to support interactive instruction, and the overall pre-class organization.

The study revealed that the post-test scores and learning outcomes of the two classes varied by a statistically negligible degree. This outcome aligns with previous studies indicating that performance remained unchanged despite a reduction in traditional classroom activities coupled with an increase in online video content (Baepler, Walker et al. 2014). Nonetheless, certain research indicate that flipped classroom methodologies markedly enhance the performance of nursing students relative to conventional teaching techniques (Entezari and Javdan 2016; Tan, Yue et al. 2017).

These findings indicate that further investigation into many flipped classroom sessions is necessary. Educators employing the flipped classroom approach cease traditional lecturing and instead engage in collaboration with students (Lai and Hwang 2016). Students can now engage in learning beyond the classroom by strategically utilizing their digital talents to enhance their education. Students can now access foundational material before class due to technological advancements (Rahmat, Anuar et al. 2023; Kuswidayani, Soepriyanto et al. 2024; Saadi 2024).

While the flipped classroom model may not appeal to all, numerous students perceive an enhancement in their learning experience. Nonetheless, a meticulous evaluation of students' competencies and optimal strategies in flipped classroom design is essential for effective implementation (Hashem 2023; Larson and Linnell 2023; Thulasidas 2024). Studies demonstrate that the flipped classroom paradigm does not influence students' academic performance (Abdel-Wahab Afifi Araby et al. 2024; Kadiri 2024; Rajhans and Saroh 2024). The impact of systematically designed flipped classroom sessions across many contexts necessitates more examination.

In conclusion, including flipped classrooms into the curriculum can augment students' educational experiences and may be beneficial if used judiciously and with student feedback seen as a significant contribution.

This study's weakness is that it only analyzed a single subject. It should be implemented across several subjects to attain more dependable conclusions. A potentially perplexing element could be the subjects that captivate pupils' interest.

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5. CONCLUSION

A pilot study examining nursing students' attitudes and performance in a flipped pharmacology course indicates that this new pedagogical method holds significant potential to enhance learning outcomes, student engagement, and confidence in applying complicated pharmacological concepts. Students said that prior access to lectures and study materials enabled them to review difficult content, learn at their own pace, and be better prepared for comprehensive discussions. Students contended that in-class activities focusing on case-based learning, collaborative problem-solving, and real-world clinical scenarios were more advantageous and interesting than standard lectures. These workshops enabled students to link theoretical concepts to nursing practice. Numerous participants first had difficulties with time management, technological utilization, and adopting increased accountability for their own education. Nevertheless, after individuals acclimated to the format, these concerns typically ameliorated. Performance measures indicated enhanced critical-thinking abilities and improved conceptual retention, especially in domains necessitating dose calculations, adverse effect identification, and pharmaceutical safety decision-making. The results indicate that the flipped classroom model is advantageous for pharmacology instruction in nursing programs, contingent upon educators providing explicit objectives, organized supervision, and continuous academic support. Additional research with bigger sample numbers, more stringent comparison groups, and extended follow-up is essential to validate these findings and to determine the optimal implementation of flipped teaching approaches across diverse student demographics and clinical learning environments.

REFERENCES

1. Abdel-Wahab Afifi Araby, O., et al. (2024). Effect of Flipped Classroom Strategy Versus Conventional Teaching Methods on Academic Achievement, Self-confidence, and Perception of Nursing Students. Journal of Nursing Science, Benha University.
2. Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. British Journal of Educational Technology, 46(6), 1133–1148.
3. Algayres, M. and E. Triantafyllou (2019). Online environments for supporting learning analytics in the flipped classroom: A scoping review. Proceedings of the 18th European Conference on e-Learning.
4. Ash, K. (2012). Educators view “flipped” model with a more critical eye. Education Week, 32(2), S6–S7.
5. Baepler, P., et al. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. Computers & Education, 78, 227–236.
6. Berdiyorova, S. (2021). Differentiating instructions by utilizing “flipped classroom” model in ESP teaching.
7. Butt, A. (2014). Student views on the use of a flipped classroom approach: Evidence from Australia. Business Education & Accreditation, 6(1), 33–43.
8. Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. Handbook of Research on Teaching. Chicago: Rand McNally, 171–246.

9. Chun, B., & Heo, H. J. (2018). The effect of flipped learning on academic performance as an innovative method for overcoming Ebbinghaus' forgetting curve. ICIET '18: Proceedings of the 6th International Conference on Information and Education Technology.
10. Cohen, R. J., & Swerdlik, M. E. (2005). Psychological testing and assessment: An introduction to tests and measurement. New York: McGraw-Hill.
11. Davies, R. S., et al. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. Educational Technology Research and Development, 61(4), 563–580.
12. El-Banna, M. M., et al. (2017). Flipping around the classroom: Accelerated Bachelor of Science in Nursing students' satisfaction and achievement. Nurse Education Today, 56, 41–46.
13. Entezari, M., & Javdan, M. (2016). Active learning and flipped classroom: Hand-in-hand approach to improve students' learning in human anatomy and physiology. International Journal of Higher Education, 5(4), 222–231.
14. Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. Business Education & Accreditation, 6(1), 63–71.
15. Haghani, F., et al. (2016). Flipped classroom: A pedagogical method. Iranian Journal of Medical Education, 16, 104–119.
16. Hashem, Z. T. (2023). The effectiveness of the flipped classroom strategy on learning the skills of passing from above and blocking in volleyball for students. International Journal of Physiology, Nutrition and Physical Education.
17. Herreid, C. F., & Schiller, N. A. (2013). Case studies and the flipped classroom. Journal of College Science Teaching, 42, 62–67.
18. Johan, A. (2024). Analysis of critical thinking skills through argumentative essay writing. English Journal Literacy Utama.
19. Kadiri, H. (2024). Use of flipped classroom instructional strategy for improving students' academic achievement in colleges of education. IJIET (International Journal of Indonesian Education and Teaching).
20. Kazanidis, I., et al. (2018). Can the flipped classroom model improve academic performance and training satisfaction in higher education instructional media design courses? British Journal of Educational Technology, 50(4), 2014–2027.

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