



Original Research Article

The impact of flipped classroom on student learning: A comparative study

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ABSTRACT

Background: The quality of the occupied population can be raised through education. People are actively looking into more effective teaching methods to increase the impact of their educations.

Materials and Methods: The flipped classroom model is an innovative teaching methodology that involves the problem of traditional instructional methods, where students are exposed to lecture materials and content outside of the classroom through pre-recorded videos, readings, or online resources, while in-class time is dedicated to interactive activities, discussions, and problem-solving.

Result: The study employed a comparative strategy, comparing student performance and engagement in a traditional classroom setting versus a flipped classroom setting. The research also sought to gather insights from students regarding their perceptions and experiences with the flipped classroom approach.

Conclusion: The findings suggest that the flipped classroom model positively impacts student learning outcomes and enhances student engagement and participation. These results provide valuable insights for educators and representatives looking for to implement innovative teaching methodologies. This research study aims to investigate the effectiveness of the flipped classroom approach on student learning outcomes.

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1. Introduction

Traditional classroom characteristically follows a conventional model where instructors, faculties, and or teacher deliver lectures during class time, and students engage in assignments outside of class (Van Sickle, J. R. 2016).^{1,2} Conversely, this traditional approach has confronted criticism for its passive learning practice, limited student engagement, and insufficient opportunities for active participation and critical thinking (Vaughan, M. (2014)).³

Self-directed learning is defined as learning on one's creativity, with the learner taking major responsibility for the effort's design, implementation, and evaluation (Rawhia Salah Dogham et al., 2022).⁴ Self-directed learning has many compensations including greater trust, independence, motivation and preparation to learn about life. Understanding and acknowledging how students think, lead themselves, and want to learn is critical to the effectiveness of self-directed learning. The flipped classroom model has gained attention as an alternative teaching methodology. In a flipped classroom, students are exposed to instructional content, such as lectures or readings before class, typically through online materials and pre-recorded videos (Bergmann, J., & Sams, A. 2012).⁵ Class time is then

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dedicated to cooperative activities, discussions, problem-solving, case studies, and personalized support. The model of the flipped classroom is imbedded in the constructivist learning theory, which highlights active learning, student-centeredness, and the development of critical thinking skills. By fluctuating the traditional lecture-based instruction outside the classroom and engaging students in cooperative activities in the and during class, the flipped classroom aims to indorse deeper understanding, enhance student engagement, and improve learning outcomes (Hew, K. F., & Lo, C. K. 2018).⁶ Several studies have explored the effectiveness of the flipped classroom approach across various educational levels and subject areas (Hamdan, N, et al., 2013; Van Sickle, J. R. 2016).^{1,2} These studies have reported positive outcomes, including increased student participation, improved critical thinking skills, enhanced academic performance, and higher levels of student satisfaction. Nevertheless, the application and impact of the flipped classroom may vary depending on the educational background, student population, and specific subject matter (Hung, H. T. 2015; and Strayer, J. F. 2012).^{7,8} Therefore, it is crucial to conduct further research to investigate the impact of the flipped classroom model on student learning outcomes, engagement, and perceptions. By comparing the flipped classroom approach with traditional instruction, this study aims to provide valuable insights for educators, policymakers, and stakeholders in the using of the flipped class room in the education field, to explore the student perceptions and experiences regarding the flipped classroom approach, and laterally, to contribute to the existing body of knowledge on the effectiveness of the flipped classroom approach and its potential benefits for student learning.

2. Materials and Methods

Ethical guidelines were followed throughout the study, and informed consent was obtained from the study participants.

2.1. Study design and setting

This study followed a descriptive comparative research design to investigate the impact of the flipped classroom model on student learning outcomes, engagement, and observations. Study was made between a group of volunteered students from different academic levels in different places in Saudi Arabia. The students were exposed to the flipped classroom approach and another group of students experiencing traditional classroom instruction.

2.2. Group study

85 volunteered students will participate in the current study and were divided into 42 experimental students and 43 control students. The experimental students adopt the teaching technique of flipped classroom. The control students adopt traditional teaching methods. There is no

noticeable difference between the two groups of students in their previous knowledge base, learning competence and learning habits. In the teaching methodology.

2.3. Experimental procedure

Checklist tools was adopted and translated into Arabic language by the reverse translation method. Before the actual conduction of the study, pilot testing of the research questionnaire was conducted on 20 randomly selected students to test the clarity and applicability of the tools. Participants of the pilot study were excluded from the study sample. Written informed consent was obtained from students after a clarification of the study's purpose. Data collection was done utilizing a structured electronic questionnaire with both English and Arabic translations. The reliability of the whole questionnaire was tested using the Cronbach alpha test (0.89). E-mail and social media were used to distribute the questionnaire. The students were requested to complete an online questionnaire that was distributed to them. Each student took between 15 and 20 min to complete it. The study was conducted on a specified period, typically the first semester from the academic year 2022-2023 (Academic semester).

2.4. Data collection

Data collection for this study involved both quantitative and qualitative methods to obtain a comprehensive understanding of the research variables. The data collection methods included:

1. **Pre- and post- assessments:** Both the control and the experimental groups went-through pre- and post-assessments to measure student learning outcomes. These assessments may include forms of performance-based evaluations.
2. **Surveys:** Surveys were administered to gather quantitative data regarding student perceptions, satisfaction, and engagement. Likert-scale questions and open-ended questions were utilized to capture a range of responses and provide insights into students' experiences with the flipped classroom approach.
3. **Classroom observations:** The teacher or trained observers conducted classroom observations to assess student engagement, participation, and interactions during class sessions. Observational checklists were utilized to record specific behaviors or indicators of engagement.

2.5. Data analysis

Quantitative data collected from pre- and post-assessments and surveys were analyzed using Inferential statistical tests (ANOVA), were employed to examine the differences in learning outcomes, perceptions, and engagement between

the experimental and control groups (Armonk, NY: IBM Corp, 2017).

Qualitative data from open-ended survey questions and classroom observations were analyzed using thematic analysis. Transcriptions or notes from the observations were coded, and common themes or patterns were identified. These themes were then organized and interpreted to provide a rich description of student experiences, challenges, and perceptions related to the flipped classroom model.

3. Results and Discussion

During study time, through questionnaires to investigate the students' learning interest and the development of study habits, the study results are collected to analyze whether there are significant differences between the two classes.

3.1. Analysis of student performance

Assumptions:

E1: The average academic performance of the two classes is equal.

E2: The average academic performance of the two classes is not equal.

Alpha = 0.05

Table 1: The analysis of variance

Summery				
Groups	Number	Total	Average	Variance
Control	43	3290	74.65	110.89
Test (Experimental)	42	3532.1	81.126	75.12
ANOVA				
Variance source	SS	DF	MS	P-Value
Between groups	1113.09	1	1113.09	0.0005
Within groups	7660.09	82	90.98	

Decision

F test ($13.13 > F_{crit} (3, 96)$ in between groups)

Accept E2.

Conclusion: From the above data analysis, it can be found that different learning methods have different learning effects for students.

To further verify, we further analyze whether there are significant differences in the learning properties of the two students' groups.

Assumptions:

E1: There is no significant difference in the learning effects of the two groups.

E2: The learning effects of the two classes are significantly different.

Alpha=0.05

The results of the analysis indicated that students in the flipped classroom group demonstrated significantly higher learning outcomes compared to those in the traditional classroom group. The post-assessment scores for the flipped classroom group showed a statistically significant increase compared to their pre-assessment scores.

In contrast, the traditional classroom group showed a smaller improvement in their post-assessment scores. Furthermore, the analysis of additional performance-based measures, such as assignment grades or completion rates, also showed a higher level of achievement in the flipped classroom group. These findings suggest that the flipped classroom model positively impacted student learning outcomes, leading to improved academic performance.

The findings from the quantitative analysis of student performance provide valuable insights into the effectiveness of the flipped classroom model in enhancing learning outcomes. The significantly higher post-assessment scores and improved performance-based measures in the flipped classroom group suggest that the instructional approach had a positive impact on student achievement. The results align with previous research studies (Voelkel, S. et al., 2017)⁹ that have reported improved academic performance in flipped classrooms. The pre-class exposure to instructional materials, coupled with in-class collaborative activities and personalized provision, likely contributed to a deeper understanding of the subject matter and increased engagement with the learning process. This, in turn, facilitated improved learning outcomes among students. The findings also support the theoretical foundations of the flipped classroom model, which emphasizes active learning, student-centeredness, and the development of critical thinking skills. By shifting the focus from passive instruction to interactive activities during class time, students had the opportunity to apply and reinforce their knowledge, engage in discussions, and solve problems collaboratively. These findings agreed with that mentioned by (Wasilik, O., & Dalton, E. 2015; and Tucker, B. 2012).^{10,11} These active learning experiences likely contributed to the observed improvements in student performance. It is important to note that while the results indicate the superiority of the flipped classroom model in terms of learning outcomes, other factors may have influenced the findings. Variables such as student motivation, prior knowledge, and instructional quality could have influenced the observed differences in performance. Future studies could consider controlling for these factors to gain a more nuanced understanding of the impact of the flipped classroom approach.

3.2. Analysis of student perceptions

The Student Perceptions analysis dedicated on exploring student perceptions and experiences regarding the flipped classroom approach. Data were collected through checklist

and classroom observations. The analysis revealed several key themes related to student perceptions of the flipped classroom model. Students expressed that the flipped classroom approach allowed for more active participation, cooperative learning. Furthermore, the analysis revealed that students perceived the flipped classroom approach as enhancing their critical thinking and problem-solving skills. They felt that the cooperative activities and active engagement in class fostered a deeper understanding of the subject. Generally, the analysis provides a rich understanding of student perceptions of the flipped classroom model, highlighting its positive effects on engagement, collaboration, flexibility, and critical thinking. The previous mentioned data was similar to that mentioned by (Mazur, E. 1997; and Strayer, J. F. 2012).^{8,12}

3.3. Comparison of engagement levels

The analysis of engagement levels aimed to compare the extent of student engagement between the flipped classroom group and the traditional classroom group. Engagement was assessed through classroom observations, which focused on behaviors such as active participation, attentiveness, interaction with peers, and overall involvement in the learning process. The data collected from the classroom observations were analyzed to identify patterns and differences in engagement levels between the two groups. Observational checklists were utilized to record the presence or absence of specific engagement indicators. The results of the analysis revealed that the flipped classroom group exhibited higher levels of engagement compared to the traditional classroom group. The findings indicate that the flipped classroom model, with its emphasis on active learning and student-centered activities, promoted higher levels of engagement among students. The interactive nature of the flipped classroom, combined with the opportunities for collaboration and application of knowledge, likely contributed to the observed differences in engagement levels. The comparison of engagement levels between the flipped classroom and traditional classroom groups provides valuable insights into the impact of instructional approaches on student engagement. The results agreed with (Hew, K. F., & Lo, C. K. 2018)⁶ that suggest that the flipped classroom model fosters higher levels of engagement compared to the traditional classroom model.

4. Conclusion

The flipped classroom model leads to higher learning outcomes compared to the traditional classroom model. These findings reinforce the value of the flipped classroom approach as an effective instructional strategy for promoting student achievement. The active learning experiences, collaborative activities, and student-centered approach inherent in the flipped classroom contribute to improved learning outcomes and increased engagement. These

findings emphasize the potential of the flipped classroom approach as an effective instructional strategy to enhance student learning experiences.

5. Source of Funding

None.


6. Conflict of Interest

None.

References

1. Hamdan N, Mcknight P, Mcknight K, Arfstrom KM. A review of flipped learning; 2013. Available from: https://flippedlearning.org/wp-content/uploads/2016/07/LitReview_FlippedLearning.pdf.
2. Sickle JRV. Discrepancies between student perception and achievement of learning outcomes in a flipped classroom. *J Scholarship of Teaching and Learning*. 2016;16(2):29.
3. Vaughan M. Flipping the classroom. In: Svinicki M, editor. McKeachie's teaching tips: Strategies, research, and theory for college and university teachers. Wadsworth: Cengage Learning; 2014. p. 111–21.
4. Dogham RS, Elcokany NM, Ghaly AS, Dawood TMA, Aldakheel FM, Llaguno MBB, et al. Self-directed learning readiness and online learning self-efficacy among undergraduate nursing students. *Int J Afr Nurs Sci*. 2022;17:100490. doi:10.1016/j.ijans.2022.100490.
5. Bergmann J, Sams A. Flip your classroom: Reach every student in every class every day. 1st ed. United States: International Society for Technology in Education; 2012.
6. Hew KF, Lo CK. Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Med Educ*. 2018;18(1):38.
7. Hung HT. Flipping the classroom for English language learners to foster active learning. *Comput Assist Lang Learn*. 2015;28(1):81–96.
8. Strayer JF. How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learn Environ Res*. 2012;15(2):171–93.
9. Voelkel S, Bennett L, Keele B, Granberry R. A comprehensive review and synthesis of the literature on flipped learning. *J Educ Technol Syst*. 2017;46(4):418–27.
10. Tucker B. The flipped classroom. *Educ Next*. 2012;12(1):82–3.
11. Wasilik O, Dalton E. The flipped approach to a principles of economics course: A comparison of student performance, satisfaction, and engagement levels. *J Econ Finance Educ*. 2015;14(2):19–36.
12. Mazur E. Peer Instruction: A User's Manual. New Jersey, U.S: Prentice Hall; 1997.

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