

Exploring the Challenges and Academic Performance of Online Learning Students in Flipped Classrooms: A Case Study

Kharolrena E. Wong & M. Khalid M. Nasir

Faculty of Education, Universiti Kebangsaan Malaysia

Email: kharolrena@kms.matrik.edu.my

Corresponding author email: mdkhalid@ukm.edu.my

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Abstract

Using a case study approach, this study investigates the challenges faced by students enrolled in the Four-semester System (SES) at Matriculation College within a flipped classroom model. The findings, a stepping stone for future research, are based on interviews with six participants, an equal number of male and female students, and the analysis of three quizzes. The study uncovers that SES students, who typically show lower academic performance, heavily depend on instructor guidance during the pre-class phase, where they engage in self-directed online learning, necessitating clear instructions. Cognitive challenges, including inconsistent comprehension and difficulty applying knowledge, surface during in-class sessions. Many SES students seek additional face-to-face instruction post-class, indicating a preference for traditional teaching methods. A correlation is found between students' past secondary school academic performance and their success in quizzes within the flipped model, underscoring the need for tailored support for those with weaker grades. This study highlights the importance of providing such support to ensure the inclusivity of education. The study recommends integrating face-to-face teaching into the second in-class phase to balance student-led activities and instructor-guided sessions, addressing identified challenges while upholding active learning principles. This study provides insights for curriculum design, pedagogical adjustments, and targeted support services tailored to the needs of low-achieving SES students, emphasizing the importance of inclusivity in education. It also proposes inspiring avenues for future research in this area, particularly in developing effective support services and the design of inclusive curriculum, thereby opening up new areas of exploration and potential solutions.

Keywords: Flipped Classroom Model, Matriculation College, Case Study Research, Online Learning, Academic Performance, Cognitive Challenges, Active Learning

Introduction

In contemporary education, there is a notable shift towards innovative teaching methods to foster more engaging learning experiences, with the flipped classroom emerging as a prominent approach. This method involves educators providing learning materials before class sessions, allowing for interactive problem-solving and in-depth topic exploration during

class time (Davies et al., 2013). Research suggests that flipped classrooms can enhance creative thinking skills in online physics education Rahayu et al (2022) and benefit low-achieving students (Day, 2018). Factors influencing student performance in this context include school, teacher, student, and family (Jia Chzin & Surat, 2021). Studies emphasize the significant impact of teaching and learning factors on academic performance, with flipped classrooms generally showing positive outcomes (Saadiyah Kariya et al., 2020; Akçayır & Akçayır, 2018; Rasheed et al., 2020; Dutta et al., 2020; Aydın & Demirer, 2022; Singh, 2020).

The popularity of the flipped classroom model is increasing across diverse educational settings (Zainuddin et al., 2019), facilitating dynamic classroom interactions and student-centered instruction (Akçayır & Akçayır, 2018; Singh, 2020). Notably, flipped classrooms correlate with improved academic performance, particularly in math confidence Zainuddin et al (2019), minimal differences in educational achievements between experimental and control groups Aydın & Demirer (2022), and high academic achievements among English as a Foreign Language (EFL) students (Bin-Hady & Hazaea, 2022). Furthermore, superior reading scores have been associated with the effective implementation of self-regulated learning strategies in flipped classrooms (Öztürk & Çakiroğlu, 2021). Despite the positive outcomes reported, a gap in the literature regarding the academic backgrounds of participants in studies from 2020-2023 suggests a need for further investigation. Understanding how the flipped learning approach impacts students with diverse academic histories can provide valuable insights into its effectiveness for historically low-achieving groups.

This study aims to identify the obstacles encountered by low academic performance students in matriculation colleges throughout the pre-class, in-class, and post-class stages within the flipped classroom framework and assess the educational achievement of academically challenged students during their involvement in flipped classrooms. In alignment with the research objectives, the study sought answers to the following inquiries:

- i. What difficulties do low academic performance students encounter throughout the pre-class, in-class, and post-class phases in the flipped classroom setting?
- ii. What is the academic performance of students with low academic performance during their engagement in flipped classrooms?

Literature Review

Student Challenges In Flipped Classroom Environments

Implementing flipped classroom methodologies in modern education has brought numerous benefits, including enhanced student engagement and academic performance. However, several challenges persist, hindering its seamless integration into educational settings. One prominent issue highlighted is the need for more student motivation to engage with pre-class video materials provided by instructors (Zainuddin et al., 2019). This reluctance often stems from lengthy video durations, heavy assignment loads, and technical difficulties such as poor video quality and limited internet access (Akçayır & Akçayır, 2018; Li & Li, 2022).

Moreover, time constraints and technical hurdles pose significant barriers to implementing flipped learning successfully. The challenge of creating and delivering effective learning materials within limited time frames while ensuring students comprehend and master the flipped learning approach (Al-Samarraie et al., 2020). Additionally, the absence of timely feedback exacerbates student dissatisfaction, further complicating the flipped classroom experience. Technical challenges, including internet connectivity issues, impede students' ability to effectively access and engage with learning materials (Li & Li, 2022).

Furthermore, students often grapple with discomfort and comprehension difficulties when navigating flipped classroom environments. Students may need more guidance from instructors and the self-directed nature of flipped learning to understand pre-course content (Zainuddin et al., 2019). This observation extended, citing the complexity of English language audio in instructional videos as a significant barrier to content comprehension (Al-Samarraie et al., 2020). These challenges are compounded by students' need for more interest in activities outside the classroom, hindering their overall engagement in flipped learning activities.

Despite these challenges, recent studies indicate promising outcomes and student receptivity to flipped learning methodologies, particularly in chemistry courses. Positive impacts were observed on examination performance, especially among students with lower academic standings (Ryan & Reid, 2016). Similarly, it was found that while weak internet access posed a challenge, students generally responded positively to the flipped classroom approach for chemistry subjects (Yit Leng et al., 2017). However, there is a pressing need for further research to address the unique challenges faced by students from diverse academic backgrounds and subject disciplines within the flipped learning paradigm.

Academic Performance Study Of Students In Flipped Classroom

It is undeniable that flipped classrooms have a significant positive impact on students' academic performance. In their study, it is stated that students' confidence in learning math-related subjects significantly correlates with academic achievement in both pre-class and in-class learning environments within the flipped classroom system Zainuddin et al (2019), while no statistically significant difference between experimental and control groups in course success and academic achievement scores (Aydin & Demirer, 2022). The achievement of EFL students in flipped classrooms is measured, and it was found that the overall class results were high, indicating positive academic achievement (Bin-Hady & Hazaea, 2022). In another study, it was found that the reading test scores of the experimental group were significantly higher than those of the control group (Öztürk & Çakıroğlu, 2021). The use of self-regulated learning strategies has a positive effect on the academic achievement of the experimental group in terms of reading skills using the flipped classroom method.

Study on The Types of Respondents In Previous Flipped Classrooms Research

Numerous studies have investigated the efficacy of flipped learning methodologies. However, a systematic review of ten journals from 2020 to 2023 reveals a notable gap concerning the academic profiles of participants involved in these inquiries. This prompts the question: Does the effectiveness of flipped learning extend uniformly to all students, irrespective of their high school academic standing? Researchers posit that delving into the educational achievements and hurdles encountered by students with lower academic performance can furnish a more holistic and nuanced comprehension of the ramifications of flipped learning on cohorts historically associated with diminished scholastic attainment.

Flipped Classroom Model

Educators often need more clarity about the flipped classroom concept (Bergmann et al., 2013). Many assume that a flipped classroom means replacing the teacher with videos as the primary source of instruction. Students are thought to learn independently online and constantly interact with computers. However, the concept of a flipped classroom is to provide quality academic time for teachers and students. The flipped classroom approach is where

students take charge of their learning, enhancing communication and relationships between students and teachers (Bergmann & Sams, 2012). During a flipped classroom session, students will first review the content of the upcoming topic using materials provided by the teacher. Teachers and students engage in reinforcement activities rather than lectures or instruction during the class. This allows students ample time to learn and reinforce their understanding of what was covered during the pre-class phase.

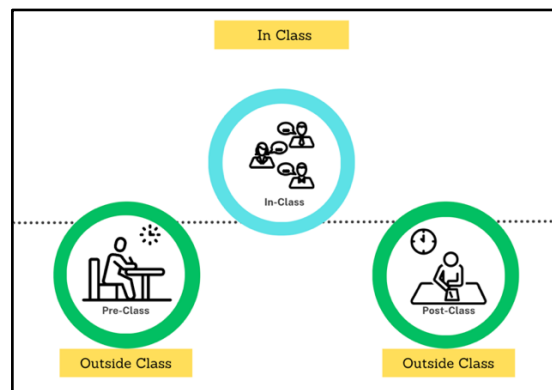


Figure 1: Flipped Classroom Model

Flipped Classroom Learning Model

The cognitive domain is one of the three main domains in learning, alongside the affective and psychomotor domains found in Bloom's Taxonomy. The cognitive domain model was successfully developed 1956 by (Bloom et al., 1956). This model comprises six main categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom's taxonomy is studied and revised by changing several aspects, such as renaming the six categories from nouns to verbs and reorganizing two of the six categories (Anderson & Krathwohl, 2001). This updated taxonomy reflects a more active form of thinking and is better suited to the cognitive domain's requirements. It is divided into two levels of thinking: lower-order thinking (remembering, understanding, and applying) and higher-order thinking (analyzing, evaluating, and creating). Figure 2.0 illustrates the differences between Bloom's Taxonomy in 1956 and Bloom's Taxonomy (Revised) in 2001.

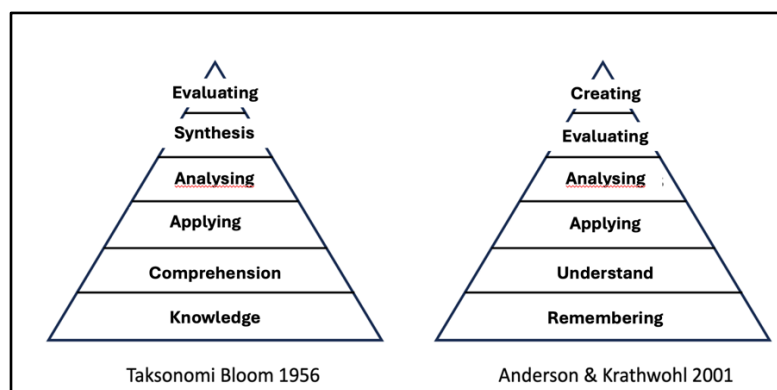


Figure 2.0: Bloom Taxonomy Learning Model 1956 and 2001

In a traditional classroom, teachers typically start teaching from the lower-order thinking level and gradually progress to the highest level, which is creating. Teaching from the lower levels

is important because it serves as a tool for understanding and mastering higher-order thinking learning (Asmadi et al., 2011). Time constraints in the classroom pose a challenge in implementing activities involving higher-order thinking with students (Hassan, 2021). This is also often experienced by researchers themselves because they need to prioritize completing the syllabus throughout the 18-week academic term. All lower-order thinking content occurs during the pre-class session in a flipped classroom. During the in-class session, teachers could engage in active learning activities involving higher-order thinking with students. This opportunity is seen as capable of fostering high-level thinking skills among students, thus producing students who can think creatively and critically. Figure 3.0 illustrates how Bloom's Taxonomy is applied in a flipped classroom.

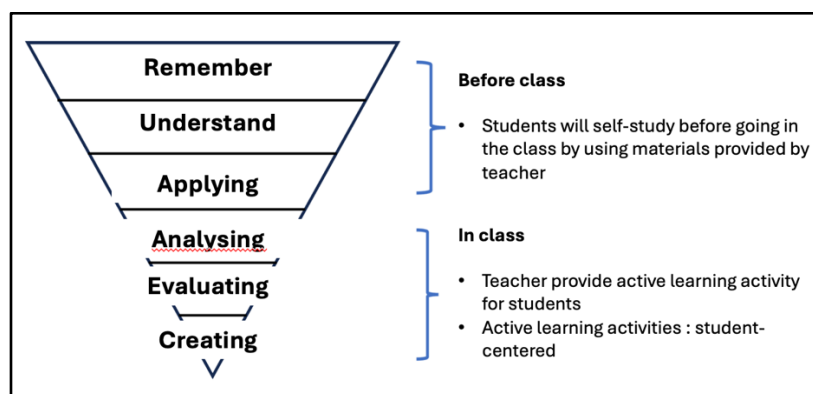


Figure 3.0: Flipped Classroom Model

Methodology

Research Method

In this study, case study research is applied for several reasons: Firstly, it facilitates thorough exploration, delving deeply into the challenges confronted by SES students in the flipped classroom, thereby uncovering nuanced experiences and perspectives. Secondly, it enables contextual understanding, allowing researchers to grasp challenges within SES students' unique environment and the flipped classroom dynamics. Thirdly, it accommodates the diversity of phenomena by examining challenges across different phases and elucidating causes, effects, and interrelationships. Moreover, informed by constructivist learning theory, the study aligns with the case study design, capturing students' active engagement and knowledge construction processes. Lastly, the qualitative approach facilitates a nuanced understanding of challenges, with data collected through interviews, observations, and document analysis, enhancing depth and contextual insights.

Data Collection Tools

In this study, the methods used to collect data are individual interviews and observations, as shown in Table 1.0

Table 1.0

Research Question and Data Collection Methods

Research Question	Data Collection Methods
RQ1: What difficulties do low academic performance students encounter throughout the pre-class, in-class, and post-class phases in the flipped classroom setting?	<p>Group-focused interviews</p> <ul style="list-style-type: none"> • six respondents <p>Observation</p> <ul style="list-style-type: none"> • Ability to prepare notes, given assignments during phase 1 • Willingness to attend face-to-face classes • Ability to complete homework assignments
RQ2: What is the academic performance of students with low academic performance during their engagement in flipped classrooms?	<p>Document analysis</p> <ul style="list-style-type: none"> • Quiz marks 1, 2, and 3 held at the end of each sub-topic taught

Study Participants

Participants are chosen through non-random sampling. Typically, respondent selection is based on their availability at the right time and place. A total of six students from the SES class in Selangor Matriculation College Session 2023/2024 (Three male and three female) were selected as study participants. The sampling type is purposive and homogeneous to ensure the study objectives are achieved. All students share the same characteristics, such as enrolling in chemistry courses, participating in a flipped classroom with the same learning materials, and having the same lecturer teach the chemistry course.

SES students are selected based on lecturers' observations, identifying them as academically low-achieving due to their Sijil Pelajaran Malaysia (SPM) results. Typically, these students score D or E in subjects such as additional mathematics, chemistry, biology, or physics, necessitating their placement in the SES group. Furthermore, they consistently achieve low marks in their Final Matriculation exams (PSPM) across multiple sessions.

Study Instruments

A comprehensive approach to data collection will be employed, utilizing various instruments to gather information systematically. Firstly, in-depth interviews will be conducted with participants, structured around the research objectives and questions. These interviews aim to explore the challenges encountered by students throughout different phases of the flipped classroom setting, ensuring consistency in data collection by using the same set of questions for all participants. Additionally, observations will be made regarding student note-taking behaviors during the pre-class phase to understand SES students' academic performance, contributing to investigating one aspect of RQ2.

Furthermore, the researcher will observe student engagement during in-class activities to assess their understanding of pre-class material and subsequent participation, anticipating active involvement from students who comprehend the pre-class content. Completing homework assignments and consistent quiz scores will also be observed to understand students' academic performance during the post-class phase, addressing another dimension of RQ2. Lastly, meticulous recording of field notes will document every aspect of the study process, emphasizing the importance of capturing the study's nuances and contributing to the overall validity of the research conducted at the study site.

Thematic analysis, as described by Lochmiller (2021), will be employed to interpret the collected data, involving extensive involvement and interpretation by the researcher to identify and explain ideas within the data and generate themes and codes. Data reliability will be ensured through triangulation, utilizing multiple methods or data sources, such as focus group interviews, document analysis, and classroom observations. Triangulation aims to validate and corroborate findings, minimizing biases and ensuring the validity of research outcomes. Additionally, member checking will be conducted, presenting preliminary findings and interpretations to participants to verify the accuracy and interpretation of collected data, thus enhancing the credibility and validity of the study's findings.

Trustworthiness

Triangulation in qualitative research aims to enhance the reliability and credibility of findings by utilizing multiple data sources or methods. This study employs three triangulations of data sources: focus group interviews, document analysis of quiz scores, and observation of classroom environments. By combining information from these diverse sources, the study validates and compares data, thereby ensuring the robustness of the research findings. Additionally, methodological triangulation is implemented through various analytical approaches, such as thematic analysis for interviews and document analysis, as well as comparative analysis in classroom observation, further strengthening the interpretation and bolstering confidence in the research outcomes.

Member checking, a common practice in qualitative research, is employed to uphold the credibility and trustworthiness of the study. This process involves presenting initial findings and interpretations to the SES students involved, allowing them to review and verify the accuracy of the collected data. Through member checking, participants can offer feedback to ensure that the study findings accurately represent their perspectives and experiences. While member checking enhances the study's validity by incorporating participants' insights, caution is warranted to prevent undue influence on interpretations or decision-making, thereby preserving the integrity of the research.

The pilot study conducted on two respondents, Edy and Tiy, with characteristics similar to the actual study participants, serves as a crucial step in testing the methodology and instruments. Findings from the pilot study revealed the need for revisions to interview questions to enhance clarity and suitability for data collection. Additionally, the pilot study informed decisions such as transitioning from individual to group-focused interviews based on the researcher's observations and reflections. Overall, the pilot study provided valuable insights to refine the research approach and ensure readiness to address challenges encountered during the study.

Findings and Discussions

RQ1: What difficulties do low academic performance students encounter throughout the pre-class, in-class, and post-class phases in the flipped classroom setting?

Question 1: What are the challenges faced during phase 1: pre-class?

During phase 1, students will access online videos created by the lecturer and uploaded to YouTube. Before attending face-to-face classes, students will study the topics the lecturer covers in these videos. They can communicate with the lecturer via messaging platforms such as Telegram or WhatsApp to ask questions or seek clarification. The analysis of pre-class face-to-face challenges has identified four main challenges (e.g., needing teacher guidance, quickly losing focus while studying videos, lack of an understanding of the content being studied, and needing to be instructed to study. With guidance, students will study on their own)

At the study's outset, the researcher made assumptions about the challenges faced in this phase based on previous studies. Among the expected challenges was time management, which the researcher raised questions about. However, time was not a hindering factor for all six respondents. Time can be categorized as a minor challenge that can be overcome, as seen from the participants' responses.

Question 2: Besides the challenges mentioned earlier, do you have any difficulties regarding time management?

"...You have reminded us to allocate at least 30 minutes daily for chemistry. So, it is okay. At the beginning, like before week 13, there were many assignments and much work to submit. So, it was not easy to manage the time. However, now it is okay." (Respondent A)

"...No, I try to manage my time to watch the videos as well." (Respondent C)

Question 3: What challenges are faced during phase 2: face-to-face classes?

In phase 2, the lecturer assumes that all students have already grasped the topic from the videos provided in phase 1. Consequently, the lecturer will proceed directly to conducting collaborative activities. Students will be presented with questions and work with their group members to solve them.

The analysis of challenges during face-to-face classes has identified four main challenges:

- i. Difficulty answering questions presented differently from what was taught during Phase 1.
- ii. Easily forgetting what was learned during Phase 1.
- iii. Lack of confidence in their understanding of what was learned during Phase 1
- iv. Different understanding compared to other students.

Regarding observations by the researcher during the class, all students participate in group discussions. There are two discussion methods used:

- i. Each group member writes their answer and then compares them. If there are differences, the discussion will be revisited.
- ii. Group members discuss from the beginning and eventually agree on the solution to the given question.

All six respondents participate in the assigned group activities. They actively engage in discussions, and none appear as passive observers during the talks.

Phase 3 in the flipped classroom is the post-face-to-face class phase. Students are given assignments or homework to complete outside class during this phase. The duration given to complete the tasks depends on the student's schedule for the next tutorial class meeting. Some students may have a day's gap, while others may have a two- to three-day gap. Students will only complete the assignments during this phase in the lecturer's presence. Students can choose to complete the tasks or homework individually or with classmates. Students can still contact the lecturer for clarification using messaging applications such as Telegram or WhatsApp. However, there is a possibility that the lecturer may not respond to students' messages, especially after office hours, as the lecturer may be busy with other matters such as family or rest.

The researcher's observation of the respondents and students participating in the flipped classroom found that 90% of the students would request the lecturer to re-explain the topics covered during phases 1 and 2. This situation occurs up to 5 times. This disrupts the time for phase 2 activities in the class the following day as the lecturer needs time to re-teach the topics.

RQ2: What is the academic performance of students with low academic performance during their engagement in flipped classrooms?

Three quizzes were conducted during the flipped classroom sessions to assess students' performance after participating in the flipped classroom. Quiz 1 and Quiz 2 were administered after students fully engaged in the flipped classroom. At the same time, Quiz 3 was implemented when the lecturer slightly altered the flipped classroom teaching method by incorporating face-to-face teaching during phase two, as shown in Table 2.0. The quizzes were held every Monday, following the completion of a topic taught in the previous week. The scores obtained from the quizzes indicate that the student's performance during the flipped classroom sessions could have been better.

Based on observations of students' marks and behaviors, it was found that students still required the lecturer to explain certain concepts face-to-face. Although explanations were provided to students in the videos, they were ineffective in imparting complete understanding. According to respondent E, he needed guidance from the lecturer to understand new topics.

"I need guidance from the lecturer to understand a new topic."

Respondent A also expressed a similar sentiment:

"The challenge is because when you watch the video, you repeat it. After that, sometimes we still do not understand because I feel like a visual learner. I need face-to-face interaction."

Table 2.0

The Marks For Quiz 1, Quiz 2, and Quiz 3 For 41 Students

Respondent	MARKS		
	Quiz 1 (/20)	Quiz 2 (/10)	Quiz 3 (/20)
A	0	5	2
B	0	5	6
C	4	5	11
D	20	0	12
E	4	4	10
F	17	3	10
Reflection (Upon 41 students who took the quizzes)	28/41 students failed in this quiz	21/41 students failed in this quiz	13/41 students failed in this quiz

Thematic Analysis

The analysis revealed two significant sub-themes under the first theme of "Dependency," namely "Dependency on Teacher Guidance" and "Need to Be Told to Learn." SES students strongly relied on teacher guidance, often seeking additional explanations during class sessions. This dependency underscores the importance of clear instructions and advice, as highlighted by Zainudin et al.'s (2019) study, to facilitate effective self-directed learning. Additionally, cognitive challenges in understanding emerged as the second theme, showcasing inconsistencies in students' comprehension and application of acquired knowledge. Addressing these challenges requires additional support for students, particularly in clarifying misunderstandings and fostering confidence in applying knowledge across different contexts. The third theme, "Retention and Recall Challenges," emphasized students' difficulties retaining and recalling information learned in the flipped classroom model. From managing time effectively to transferring knowledge between phases, students encounter various hurdles that necessitate improved learning strategies. Lastly, the "Post-Class Explanation Needs" theme highlighted students' ongoing demand for post-class explanations and guidance. This reflects the importance of direct interaction with teachers in resolving uncertainties and bolstering students' confidence in their understanding. Together, these themes underscore the multifaceted challenges SES students encounter in the flipped classroom model and emphasize the critical role of teacher support and effective learning strategies in overcoming these obstacles, as summarized in Table 3.0.

Table 3.0

Themes Underscore The Multifaceted Challenges SES

Theme	Sub-Theme
Dependency	<ul style="list-style-type: none"> • Dependency on Teacher Guidance • Need to Be Told to Learn
Cognitive Challenges in Understanding	<ul style="list-style-type: none"> • Inconsistent understanding among students • Difficulty in applying understanding
Retention and Recall Challenges	<ul style="list-style-type: none"> • Unable to remember what had been learned in Phase 1
Post-Class Explanation Needs	<ul style="list-style-type: none"> • Ongoing demand for post-class explanations and guidance

Conclusion

Although the academic performance may appear less satisfactory during students' participation in the flipped classroom, respondents expressed their agreement that the flipped classroom should continue because it still has its advantages.

"...flipped learning, because we should not just rely solely on the teacher to teach us because as students, we should take the initiative to learn first." - respondent C

"Flipped learning is good as it saves time for the students, making it flexible. It also saves time for the teacher to manage many classes. As we know, managing numerous classes is challenging. So, by providing flipped learning, it facilitates both the teacher and the students because the students can flexibly allocate time to study according to their mood." - respondent D

Based on the analysis and discussion of the collected data, several recommendations are proposed to enhance the flipped classroom model. Firstly, it is suggested that phase 2 of the model be modified by incorporating short face-to-face teaching sessions to offer additional guidance and support to students. These sessions, lasting around 10 to 15 minutes, could address challenges encountered during phase 1 and facilitate discussions on related topics. Implementing such interventions has shown promising results in improving students' quiz scores and instilling confidence in their understanding of phase 1 concepts.

This research significantly contributes to theoretical frameworks and contextual applications within educational methodologies. Theoretically, it advances our understanding of the flipped classroom model by highlighting its effectiveness and challenges precisely for low-achieving students in a matriculation college context, filling a critical gap in the existing literature by focusing on the academic backgrounds of participants. Contextually, the findings offer practical implications for curriculum designers and educators, addressing the needs of low-achieving students who traditionally struggle with entirely flipped classroom methods. By integrating guided face-to-face sessions within the flipped model, this study suggests a balanced approach that enhances self-directed learning while providing necessary support, fostering collaborative learning, and producing meaningful learning experiences. These contributions are pivotal in shaping inclusive educational practices that cater to diverse learning needs, promoting equity in academic performance.

Way Forward

Additionally, there is a need to ensure flexibility in learning activities to cater to the diverse needs of students. Individual activities should be integrated alongside collaborative tasks to accommodate various learning preferences and styles. Furthermore, conducting longitudinal studies can provide deeper insights into how students, particularly those from socioeconomically disadvantaged backgrounds or with low academic achievement, adapt to the flipped classroom model over an extended period. Support interventions, both within and outside the classroom, should be implemented and evaluated to address specific challenges identified among students. Moreover, providing professional development opportunities for educators is essential to equip them with the necessary skills to effectively implement the flipped classroom model, especially in addressing the unique needs of students with lower academic achievement. Lastly, future research should expand its scope to include SES students from other matriculation colleges to fully understand the model's effectiveness across different demographic contexts.

The obstacles pinpointed, exclusive to SES students, are interconnected with broader conversations concerning inclusivity and personalized teaching methodologies. Suggestions to enhance the flipped classroom model through the integration of guided instruction in phase 2 and the equilibrium between student-driven activities and instructor support present pragmatic approaches to enriching the educational journey of students with lower academic achievement.

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