

Flipped Classroom and its Effects on Student's Academic Performance and Behaviour

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Abstract

This study investigates the effects of the flipped classroom approach on students' academic performance and conduct. The flipped classroom takes learning outside of the traditional environment, encouraging self-reliance and active participation through technology. The Covid-19 epidemic has hastened the implementation of blended learning and flipped classrooms, so altering educational methods. The study aims to investigate the impact of the flipped classroom on academic attainment, to determine its effect on student conduct, and to analyze student preferences between flipped and regular classes. The flipped classroom has significant advantages, including increased engagement, higher attendance, and improved communication between students and educators. Nonetheless, some students prefer traditional classrooms. This study offers insights for students, instructors, institutions, parents, and legislators to improve educational processes. The findings will help students choose appropriate learning approaches, educators create effective teaching environments, institutions shape instructional methods, parents learn about educational strategies, and the Ministry of Education gain insights to foster dynamic learning environments. The larger educational community as well as teachers who are interested in raising the standard of physics education are expected to find this research to be significant.

Keywords: Academic Performance, Behaviour, Flipped Classroom, Online Physics Subject.

Introduction*Background of Study*

As educational paradigms shift to meet the demands of a rapidly evolving society, the exploration of innovative teaching methodologies has become increasingly vital. One such approach gaining traction is the flipped classroom model, which reverses traditional instructional roles by delivering lecture content outside of class, often through video recordings, and using in-class time for active learning and application (Bergmann & Sams, 2012). This model has garnered significant interest due to its potential to enhance both student engagement and academic performance.

The importance of studying the flipped classroom model is underscored by its implications for improving educational outcomes. Traditional lecture-based teaching often results in passive learning environments where students may struggle to engage deeply with the material (Bishop & Verleger, 2013). In contrast, the flipped classroom emphasizes active learning during class time, allowing students to collaborate and apply concepts in real-time. This shift has been associated with improved academic performance, as students can learn new material at their own pace outside of class and benefit from more interactive, application-based learning during class (Lage, Platt, & Treglia, 2000; Gilboy, Heinerichs, & Pazzaglia, 2015). Moreover, understanding the flipped classroom model is crucial for addressing behavioral issues in education. Traditional teaching methods can lead to disengagement and low motivation, particularly among students who struggle with self-regulation and time management (O'Flaherty & Phillips, 2015). The flipped classroom's focus on active participation and collaborative work is designed to foster greater student engagement and motivation. Research indicates that students in flipped classrooms often exhibit higher levels of participation and enthusiasm Mazur (1997), which can lead to more positive behavioral outcomes and a more dynamic classroom environment.

The flipped classroom method is a learner-centered pedagogical style that operates inversely to traditional education. In conventional settings, primary instruction occurs during class through lectures, with homework assigned for reinforcement. Conversely, the flipped classroom model assigns asynchronous practice problems and instructional videos as homework, while class time is devoted to collaborative problem-solving activities (Aghaei et al., 2020; Gündüz & Akkoyunlu, 2019; Yang & Chen, 2020). This model has gained traction due to advancements in technology, the widespread use of social media, and the prevalence of mobile devices. Many educators, particularly in business education, have blended traditional lectures with this model to assess its impact on undergraduate education (HELIYON, 2023). The flipped classroom also utilizes gamification to enhance engagement and enthusiasm among both educators and learners.

In 2007, chemistry instructors Jonathan Bergmann and Aaron Sams at Woodland Park High School pioneered this approach by recording lectures and sharing them online, benefiting students who missed classes or needed review (Hamdan et al., 2013). This method quickly expanded within their school and significantly influenced global perceptions of online education. The success of their nonprofit organization, which saw membership grow from 2,500 to 11,000 in a year, highlights the flipped classroom's impact (Overmyer, 2012). The traditional classroom setup poses challenges in fostering creativity and critical thinking,

prompting the exploration of alternative approaches like small group activities, case studies, and blended learning. Active learning strategies effectively engage students in cognitive processes, fostering critical thinking skills (Dehghanzadeh & Jafaraghaee, 2018). The flipped classroom, as a contemporary active learning strategy within blended learning, has proven to enhance overall skills, engagement, and motivation (HELIYON, 2023; Picciano et al., 2013; McCutcheon et al., 2018). Integrating creativity and technology in teaching has been shown to attract student interest, leading to higher motivation and participation (Ito et al., 2022; Alshawish et al., 2021).

Despite these potential benefits, the flipped classroom model also presents challenges, including varying levels of access to technology and the need for students to develop strong self-regulation skills (O'Flaherty & Phillips, 2015). Thus, there is a pressing need to investigate how these factors influence the effectiveness of the flipped classroom approach and to identify best practices for its implementation.

In summary, studying the effects of the flipped classroom model on students' academic performance and behavior is essential for advancing educational practices and achieving improved learning outcomes. By exploring this innovative approach, researchers can provide valuable insights into how to enhance teaching strategies and create more engaging and effective learning environments.

Statement of Problem

The aim of this research is to study the flipped classroom implemented during class, the student's academic performance of different classes and their change of behavior when the method of teaching was implemented. In order to facilitate improvement, the use of the flipped classroom model is suggested as a potential replacement for the conventional classroom setting. Several advantages and benefits of the flipped classroom approach may be noted. Students were gaining outstanding achievement and effective communication with their teacher was shown in a pilot test by Flumerfelt and Green in 2013. The flipped classroom can also influence a student's exam result. It has been reported that the final exam results are higher with the flipped classroom approach compared to traditional classroom (Holm et al., 2022). In contrast, there are also students who found out the academic performance and results were better in traditional classrooms and preferred more than the online and blended teaching (Alshawish et al., 2021).

The traditional classroom has been an identity in Malaysian education. It is commonly used by most of the teachers. This classical method of teaching affects the student's behavior during teaching and learning sessions and also their academic performance. Traditional classrooms showed that the quality produced by our students is quite low especially in terms of creativity. The incorporation of technological advancements into educational settings can provide novel and dynamic prospects, with students assuming the central role in the learning process. (Flores-Alarcia et al., 2022). Flipped classrooms enhance engagement and provide better performance (Banks & Kay, 2022) and also found that it can generate chances for active learning (Leicht, Zappe, Messner, & Litzinger, 2012). Student's attendance to the class seems bland but not in flipped classroom. The attendance percentage in a flipped classroom is much greater compared to that in a standard classroom (Elzainy & Sadik, 2022).

Traditional classrooms show a significant decrease or not much improvement in terms of student academic achievement. The implementation of flipped classrooms somehow intended to improve the communication between the students and the educators. The use of the flipped classroom model allows for the allocation of additional time towards engaging in active learning. This approach optimises the utilisation of classroom time by enabling teachers to address specific queries and concerns brought out by students (Cabi, 2018). This study aims to examine the benefits and drawbacks of flipped classrooms on student academic performance and behaviour. The objective is to determine which instructional approach, between flipped classrooms and regular classes, is more appropriate for students to select as their primary preference.

Research Questions

Based on the above problem statement, this research has formulated a research question as follows

- (i) To examine the potential influence of the flipped classroom model on the academic accomplishment of individual students
- (ii) To determine how the implementation of the flexible classroom affects the behaviors of students
- (iii) To investigate the student's preference on the flipped classroom or traditional classroom

Literature Review

Flipped Classroom

The flipped classroom is a kind of mixed learning, representing one of the contemporary pedagogical approaches. The flipped classroom approach emphasises pre-class and in-class activities, whereby the instructor first provides students with instructions, such as notes and informational resources. During instructional sessions within the educational setting, educators engage in captivating classroom activities, such as workshops and discussions, according to the predetermined subject matter that was assigned prior to the commencement of the class (Banks & Kay, 2022).

There are a limited number of teaching methods that use the flipped classroom model, and educators possess the ability to adapt and customize this instructional approach according to the specific circumstances and subject matter they are instructing. In the flipped classroom paradigm, the teacher assumes the role of either an instructor or a facilitator, wherein students independently acquire knowledge on a certain subject with the assistance provided by the teacher. The educational landscape of the 21st century has seen a shift in pedagogical emphasis, transitioning from a traditional teacher-centered approach to a more student-centered paradigm. According to Nja et al (2022), students exhibit an active role in the classroom rather than assuming a passive stance of just occupying a chair. This fosters the cultivation of cooperation and collaborative skills, while also nurturing the development of creativity among the student body. The use of interactive activities has been proposed as a means to enhance students' comprehension, as suggested by (Alshawish et al., 2021).

The concept of flipped classrooms was initiated in 2007 by Bergmann and Sams, two chemistry instructors, who sought to modify their teaching approach (Holm et al.,

2022). Athlete students who exhibit a pattern of frequent class absences will inevitably fail to acquire crucial knowledge and substance pertaining to their studies. To ensure that all students are adequately supported, Bergmann and Samsth implemented the provision of online iterations of PowerPoint lectures (Eppard & Rochdi, 2017). The adoption of the flipped classroom model is becoming prevalent on a global scale, accompanied by the emergence of novel variations and enhancements. Nevertheless, several studies have shown neutral academic results, indicating that the implementation of the flipped classroom model does not have a significant impact on students' academic performance (Elzainy & Sadik, 2022). According to a study conducted by Ng (2023), the use of flipped classroom strategies among undergraduate nursing students resulted in either neutral or positive effects on their academic performance.

Effect on Student's Academic Performance and Behavior

The revolution in education may be attributed to more than simply the integration of technological advancements in instructional methods and educational practices. The inadequate academic outcomes and the students' conduct and disposition towards their courses and classes are further contributing factors. The methodology was also altered in response to the global issue that impacted the whole of the planet. The implementation of online distance learning in Spanish was necessitated due to the complete transition of teaching and learning sessions to online platforms in response to the SARS-CoV-2 pandemic. This sudden shift caused significant levels of stress among educators who were unprepared for this mode of instruction (Flores-Alarcia et al., 2022).

One strategy for addressing the limitations of conventional classrooms is the use of twenty-first century learning principles, such as blended learning and flipped classrooms, as a means of instructional delivery. While Elzainy and Sadik (2022), argue that the implementation of the flipped classroom model does not yield significant positive impacts, other studies have found mixed results. Some research suggests that the traditional classroom approach is more effective in enhancing students' academic performance. However, a majority of studies indicate that the flipped classroom model has the potential to improve both academic performance and student behaviour.

The use of critical thinking is crucial for addressing topics that need high-order cognitive skills. The flipped classroom approach involves the instructor assuming the role of a facilitator, aiming to foster the development of critical thinking and logical reasoning skills among students, rather than only providing material (Dehghanzadeh & Jafaraghaee, 2018). According to Holm et al (2022), the use of a flipped classroom approach led to notable improvements in test outcomes, attributed to enhanced critical thinking skills among students.

Within the realm of behavioural studies, extant research has shown a correlation between an individual's disposition towards their courses and classes and their academic achievement (Nja et al., 2022). The choice of instructional environment might potentially impact students' attitudes, fostering more engagement with the course material and enhancing the overall appeal of the classroom setting. According to Nja et al. (2022), the use of an active and flipped classroom approach in chemistry lectures has been shown to foster a more favourable attitude among students compared to the conventional classroom

setting. Attitude may be conceptualised as a cognitive and affective construct that has an impact on an individual's inclination to engage in certain actions or behaviours (Nja et al., 2022). Conversely, behaviour refers to the observable responses and reactions shown by an individual in response to specific stimuli, such as other individuals, actions, or environmental factors.

Hofstein and Mamlok-Naaman (2011), identified three key aspects that have the potential to impact student behaviour and thereby enhance student attitudes. These factors include the instructional approach used in course content delivery, the availability and utilisation of course materials and teaching aids, and the presence of gender bias. Juma and Ahmad (2012), have shown a link between an individual's academic achievement and their attitude and behaviour.

There is an expectation that the implementation of flipped classrooms would provide a positive impact on students' academic performance. This is attributed to the notion that the learning experience would become more pleasurable and engaging for students, as they would actively participate in instructional activities and exercises. Blair, Maharaj, and Primus (2016), have provided empirical data indicating that the implementation of the flipped classroom approach leads to superior performance on final examinations when compared to the traditional classroom environment. The results of the study revealed that there was a notable difference in the test scores between the flipped classroom setting and the traditional classroom setting, with the former exhibiting higher marks. Moreover, the incorporation of quizzes inside educational settings might perhaps be attributed to the documented rise in academic performance. Two scholarly investigations have shown improvements in general scholastic accomplishment, notwithstanding an initial below-average performance on the first assessment (Gopalan, 2019; Olivan Blazquez et al., 2019). The flipped classroom paradigm offers benefits to students by facilitating the seamless integration of pre-class preparatory information with in-class assignments. As a result, it can be seen that students tend to come to their classes with a higher level of preparedness, which subsequently facilitates their engagement in more comprehensive and profound learning experiences (Critz & Knight, 2013).

Prober (2012) reported a significant increase in attendance rates inside the flipped classroom environment when compared to the attendance rates recorded in the regular classroom setting. The issue of student absenteeism is a prevalent and persistent problem, not just in the specific context of Japan, but also on a worldwide level. Various initiatives have been implemented to improve the attendance rate. The research suggests that the deployment of the flipped classroom approach has the potential to improve attendance rates, therefore presenting a benefit. The first challenge that necessitates resolution is the attendance rate, as it is the initial factor that impacts a student's academic achievement. The use of flipped classrooms has the potential to enhance student attendance rates. According to Elzainy and Sadik (2022), the use of a lecture-free format in the Biochemistry dissertation course at Stanford University School of Medical has resulted in a significant increase in class attendance, with rates rising from 30% to 80%.

Conceptual Framework

For the conceptual framework, flipped classrooms may change the behavior and

the academic performance of the students. Flipped classrooms may cause a direct effect on the student's academic performance but flipped classrooms can also change student's behavior and their attitude that then bring to the change in their academic performance and achievement.

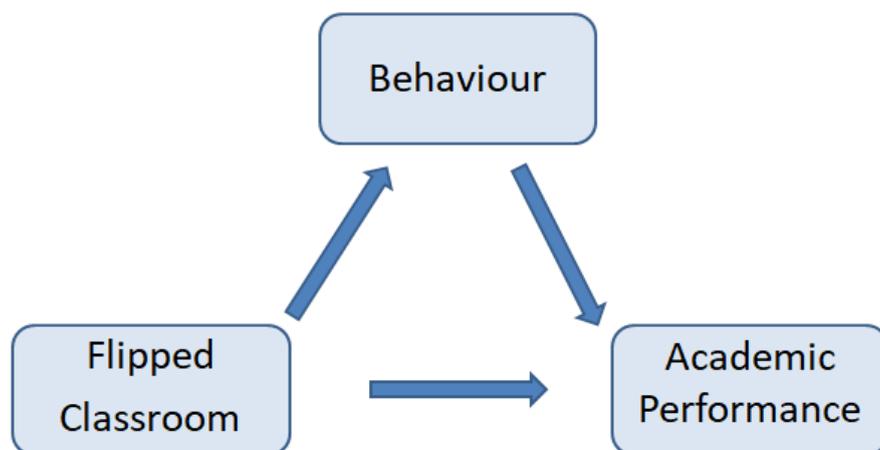


Figure 1: The relationship between behavior, flipped classroom and academic performance

Methodology

This study aims to determine the impact of the flipped classroom model on students' academic performance and behavioral outcomes, focusing on Part 7 and 8 Physics Education students at UiTM Puncak Alam during and after the COVID-19 pandemic. Various learning methods were employed during the pandemic in Malaysian universities, and this research specifically investigates the flipped classroom approach at UiTM Puncak Alam to identify the most suitable method for Physics Education students. Part 7 and 8 students were chosen due to their two-year experience with flipped classes. The methodology involved administering a survey to collect data on students' perceptions of the flipped classroom model and its effects on their academic performance and behavior. Quantitative data analysis was conducted using SPSS. The study employs a quantitative research design to explore the influence of the flipped classroom on academic achievement and behavior, utilizing an analytical descriptive technique for in-depth understanding. A survey was selected for its effectiveness in examining the relationship between the flipped classroom approach and students' experiences. Simple random sampling was used to select a sample of 52 Physics Education students from semesters 7 and 8. The survey questionnaire, based on a Likert scale, included sections on demographic information, academic performance, classroom behavior, and student perceptions of the flipped classroom. Before administering the questionnaire, the researcher provided an explanation of the flipped classroom concept to participants.

Table 1

Distribution of Items in Survey

		ITEM
SECTION 1	DEMOGRAPHIC INFORMATION	GENDER
		AGE
		CGPA
		SEMESTER
SECTION 2	IMPLEMENTATION OF FLIPPED CLASSROOM	Engaging in diverse activities enhances cognitive abilities related to comprehension and retention.
		My problem-solving abilities has a notable improvement subsequent to my engagement with the flipped classroom methodology.
		Pre-viewing the video before the lesson enhances the learning process.
		The use of flipped courses did not impose any constraints on my engagement with teachers.
		I feel that mastering learning through flipped classroom improved my academic achievement.
		The exercises conducted throughout the class contribute to the development of skills and information pertaining to the subject matter being taught.
		The use of a flipped classroom model has been shown to decrease the cognitive effort required for students to grasp fundamental concepts within a given topic.
		The use of the flipped classroom model fosters the development of critical and creative thinking skills inside me.
		The use of the classroom model promotes a heightened inclination towards active participation via the continuous engagement of students in asking supplementary inquiries over the duration of the class session.

SECTION 3	INVOLVEMENT AND BEHAVIOR	The implementation of the flipped classroom model has a significant impact on my level of engagement and participation within group discussions.
		The inverted classroom structure motivated me to put in more efforts into my studies.
		When I am given a challenging task, I make an extra effort to complete them.
		The use of the flipped classroom approach facilitated a notable improvement in my class attendance rate.
		The adoption of the flipped classroom pedagogy has resulted in a transformation in my academic approach, leading me to consistently maintain a high level of attentiveness throughout class sessions.
SECTION 4	PERCEPTION TOWARDS FLIPPED CLASSROOM	I find that my ability to comprehend and retain information is enhanced when exposed to flipped classroom method as opposed to conventional lecture-based method.
		I have developed a favorable disposition towards the implementation of the flipped classroom model.
		I believe that the use of the flipped classroom approach should be undertaken by the instructors in order to enhance the engagement and appeal of the learning experience.
		The implementation of the flipped classroom model has the potential to serve as an effective pedagogical approach.
		I hold the belief that my ability to acquire knowledge via flipped classroom training surpasses that of conventional lecture-based instruction.

	I would highly advocate the use of the flipped classroom approach to a colleague.
Total Items	24

Findings

Table 2

Socio-demographic Data (n=62)

Variables	Frequency	Percentage (%)
Gender		
Male	19	30.6 %
Female	43	69.4 %
Age		
22	35	56.5 %
23	9	14.5 %
24	18	29 %
CGPA		
2.00 - 2.50	0	00.0%
2.51 - 3.00	17	27.4 %
3.01 - 3.50	35	56.1 %
3.51 - 4.00	10	16.1 %
Semester		
7	32	51.6 %
8	30	48.4 %

Table 2 depicts the gender, age, CGPA and semester. A total of 62 respondents from Part 7 and Part 8 Physics Education Students were involved in this questionnaire. Among the 62 respondents, 19 were male (30.6%) and 43 were female (69.4%). Most of the respondents' age for this research was 22 years old with the frequency of 35 (56.5%) respondents while the least respondent age for this research was 23 years old with the frequency of 9 (14.5%) respondents. From the aspect of semester, there are no significant differences between the respondents, of which a total of 32 respondents (51.6%) were in the seventh semester and the remainder which were 30 respondents (48.4%) in the final semester. Lastly from the aspect of CGPA, most of the respondents with a CGPA range of 3.01 - 3.50 with frequency of 35 (45.1%) has over half of the total respondents. The lowest ranges of CGPA respondents recorded was 3.51 - 4.00 at the frequency of 10 (16.1%) while there were no students

recorded with the CGPA ranges between 2.00 - 2.50.

Table 3

Descriptive analysis (n=62)

Item	N	Mode	Mean
1. Engaging in diverse activities enhances cognitive abilities related to comprehension and retention.	62	4	4.29
2. My problem-solving abilities have a notable improvement subsequent to my engagement with the flipped classroom methodology.	62	5	4.27
3. Pre-viewing the video before the lesson enhances the learning process.	62	5	4.47
4. The use of flipped courses did not impose any constraints on my engagement with teachers.	62	3	3.74
5. I feel that mastering learning through flipped classrooms improved my academic achievement.	62	4	4.18
6. The exercises conducted throughout the class contribute to the development of skills and information pertaining to the subject matter being taught.	62	5	4.39
7. The use of a flipped classroom model has been shown to decrease the cognitive effort required for students to grasp fundamental concepts within a given topic.	62	4	4.00

Table 3 presents the statistics of the influences of flipped classroom models on students' ability to perform well academically. The descriptive analysis was executed from the questionnaire with 7 items that students were answered based on the 5-Likert Scale score. From the table, we can observe that the biggest influence of flipped classroom models on students' ability to perform well academically is the third item; pre-viewing the video before the lesson enhances the learning process (mean = 4.47, SD = 0.762) with most of the respondents strongly agreeing with the enhances of the learning process (mode = 5). The lowest influence of flipped classroom models on students' ability to perform well academically is the fourth item; the use of flipped courses did not impose any constraints on my engagement with teachers (mean = 3.74, SD = 1.070) with most of the respondents are moderate with how the flipped classroom constraints on the engagement with teacher (mode = 3).

Table 4

Descriptive analysis (n=62)

Item	N	Mode	Mean
1. The use of the flipped classroom model fosters the development of critical and creative thinking skills inside me.	62	4	4.18
2. The use of the classroom model promotes a heightened inclination towards active participation via the continuous engagement of students in asking supplementary inquiries over the duration of the class session.	62	4	4.27
3. The implementation of the flipped classroom model has a significant impact on my level of engagement and participation within group discussions.	62	4	4.31
4. The inverted classroom structure motivated me to put in more effort into my studies.	62	3	3.85
5. When I am given a challenging task, I make an extra effort to complete them.	62	5	4.35
6. The use of the flipped classroom approach facilitated a notable improvement in my class attendance rate.	62	4	3.94
7. The adoption of the flipped classroom pedagogy has resulted in a transformation in my academic approach, leading me to consistently maintain a high level of attentiveness throughout class sessions.	62	5	4.27

Table 4 illustrates the statistics of the influences of flipped classroom models on students' involvement and behavior modifications. The descriptive analysis was performed from the questionnaire with 7 items that students were answered based on the 5-Likert Scale score. From the table, we can detect that the biggest influence of flipped classroom models on students' involvement and behavior modifications toward the classes, courses, and lecturers is the fifth item; when I am given a challenging task, I make an extra effort to complete them (mean = 4.35, SD = 0.812) with most of the respondents strongly agreeing that they will give extra effort on finishing more challenges task (mode = 5). The lowest influence of flipped classroom models on students' ability to perform well academically is the fourth item; the inverted classroom structure motivated me to put in more effort into my studies (mean = 3.85, SD = 0.876) with most of the respondents are moderate with how the flipped classroom can motivated them to give more effort on their studies (mode = 3).

Significance of Study

The significance of studying the flipped classroom model and its effects on students' academic performance and behavior is multifaceted, encompassing improvements in teaching effectiveness, student engagement, and educational equity. This innovative pedagogical approach has gained considerable attention for its potential to address longstanding issues within traditional educational settings.

One of the primary reasons for studying the flipped classroom model is its potential to enhance academic performance. Traditional lecture-based teaching often limits the time available for interactive learning, which can impede students' ability to deeply understand and apply concepts. The flipped classroom model, by shifting direct instruction outside the classroom, allows students to engage with new content at their own pace and revisit challenging material as needed (Bergmann & Sams, 2012). Research has shown that this approach can lead to improved test scores and a better grasp of subject matter (Lage, Platt, & Treglia, 2000). By investigating the effects of the flipped classroom on academic outcomes, educators can better understand how to leverage this model to improve learning effectiveness and student achievement.

Student engagement and behavior are critical factors influencing educational success. Traditional teaching methods, characterized by passive learning, often result in disengagement and low motivation among students (Bishop & Verleger, 2013). The flipped classroom model addresses these issues by emphasizing active learning during class time, which can foster greater participation, collaboration, and motivation (Gilboy, Heinerichs, & Pazzaglia, 2015). Understanding how the flipped classroom impacts student behavior is essential for creating a more dynamic and supportive learning environment. Research in this area can provide insights into how this model can improve classroom interactions and overall student enthusiasm for learning.

Implementing the flipped classroom model presents several challenges, including disparities in students' access to technology and variations in self-regulation skills (O'Flaherty & Phillips, 2015). By studying these challenges, educators and policymakers can develop strategies to address potential inequities and ensure that all students benefit from this approach. For instance, understanding how to provide equitable access to the necessary technology and support students in developing self-regulation skills can help maximize the effectiveness of the flipped classroom and promote educational equity.

The findings from research on the flipped classroom model can inform educational policy and practice by providing evidence-based insights into its effectiveness. As educational institutions continue to seek ways to enhance teaching and learning, understanding the impact of different pedagogical strategies is crucial. This study can contribute to the development of best practices for implementing the flipped classroom model, guiding educators in designing effective learning experiences and improving overall teaching strategies.

Finally, studying the flipped classroom model provides valuable insights for teacher professional development. As educators adopt new teaching methods, they need support and training to effectively implement these strategies. Research on the flipped classroom can identify key areas where teachers may need additional resources or training, helping to ensure successful adoption and integration of this innovative approach.

In conclusion, the significance of studying the flipped classroom model lies in its potential to improve academic performance, enhance student engagement and behavior, address challenges and inequities, inform educational policy and practice, and support teacher professional development. By exploring these aspects, this research can contribute to advancing educational practices and creating more effective and inclusive learning environments.

Conclusion

Findings and Discussion

In this study, the researcher explored the impact of the flipped classroom on students' academic performance, classroom behavior, and perceptions. The findings are categorized into three primary sections: academic performance, behavioral changes, and student preferences regarding traditional and flipped classrooms.

The first research question examined how the flipped classroom influences students' academic performance. This approach allows students to work at their own pace with pre-class assignments, which promotes individualized learning. According to Binoy (2024), this flexibility enhances academic achievement by enabling students to tailor their education to their specific needs. The flipped classroom model also fosters analytical reasoning and active participation, resulting in a better understanding and practical application of the subject matter. Additionally, it encourages collaboration and interpersonal skill development, facilitated by technology such as online platforms and video-sharing websites.

Findings indicate that the majority of students recognize the value of pre-class exercises in developing relevant skills and knowledge. They reported significant improvements in problem-solving abilities due to engagement with the flipped classroom methodology. Previewing videos before lessons was noted to make the learning process smoother and more interactive. Overall, the flipped classroom enables teachers to structure their methods more effectively, leading to better learning outcomes and exam success.

The second research question focused on how the flipped classroom affects students' behavior and involvement during class activities. This approach replaces traditional in-class lectures with pre-class audiovisual resources, while classroom time is devoted to instructor-led activities like problem-solving and discussions. Studies consistently show that the flipped classroom format significantly enhances student engagement and participation. For instance, McLaughlin et al (2013, 2014) found that pharmacy students benefited from pre-class preparation, leading to higher engagement levels during class.

Surveyed students reported a strong preference for the flipped classroom model over traditional methods, citing increased involvement in group discussions and continuous engagement throughout class sessions. The methodology also positively impacted students' attention spans and morale, leading to higher participation in classroom activities.

The third research question explored students' preferences between flipped and traditional classrooms. The study assessed overall student involvement before, during, and after class activities. Findings reveal a strong preference for the flipped classroom due to its

positive impact on academic performance, engagement, and behavior. Students felt more connected to the material and motivated, leading to better understanding and retention. Additionally, the flipped classroom model resulted in higher attendance and participation rates. Students highly recommended this approach to peers and educators, highlighting its potential to transform educational practices.

This chapter summarizes the key findings from the questionnaire-based research, reinforcing previous studies on the efficacy of flipped classrooms. The post-COVID era has prompted a reevaluation of traditional educational methods, and this research provides insights to help educators develop more interactive and engaging teaching approaches. By adopting the flipped classroom model, educators can create dynamic learning experiences that better meet the needs of modern students. This shift not only addresses the challenges posed by the pandemic but also lays the foundation for a more resilient and effective educational system in the future.

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