

Perceived Effectiveness of Flipped Classroom Strategies in Enhancing Students' Critical Thinking at the Graduate Level

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ABSTRACT

The study aimed to examine the perceived effectiveness of flipped classroom strategies on students' critical thinking skills at the graduate level. The objectives of the study were to identify the effect of flipped classroom strategies on enhancing students' critical thinking, developing problem-solving skills, and improving classroom engagement. The study had a quantitative descriptive research design. The study population consisted of male and female students at private universities in Gujranwala city. The study selected two private universities from Gujranwala city as the accessible population. Using the simple random sampling technique, data were collected from a sample of 367 students from the population. The questionnaire consisted of 30 statements and was designed according to the 5-point Likert scale. A self-constructed questionnaire informed by the study objectives served as the primary means of data collection. For this study, the value of Cronbach's alpha was above 0.7, which indicates that the reliability of the instrument was acceptable. Analysis of the collected data was done with the help of SPSS. Descriptive statistics and inferential statistics were used to measure the mean and standard deviation, ANOVA, t-test, regression, and correlation. Results of the study indicate that most of the respondents agreed that flipped classroom strategies enhance students' critical thinking at the graduate level. A statistically significant difference was observed across departments, indicating that perceptions of the FC's effectiveness in enhancing critical thinking varied by departmental affiliation. This study suggests that training programs structured around flipped classroom strategies should be developed to enhance educators' and students' capacity for creativity and effective learning.

Keywords: Flipped Classroom Strategies, Critical Thinking, Pre-class, in-class.

Introduction

Education is a rapidly changing field that continuously incorporates new techniques and innovative methodologies to boost students' learning outcomes. flipped classroom strategy is one of the innovative learning approaches that has received significant attention in today's educational field. The flipped classroom strategy reverses the traditional teaching and learning patterns. This approach consists of students engaging with instructional materials before attending class, while Classroom time is then utilized for interactive activities, discussions, and problem-solving exercises, permitting students to practice their knowledge practically. Moreover, the in-class activities develop great collaboration, critical thinking, and engagement among students, so they get more clarity and guidance from their peers and the teachers in real-time (Hussain et al., 2023).

Critical thinking is recognized as a reflective, rational, and practical approach to decision-making that individuals employ when deciding what to believe or do. Individuals can defend themselves against false information in today's world thanks to Critical Thinking, which is a logical approach to evaluating arguments, ideas, and evidence; students acquire the skills of questioning, analysis, and decision-making. Critical Thinking is not only about cognitive skills, but also about certain dispositions, such as being innovative, self-confident, open-minded, objective, and willing to seek the truth (Orhan,2023).

In flipped learning, goals such as getting information are completed by students before attending class. That's why teachers prepare instructional material with the help of digital technologies such as videos, documentaries, and presentations, and permit learners to access them before class. As a result, teachers have more classroom time to solve the students' problems, answer their questions, and focus on critical skills such as solving real-life problems, decision-making, analyzing situations, and practical learning activities. Teachers in flipped classrooms perform the role of guide, mentor, and helper, and they design practical opportunities for the students so they can learn by doing. Thus, learners have the chance to develop themselves by polishing their knowledge through a practical environment. In this approach, class time becomes more beneficial and offers a wide range of practices for critical social learning activities. Moreover, teachers can devote more time to interesting and practical activities that are necessary for high-level skills such as critical thinking, questioning, analyzing, decision-making, peer engagement, and reasoning (Aydin & Demirer,2022).

By shifting foundational lectures to be studied at home and dedicating class time to active learning, the flipped classroom provides a unique framework for cultivating critical thinking. This model naturally asks more from teachers and students alike. (Pan,2024).

Review of Related Literature

Background

Blended learning combines online and classroom teaching, and the Flipped Classroom (FC) is considered one of its important models. Although the term FC was formally introduced about two decades ago, its roots are much older. In 1993, Alison King, in her work "From Sage on the Stage to Guide on the Side," criticized the traditional university teaching style where the teacher was the central figure who just transmitted information without engaging students in critical thinking, and she named this approach the Transmittal Model (King, 1993). The concept of the FC approach was first clearly defined in 2000 through two separate studies. In the same year, at Cedarville University, J. Wesley Baker proposed a new approach that links teaching methods with technology, keeping in view the changing philosophy of education and technological development, and he referred to this new approach as the flipped classroom (Baker, 2000). University of Miami academicians Maureen J. Lage, Glenn J. Platt, and Michael Treglia used the FC Model in order to meet the needs of students with different learning approaches and not having enough class period for tough subjects, in the same year. This innovative model was highly appreciated by students and teachers. The broader use of the FC Model took place almost seven years after the application of Baker (Agirman & Ercoskun, 2022).

Flipped Classroom

The flipped classroom method offers an environment of practical learning and a set of teaching models that provide mostly information and course content before class, and use class time for practical learning activities that are active and social, and demand that students complete pre-or post-class activities to get full benefit from in-class work” (Soma, 2024).

Flipped Classroom Models

There are different models (traditional, partial, and holistic models) for the application of the flipped classroom approach. If the instructor analyzes the situation of the classroom while choosing one of these models, the results will be more effective. Sams and Bergmann described the flipped classroom as a model where activities typically carried out in school are done at home, and homework usually done at home is accomplished in the classroom. In the traditional flipped classroom approach, after seeing the lecture video from the previous night, peers attend the class. In this approach, a student-centered class is in question, and the teacher performs as just a guide. The least strict model of the FC approach is known as the partial flipped classroom model. The perfect application of the partial flipped classroom model was made by Gwyneth Jones at Murray Hill Secondary School. Jones motivated his students to watch the videos before attending class. A model that includes home, mobile, and physical classrooms simultaneously is known as the holistic flipped classroom model. In the holistic flipped classroom model, all pre-, post-, and in-class activities are fully monitored and examined by the teachers, compared to traditional flipped classrooms, where learners are only monitored by teachers in the physical classroom, and their pre-class activities are not recorded and monitored, and that’s why they also cannot be examined (Ozdamli & Asiksoy, 2016).

Strategies of the Flipped Classroom

There are two strategies of the flipped classroom: in-class and pre-class strategies. Pre-class involves online learning environments, like reading, online quizzes, and video lectures. In-class strategies help to build the habit of problem-solving, discussion, and case studies. Critical thinking is the ability to promote collaboration, engagement, personalized learning, and so on. Flipped classrooms play the most important role in education (Chen et al.,2023).

Flipped Classroom Vs Traditional Learning

A traditional classroom refers to one that offers physical lectures, with no use of technological tools within the classroom, and depends heavily on the teacher mediating between the learners and course content. This means that students have insufficient awareness of the topic, and the teacher is the only source of knowledge. While the flipped classroom approach is a student-centered approach where the teacher only plays the role of a guide, learning activities take place outside the classroom, and peers utilize class time for active learning strategies, such as problem solving, questioning, and discussion between students in the presence of the instructor (Jdaitawi, 2019).

Critical Thinking

The ability to analyze situations, raise questions, and find logical reasoning about any situation is known as critical thinking. Critical thinking helps an individual decide what to believe and how to act. It involves analyzing, reasoning, questioning, and interpreting. With the rapid development of information technology in today's world, critical thinking has become more significant to make well-informed decisions after analyzing the authenticity of the provided information (Jamil, Hafeez, & Muhammad,2024).

Effectiveness of Flipped Classroom

The flipped classroom enhances collaboration among peers and promotes effective learning during class. It consists of providing asynchronous learning material for students to watch before attending class. Questioning, Discussions, logical reasoning, problem-solving, and practical activities then utilize the class time for practicing the knowledge from the videos (Mazlan et al., 2025).

Objectives of the Study

The following were the objectives of the study:

1. To find out how the use of flipped classroom strategies helps students in developing critical thinking at the graduate level.
2. To examine the effect of the flipped classroom on students' problem-solving skills at the graduate level.
3. To investigate the impact of the flipped classroom on improving students' engagement.

Significance of the Study

This study highlights the importance of modern teaching strategies in improving students' learning outcomes. The flipped classroom approach diverts the focus from teacher-oriented to student-oriented learning, which helps students become more active, confident, and independent thinkers by promoting critical thinking. It makes students accustomed to real-life problem-solving and decision-making. For teachers, it provides an opportunity to use class time more effectively and engage students through discussions and activities. Parents can also see improvement in their children's learning attitude and motivation. On a broader level, this research supports educational institutions in adopting innovative methods that match the demand of the modern world and develop a more analytical and creative generation.

Research Methodology of the Study

For this study investigating the perceived effectiveness of the flipped classroom on students' critical thinking at the graduate level, a descriptive research design was used. 8000 students from 2 private universities of Gujranwala city in Punjab, Pakistan were considered as the accessible population of the study, from which 367 students were chosen through a simple random sampling technique using the Krejcie & Morgan (1970) table as the sample of the study. Data were collected through physical visits to the selected universities in Gujranwala city with the help of a self-constructed questionnaire. The questionnaire comprised four sections: demographic information, flipped classroom and critical thinking, flipped classroom and problem-solving skills, and flipped classroom and student engagement. Expert opinions were taken to check the Validity of the instrument, while the reliability was analyzed using Cronbach's alpha (.81 for critical thinking, .78 for problem-solving, and .81 for student engagement). To analyze data, SPSS version 27.0 was used. The analysis included descriptive statistics (mean, standard deviation, and percentage) to summarize participants' responses regarding collaborative learning. In addition, inferential statistics were applied, where independent-samples t-tests were used to examine distinctions in perceptions based on gender and semester, while one-way ANOVA was used to find differences based on the departments of respondents.

Reliability Analysis of Questionnaire

After completing data collection, the data were entered into SPSS to measure the reliability of all scales.

Table 1 *Reliability Analysis of the Scales*

Sr.no	Name of scale	Number of items	Cronbach's alpha value
1	Flipped classroom and critical thinking	10	.810
2	Flipped classroom and problem-solving skills	10	.782
3	Flipped classroom and student engagement	10	.817

Cronbach's alpha values for critical thinking (.810), problem-solving skills (.782), and student engagement (.817) all exceeded .70, indicating that the scales have acceptable to good internal consistency and are reliable for this study.

Descriptive Analysis of Scales

This section provides a descriptive analysis of the statements based on these factors, namely, the flipped classroom and critical thinking, problem-solving skills, and students' engagement. Descriptive statistics, used to measure the mean and standard deviation of scales, provide valuable insights into the central tendency.

Mean and Standard Deviation of Factor Critical Thinking

This table presents students' point of view about the effectiveness of the flipped classroom approach in enhancing critical thinking skills.

Table 2. *Descriptive statistics based on the scale of the flipped classroom and critical thinking*

Statement	Mean	SD
Watching pre-class videos helps me understand the course topic before the class session.	3.16	1.07
Flipped classroom activities help me analyze course content more deeply	3.41	1.15
Class discussions encourage me to think beyond a basic understanding of the topic	3.47	1.04
Flipped classroom tasks require me to apply concepts to real-life or practical situations.	3.31	1.04
Flipped classroom activities enable me to construct my own academic opinions independently.	3.23	1.11
Flipped classroom activities help me identify strengths and weaknesses in academic arguments.	3.26	1.17
I can compare different viewpoints on a topic through flipped classroom discussions.	3.17	1.13
Flipped classroom strategies encourage me to question the accuracy of information	3.21	1.13
I develop higher-order thinking skills through flipped classroom tasks.	3.17	1.16

Students expressed a moderate level of agreement that the flipped classroom supports critical thinking, with mean scores ranging from 3.16 to 3.47, slightly above the neutral midpoint of 3 on a 5-point scale. The highest-rated statement was that class discussions encourage students to think beyond a basic understanding of the topic ($M = 3.47$, $SD = 1.04$), followed by the statement that flipped classroom activities help students analyze course content more deeply ($M = 3.41$, $SD = 1.15$). In contrast, the lowest-rated statement was that watching pre-class videos helps students understand the topic before the session ($M = 3.16$, $SD = 1.07$), closely followed by comparing different viewpoints ($M = 3.17$, $SD = 1.13$) and developing higher-order thinking skills ($M = 3.17$, $SD = 1.16$). The standard deviations, which ranged from 1.04 to 1.17, indicate considerable variation in students' responses. Overall, the findings suggest that students view flipped classroom activities, particularly class discussions and in-depth analysis, as moderately effective in developing critical thinking.

Mean and Standard Deviation of Factor Problem-Solving Skills

This table presents students' perceptions regarding the role of the flipped classroom in enhancing problem-solving skills.

Table 3 *Descriptive statistics based on the scale of the flipped classroom and problem-solving skills*

Statement	Mean	SD
Flipped classroom sessions give me enough time to work on complex academic problems in class.	3.28	1.22
Group tasks in the flipped classroom improve my ability to solve problems effectively.	3.25	1.15
Pre-recorded lectures allow me to revisit difficult content and clear my confusion.	3.26	1.10
Flipped classroom strategies help me develop a structured approach to solving problems	3.16	1.12
The problem-based activities in flipped classrooms are relevant to graduate-level academic work.	3.11	1.17
After flipped classroom activities, I can think of more than one solution to a given problem	3.12	1.20
Peer feedback during in-class sessions helps me improve my problem-solving strategies.	3.16	1.17
Flipped classroom assignments encourage me to use additional resources to solve problems.	3.30	1.16
Flipped classroom learning enhances my ability to handle academic challenges with greater preparedness.	3.21	1.11
The instructor's facilitation in the flipped classroom helps me develop effective problem-solving strategies	3.11	1.16

Students expressed a moderate level of agreement that the flipped classroom supports problem-solving skills, with mean scores ranging from 3.11 to 3.30, slightly above the neutral midpoint of 3 on a 5-point scale. The highest-rated statement was that flipped classroom assignments encourage students to use additional resources to solve problems ($M = 3.30$, $SD = 1.16$), followed by the statement that sessions provide enough time to work on complex academic problems in class ($M = 3.28$, $SD = 1.22$). The lowest-rated statements were that problem-based activities are relevant to graduate-level academic work ($M = 3.11$, $SD = 1.17$) and that the instructor's facilitation helps develop effective problem-solving strategies ($M = 3.11$, $SD = 1.16$). The standard deviations, ranging from 1.10 to 1.22, indicate considerable variation in students' responses. Overall, the findings suggest that students view the flipped classroom as moderately effective in enhancing problem-solving skills, particularly through additional resource use and in-class working time.

Mean and Standard Deviation of Factor: Students' Engagement

This table presents students' perceptions regarding the effectiveness of the flipped classroom approach in enhancing academic engagement.

Table 4 *Descriptive statistics based on the scale of students' engagement*

Statement	Mean	SD
I feel more actively involved in learning during flipped classroom sessions than in traditional lectures.	3.27	1.34
Peer interaction during in-class activities increases my motivation to participate	3.18	1.24
Pre-class materials (videos, readings) help me stay consistently engaged throughout the course.	3.19	1.18
Flipped classroom activities make learning more interactive and meaningful for me	3.08	1.17
I am more focused during in-class sessions in a flipped classroom model.	3.13	1.18
Flipped classroom strategies help me maintain a regular study habit.	3.13	1.17
I feel a greater sense of responsibility for my own learning in the flipped classroom.	3.15	1.16
The variety of tasks in flipped classrooms keeps me intellectually engaged throughout the course.	3.20	1.12
Instructor feedback during flipped classroom sessions increases my engagement with the subject.	3.22	1.17
The flipped classroom approach has positively influenced my academic engagement and motivation.	3.10	1.12

Students expressed a moderate level of agreement that the flipped classroom enhances student engagement, with mean scores ranging from 3.08 to 3.27, only slightly above the neutral midpoint of 3 on a 5-point scale. The highest-rated statement was that students feel more actively involved in learning during flipped sessions than in traditional lectures ($M = 3.27$, $SD = 1.34$), followed by instructor feedback increasing engagement with the subject ($M = 3.22$, $SD = 1.17$) and the variety of tasks keeping students intellectually engaged ($M = 3.20$, $SD = 1.12$). The lowest-rated statement was that flipped classroom activities make learning more interactive and meaningful ($M = 3.08$, $SD = 1.17$), followed closely by the view that the approach has positively influenced academic engagement and motivation ($M = 3.10$, $SD = 1.12$). The standard deviations, ranging from 1.12 to 1.34, indicate considerable variation in responses, with the widest disagreement on active involvement. Overall, the findings suggest that students perceive the flipped classroom as moderately effective in promoting engagement, particularly through active involvement and instructor feedback.

Analysis of the t-test Based on Semesters

This table reports independent-samples t-tests comparing 6th semester ($n = 139$) and 8th semester ($n = 228$) students on three flipped classroom outcome scales, all measured on a 5-point Likert scale.

Table 5 Means, Standard Deviations, and Independent Samples t-Test Results for Flipped Classroom and critical thinking, problem-solving skills, and Student Engagement by Semester.

Scale	Semester	N	M	SD	t	Sig
Flipped classroom and critical thinking	6	139	3.39	.633	2.972	.003
	8	228	3.17	.694	3.040	.003
Flipped classroom and problem-solving skills	6	139	3.32	.666	2.890	.004
	8	228	3.11	.663	2.886	.004
Flipped classroom and student engagement	6	139	3.33	.660	3.449	<.001
	8	228	3.06	.753	3.560	<.001

Independent samples t-tests showed that 6th-semester students ($n = 139$) scored significantly higher than 8th-semester students ($n = 228$) on all three scales: critical thinking ($M = 3.39$ vs. 3.17 , $t = 2.972$, $p = .003$), problem-solving skills ($M = 3.32$ vs. 3.11 , $t = 2.890$, $p = .004$), and student engagement ($M = 3.33$ vs. 3.06 , $t = 3.449$, $p < .001$). Since all p-values are below .05, 6th-semester students perceived the flipped classroom as more effective than 8th-semester students, with the largest difference in engagement.

Analysis of the t-test Based on Gender

The table presents independent-samples t-test results comparing male (n = 163) and female (n = 204) students across three flipped classroom outcome scales. All mean scores are on a 5-point Likert scale.

Table 6 *Descriptive Statistics and Independent Samples t-Test Results for Flipped Classroom Outcomes by Gender*

Scale	Gender	N	M	SD	t	Sig
Flipped classroom and critical thinking	Male	163	3.23	.721	-.815	.501
	female	204	3.29	.644	-.805	
Flipped classroom and problem-solving skills	Male	163	3.23	.666	.807	.646
	Female	204	3.17	.675	.808	
Flipped classroom and student engagement	Male	163	3.14	.752	-.406	.893
	Female	204	3.18	.715	-.458	

Independent samples t-tests showed no significant differences between male (n = 163) and female (n = 204) students on any of the three scales: critical thinking (M = 3.23 vs. 3.29, t = -.815, p = .501), problem-solving skills (M = 3.23 vs. 3.17, t = .807, p = .646), and student engagement (M = 3.14 vs. 3.18, t = -.406, p = .893). Since all p-values are above .05, male and female students perceived the flipped classroom similarly, indicating that gender does not influence perceptions of its effectiveness.

Analysis of variance (ANOVA) based on the Department

This table presents statistical results comparing the effectiveness of the flipped classroom on students' critical thinking, problem-solving skills, and engagement across six departments, i.e., Education, English, IR, BBA, Graphic Designing, and Data Science.

Table 7

Factors	Departments	Mean	SD	F	p	Sequence of differences
Flipped classroom and critical thinking	Education	3.39	.547	3.967	.002<.05	1>2>5>6>3>4

	Data science	3.39	.693	3.942		
	BBA	3.05	.753	3.946		
	IR	3.00	.698	3.935		
	English	3.35	.668	3.923		
		3.30	.617	3.912		
	Graphic designing					
Flipped classroom and problem-solving skills	Education	3.23	.650	0.150	.977	1>2>4>6>5>3
	Data science	3.23	.760	0.140		
	BBA	3.15	.611	0.150		
	IR	3.20	.628	0.130		
	English	3.16	.746	0.140		
		3.18	.646	0.190		
	Graphic designing					
Flipped classroom and student engagement	Education	3.23	.651	1.740	.134	2>1>6>3>5>4
	Data science	3.26	.745	1.734		
	BBA	3.17	.646	1.734		

A one-way ANOVA compared perceptions across six departments (Education, Data Science, BBA, IR, English, and Graphic Designing). A significant difference was found only for critical thinking ($F = 3.967$, $p = .002 < .05$), where Education and Data Science students scored highest ($M = 3.39$ each), followed by English (3.35) and Graphic Designing (3.30), while BBA (3.05) and IR (3.00) scored lowest. No significant differences were found for problem-solving skills ($F = 0.150$, $p = .977$) or student engagement ($F = 1.740$, $p = .134$), indicating that students from all

departments perceived the flipped classroom similarly on these two scales. The highest engagement was reported by Data Science students ($M = 3.26$) and the lowest by IR students ($M = 3.00$)

Correlation Analysis

Pearson correlation analysis showed positive, moderate relationships among all three variables.

Table 8 *Correlation Analysis*

	Critical Thinking	Problem-Solving Skills	Student Engagement
Flipped classroom and critical thinking	1	.44	.54
Flipped classroom and problem-solving skills	.44	1	.49
Flipped classroom and student engagement	.54	.49	1

Critical thinking was moderately correlated with problem-solving skills ($r = .44$) and more strongly with student engagement ($r = .54$). Problem-solving skills and student engagement were also moderately correlated ($r = .49$). The strongest relationship was between critical thinking and student engagement, while the weakest was between critical thinking and problem-solving skills. Overall, students who perceived the flipped classroom as effective in one area tended to perceive it as effective in the others.

Regression Analysis

Table 9 *Regression Analysis*

Model	B(unstandardized coefficient)	SD. Error	B(standardized)	t-value	sig
Constant	1.25	.15		8.02	<0.01
Flipped classroom and problem-solving skills	.231	.05	.228	4.6	<0.01
Flipped classroom and student engagement	.400	.04	.430	8.7	<0.01

Both predictors were statistically significant ($p < .01$). Problem-solving skills positively predicted critical thinking ($B = .231$, $\beta = .228$, $t = 4.6$), meaning a one-unit increase in problem-solving skills raises critical thinking by .231 units. Student engagement was the stronger predictor ($B = .400$, $\beta = .430$, $t = 8.7$), with a one-unit increase raising critical thinking by .400 units. The constant ($B = 1.25$, $p < .01$) represents the expected level of critical thinking when both predictors are zero. Overall, student engagement contributes more than problem-solving skills in explaining critical thinking.

Findings

The results representing the effectiveness of flipped classroom strategies by students were: Students agreed ($M=3.47$) that class discussions encouraged them to think beyond a basic understanding of the topic. Students agreed ($M=3.41$) that flipped classroom activities helped them analyse course content more deeply. Students agreed ($M=3.31$) that flipped classroom tasks required them to apply concepts to real-world practical situations. Students agreed ($M=3.30$) that flipped classroom assignments encouraged them to utilize additional resources in solving problems. Students agreed ($M=3.28$) that flipped classroom sessions provided sufficient time to work on complex academic problems during class.

The lowest mean value ($M=3.08$) suggests that students were less convinced that the flipped classroom made their learning experience more interactive and meaningful. The lowest mean value ($M=3.10$) suggests that students were less convinced that the flipped classroom had a positive influence on their academic engagement. The lowest mean value ($M=3.11$) suggests that students were less convinced that instructional facilitation in the flipped classroom helped them develop effective problem-solving strategies. The lowest mean value ($M=3.11$) suggests that students were less convinced about the relevance of problem-based flipped classroom activities to their graduate-level academic work. The lowest mean value ($M=3.12$) suggests that students were less convinced that flipped classroom activities enhanced their ability to generate multiple solutions to a given problem.

Limitations of This Study

This study provides useful insights into the perceived effectiveness of flipped classroom strategies on students' critical thinking, but there are some limitations to keep in mind. First, the research was only conducted in Gujranwala city, which means the findings might not apply to other places in Pakistan. Students from other regions, programs, or backgrounds might have different opinions and experiences. All the data in this study came from a questionnaire where students shared their personal opinions. These answers can be influenced by mood, personal bias, or current situations, and may not always reflect the full reality. The study used multiple-choice questions with rating scales (Likert scale), but did not include open-ended questions or interviews.

Recommendation

The following are the major recommendations of the study.

1. The government should develop training programs on flipped classroom strategies to build educators' and students' creativity and effective learning.
2. Teachers should emphasize critical thinking so students can properly evaluate the outcomes of flipped classroom activities.
3. Educators should actively take part in flipped classroom activities while continuing to use conventional teaching methods.
4. University administrations should regularly evaluate flipped classroom strategies and make improvements to increase student engagement.
5. Instructors should improve pre-class materials (e.g., short, interactive videos), since these received the lowest rating for critical thinking

Future call for Researcher

Future researchers are encouraged to extend this study to public universities and other regions of Pakistan. Adopt mixed-methods or experimental designs, and include teachers' perspectives. Further research could also explore why perceptions differ by department and semester, examine the role of variables such as motivation and digital access, and compare different flipped classroom models to determine their relative effectiveness.

Conclusion

This study demonstrates that flipped classroom strategies have significant ability to enhance critical thinking, problem-solving skills, and student engagement at the graduate level. Quantitative data (N=367) revealed strong positive perceptions of their utility (M=3.25 for critical thinking). Key findings show that flipped classroom strategies effectively support critical thinking, student engagement, and problem-solving skills. The research underscores the need for structured training and ethical guidelines to maximize benefits while mitigating risks.

While limited to private institutions, the study provides valuable groundwork for future research on the educational application. The flipped classroom proves most valuable as a complementary tool that, when used critically, can expand learning possibilities.

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