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FLIPPED CLASSROOM PEDAGOGY IN AGRICULTURAL ECONOMICS: STUDENT ENGAGEMENT AND ACADEMIC PERFORMANCE

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Abstract

This study evaluates the effectiveness of flipped-classroom pedagogy in an undergraduate agricultural economics course to address the persistent limitations of passive, lecture-based instruction. Grounded in social constructivism and self-determination theory, the research utilized a quasi-experimental design with non-equivalent control groups to compare a traditional lecture format against a flipped teaching approach. Data collection involved a comprehensive perception survey of 92 students and a comparative analysis of academic performance conducted over a single semester. The findings reveal that students hold highly positive perceptions of the flipped classroom, significantly valuing the flexibility of pre-recorded videos, enhanced peer collaboration, and increased interactivity. However, an independent samples t-test indicated no statistically significant difference in academic performance between the flipped and traditional cohorts. These results suggest that while the short-term implementation of flipped-classroom pedagogy effectively stimulates student engagement and active participation, it does not immediately translate into measurable improvements in academic performance. Consequently, achieving significant academic gains likely requires sustained implementation, adequate adaptation periods, and enhanced student readiness for self-directed learning.

Keywords: Flipped Classroom Pedagogy, Agricultural Economics Education, Student Engagement, Academic Performance, Active Learning

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Introduction

Agricultural economics education faces mounting challenges in engaging undergraduate students with abstract theoretical concepts while preparing them for practical applications in rapidly evolving agricultural sectors. Traditional lecture-based pedagogies, characterized by passive knowledge transmission and limited student interaction, have demonstrated declining effectiveness in promoting deep learning and sustained engagement in economics education (Becker & Watts, 2001; Goffe & Kauper, 2014). The complexity of agricultural economic systems, combined with students' diverse academic backgrounds and varying quantitative competencies, necessitates innovative pedagogical approaches that bridge theoretical understanding with practical application while addressing individual learning needs.

Recent scholarship in economics education has increasingly emphasized the limitations of traditional instructional methods. Students frequently report difficulty connecting abstract economic theories to real-world applications, particularly in specialized fields such as agricultural economics, where theoretical concepts must integrate with practical agricultural knowledge (Marangos, 2006). Mathematics anxiety and limited quantitative preparation further compound these challenges, creating barriers to student success and career preparation in agricultural economics fields. These pedagogical concerns are particularly acute in Malaysian higher education contexts, where agricultural economics programs serve diverse student populations with varying academic backgrounds and career aspirations.

The flipped classroom model has emerged as a promising pedagogical innovation that addresses many limitations of traditional lecture-based instruction. This approach inverts conventional teaching patterns by delivering foundational content through pre-class activities (typically video lectures or online modules) while dedicating class time to active learning experiences such as problem-solving, discussion, and collaborative projects (O'Flaherty & Phillips, 2015). Research across multiple disciplines has demonstrated the effectiveness of the flipped classroom in enhancing student engagement, improving academic performance, and developing critical thinking skills (Freeman et al., 2014; Thai et al., 2017).

Theoretical foundations for the effectiveness of the flipped classroom primarily draw on social constructivist learning theory and self-determination theory. Social constructivism, grounded in Vygotsky's (1978) work, posits that meaningful learning occurs through social interaction and collaborative knowledge construction. The flipped model supports these principles by repositioning class time from passive content delivery to active knowledge construction through peer interaction and collaborative problem-solving (Kim et al., 2014). Self-determination theory provides an additional explanatory framework by identifying three basic psychological needs that enhance intrinsic motivation: autonomy (self-paced learning), competence (scaffolded skill development), and relatedness (peer collaboration and instructor interaction) (Deci & Ryan, 2000). Flipped-classroom design elements directly address these fundamental needs, potentially explaining the observed increases in student motivation and engagement.

Despite growing evidence of the effectiveness of flipped-classroom instruction across disciplines, research on its application in agricultural economics education, particularly in Malaysian higher education contexts, remains limited. Existing studies have primarily focused on general economics courses or engineering disciplines, leaving significant gaps in understanding how flipped pedagogies function within specialized agricultural economics curricula. Furthermore, most research has emphasized either student perceptions or academic performance outcomes, with fewer studies providing a comprehensive analysis of both dimensions and considering disciplinary and cultural contexts.

This study addresses these research gaps by investigating the implementation of the flipped classroom in undergraduate Agricultural Economics at Universiti Sultan Zainal Abidin, Malaysia. The research examines both student perceptions and academic performance

outcomes across three related programs (Agribusiness, Biotechnology, and Aquatic Science) to provide a comprehensive understanding of the effectiveness of the flipped-classroom approach in agricultural economics education. Specific research objectives include: (1) evaluating student perceptions of flipped classroom experiences regarding engagement, preparation, interaction, and participation; and (2) assessing academic performance differences between flipped and traditional classroom conditions. The study contributes to growing literature on active learning in economics education while providing practical guidance for curriculum innovation in Malaysian agricultural education contexts.

Literature Review

Active learning is a significant teaching method in higher education that promotes students' active engagement with course material rather than simply passively absorbing information. Bonwell & Eison (1991) define active learning as instructional activities that engage students in hands-on tasks and encourage them to reflect on their actions. The flipped classroom concept, a form of active learning, has gathered significant attention in the last two decades across various fields, including economics.

The flipped classroom has been advocated as a method to enhance student learning (Deslauriers et al., 2011; Bergmann & Sams, 2012) and has been widely applied in higher education. The body of research regarding the flipped classroom is growing across disciplines (Albert & Beatty, 2014; Kerr, 2015; O'Flaherty & Phillips, 2015; Simpson & Richards, 2015; Thai et al., 2017; Yough et al., 2019; Cho et al., 2021). The flipped classroom is a pedagogical paradigm in which learning content is delivered through online instruction before in-class sessions. This allows face-to-face time to be dedicated to interactive group learning tasks and active learning, as defined by multiple scholars (Albert & Beatty, 2014; Baker, 2000; Bishop & Verleger, 2013; Bland, 2006; Kerr, 2015; Strayer, 2012; Thai et al., 2017; Thorne, 2003).

This study draws upon constructivist learning theory, which posits that learners actively construct their own knowledge through experience and interaction. The flipped classroom model aligns with constructivist principles by providing students with opportunities to engage in active learning, collaborate with peers, and apply their knowledge to real-world problems. According to the constructivist, inquiry-based learning cycle model (Heiss et al., 1950; Bybee, 1993; Lawson, 2009), teaching can be divided into two distinct phases. The first is the content attainment phase, during which students develop a conceptual understanding of the subject matter. The second is the concept application phase, where students apply and evaluate these concepts in new contexts, thereby extending their understanding beyond the initial learning environment.

In the traditional teaching setting, teachers or instructors guide students through the process of attaining content in the classroom using various instructional methods. Students are then expected to apply the concepts they have learned independently, typically through homework or assignments. In contrast, the flipped classroom model reverses these roles, with students responsible for acquiring content knowledge prior to class, while class time is dedicated to instructor-facilitated activities that emphasize the application of concepts. Thus, the key difference between the two models lies in the instructor's role in facilitating content attainment or concept application. This pedagogical shift allows more class time to be allocated to interactive and higher-order learning activities, strengthening understanding and promoting active student engagement.

By reallocating class time from lecture to active engagement, the flipped classroom promotes higher-order cognitive processes such as analysis, evaluation, and creation by enabling students to spend in-class time on complex problem-solving and teamwork tasks rather than on basic content delivery (Ay & Dağhan, 2023). This learner-centered approach also enables timely feedback and targeted instructor support, allowing students to refine their understanding and

correct misconceptions during class activities (Mengesha et al., 2024). The individual online instruction serves as an additional session to enhance classroom interaction. The flipped classroom model combines online lectures and traditional face-to-face learning, emphasizing learner-centered teaching (Gilboy et al., 2015; Thai et al., 2017). In contrast, a traditional classroom approach relies mainly on teacher-centered instruction, with students having limited interaction with materials or peers (Velegol et al., 2015). Introducing a flipped classroom technique in an agricultural economics course can improve student involvement and understanding of complex concepts. This method enables students to explore theoretical components independently before class, and it gives them more time for activities such as case studies, simulations, and discussions that link theory to real agricultural issues during class.

Globally, the flipped classroom has been implemented across diverse disciplines, from engineering to the health sciences, with evidence of improved outcomes. In economics, adoption remains slower, with lectures still the dominant instructional method (Goffe & Kauper, 2014). Nonetheless, recent studies (Chen & Lin, 2012; Yamarik, 2019; Roach, 2014) suggest that flipped learning can enhance performance and engagement in economics courses, helping to address long-standing issues of abstraction, mathematical difficulty, and low interactivity.

Recent years have seen a substantial shift in economics education toward digitalization and technology-enhanced learning. (see Nunvarova et al., 2023; Adu & Zondo, 2024). There is an increasing number of studies on implementing the flipped classroom in economics. Chen & Lin (2012) found that using lecture videos in microeconomics improved student performance by an average of four percentage points. Flores & Savage (2007) showed that students were willing to pay more for classes using recorded lectures, which also enhanced performance. Similarly, Roach (2014) reported positive student reactions to flipped learning, indicating pedagogical benefits across various student groups. Yamarik (2019) found that the flipped format enhanced student productivity but reduced attendance among students with similar academic performance. However, economics courses still employ less active learning compared to other disciplines (Yamarik, 2019). Goffe & Kauper (2014) noted that 61% of academic economists primarily relied on lectures, while only 18% routinely used small group activities.

In Malaysia, the implementation of the flipped classroom approach has expanded significantly in recent years. In earlier studies, Zainuddin & Attaran (2016) found that students at the University of Malaya perceived the flipped classroom as flexible, as it allowed them to manage their learning and review content according to their personal schedules and learning needs. While Othman et al. (2024) reveal significant improvements in both examination scores and classroom-based assessments, highlighting the Flipped & Blended Classroom Program's impact on the academic performance of secondary school students in Malaysia. Othman et al. (2023) found that third-year undergraduate dental students at the University of Malaya, Malaysia, perceived that the flipped classroom allowed for a more convenient and flexible learning experience, with personalized learning and improved in-class teaching efficiency.

The effectiveness of the flipped classroom depends not only on its structure but also on students' perceptions. Student engagement and perception play a crucial role in determining the success of active learning methodologies. Although many studies report positive student feedback, for instance, Thai et al. (2017) found that the flipped model positively affects self-efficacy and intrinsic motivation, while other studies highlight challenges. The flipped classroom promotes engagement and supports higher-order activities such as problem-solving (Bishop & Verleger, 2013; Gilboy et al., 2015), and it enhances learning outcomes compared to traditional classrooms (Albert & Beatty, 2014; Roach, 2014). Some studies report improved academic performance (Lax et al., 2017; Mason et al., 2013). Nevertheless, difficulties persist, including increased workload and the need for self-discipline (Kim et al., 2014), student

reluctance to participate actively (Buhl-Wiggers et al., 2023), and lack of understanding of these innovations' benefits among both instructors and learners (Senali et al., 2022). These mixed findings highlight the need for further investigation into how flipped classrooms can be refined to improve student perception and achievement, particularly in economics education.

Methodology

Research Design

Flipped learning was implemented in the Agricultural Economics course across three programs: Bachelor of Agribusiness with Honours (SMPT), Bachelor of Agricultural Biotechnology with Honours (SMBP), and Bachelor of Aquatic Science with Honours (SMSA). These courses are offered by the School of Agriculture Science and Biotechnology, Faculty of Bioresources and Food Industry, Universiti Sultan Zainal Abidin (UniSZA), Malaysia. The course is compulsory for SMPT and SMBP students and offered as an elective for SMSA students. All students involved in this study completed the perception survey to gather feedback on their learning experiences in the flipped classroom.

However, to evaluate the effectiveness of the flipped classroom approach, only students from the SMPT program were included in the performance analysis. This decision was made to ensure comparability in instructional materials, course structure, and assessment components within the same program.

This study adopted a quantitative quasi-experimental design with a non-equivalent control group to compare the effectiveness of flipped and traditional classroom approaches. Two groups of students were involved: one received instruction through traditional lectures, while the other used the flipped classroom model. Both groups covered identical course content and were assessed using the same evaluation instruments to ensure comparability (Thai et al., 2017; Zainuddin & Perera, 2019). The quasi-experimental design was selected because random assignment was not feasible within the institutional context; however, it allows meaningful comparisons between instructional methods in real educational settings. Nonetheless, it has inherent limitations, including potential pre-existing group differences that may influence outcomes (Cook & Campbell, 1979; Shadish et al., 2002).

Course Design and Structure

At the beginning of the semester, students were introduced to the flipped classroom approach and informed that they would be required to watch pre-recorded lecture videos on selected topics. These materials were made available through the Knowledge and e-Learning Integrated Platform (KeLIP), an online platform that facilitates interaction between students and lecturers. There are 14 topics taught throughout one semester (Table 1). Flipped learning was applied to five to six topics in the syllabus, including Market Structure I (Perfect Competition and Monopoly), Market Structure II (Monopolistic Competition and Oligopoly), Introduction to Macroeconomics, Macroeconomic Problems, and International Economics.

The flipped classroom process consisted of several stages. Initially, students accessed pre-recorded lectures, written notes, and supplementary materials related to each topic (Bergmann & Sams, 2014). The videos were concise and focused, allowing students to pause, rewind, and review content at their own pace to build foundational understanding before class.

During in-class sessions, instructional time was allocated to active learning activities, such as discussions, group problem-solving, and real-life case studies (O'Flaherty & Phillips, 2015). Two types of activities were emphasized: individual exercises, which required students to apply economic models or theories to new situations through written tasks involving numerical problems and short interpretations, and group exercises, where teams of four to five students analyzed and presented examples of different market structures (e.g., monopoly, oligopoly) based on economic theory. This interactive structure aimed to foster peer learning, enhance

communication skills, and help students relate theoretical concepts to real-world agricultural contexts.

Table 1 List of topics taught in the Agricultural Economics course

Week	Topic
1	Introduction to agricultural economics
2	Agriculture industry: an economic perspective
3	Theory of consumer behavior
4	Demand and supply
5	Elasticities
6	Organising production
7	Output and cost
8	Market structure I (perfect competition and monopoly)
9	Market structure II (monopolistic competition and oligopoly)
10	Introduction to macroeconomics
11	Macroeconomics problems
12	National income accounting
13	Money and banking
14	International economics

Data Collection Tools

Data collection consisted of two components: students' perceptions and academic performance.

For students' perceptions, data were gathered through a questionnaire administered at the end of the semester. The questionnaire included items on interest, preparation, interaction, and participation, rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Responses were analyzed descriptively using mean and standard deviation. The questions of perception were adapted from Roach (2014). A total of 92 undergraduate students enrolled in the Agricultural Economics course across two semesters (Semester 1 2023/2024 and Semester 2 2023/2024) participated in the perception survey. The respondents comprised 51 students from SMPT, 25 from SMBP, and 16 from SMSA programs.

To determine the effectiveness of the flipped classroom, academic performance was measured. The total academic performance score was calculated as 20% from the midterm examination, 30% from the assignments, 10% from the presentations, and 40% from the final examination. Both traditional and flipped classroom groups followed the same course outline, with an equal number of assignments and similar assessment weightage. Examination questions in both groups were designed to align with the Course Learning Outcomes (CLOs) stated in the detailed course information, ensuring comparable levels of difficulty and cognitive demand. To ensure as much group equivalence as possible, the same instructor or lecturer taught the course, and the same textbook and course materials were used. All assignments in this course were conducted individually and were designed to assess the second Course Learning Outcome (CLO2), which focuses on evaluating students' numeracy skills. Each assignment consisted of a short case study involving quantitative problem-solving and economic calculations relevant to agricultural markets. Meanwhile, the presentation component was developed to assess the third Course Learning Outcome (CLO3), which emphasizes personal and communication skills. For this task, students were required to present an analysis of different market structures using real-world examples, demonstrating their ability to apply theoretical concepts to practical economic situations.

The performance data were obtained from two cohorts of SMPT students. Group 0 (Traditional Classroom) consisted of 37 students from Semester 1 2022/2023 who received conventional

lecture-based instruction, while Group 1 (Flipped Classroom) consisted of 51 students from Semester 1 2023/2024 who experienced the flipped classroom approach. Both groups were assessed using the same course structure, learning outcomes, and evaluation components to ensure consistency and comparability in measuring the impact of the teaching method on academic performance.

Data Analysis

Descriptive analysis was employed to summarize students' perceptions of the flipped classroom approach, with mean and standard deviation calculated for each item. While assessing the effect of flipped learning on academic performance, independent samples t-tests were conducted to compare the mean scores of the traditional and flipped classroom groups. The t-test was chosen because it is appropriate for comparing two independent groups, provided the assumptions of normality and equal variance are met.

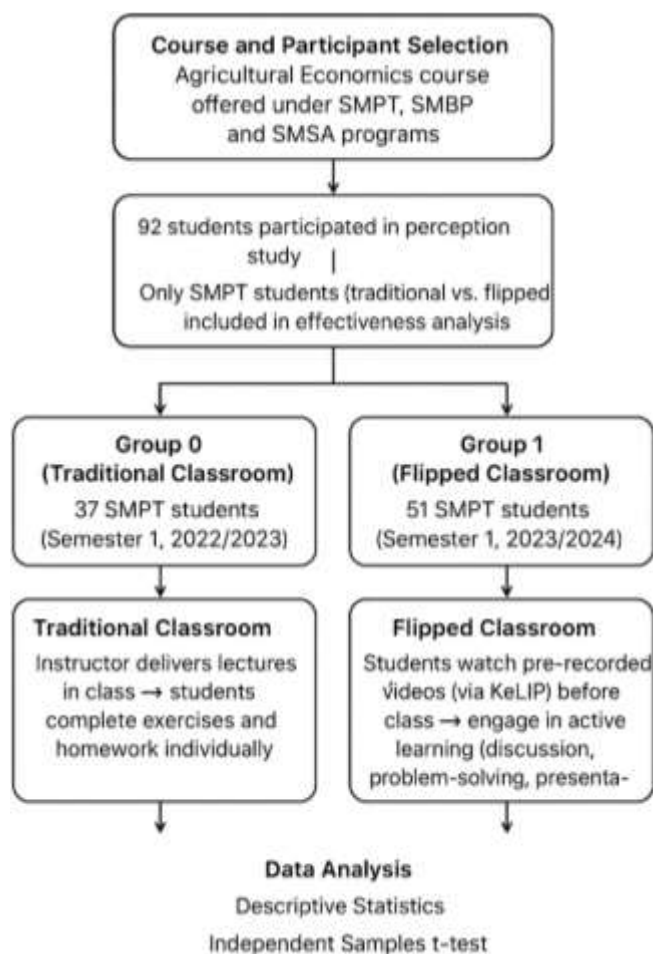


Figure 1 Research Design

Results and Discussion

Students Perception

The survey included basic demographic questions and perception questions on a Likert-type scale. This survey was taken online using Google Forms and was completely anonymous. A total of 92 students participated in the survey. Among them, 32 students reported not being familiar with the flipped classroom concept, while 59 indicated they had previously participated in a flipped classroom before taking this course. Students who are unfamiliar with the flipped classroom approach might have initially struggled to manage pre-class preparation and in-class activities. Zainuddin & Attaran (2016) highlight that familiarity with the flipped

classroom method positively affects student engagement and confidence. In contrast, those with previous experience may have adjusted more easily to the flipped classroom environment. The survey was designed to collect responses across four categories: (1) the overall impression students have about flipped learning, (2) whether students were actually watching the video lectures, (3) the perceived level of interaction, and (4) how students reacted to the method and type of video lectures. Table 2 presents descriptive statistics and frequency distributions of students' responses for each item, providing a comprehensive overview of their perceptions.

Table 2 Frequency distribution and descriptive statistics of students' perception

No.	Item	Strongly Disagree (1)	Disagree (2)
1	I would take another course that used the video lectures alongside traditional classroom learning.	0	6
2	The video lectures were easy to access.	1	2
3	The video lectures helped me learn.	1	2
4	Discussing with classmates helps me learn.	1	0
5	Compared to other courses, this course is interactive.	1	0
6	The ability to rewind the video lecture helps me learn.	0	1
7	Knowledge about economics from other sources helps my understanding.	1	0
8	I usually watch the video lecture for the week.	0	3
9	Video lectures that resemble in-class lectures help me learn.	0	1
10	The course as a whole was a valuable learning experience.	1	0

Overall, the results reveal a positive perception of the flipped classroom among students in the agricultural economics course. In response to item 1, the mean score of 3.89 is relatively positive; however, it is slightly lower than that of other items, suggesting some hesitation among students toward adopting the flipped classroom model in the future. This finding may indicate that while students valued certain aspects of flipped learning, such as flexibility and self-paced study, they may still prefer the familiarity and structure of traditional classroom teaching. Several studies, for example, Kim et al. (2014) and Buhl-Wiggers et al. (2023), have reported that students often find flipped classrooms challenging due to increased workload, greater self-discipline, and the responsibility of pre-class preparation. However, this finding is somewhat consistent with Roach's (2014) study.

Regarding the accessibility and utility of the learning materials (Items 2, 3, and 6), an overwhelming 92% of students agreed or strongly agreed that the video lectures were easy to access. Furthermore, 95% indicated that the ability to pause and rewind the videos significantly enhanced their understanding. The relatively low standard deviations (0.72 and 0.61, respectively) reflect consistent agreement among students. The ability to revisit difficult concepts at one's own pace likely reduces cognitive overload. It enhances retention, particularly in technical subjects such as agricultural economics, effectively supporting diverse learning paces and styles. Additionally, most respondents found the video content helpful in their learning process, particularly when the videos mirrored traditional in-class lectures (Item 9, mean = 4.27), suggesting that familiarity with content delivery may facilitate learning. Compliance was also notable, with 80% of students reporting that they regularly watched the weekly video lectures (Item 8, mean = 4.00), which is essential for the effectiveness of the flipped classroom model according to Bishop & Verleger (2013).

The social and interactive dimensions of the flipped classroom were also highly rated. Students recognized the benefit of peer discussions, supporting the perception that social learning is an integral part of this pedagogical approach. For Item 4, 97% of students strongly supported the idea that class discussions enhanced their learning, resulting in the joint-highest mean (4.40) and indicating a strong confirmation of collaborative learning. This aligns with Cilliers & Pylman (2022), who suggested that real-life exposure through peer conversations enhances critical thinking and problem-solving skills necessary for the workplace. The course was also considered more interactive than traditional formats (Item 5, mean = 4.18), indicating that the blended structure successfully fosters engagement and participation.

Finally, this format strongly encouraged independent learning. Tying for the highest mean of 4.40, 97% of students acknowledged that prior knowledge and exposure to economics from other sources contributed positively to their understanding (Item 7). This reflects the assertions by Goedhart et al. (2019) and Awidi & Paynter (2019) that self-directed learning before class, combined with in-class activities, encourages deeper learning. Overall, the course was generally perceived as a valuable learning experience (Item 10, mean = 4.36), reinforcing the potential of flipped classrooms to improve academic experiences and confirming previous conclusions by Zainuddin & Halili (2016) regarding the model's benefits across multiple disciplines.

Effectiveness of Flipped Classroom

An independent samples t-test was conducted to compare the mean scores between Group 0 (traditional class) and Group 1 (flipped class). The results are shown in Table 3.

Table 3 Independent samples t-test result

Variable	Group	n	Mean	SD	SE	95% Confidence Interval	Mean Difference	t	p- value
Student performance score	Traditional classroom	37	66.62	6.83	1.12	64.34-68.90			
	Flipped classroom	75	66.99	8.64	1.00	65.00-68.97			
	Total Pooled	112	66.87	8.06	0.76	65.36-68.37			
	Mean Difference						-0.37	-0.22	0.82

An independent samples t-test was conducted to compare student performance between those who experienced the flipped classroom approach (Group 1, n = 75) and those who experienced the traditional classroom approach (Group 0, n = 37). The results show that students in the traditional classroom had a mean score of 66.62 (SD = 6.83), while those in the flipped classroom had a slightly higher mean score of 66.99 (SD = 8.64). The mean difference between the two groups was -0.37. The analysis revealed that this difference was not statistically significant, $t(110) = -0.22$, $p = 0.82$. The 95% confidence interval for the mean difference ranged from -3.59 to 2.86, which includes zero. This indicates that the observed difference in mean scores could be due to chance. Therefore, the null hypothesis stating that there is no significant difference in student performance between the flipped classroom and the traditional classroom could not be rejected. These findings suggest that both teaching approaches yielded comparable student performance, implying that the flipped classroom did not lead to a statistically significant improvement in mean scores compared to the traditional teaching method. Previous studies, for example, Blair et al. (2016), found no evidence that participation in the flipped classroom leads to better student performance than in the traditional format.

Similar to Jensen et al. (2015), they found no significant differences in student outcomes between lecture and flipped-classroom instruction.

One factor that may affect the potential of the flipped classroom is student preparation. Student preparation serves as a crucial moderator of flipped classroom effectiveness, as the model relies on the assumption that learners have completed and reviewed all assigned pre-class materials. When students fail to prepare adequately, instructors are accountable for spending valuable class time revisiting or reteaching concepts that should have been understood during the pre-class phase, thereby reducing opportunities for active learning. Furthermore, students are unlikely to gain meaningful benefits from active learning activities if they lack adequate prior knowledge or a basic understanding of the topic. Xiaoying & Samah (2024) point out that one of the major challenges is students' lack of preparedness for pre-class work, which undermines the model's foundational assumption that students come ready and thereby limits its effectiveness. This situation tends to worsen, especially among weaker students. Students with limited academic ability or poor time management may struggle to understand pre-class materials independently. Consequently, they may attend class sessions underprepared and unable to fully participate in higher-order learning activities, such as problem-solving or group discussions. This lack of preparation can lead to frustration, lower confidence, and a sense of exclusion, eventually widening the performance gap between stronger and weaker students.

The second factor that might contribute to this finding is the implementation period. As mentioned, the flipped classroom was offered for 5 to 6 topics in the agricultural economics course for one semester, which was considered a short period. A short period might affect students' acceptance of the flipped classroom. Gillette et al. (2018) found that short-term studies often fail to identify significant improvement. The success of flipped learning depends largely on students' and instructors' ability to adapt to its pedagogical structure, which requires time for both parties to develop new learning and teaching habits. When implemented over a short period, students may experience confusion, resistance, or struggle to adjust to the requirement of completing pre-class tasks independently. Similarly, instructors may face challenges in designing suitable materials and facilitating active learning effectively within a limited timeframe. Existing evidence indicates that the effectiveness of the flipped classroom may be constrained when implemented only in the short term or within a single module. For example, a longitudinal study found that the year when the flipped model was not fully implemented was associated with a decline in academic achievement relative to years of full implementation (Torres-Martín et al., 2022).

Conclusion

This study has explored the implementation of the flipped classroom model in an undergraduate Agricultural Economics course conducted at Universiti Sultan Zainal Abidin, Malaysia. According to the findings, students have positive perceptions of their involvement in the flipped classroom, including their ability to organize video lectures at their own pace, re-watch materials to understand the discussed economic concepts, and connect with peers to address challenging issues. It may be suggested that the flipped model prepares for the diversity of learning styles and fosters student-centeredness. However, in the data analysis, no statistically significant differences in academic performance were identified between flipped and traditional students who completed the course. It is evident that although the flipped approach is successful in stimulating interest and creating valuable learning experiences, its short-term impact on intellectual outcomes is not significant.

These findings must be considered in light of several limitations. The flipped classroom approach was implemented only for a short period, covering around five to six topics instead of the full course, making it impossible to fully evaluate the method's effects on longer-term student outcomes and engagement levels. Furthermore, some students experienced difficulty

preparing for class, as the flipped format requires additional self-discipline and time management. The transitional phase also demanded considerable time for both students and the instructor to adjust to the new way of learning and teaching, which inherently limited the overall scope and efficacy of the flipped-classroom implementation.

Nevertheless, the lack of sufficient performance improvement is offset by positive student feedback, emphasizing the importance of this approach in agricultural economics education. The most notable advantage of the flipped classroom model is students' active participation and deeper understanding of fundamental concepts. Not only does this model facilitate the rapid acquisition of essential knowledge and skills, but it also cultivates soft skills, including communication and teamwork, required for success in agricultural economics and agribusiness administration.

The practical implementation of the flipped classroom approach entails the pedagogically appropriate design of the preparation stage, continuous monitoring of students' readiness, and subsequent extended use across multiple topics or semesters. The full effect likely lasts longer; thus, a longer implementation and incorporation into the curriculum would most likely yield long-term academic advantages from the approach. Going forward, the study of the long-term response to the flipped classroom, the exploration of the role of technology literacy and investment in learning, and the design of an optimal implementation mechanism remain to be conducted.

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