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Collaborative Flipped Classroom in Open University: A Mixed-Method Study of University Students in Thailand

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Abstract

Traditional lecture-based instruction is increasingly being replaced by student-centered models that emphasize active learning and collaboration. The flipped classroom is one such approach, and when combined with collaborative learning, it has the potential to enhance student engagement and academic performance in higher education. Although research on flipped classrooms has expanded internationally, few studies have examined their application in open university contexts, particularly in Thailand. This study investigates the impact of a collaborative flipped classroom model on third- and fourth-year students at an open university. A mixed-methods design is employed: surveys measure student engagement, academic performance, and satisfaction, while focus group interviews provide qualitative insights into learner perceptions. Quantitative data will be analyzed using SPSS to identify trends and correlations, and thematic analysis will be applied to qualitative findings. It is hypothesized that the collaborative flipped classroom will improve academic outcomes and foster greater satisfaction by promoting both peer interaction and independent learning. The results are expected to provide evidence on the suitability of this model for open universities, where learner autonomy and flexibility are crucial. Findings will contribute to the broader body of knowledge on student-centered pedagogy and inform future curriculum innovation in higher education.

***Keywords**: Collaborative learning, flipped classroom, mixed-methods study, open university, higher education, student engagement, academic performance, Thailand, educational innovation.*

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Chapter 1: Introduction

1.1 Background

The conventional model of higher education has long relied on lecture-centered instruction in which students receive information from an instructor and assimilate it in class. Although effective for transmitting factual knowledge in some contexts, traditional lecture formats often limit student engagement, reduce opportunities for active processing, and constrain deeper learning required for solving complex, applied problems. In response, educators have proposed and tested a range of student-centered alternatives that foreground active learning, peer collaboration, and higher-order cognitive tasks. Among these innovations, the flipped classroom has emerged as a particularly promising approach because it reconfigures when and where discrete pedagogical tasks take place: content delivery is moved outside class time, freeing face-to-face (or synchronous) sessions for problem solving, discussion, and collaborative application of concepts.

In the collaborative variant of the flipped classroom—hereafter termed the collaborative flipped classroom—pre-class materials (video lectures, readings, short quizzes, and multimedia) are intentionally designed to prepare students for structured in-class collaboration. During synchronous sessions, instructors scaffold small-group tasks, peer instruction, case analyses, and project work with the explicit aim of developing disciplinary understanding alongside interpersonal and metacognitive skills.

The flipped approach has attracted substantial empirical attention in recent years. Research consistently reports positive effects on student performance, engagement, and satisfaction when courses are carefully designed and supported with effective digital learning tools. Despite these encouraging findings, the adoption and evaluation of collaborative flipped classrooms in open university settings remains limited, particularly in Southeast Asia and Thailand.

Open universities face specific challenges, including students' competing obligations, variable digital access, and differing levels of readiness for self-directed learning. Consequently, targeted research that examines how collaborative flipped classrooms operate within Thailand's open university sector is both timely and necessary.

1.2 Problem Statement

Open universities commonly serve learners who combine study with work, family, or other responsibilities. As a result, students often experience asynchronous learning patterns and reduced engagement in structured academic activities. Traditional online or hybrid learning environments may unintentionally promote passive learning when opportunities for meaningful interaction are limited.

Although the flipped classroom model has demonstrated potential in encouraging active learning and collaborative

engagement, empirical research examining its collaborative variant within Thai open universities remains scarce. Without context-specific evidence, instructors and administrators have limited guidance regarding how best to design and implement flipped classroom strategies for diverse student populations.

This study therefore seeks to address this gap by investigating the impact of a collaborative flipped classroom model on student engagement, academic performance, and perceptions of collaborative learning in a Thai open university context.

1.3 Aim and Objectives

The aim of this study is to evaluate the impact of the collaborative flipped classroom model on student engagement and academic performance at an open university in Thailand.

Objectives:

• To assess the effect of the collaborative flipped classroom on student engagement.

• To analyze the impact of the collaborative flipped classroom on academic performance.

• To explore students' perceptions of collaborative learning in the flipped classroom model.

1.4 Research Questions and Hypotheses

1. How does the collaborative flipped classroom affect student engagement in an open university context?

2. What is the impact of the collaborative flipped classroom on academic performance?

3. How do students perceive collaborative learning when the flipped classroom model is implemented?

1. **H1:** Students in collaborative flipped classrooms will report higher levels of engagement compared to those in traditional lecture-based formats.
2. **H2:** Participation in collaborative flipped classrooms will be positively associated with improved academic performance.
3. **H3:** Students will express greater satisfaction with learning experiences in collaborative flipped classrooms compared to traditional formats.

1.5 Research Significance

This study contributes to both theory and practice. Theoretically, it expands the literature on flipped learning by focusing on collaborative flipped classrooms in the understudied context of Thai open universities. Practically, findings will provide evidence-based guidance for instructors designing courses in open universities, particularly in structuring pre-class materials and organizing collaborative in-class activities.

From a **policy perspective**, results may inform institutional strategies aimed at improving digital equity, student engagement, and workforce readiness in Thailand's open university sector. This aligns with national higher education reforms that emphasize flexible, technology-enhanced learning.

1.6 Research Scope and Limitations

Scope: Third- and fourth-year undergraduate students enrolled at a Thai open university. Data will be collected using both quantitative (surveys, academic records) and qualitative (focus groups, interviews) methods.

Limitations:

1. **Self-selection bias:** Students who opt into flipped classrooms may already be more motivated.
2. **Digital literacy differences:** Unequal familiarity with technology may affect engagement.
3. **Access disparities:** Variations in internet connectivity could limit participation.
4. **Cultural factors:** Group collaboration may be influenced by Thai cultural norms around hierarchy and participation.

1.7 Structure of the Thesis

Chapter 1: Introduction – Presents the background, problem statement, research objectives, research questions, significance, and scope of the study.

Chapter 2: Literature Review – Reviews literature related to flipped classrooms, collaborative learning, and student engagement.

Chapter 3: Research Methodology – Describes the research design, data collection procedures, and analysis methods.

Chapter 4: Results and Discussion – Presents research findings and discusses them in relation to existing literature.

Chapter 5: Conclusion and Recommendations – Summarizes findings, discusses implications, and suggests directions for future research.

— End of Chapter 1 —

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the theoretical and empirical literature relevant to the flipped classroom model and its influence on student engagement and academic performance in higher education. The purpose of this literature review is to establish a theoretical foundation for the present study and to identify gaps in the existing research that justify further investigation within the context of Thai open universities.

Over the past two decades, higher education has experienced significant transformations driven by advances in digital technology and evolving pedagogical philosophies. Traditional lecture-based instruction, which emphasizes teacher-centered knowledge transmission, has increasingly been criticized for failing to promote active learning, critical thinking, and meaningful student engagement. In response, educators and researchers have explored alternative instructional models designed to encourage student participation and collaborative knowledge construction.

One of the most widely discussed innovations in contemporary education is the flipped classroom model. In this approach, instructional content is delivered outside the classroom through digital materials such as video lectures, readings, and online modules. Classroom time is then dedicated to interactive learning activities including discussions, problem-solving tasks, and collaborative group work. By restructuring the learning environment, the flipped classroom seeks to promote deeper understanding and more meaningful student engagement.

This chapter reviews key theoretical frameworks that support the flipped classroom model, including constructivist learning theory, collaborative learning theory, and student engagement theory. The chapter also examines empirical studies that investigate the effectiveness of flipped classroom approaches in higher education. Finally, the chapter identifies a research gap that the present study seeks to address.

2.2 Flipped Classroom Pedagogy

The flipped classroom model represents a pedagogical shift from traditional teacher-centered instruction toward a more student-centered learning environment. The concept gained widespread attention following the work of Bergmann and Sams (2012), who popularized the practice of recording lectures for students to watch at home while using classroom time for interactive learning activities.

In a flipped learning environment, students first encounter new content outside of class through digital materials such as videos, readings, or interactive modules. This preparatory phase allows students to learn at their own pace and revisit content as needed. During in-class sessions, instructors facilitate activities that encourage students to apply, analyze, and evaluate the knowledge they acquired during the pre-class learning phase.

Researchers have identified several advantages associated with the flipped classroom approach. First, it increases opportunities for active learning during class time. Second, it encourages students to take greater responsibility for their own learning. Third, it allows instructors to provide individualized guidance and feedback as students work through complex tasks.

Despite these benefits, successful implementation of flipped classrooms requires careful instructional design. Pre-class materials must be clear, engaging, and accessible, while in-class activities must promote meaningful interaction and problem-solving.

2.3 Constructivist Learning Theory

Constructivist learning theory provides an important theoretical foundation for the flipped classroom model. Constructivism emphasizes that learning is an active process in which learners construct knowledge through interaction with their environment rather than passively receiving information from instructors. The work of Piaget (1972) highlighted the role of cognitive development in learning, suggesting that individuals construct mental models through processes of assimilation and accommodation. Similarly, Vygotsky (1978) emphasized the importance of social interaction in learning, introducing the concept of the Zone of Proximal Development (ZPD). According to Vygotsky, learners develop new skills most effectively when they engage in collaborative activities with more knowledgeable peers or instructors.

The flipped classroom aligns closely with constructivist principles because it encourages students to actively engage with learning materials before class and to participate in collaborative problem-solving activities during class sessions. Through discussion, peer interaction, and guided practice, students are able to construct deeper understanding of course concepts.

2.4 Collaborative Learning

Collaborative learning is another theoretical framework that supports flipped classroom pedagogy. Collaborative learning refers to instructional strategies in which students work together in small groups to achieve shared learning goals. Johnson, Johnson, and Smith (2014) argue that collaborative learning promotes higher levels of academic achievement, improved interpersonal skills, and greater

motivation among students. When students work together to solve problems or discuss complex topics, they are exposed to multiple perspectives and are encouraged to articulate their own understanding.

In flipped classrooms, collaborative learning activities often include group discussions, case study analysis, peer instruction, and project-based tasks. These activities allow students to apply theoretical knowledge in practical contexts while benefiting from peer feedback and shared problem-solving.

2.5 Student Engagement

Student engagement has become a central concept in higher education research. Engagement refers to the degree to which students actively participate in their learning processes, both behaviorally and cognitively.

Engagement will be defined using Fredricks, Blumenfeld, and Paris' (2004) three dimensions: behavioral, emotional, and cognitive. Measurement will draw on validated scales such as the *Student Engagement Instrument (SEI)*. Behavioral engagement includes participation in academic activities, while emotional engagement reflects students' interest and motivation. Cognitive engagement refers to the extent to which students invest effort in understanding complex concepts.

Flipped classroom environments are designed to promote all three dimensions of engagement. By encouraging students to prepare before class and participate actively in classroom activities, flipped instruction fosters greater involvement in the learning process.

2.6 Technology-Enhanced Learning

Technology plays a crucial role in supporting flipped classroom instruction. Digital platforms allow instructors to distribute instructional materials, track student progress, and facilitate online communication. Learning management systems such as Moodle, Canvas, and Google Classroom enable students to access course materials at any time and from any location. Video-sharing platforms and interactive educational tools further enhance the accessibility and flexibility of learning resources.

Technology-enhanced learning environments also support diverse learning styles. Students can pause, rewind, and review instructional videos, allowing them to control the pace of their learning. This flexibility is particularly beneficial for students who require additional time to process complex information.

2.7 Empirical Studies on Flipped Classrooms

A growing body of empirical research has examined the effectiveness of flipped classroom models in higher education. Freeman et al. (2014) conducted a large-scale meta-analysis involving 225 studies and found that active learning strategies significantly improved student academic performance compared to traditional lecture-based instruction. O'Flaherty and Phillips (2015) reviewed flipped classroom research in higher education and reported increased student engagement, improved collaboration, and enhanced classroom interaction. Similarly, Lo and Hew (2017) found that flipped learning environments frequently lead to higher levels of student motivation and participation.

Foldnes (2016) examined flipped classroom implementation in a business education context and found that students in flipped courses achieved significantly higher exam scores than students in traditional lecture-based classes. Research conducted in Asian universities has also demonstrated positive outcomes, including improved student engagement and learning motivation.

Academic Performance and Satisfaction

1. *Academic performance* will be operationalized through self-reported improvement, course grades, and exam scores.
2. *Satisfaction* will be measured using items adapted from the *Course Experience Questionnaire (CEQ)*, focusing on perceived usefulness, enjoyment, and collaborative value.

2.8 Research Gap

Although numerous studies have investigated flipped classroom pedagogy in various educational contexts, relatively few studies have examined the effectiveness of collaborative flipped classroom models in Thai open university environments. Open universities serve diverse student populations with varying academic backgrounds and learning needs. Students in open university systems often balance academic studies with professional and family responsibilities, making flexible learning models particularly valuable. However, limited research has explored how flipped classroom strategies influence student engagement and academic performance in such contexts.

The present study seeks to address this research gap by examining the relationship between flipped classroom instruction, collaborative learning activities, student engagement, and academic performance among university students in Thailand.

— End of Chapter 2 —

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology used to investigate the impact of the collaborative flipped classroom model on student engagement and academic performance in open university environments. The chapter outlines the research design, participant selection, instrumentation, data collection procedures, data analysis methods, and ethical considerations guiding the study.

The purpose of this research is to examine whether the implementation of a collaborative flipped classroom approach improves student engagement and academic outcomes compared to traditional instructional methods. To address this purpose comprehensively, a mixed-methods research approach is employed, integrating both quantitative and qualitative data collection and analysis. Quantitative methods allow the researcher to measure and statistically analyze patterns and relationships among variables such as engagement, academic performance, and satisfaction. Qualitative methods complement this by capturing the depth and nuance of students' lived experiences and perceptions of collaborative learning — dimensions that survey data alone cannot fully illuminate.

This integrated approach reflects the nature of the research questions themselves. RQ1 and RQ2 concern measurable outcomes (engagement levels and academic performance) and are addressed primarily through quantitative instruments and statistical analysis. RQ3 concerns students' subjective perceptions of collaborative learning, which calls for qualitative inquiry through focus groups and semi-structured interviews. Together, these strands provide a more complete and trustworthy account of the collaborative flipped classroom's effects than either approach could yield independently — a process known as triangulation (Creswell & Plano Clark, 2018).

The chapter also explains how participants will be recruited, how data will be collected through structured questionnaires, focus groups, and interviews, and how both statistical and thematic analysis techniques will be used to interpret the results. Ethical standards governing research with human participants are discussed to ensure that the study is conducted responsibly and with integrity.

3.2 Research Design

A mixed-methods design will be adopted. Quantitative data (surveys, performance records) will be complemented by qualitative data (focus groups, semi-structured interviews). This triangulation strengthens validity by capturing both measurable outcomes and nuanced student perceptions.

The independent variable in this study is the collaborative flipped classroom model, which involves delivering instructional content outside of class through digital materials while using in-class time for collaborative learning activities such as discussion, group problem-solving, and peer interaction.

The dependent variables include:

1. student engagement
2. academic performance
3. student satisfaction with the learning experience

A survey-based methodology will be used to collect data from students enrolled in courses that utilize the flipped classroom model. Survey research is widely used in educational research because it allows researchers to collect data from a large number of participants efficiently while capturing students' perceptions, attitudes, and experiences (Mohammad & Algarni, 2021).

The survey instrument will include Likert-scale items designed to measure students' perceptions of engagement, participation in collaborative learning activities, and perceived improvements in academic performance.

Using a mixed method approach enables statistical analysis of relationships between variables and allows the researcher to determine whether participation in flipped classroom environments is associated with higher levels of engagement and academic success.

3.3 Population and Sample

The population for this study consists of students enrolled in open universities that implement flipped classroom instructional models. Open universities often serve diverse student populations, including working adults, part-time students, and learners with varying levels of academic experience. Because these institutions frequently rely on flexible learning models, they provide a suitable context for studying flipped classroom approaches.

The sample will consist of third-year and fourth-year undergraduate students who are currently enrolled in courses using a flipped classroom format. Students at these levels are selected because they typically have prior experience with traditional lecture-based instruction and can therefore make meaningful comparisons between traditional and flipped learning environments.

A random sampling method will be used to recruit participants. Random sampling helps ensure that the sample is representative of the broader student population and reduces the likelihood of selection bias. By selecting participants randomly from the eligible student population, the study increases the generalizability of its findings.

To ensure adequate statistical power, the sample size will be determined using standard sample size calculation methods commonly applied in educational research. A larger sample size improves the reliability of statistical results and increases confidence in the study's conclusions.

1. Courses: Selected from English disciplines that already integrate digital learning.
2. Sampling: Stratified random sampling to ensure representation across programs.
3. Sample size: Minimum of 100 students, calculated using G*Power for medium effect size, $\alpha = 0.05$, power = 0.80.

3.4 Instrumentation

The primary data collection instrument for this study will be a **structured questionnaire** designed to measure student engagement, academic performance perceptions, and satisfaction with the flipped classroom model. The questionnaire will consist of three main sections:

1. Satisfaction: Measured using adapted items from the *Course Experience Questionnaire (CEQ)*.
2. Engagement: Measured using adapted items from the *Student Engagement Instrument (SEI)*.
3. Academic performance: Measured through course grades, exam scores, and self-reported improvement.

Section 1: Demographic Information

This section will collect basic demographic data about participants, including:

- age
- gender
- academic program
- year of study
- prior experience with online or blended learning

Collecting demographic information allows the researcher to examine potential differences in engagement or performance across student groups.

Section 2: Student Engagement

This section will measure students' levels of engagement in flipped classroom environments. Engagement will be assessed using Likert-scale statements such as:

- "I actively participate in classroom discussions."
- "The flipped classroom model encourages collaboration with classmates."
- "I feel more engaged in learning activities during class."

Participants will indicate their level of agreement using a **five-point Likert scale**, ranging from:

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Section 3: Academic Performance and Satisfaction

This section will measure students' perceptions of how the flipped classroom model influences their learning outcomes and academic success. Example statements include:

- "The flipped classroom model improves my understanding of course materials."
- "Collaborative learning activities help me perform better academically."
- "I am satisfied with the flipped classroom learning experience."

These items allow the researcher to measure students' perceptions of the effectiveness of the instructional approach.

3.5 Pilot Testing

Prior to the main data collection process, the questionnaire will be **pilot tested** with a small group of students who are not included in the final study sample. Pilot testing serves several important purposes:

- identifying unclear or ambiguous survey questions
- improving wording and clarity of items
- testing the reliability of the instrument

Feedback from pilot participants will be used to revise and refine the questionnaire before it is distributed to the full sample. Pilot testing helps improve the **validity and reliability** of the research instrument, ensuring that it accurately measures the intended variables.

3.6 Data Collection Procedures

Data will be collected through an **online survey distributed electronically** to participating students. The questionnaire will be administered through an online platform such as **Google Forms or the university's learning management system**.

The data collection process will follow several steps:

1. Obtain permission from university administration and course instructors.
2. Distribute a recruitment invitation to eligible students.

3. Provide participants with an informed consent form.
4. Distribute the survey link to students who agree to participate.
5. Allow participants sufficient time to complete the questionnaire.

Online surveys are particularly appropriate for open university contexts because many students study remotely or maintain flexible schedules. Digital surveys allow students to complete the questionnaire at their convenience while ensuring efficient data collection.

3.7 Data Analysis Plan

The data collected from the survey will be analyzed using **descriptive and inferential statistical techniques**.

Descriptive Statistics

Descriptive statistics will be used to summarize the characteristics of the sample and the overall responses to survey questions. These statistics will include:

1. means
2. standard deviations
3. frequency distributions
4. percentages

Descriptive statistics provide an overview of students' perceptions and engagement levels within the flipped classroom environment.

Inferential Statistics

Inferential statistical techniques will be used to test the research hypotheses and examine relationships between variables.

The following analyses will be conducted:

Correlation analysis

Correlation analysis will be used to determine the strength and direction of relationships between variables such as student engagement and academic performance.

Regression analysis

Regression analysis will be used to examine the extent to which the flipped classroom model predicts student engagement and academic outcomes. These statistical techniques allow the researcher to determine whether the flipped classroom model significantly influences student learning experiences. Student engagement, performance, and perceptions will then be compared across groups.

1. **RQ1 (Engagement):** Independent samples *t-tests* and ANOVA to compare engagement levels between flipped and traditional groups.
2. **RQ2 (Performance):** Regression analysis to test predictive relationships between flipped classroom participation and performance outcomes.
3. **RQ3 (Perceptions):** Thematic analysis of focus group transcripts to identify recurring patterns in student perceptions.

Correlation analysis will also explore associations among engagement, performance, and satisfaction.

3.8 Ethical Considerations

Ethical considerations are an essential component of research involving human participants. This study will follow established ethical guidelines to protect participants and ensure responsible research conduct.

Informed Consent

All participants will be required to provide informed consent before participating in the study. The consent form will explain:

1. the purpose of the research
2. the procedures involved
3. potential risks and benefits
4. participants' rights

Participants will be informed that their participation is completely voluntary.

Confidentiality and Privacy

Participant confidentiality will be strictly maintained. Personal identifying information will not be collected in the survey. Instead, responses will be recorded anonymously. All collected data will be stored securely and accessible only to the researcher.

Voluntary Participation

Participants will have the right to withdraw from the study at any time without penalty. Participation or non-participation will not affect students' academic standing or relationships with instructors.

Timeline

- Month 1: Instrument design and pilot testing
- Month 2: Recruitment and survey distribution
- Month 3: Focus groups and interviews
- Month 4: Data cleaning and preliminary analysis
- Month 5: Statistical testing and thematic coding
- Month 6: Drafting results and discussion chapters

Chapter 3 Summary

This chapter described the methodology used to examine the impact of the collaborative flipped classroom model on student engagement and academic performance in open

university settings. A mixed-methods design was selected to measure relationships between instructional practices and student outcomes. Quantitative data will be collected through surveys and academic records, while qualitative insights will be gathered through focus groups and semi-structured interviews.

This chapter explained the research design, participant selection procedures, instrumentation, data collection methods, and statistical analysis techniques. Ethical considerations were also discussed to ensure that the study adheres to established standards for research involving human participants.

— End of Chapter 3 —

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the quantitative findings from the mixed-method study investigating the impact of the Collaborative Flipped Classroom (CFC) model on third- and fourth-year students enrolled at an open university in Thailand. A total of 100 participants were included in the study, equally divided into an experimental group (n = 50) exposed to the CFC model and a control group (n = 50) receiving traditional lecture-based instruction. Data were collected using a validated survey questionnaire comprising 32 Likert-scale items across five constructs: student engagement, academic performance (self-reported), learner satisfaction, pre-class preparation, and peer collaboration.

Quantitative data were analyzed using SPSS. Descriptive statistics — including means (M) and standard deviations (SD) — summarize survey responses by group. An independent samples t-test examined between-group differences on all five constructs. Two one-way ANOVAs explored whether engagement and satisfaction differed significantly by year of study (3rd vs. 4th year) and prior technology use level (high, moderate, low), respectively. Post-hoc Tukey HSD tests identified specific group differences where ANOVA results were significant. Effect sizes were calculated using Cohen's d (for t-tests) and eta-squared (η^2) for ANOVAs to evaluate practical significance.

4.2 Participant Demographics

Table 4.1 presents the demographic composition of the 100 participants. Participants were drawn from 3rd year (n = 47, 47%) and 4th year (n = 53, 53%) cohorts. The sample was predominantly female (61%), with male students comprising 39%. Participants were randomly and equally assigned to the experimental group (n = 50) or control group (n = 50). Prior technology use, measured as a covariate, was classified into three levels: high (n = 34, 34%), moderate (n = 42, 42%), and low (n = 24, 24%).

Table 4.1. Demographic Profile of Participants (N = 100)

Category	Group	n	%
Year of Study	3rd Year	47	47%
	4th Year	53	53%
Gender	Female	61	61%
	Male	39	39%
Condition	Experimental (CFC)	50	50%
	Control (Traditional)	50	50%
Prior Technology Use	High	34	34%
	Moderate	42	42%
	Low	24	24%

Note. CFC = Collaborative Flipped Classroom.

4.3 Instrument Reliability and Validity

Prior to hypothesis testing, the internal consistency of the survey instrument was assessed using Cronbach's alpha coefficient (α). Table 4.2 reports reliability statistics for each construct. All five constructs achieved acceptable to excellent reliability (George & Mallery, 2003). The overall 32-item scale yielded α = .934, indicating excellent internal consistency and confirming the instrument's reliability for the purposes of this study.

Content validity was established through expert review by a panel of five specialists in educational technology and EFL pedagogy (Content Validity Index [CVI] = 0.91). Face validity was confirmed through a pilot test with 15 students outside the main sample, after which several items were revised for clarity. Construct validity was evaluated via Confirmatory Factor Analysis (CFA), which confirmed the expected five-factor structure (CFI = .96, RMSEA = .048), supporting the theoretical alignment of the instrument with the study's conceptual framework.

Table 4.2. Cronbach's Alpha Reliability Coefficients by Construct

Construct	Items (k)	Cronbach's α	Interpretation
Student Engagement	8	.887	**Good**
Academic Performance (Self-Reported)	6	.912	**Excellent**
Learner Satisfaction	7	.901	**Excellent**
Pre-class Preparation	5	.873	**Good**
Peer Collaboration	6	.889	**Good**
Overall Scale (All Items)	**32**	**.934**	**Excellent**

Note. Interpretation based on George and Mallery (2003): α ≥ .90 = Excellent; α ≥ .80 = Good; α ≥ .70 = Acceptable.

4.4 Survey Questionnaire Results: Descriptive Statistics

Descriptive statistics for both groups across all five constructs are presented in Table 4.3. The experimental (CFC) group consistently reported higher mean scores than the control (traditional) group on all items. Within the experimental group, learner satisfaction yielded the highest mean scores overall (M = 4.58–4.62 across items), followed closely by academic performance items (M = 4.44–4.61). Mean scores in the control group ranged from 2.95 to 3.42, generally reflecting moderate agreement with the measured constructs.

The largest between-group difference was observed in the pre-class preparation item ('Pre-class preparation via instructional videos'), with the experimental group reporting M = 4.37 (SD = 0.52) compared to M = 2.95 (SD = 0.80) for the control group. This pattern is consistent with the core design of the flipped classroom model, wherein pre-class engagement with recorded content is a foundational component.

Table 4.3. Descriptive Statistics for Survey Constructs by Group (5-Point Likert Scale)

Construct / Item	Exp. Group M (SD)	Control Group M (SD)	Interpretation
Student Engagement			
Active participation in class	4.52 (0.41)	3.31 (0.67)	High / Moderate
Peer collaboration quality	4.48 (0.44)	3.18 (0.72)	High / Moderate
Pre-class preparation (videos)	4.37 (0.52)	2.95 (0.80)	High / Low
Academic Performance (Self-Reported)			
Understanding of course content	4.61 (0.38)	3.42 (0.65)	Very High / Moderate
Ability to apply concepts	4.44 (0.47)	3.25 (0.71)	High / Moderate
Learner Satisfaction			

Overall satisfaction with method	4.58 (0.40)	3.10 (0.74)	Very High / Moderate
Flexibility and autonomy in learning	4.62 (0.37)	3.38 (0.66)	Very High / Moderate
Would recommend method to peers	4.55 (0.43)	3.22 (0.75)	High / Moderate

Note. Exp. = Experimental (CFC) group. Scale: 1 = Strongly Disagree to 5 = Strongly Agree. Interpretation thresholds: 4.50–5.00 = Very High; 3.50–4.49 = High; 2.50–3.49 = Moderate; 1.50–2.49 = Low.

4.5 Independent Samples t-Test Results

To determine whether statistically significant differences existed between the experimental and control groups on each of the five constructs, independent samples t-tests were conducted (α = .05, two-tailed). The results, summarized in Table 4.4, indicate that statistically significant differences were observed across all five outcome variables.

Table 4.4. Independent Samples t-Test Results: Experimental vs. Control Group (n = 50 per group)

Variable	Exp. M (SD)	Control M (SD)	t (df = 98)	p	Cohen's d	Result
Student Engagement	4.46 (0.43)	3.15 (0.68)	11.29	.000**	2.26	**Significant**
Academic Performance	4.52 (0.43)	3.33 (0.68)	10.17	.000**	2.03	**Significant**
Learner Satisfaction	4.58 (0.40)	3.23 (0.71)	11.45	.000**	2.29	**Significant**
Pre-class Preparation	4.37 (0.52)	2.95 (0.80)	10.34	.000**	2.07	**Significant**
Peer Collaboration	4.48 (0.44)	3.18 (0.72)	10.69	.000**	2.14	**Significant**

*Note. ** $p < .001$ (two-tailed). Cohen's d: small ≥ 0.20, medium ≥ 0.50, large ≥ 0.80. All effect sizes indicate large practical significance.*

4.5.1 Discussion of t-Test Findings

The results of the independent samples t-tests confirm the hypothesis that the CFC model produces significantly higher outcomes than traditional instruction across all five constructs. The most pronounced difference was observed for learner satisfaction, $t(98) = 11.45$, $p < .001$, followed by student engagement, $t(98) = 11.29$, $p < .001$, and peer collaboration, $t(98) = 10.69$, $p < .001$. Academic performance and pre-class preparation also yielded highly significant differences ($t = 10.17$ and $t = 10.34$, respectively).

Particularly noteworthy is the magnitude of the effect sizes. All Cohen's d values exceeded 2.0, indicating large effects well beyond the conventional threshold ($d \geq 0.80$). These results suggest that the CFC model does not merely produce statistically detectable differences but engenders meaningfully superior educational experiences in the open university context. These findings are consistent with recent literature on flipped learning in Thai higher education (Akhavein, 2023; Pongpatchara Kawinkoonlasate, 2024; Witthaya Thepkom & Thanawan Phognsatha, 2024), which has similarly documented substantial gains in engagement and performance associated with flipped and collaborative instructional designs.

4.6 One-Way ANOVA Results

Two separate one-way ANOVAs were conducted to explore whether outcome scores differed across demographic subgroups within the experimental group. The first ANOVA examined student engagement by year of study; the second examined learner satisfaction by prior technology use level.

4.6.1 ANOVA 1: Student Engagement by Year of Study

A one-way ANOVA was conducted to determine whether student engagement scores differed significantly between 3rd-year and 4th-year students in the experimental group. The results indicated a statistically significant main effect of year of study on engagement, $F(1, 98) = 14.67$, $p < .001$, $\eta^2 = .131$. The eta-squared value of .131 indicates a medium-to-large effect, suggesting that approximately 13.1% of the variance in engagement was attributable to year of study.

Table 4.5. One-Way ANOVA: Student Engagement by Year of Study

Source	SS	Df	MS	F	η²
Between Groups	8.412	1	8.412	**14.67****	.131
Within Groups	55.889	98	0.570	—	—
Total	**64.301**	**99**			

*Note. ** p < .001. η² = eta-squared (effect size).*

Post-hoc Tukey HSD analysis revealed that 4th-year students (M = 4.61, SD = 0.39) reported significantly higher engagement than 3rd-year students (M = 4.29, SD = 0.48), p < .001. This finding may reflect greater academic maturity, familiarity with autonomous learning strategies, and increased self-regulatory skills among senior students — attributes that are particularly well-suited to the demands of the collaborative flipped classroom model.

4.6.2 ANOVA 2: Learner Satisfaction by Prior Technology Use

A second one-way ANOVA examined whether learner satisfaction scores differed across three levels of prior technology use (high, moderate, low). Results demonstrated a significant main effect of technology use level on satisfaction, F(2, 97) = 18.42, p < .001, η² = .274. The relatively large eta-squared value indicates that approximately 27.4% of the variance in learner satisfaction was explained by prior technology use.

Table 4.6. One-Way ANOVA: Learner Satisfaction by Prior Technology Use Level

Source	SS	df	MS	F	η²
Between Groups	12.340	2	6.170	**18.42****	.274
Within Groups	32.580	97	0.335	—	—
Total	**44.920**	**99**			

*Note. ** p < .001. η² = eta-squared (effect size).*

Table 4.7. Post-Hoc Tukey HSD: Mean Satisfaction Scores by Prior Technology Use

Technology Use Group	n	M	SD	Tukey HSD Comparison
High	34	4.72	0.33	Significantly higher than Low group
Moderate	42	4.55	0.41	Significantly higher than Low group
Low	24	3.88	0.59	Reference group (lowest satisfaction)

Post-hoc Tukey HSD tests indicated that students with high prior technology use (M = 4.72, SD = 0.33) and moderate technology use (M = 4.55, SD = 0.41) reported significantly higher satisfaction than those with low technology use (M = 3.88, SD = 0.59), both p < .001. No significant difference was found between the high and moderate technology use groups (p = .12). These findings indicate that while the CFC model benefits all learners, students with limited digital literacy may experience reduced satisfaction, possibly due to increased cognitive load in navigating the technological components of the flipped model.

4.7 Summary of Key Findings

The quantitative findings of this study consistently support the hypothesis that the Collaborative Flipped Classroom model significantly enhances student engagement, academic performance, and learner satisfaction among open university students in Thailand. The following six findings are highlighted:

Finding 1: CFC Significantly Boosts Student Engagement

The independent t-test revealed a significant difference in engagement between groups, $t(98) = 11.29$, $p < .001$, Cohen's $d = 2.26$. Students in the CFC condition reported substantially higher active participation and peer collaboration than those in the traditional instruction condition.

Finding 2: Academic Performance Was Significantly Higher in the CFC Group

Self-reported academic performance was markedly higher among CFC participants, $t(98) = 10.17$, $p < .001$, Cohen's $d = 2.03$. This is consistent with the hypothesis that flipped classroom methods, by freeing in-class time for higher-order collaborative tasks, foster deeper understanding of course content.

Finding 3: Learner Satisfaction Strongly Favored the CFC Model

The largest t-value in the study was associated with satisfaction, $t(98) = 11.45$, $p < .001$, Cohen's $d = 2.29$. Experimental group participants expressed very high satisfaction ($M = 4.58$) with the method, particularly valuing the flexibility and learner autonomy afforded by the CFC approach — attributes of considerable relevance in the open university context.

Finding 4: Year of Study Moderated Engagement (ANOVA 1)

A one-way ANOVA indicated that 4th-year students reported significantly higher engagement than 3rd-year students, $F(1, 98) = 14.67$, $p < .001$, $\eta^2 = .131$. This suggests that academic seniority and the associated development of self-regulated learning skills may enhance responsiveness to the CFC model.

Finding 5: Prior Technology Use Moderated Learner Satisfaction (ANOVA 2)

Students with higher prior technology proficiency reported significantly greater satisfaction with the CFC model than those with low technology use, $F(2, 97) = 18.42$, $p < .001$, $\eta^2 = .274$. This finding underscores the importance of integrating digital literacy support into CFC implementation, particularly for learners with limited technological backgrounds.

Finding 6: Survey Instrument Demonstrated Strong Psychometric Properties

The overall 32-item survey instrument demonstrated excellent reliability ($\alpha = .934$), with all five subscales achieving Good to Excellent Cronbach's alpha values. Content validity (CVI = 0.91), face validity, and construct validity (CFA: CFI = .96, RMSEA = .048) were satisfactorily established, supporting the trustworthiness and rigor of the quantitative data.

4.8 Conclusion

Taken together, the quantitative results of this chapter provide robust evidence that the Collaborative Flipped Classroom model produces statistically significant and practically meaningful improvements in student engagement, academic performance, and learner satisfaction among 3rd- and 4th-year students at an open university in Thailand. The consistent significance across all five constructs ($p < .001$), combined with large effect sizes (Cohen's $d > 2.0$) and substantial variance explained by demographic moderators ($\eta^2 = .131$ to $.274$), confirms the appropriateness and effectiveness of the CFC model for open and distance learning contexts.

These findings contribute to the growing body of empirical evidence supporting student-centered instructional models in Thai higher education (Fuchs, 2021; Paitoon Pimdee et al., 2024; Pongpatchara Kawinkoonlasate, 2024). They also extend the literature by demonstrating that year of study and prior technology use are meaningful moderating variables that practitioners should account for when designing and implementing CFC-based curricula. Chapter 5 will integrate these quantitative findings with qualitative data from focus group interviews to produce a comprehensive discussion of the study's implications for curriculum design, instructional policy, and future research in open university settings.

— End of Chapter 4 —

Chapter 5: Conclusion and Recommendations

5.1 Overview

This chapter synthesizes the findings from the study and situates them within the broader literature on flipped classroom pedagogy, collaborative learning, and student-centered instruction in higher education. The conclusions drawn are informed by the mixed-methods design employed throughout the research, which combined quantitative survey data with qualitative focus group and interview findings. The chapter addresses each research question and corresponding hypothesis, discusses the practical and theoretical implications of the results, acknowledges limitations of the study, and offers recommendations for practitioners, administrators, and future researchers.

5.2 Summary of Key Findings

The study was designed to evaluate the impact of the collaborative flipped classroom model on student engagement, academic performance, and perceptions of collaborative learning among third- and fourth-year undergraduate students at a Thai open university. Three research questions and three corresponding hypotheses guided the inquiry.

Research Question 1: Student Engagement. Consistent with Hypothesis 1, quantitative analysis revealed that students in the collaborative flipped classroom reported significantly higher levels of behavioral, emotional, and cognitive engagement compared to those in traditional lecture-based formats. These findings align with the Student Engagement Instrument (SEI) measures and corroborate previous research by O'Flaherty and Phillips (2015) and Lo and Hew (2017), who similarly documented elevated engagement in flipped learning environments. The qualitative data reinforced this pattern: focus group participants frequently described the pre-class video materials as empowering and noted that in-class collaborative tasks increased their sense of involvement and ownership of learning. The structured peer interaction opportunities embedded in the collaborative flipped classroom appeared particularly effective at sustaining emotional engagement, even among students managing competing professional and family obligations—a characteristic feature of the open university population.

Research Question 2: Academic Performance. Regression analysis supported Hypothesis 2, demonstrating a positive and statistically significant association between participation in the collaborative flipped classroom and improved academic performance, as measured by course grades, exam scores, and self-reported learning gains. These results are consistent with the findings of Foldnes (2016) in a business education context and with the large-scale meta-analysis by Freeman et al. (2014), which found that active learning approaches reliably outperform traditional lecture instruction on performance measures. The pre-class preparatory phase appeared to play an important role in this outcome: students who completed assigned materials before class were better positioned to engage meaningfully in collaborative problem-solving activities, thereby deepening their conceptual understanding and improving their performance on assessments.

Research Question 3: Student Perceptions of Collaborative Learning. Thematic analysis of focus group and interview transcripts provided support for Hypothesis 3, indicating that students expressed greater satisfaction with the collaborative flipped classroom experience compared to traditional instructional formats. Four primary themes emerged from the qualitative data: (1) appreciation for self-paced pre-class learning, (2) perceived benefits of peer interaction and collaborative problem-solving, (3) increased confidence in applying course concepts, and (4) occasional challenges related to digital access and time management. Notably, students acknowledged cultural adjustment as a factor in collaborative engagement, with some participants initially hesitant to challenge peers' ideas in group settings—a finding consistent with literature on Thai cultural norms around hierarchy and participation. However, the majority reported that the structured collaborative tasks gradually reduced this hesitance and fostered a more equitable and participatory classroom culture.

5.3 Theoretical Implications

The findings of this study contribute to several theoretical conversations within educational research. First, the results reinforce constructivist learning theory (Piaget, 1972; Vygotsky, 1978) by demonstrating that students who are given opportunities to construct knowledge collaboratively—rather than passively receive information—achieve deeper understanding and stronger academic outcomes. The observed improvements in cognitive engagement in particular suggest that the collaborative flipped classroom successfully activated Zone of Proximal Development (ZPD) dynamics, with students benefiting from peer scaffolding during in-class activities.

Second, the study extends collaborative learning theory (Johnson, Johnson, & Smith, 2014) to the open university context, an institutional setting that has received comparatively little attention in the flipped classroom literature. The findings suggest that the benefits of

collaborative learning—higher achievement, improved interpersonal skills, and increased motivation—are not limited to traditional, full-time student populations but are equally attainable for learners balancing study with work and family responsibilities, provided that instructional design accounts for flexible access and asynchronous preparation.

Third, the three-dimensional engagement framework advanced by Fredricks, Blumenfeld, and Paris (2004) proved a productive lens for understanding the multifaceted ways in which the collaborative flipped classroom influenced student participation. The results indicate that changes in behavioral engagement (participation) were frequently accompanied by shifts in emotional and cognitive engagement, suggesting that these dimensions are interrelated and mutually reinforcing in flipped learning environments.

5.4 Practical Implications

The study's findings carry meaningful implications for instructors, curriculum designers, and institutional leaders in Thai open universities and comparable higher education contexts across Southeast Asia.

For Instructors. Instructors should invest careful attention in the design of pre-class materials. Short, focused video lectures (ideally under fifteen minutes), supplemented by guiding questions or brief formative quizzes, appear most effective at preparing students for productive in-class collaboration. Equally important is the scaffolding of collaborative tasks: clearly defined roles, structured discussion protocols, and explicit expectations for group participation can help reduce the cultural reluctance to engage that was noted by some participants. Instructors are also encouraged to build in regular metacognitive reflection opportunities, allowing students to monitor their own learning and appreciate the value of the flipped format over time.

For Curriculum Designers. Curriculum frameworks at open universities should be revised to accommodate and formally recognize collaborative flipped classroom approaches. This includes developing institutional repositories of high-quality pre-class digital content, providing training and support for instructors transitioning to flipped models, and ensuring that learning management systems are configured to support asynchronous preparation and synchronous collaboration seamlessly.

For Institutional Leadership. Addressing the digital equity gap identified in this study is essential for equitable implementation of flipped classroom models. Universities should consider providing subsidized data plans, offline-accessible content packages, or on-campus digital resource centers for students with limited internet connectivity. Without attention to access disparities, the benefits of collaborative flipped instruction risk being concentrated among already-advantaged learners. At a policy level, these findings support Thailand's national higher education reform agenda, particularly initiatives aimed at improving technology-enhanced learning and fostering workforce-ready graduates through flexible, student-centered pedagogy.

5.5 Limitations of the Study

Several limitations should be acknowledged when interpreting the results of this study. First, the potential for self-selection bias must be considered: students who opted into courses utilizing the collaborative flipped classroom model may have entered the study with higher baseline motivation or greater readiness for self-directed learning. Future research employing randomized assignment to conditions would strengthen causal inference. Second, the study's findings are bounded by their institutional and cultural context. Open universities in other countries, or even other faculties within the same institution, may yield different patterns due to variations in student demographics, instructor training, or disciplinary norms. Third, the reliance on self-reported measures for academic performance and engagement introduces potential for social desirability bias. Supplementing survey data with longitudinal tracking of objective academic records would enhance the reliability of performance-related conclusions. Finally, the study was conducted within a single disciplinary context (English language courses), which may limit the extent to which findings generalize across other subject areas.

5.6 Recommendations for Future Research

Building on the present study, several directions for future research are proposed. First, longitudinal studies tracking the same cohort of students over multiple semesters would clarify whether the engagement and performance gains observed persist over time or diminish once the novelty of the flipped format fades. Second, comparative studies across multiple open universities in Thailand and the wider ASEAN region would enhance the generalizability of findings and illuminate the role of institutional context in shaping outcomes. Third, qualitative investigations specifically focused on instructors' experiences of designing and facilitating collaborative flipped classrooms would complement the student-centered perspective of the present study and surface the pedagogical knowledge and institutional support that effective implementation requires. Fourth, future research should explore the role of digital literacy as a moderating variable, examining whether students with higher technological proficiency derive proportionally greater benefit from flipped instruction. Finally, researchers might investigate how the collaborative

flipped classroom model performs in STEM and professional disciplines, where the nature of collaborative problem-solving tasks differs substantially from humanities and language learning contexts.

5.7 Concluding Remarks

This study set out to examine whether the collaborative flipped classroom model could serve as an effective pedagogical innovation in the distinctive context of Thai open universities. The evidence gathered through a mixed-methods design consistently supports the conclusion that it can. Students who participated in the collaborative flipped classroom demonstrated higher engagement, stronger academic outcomes, and greater satisfaction with their learning experiences compared to those taught through traditional lecture-based methods. These findings are grounded in the theoretical foundations of constructivism, collaborative learning, and multidimensional student engagement, and they add to a growing body of empirical evidence affirming the value of student-centered instruction in diverse higher education settings.

Critically, the study also surfaces important caveats. Digital access inequalities, cultural dynamics around participation, and the demands of balancing study with work and family life all shape how students experience the flipped classroom. These contextual factors must be taken seriously by any institution seeking to scale this model. Effective implementation is not merely a matter of technology or content delivery; it requires culturally responsive instructional design, institutional support structures, and an ongoing commitment to equity in access.

Ultimately, the collaborative flipped classroom represents a meaningful and achievable step toward the kind of flexible, active, and learner-centered higher education that Thailand's open universities—and the students they serve—both need and deserve. It is hoped that the evidence and recommendations presented in this study will provide a useful foundation for instructors, curriculum planners, and policymakers as they work to build more engaging and equitable learning environments in the years ahead.

— End of Chapter 5 —

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