

**EFFECTS OF PROJECT-BASED LEARNING ON ENGLISH SPEAKING
PROFICIENCY AND STUDENT ENGAGEMENT AMONG POLYTECHNIC
EFL LEARNERS IN CHINA**

By

ZHONG JIANER

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of
Philosophy**

February 2025

FPP 2025 16

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February 2025

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Many EFL learners face challenges in English speaking and classroom engagement due to limited opportunities for authentic communication, low motivation, and passive learning environments. To address these challenges, Project-Based Learning (PBL) was implemented to foster active participation and improve speaking proficiency. Grounded in Sociocultural Theory, Self-determination Theory, Comprehensive Output Hypothesis and Trade-Off Hypothesis, this study aims to investigate the effects of PBL on polytechnic EFL learners' English speaking proficiency (complexity, accuracy, and fluency) and student engagement (behavioural, emotional, cognitive, and agentic engagement). A quasi-experimental design was utilized in this study. Ninety-six participants from two classes at a polytechnic in China were assigned to the experimental and control groups. The experimental group received instruction through PBL, while the control group was taught using a conventional teaching method. Data were collected using speaking tests,

questionnaires, and interviews. The data from speaking tests and questionnaires were analysed using t-tests, MANOVA, and ANOVA. The data from interviews were analysed using thematic analysis. The results of t-tests revealed significant effects between two groups on complexity ($p = .042$) and fluency ($p = .015$), but found no significant difference in accuracy ($p = .837$). Furthermore, the results of t-test showed that there were significant differences in syntactic complexity ($p = .048$), pronunciation accuracy ($p = .020$), speech rate ($p = .033$), and self-repairs ($p = .007$). However, no significant difference were found in lexical complexity ($p = .094$) and syntactic accuracy ($p = .648$) between the two groups. The MANOVA results revealed a significant difference between two groups in overall speaking proficiency ($p = .023$). The ANOVA results showed significant interaction effects on complexity ($p = .001$) across high, medium, and low proficiency PBL learners over time. However, there were significant differences in fluency only between high and low proficiency learners ($p = .004$), and no significant effects were found in accuracy ($p = .686$). The t-tests results showed significant effects on behavioural ($p = .001$), emotional ($p = .009$), and cognitive ($p = .034$) engagement between two groups, but found no significant difference in agentic engagement ($p = .823$). The MANOVA results revealed a significant difference between two groups in overall engagement ($p = .001$). Lastly, the thematic analysis showed that the polytechnic learners highly perceived PBL as improving speaking proficiency, enhancing student engagement, developing soft skills, and boosting self-confidence and courage. Meanwhile, challenges were reported to be encountered in the implementation of PBL, such as collaborative and video-making issues. This study concludes that PBL is more effective than the

conventional teaching method in improving polytechnic EFL learners' speaking proficiency and student engagement. This study provides implications for curriculum designers and teachers to implement PBL effectively to improve EFL learners' English speaking proficiency and student engagement.

Keywords: Project-Based Learning, English Speaking Proficiency, Student Engagement, Polytechnic EFL Learners, English Speaking.

SDG: GOAL 4: Quality Education



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KESAN PEMBELAJARAN BERASASKAN PROJEK TERHADAP
KECEKAPAN BERTUTUR DALAM BAHASA INGGERIS DAN
PENGLIBATAN PELAJAR DALAM KALANGAN PELAJAR EFL
POLITEKNIK DI CHINA**

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Ramai pelajar EFL menghadapi cabaran dalam pertuturan dan penglibatan bilik darjah kerana peluang terhad untuk berkomunikasi, motivasi rendah dan persekitaran pembelajaran pasif. Untuk menangani cabaran ini, Pembelajaran Berasaskan Projek (PBL) telah dilaksanakan untuk memupuk penyertaan aktif dan meningkatkan kecekapan bertutur. Berdasarkan Teori Sosiobudaya, Teori Penentuan Kendiri, Hipotesis Output Komprehensif dan Hipotesis Trade-Off, kajian ini bertujuan untuk menyiasat kesan PBL terhadap penguasaan berbahasa Inggeris pelajar EFL politeknik (kerumitan, ketepatan, dan kelancaran) dan penglibatan pelajar (penglibatan tingkah laku, emosi, kognitif, dan agensi). Reka bentuk kuasi eksperimen digunakan dalam kajian ini. Sembilan puluh enam peserta dari dua kelas di sebuah politeknik di China telah diagihkan kepada kumpulan eksperimen dan kawalan. Kumpulan eksperimen menerima pengajaran melalui PBL, manakala kumpulan kawalan diajar menggunakan kaedah pengajaran konvensional. Data dikumpul

menggunakan ujian bertutur, soal selidik, dan temu bual. Data dari ujian bertutur dan soal selidik dianalisa menggunakan ujian-t, MANOVA, dan ANOVA. Data dari temu bual dianalisa menggunakan analisis tematik. Keputusan ujian-t menunjukkan kesan yang signifikan antara dua kumpulan terhadap kerumitan ($p = .042$) dan kelancaran ($p = .015$), tetapi mendapati tiada perbezaan yang signifikan dalam ketepatan ($p = .837$). Seterusnya, keputusan ujian-t menunjukkan terdapat perbezaan yang signifikan dalam kerumitan sintaksis ($p = .048$), ketepatan sebutan ($p = .020$), kadar pertuturan ($p = .033$), dan pembetulan sendiri ($p = .007$). Walau bagaimanapun, tiada perbezaan yang signifikan ditemui dalam kerumitan leksikal ($p = .094$) dan ketepatan sintaksis ($p = .648$) antara kedua-dua kumpulan. Keputusan MANOVA menunjukkan perbezaan yang signifikan antara dua kumpulan tersebut dalam kecekapan bertutur secara keseluruhan ($p = .023$). Keputusan ANOVA menunjukkan kesan interaksi yang signifikan terhadap kerumitan ($p = .001$) merentas pelajar PBL berkemahiran tinggi, sederhana dan rendah dari semasa ke semasa. Walau bagaimanapun, terdapat perbezaan yang signifikan dalam kefasihan hanya antara pelajar berkemahiran tinggi dan rendah ($p = .004$), dan tiada kesan ketara ditemui dalam ketepatan ($p = .686$). Keputusan ujian-t menunjukkan kesan yang signifikan terhadap keterlibatan tingkah laku ($p = .001$), emosi ($p = .009$), dan kognitif ($p = .034$) antara dua kumpulan, tetapi mendapati tiada perbezaan yang signifikan dalam keterlibatan agensi ($p = .823$). Keputusan MANOVA mendedahkan perbezaan yang signifikan antara dua kumpulan dalam keterlibatan keseluruhan ($p = .001$). Akhir sekali, analisis tematik menunjukkan bahawa pelajar politeknik menganggap PBL sebagai meningkatkan kecekapan bertutur, meningkatkan

keterlibatan pelajar, membangunkan kemahiran insaniah, dan meningkatkan keyakinan diri dan keberanian. Sementara itu, beberapa cabaran dihadapi dalam pelaksanaan PBL, seperti isu kerjasama dan penglibatan video. Kajian ini merumuskan bahawa PBL adalah lebih berkesan daripada kaedah pengajaran konvensional dalam meningkatkan kecekapan bertutur pelajar EFL politeknik dan penglibatan pelajar. Kajian ini memberi implikasi kepada pereka kurikulum dan guru untuk melaksanakan PBL secara berkesan untuk meningkatkan kecekapan bertutur pelajar EFL kolej dan penglibatan pelajar.

Kata kunci: Pembelajaran Berasaskan Projek, Kemahiran Berbahasa Inggeris, Penglibatan Pelajar, Pelajar EFL Politeknik, Bertutur Bahasa Inggeris.

SDG: MATLAMAT 4: Pendidikan Berkualiti

ACKNOWLEDGEMENTS

I would like to extend my deepest gratitude to my main supervisor, Associate Professor Dr. Lilliaty binti Ismail, for her generous time, patient guidance, and unwavering support throughout my research. I truly appreciate the discussions we had, during which she helped me navigate the challenges of my thesis. Her commitment to resolving my uncertainties was crucial in helping me overcome my doubts. The encouragement and supportive comments she provided were critical to the success of my thesis.

I would also like to express my sincere appreciation to my co-supervisor, Dr. Norhakimah Khaissa binti Ahmad, for her invaluable advice on the qualitative aspects of my research. Her guidance and support were essential in enabling me to make progress and effectively complete the qualitative portion of my thesis.

I am deeply grateful to Professor Dr. Paul Kei Matsuda, Associate Professor Dr. Yong Meifang, and Associate Professor Dr. Vahid Nimehchisalem for their patience in addressing my queries. I owe special thanks to Professor Dr. Paul Kei Matsuda for his expert advice, which significantly illuminated my thesis journey. My heartfelt appreciation also goes to Associate Professor Dr. Yong Meifang for her invaluable guidance and encouragement, which empowered me to advance in my research. I am equally thankful to Associate Professor Dr. Vahid Nimehchisalem for his gentle encouragement and professional counsel. I am particularly thankful for the opportunity to meet them at the Penang

conference, where I gained new perspectives and knowledge. This experience will remain one of the most memorable highlights of my PhD journey.

I am deeply thankful for the support of my family. My heartfelt gratitude goes especially to my beloved husband for his love, encouragement, and steadfast support throughout my PhD journey. His patience and sacrifices were crucial to the completion of this thesis. My two kids have been my true inspiration, motivating me to persevere. I am also profoundly grateful to my parents, who have always supported my pursuit of dreams and cared for my kids during my time in Malaysia.

Finally, I would like to express my sincere thanks to my Chinese and Malaysian friends, Shen Xiaolei, Ye Xiaolu, Peng Yongjing, and Nisa Azmar. Their companionship in Malaysia—studying together in the UPM library, discussing thesis-related questions, travelling around—added vibrancy and joy to my otherwise demanding PhD life. Thanks to them, this journey has been filled with memorable moments and happiness.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
AS-unit	Analysis Speech of unit
CAF	Complexity, Accuracy and Fluency
CET	College English Test
CLT	Communicative Language Teaching
CTM	Conventional Teaching Method
EFL	English as a Foreign Language
ESL	English as a Second Language
HVE	Higher Vocational Education
ICT	Information Communication Technology
IELTS	International English Language Testing System
IVI	IFlytek Voice Input
JKEUPM	Ethics Committee for Research Involving Human Subjects of Universiti Putra Malaysia
L1	First Language
L2	Second Language
MANOVA	Multivariate Analysis of Variance
NMTS	Nation Matriculation Test in Spring
PBL	Project-Based Learning
PRC	People's Republic of China
SCE	Student Classroom Engagement
SCT	Sociocultural Theory
SDT	Self-Determination Theory
TTR	Type-Token Ration
ZPD	Zone Proximal Development



CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides an overview of the current study. Firstly, it provides an introduction to the study background. Subsequently, it highlights the problem statement, study objectives, research questions, and hypotheses. Following that, it discusses the significance, scope, and limitations of the research. Finally, the chapter concludes by defining key terms used throughout the study.

1.2 Background of the Study

English has emerged as a lingua franca, serving as a common means of communication for speakers with diverse first languages. The acquisition of speaking skills has become a global educational goal worldwide (Mridha & Muniruzzaman, 2020). Without these skills, the purpose of communication cannot be performed effectively (Akther et al., 2020). Especially for English as a Foreign Language (EFL) learners, their English proficiency is commonly evaluated based on their speaking proficiency (Amoah & Yeboah, 2021). Speaking proficiency is typically assessed by complexity, accuracy, and fluency (CAF), which collectively reflect a learner's underlying language competence (Ellis, 2008; Yan et al., 2021). Achieving accuracy and fluency in speaking is a primary goal for many EFL learners, as it not only enhances their

ability to communicate effectively in daily interactions but also significantly impacts their future career prospects (Akther, 2022; Sahan & Sahan, 2024). As a result, making the improvement of EFL learners' speaking proficiency a central focus of contemporary English instruction.

The significance of speaking proficiency is also highlighted in the policies of higher vocational education (HVE) in China. The Ministry of Education of the People's Republic of China (PRC) (2000) has advocated for the integration of Communicative Language Teaching (CLT) into the English curriculum standards for HVE, prioritizing the development of practical communication skills over rote memorization of grammar and vocabulary (The Ministry of Education of PRC, 2000). In 2021, the Ministry revised the English curriculum standards for HVE to strengthen the focus on speaking proficiency (The Ministry of Education of PRC, 2021). These updated standards underscore the importance of equipping students with the ability to use English for professional purposes, such as negotiating, presenting, and collaborating with international partners. Additionally, the Ministry of Education has incorporated speaking components into standardized tests, such as the College English Test (CET), which now includes an optional speaking section (National Committee of College English Test, 2016). Through these initiatives, the Ministry of Education of PRC has made substantial efforts to prioritize speaking proficiency in the HVE curriculum.

However, despite ongoing efforts, the development of speaking proficiency remains a significant challenge for EFL learners in China. The persistence of

conventional teaching methods, which emphasize teacher-centered instruction, continues to hinder students' ability to develop practical speaking skills (Li, 2020). In English-speaking classrooms in China, many EFL teachers continue to rely on traditional, teacher-centered methods rather than adopting CLT or student-centered approaches. In these conventional settings, teachers dominate instruction, delivering lectures and explanations, while students passively absorb knowledge with minimal interaction (Fan, 2018). This teacher-centered approach often fails to engage students, as they find the lessons monotonous and irrelevant to real-life communication (Wang et al., 2022). Additionally, the lack of authentic speaking opportunities outside the classroom, combined with the exam-oriented education system that prioritizes writing and reading skills over oral communication, exacerbates the problem (Shi & Li, 2019). As a result, students often lack motivation and confidence to engage in speaking tasks, leading to low levels of participation and limited improvement in speaking proficiency.

Project-Based Learning (PBL) offers a promising solution to these challenges by involving learners in collaborative, real-world projects (Torres & Rodríguez, 2017). Unlike conventional methods, PBL emphasizes authentic tasks, enabling students to use English for communication, problem-solving, and critical thinking, thus improving speaking fluency, accuracy, and complexity (Thakur et al., 2019). It creates a low-pressure environment for language experimentation, fostering confidence (Ariani et al., 2023). PBL enhances engagement by aligning topics with students' interests and career goals, boosting motivation (Sari & Tridianti, 2021). Project-based collaboration

reduces anxiety, while tangible outcomes provide a sense of accomplishment, enhancing cognitive and agentic engagement (Kemaloglu & Sahin, 2022).

Despite the arguments supporting the benefits of PBL, there is still a lack of sufficient evidence for the positive effects of PBL on speaking proficiency and student engagement (Sayuti et al., 2020; Zheng et al., 2022; Wahidati & Kharismawati, 2023). Previous research findings on the impact of PBL on speaking proficiency were contradictory (Park & Eisenhower, 2019; Mantra et al., 2022). Little research was conducted using objective measurements of CAF. With regard to student engagement, there have been no studies regarding the effects of PBL on EFL students' engagement in a Chinese context. Earlier research indicated conflicting results regarding the influence of PBL on student engagement (Putri, 2018; Zheng et al., 2022). Empirical research adopting a multi-dimensional perspective to explore student engagement in PBL is still in its infancy. Thus, there is ongoing disagreement on the extent to which the implementation of PBL in EFL classes can enhance speaking proficiency and student engagement.

One way to shed light on whether implementing PBL can improve EFL learners' speaking proficiency and student engagement is through objective measures of CAF and from a multi-dimensional perspective of student engagement. This study contributes to understanding the impact of PBL (video-creation activities) on enhancing Chinese polytechnic EFL learners' speaking proficiency by using objective measurement of CAF and student engagement with four dimensions, including behavioural, emotional, cognitive, and agentic engagement.

Furthermore, it investigates the effects of PBL (video-creation activities) on learners with different language proficiency levels to determine whether the method benefits students uniformly or requires tailored strategies based on individual competencies.

1.3 Statement of the Problem

Improving speaking proficiency has become a global educational goal, particularly in the fields of EFL and ESL. Speaking proficiency is critical to the academic and professional success of EFL learners (Islam & Islam, 2022). However, the reality shows that a considerable number of Chinese EFL learners struggle to communicate fluently and accurately in English. Limited exposure to the target language is cited as a primary obstacle for EFL learners in developing their speaking skills (Fan, 2018). In China, Mandarin dominates daily communication in China, leaving few contexts for learners to use English outside the classroom (Shi & Li, 2019). Additionally, the exam-oriented education system in China prioritizes writing and reading skills over speaking, as standardized tests like the CET place less emphasis on oral communication. This results in a lack of emphasis on oral English in both curricula and assessments.

Conventional teaching methods, which are still prevalent in many Chinese EFL classrooms, further exacerbate the problem. These methods often rely on teacher-centered instruction and rote memorization, leaving little room for interactive speaking activities or meaningful communication (Fan, 2018). The

focus on grammar and vocabulary, rather than communicative competence, further reduces students' ability to use English in real-life situations (Ismail & Kassem, 2022). As a result, students struggle to develop fluency, accuracy, and complexity in their spoken English (Thakur et al., 2019). Moreover, cultural factors such as the fear of losing face and the emphasis on conformity discourage students from actively participating in speaking tasks, as they fear making mistakes or being judged by their peers (Liu & Zhang, 2019). This lack of engagement and practice perpetuates poor speaking proficiency over time.

Empirical studies have also shown that Chinese EFL learners often exhibit low levels of confidence and high levels of language anxiety when speaking English, which further hinders their ability to communicate effectively (Wang et al., 2022). For example, many students report feeling nervous or embarrassed when asked to speak in class, leading to reluctance or avoidance of speaking activities (Liu & Zhang, 2019). This anxiety was often exacerbated by the pressure to perform well and the fear of negative evaluation from teachers or peers (Wang et al., 2022). These psychological barriers, combined with insufficient speaking opportunities and ineffective teaching methods, contribute to the persistent challenges in developing speaking proficiency among Chinese EFL learners.

Previous studies have demonstrated that PBL can effectively contribute to the enhancement of students' oral communication skills in their target language (Riswandi, 2018; Kristianto & Harendita, 2022). Sayuti et al. (2020) investigated the effectiveness of PBL in developing EFL learners' speaking

skills using observations, interviews, and classroom-based assessment reports. Their findings confirmed that PBL significantly improved students' speaking abilities. Similarly, Aldobekhi and Abahussain (2024) employed a mixed-method approach, including pre- and post-tests, interviews, and observations, to examine the impact of PBL on English language learners' productive skills at Majmmaah University, further highlighting its positive effects on language development. The Aldobekhi and Abahussain's study also reported that PBL had a notable positive influence on enhancing students' motivation, confidence, creativity, and collaboration skills. While these studies mainly rely on qualitative data or subjective assessment by teachers' scoring rubrics, little research was conducted using an objective measurement to evaluate the influence of PBL on EFL learners' speaking proficiency.

Furthermore, current studies often treat learners as a homogeneous group, neglecting tailored strategies for diverse proficiency levels. Emerging studies highlight the importance of adjusting PBL implementation based on learners' language proficiency levels. Abu Bakar et al. (2019) explored the impact of PBL as an instructional approach to enhance the oral communication skills of Malaysian English language learners. The study found that PBL was an effective strategy for improving oral communication, particularly among low-proficiency English learners. Similarly, research by Sheikhveisi et al. (2024) supported these findings, suggesting that PBL can be beneficial in making learning more accessible for students with lower language proficiency. While PBL is theorized to benefit low-proficiency learners, there is insufficient empirical evidence on how its effectiveness varies across language proficiency tiers.

Student engagement is improved as a result of PBL. Numerous studies have demonstrated that PBL positively impacts student engagement (Kusumawati, 2019; Aubrey, 2022). However, there is a scarcity of evidence supporting the improvement of student engagement through PBL in EFL and ESL contexts, and the existing research presents conflicting views on its effectiveness. For instance, Putri (2018) found that PBL implementation could enhance students' learning processes, while Zheng et al. (2022) observed that students shifted from active participants to *team escapers* and from contributors to *free riders*, indicating negative changes in engagement. Student engagement is recognised to encompass multiple dimensions, including behavioural, cognitive, emotional, and agentic engagement (Reeve & Tseng, 2011). Given the conflicting findings in previous studies, further research is necessary to clarify the impact of PBL on these aspects of engagement among EFL learners.

In summary, research supports PBL as an effective method for enhancing speaking proficiency and engagement. However, studies often overlook proficiency-based adaptations and present mixed findings on English speaking proficiency and student engagement. While PBL benefits low-proficiency learners, more empirical evidence is needed to assess its impact across different skill levels and engagement dimensions, clarifying its effectiveness in diverse EFL learning contexts.

1.4 Research Objectives

The general objective of the study is to investigate the effects of PBL through video-creation activities on English speaking proficiency (complexity, accuracy,

and fluency) and student engagement (behavioural, emotional, cognitive, and agentic engagement) in comparison to the conventional teaching method among polytechnic EFL learners in China. The specific objectives of this study are presented as follows:

- a. To determine the effects of PBL on polytechnic EFL learners' speaking proficiency (complexity, accuracy, and fluency).
- b. To determine the effects of PBL on complexity, accuracy, and fluency across polytechnic EFL learners with different levels of speaking proficiency.
- c. To determine the effects of PBL on polytechnic EFL learners' student engagement (behavioural, emotional, cognitive, and agentic engagement).
- d. To explore the polytechnic EFL learners' perspectives on the implementation of PBL in an English-speaking class.

1.5 Research Questions

To address the research objectives, the study centers around the four questions:

- a. Does PBL have any effects on polytechnic EFL learners' speaking proficiency when compared to the conventional teaching method?
- b. Does PBL have any effects on complexity, accuracy, and fluency across polytechnic EFL learners with different levels of speaking proficiency?
- c. Does PBL have any effects on polytechnic EFL learners' student engagement when compared to the conventional teaching method?
- d. What are the polytechnic EFL learners' perspectives on the implementation of PBL in an English-speaking class?

1.6 Research Hypotheses

In order to address each question, the twelve null hypotheses were proposed:

- H₀1: There is no significant difference in polytechnic EFL learners' complexity between the experimental and control groups.
- H₀2: There is no significant difference in polytechnic EFL learners' accuracy between the experimental and control groups.
- H₀3: There is no significant difference in polytechnic EFL learners' fluency between the experimental and control groups.
- H₀4: There is no significant difference in polytechnic EFL learners' overall speaking proficiency between the experimental and control groups.
- H₀5: There is no significant interaction effect on complexity between time (pretest and posttest) and subgroups (high, medium, and low proficiency).
- H₀6: There is no significant interaction effect on accuracy between time (pretest and posttest) and subgroups (high, medium, and low proficiency).
- H₀7: There is no significant interaction effect on fluency between time (pretest and posttest) and subgroups (high, medium, and low proficiency).
- H₀8: There is no significant difference in polytechnic EFL learners' behavioural engagement between the experimental and control groups.
- H₀9: There is no significant difference in polytechnic EFL learners' emotional engagement between the experimental and control groups.
- H₀10: There is no significant difference in polytechnic EFL learners' cognitive engagement between the experimental and control groups.
- H₀11: There is no significant difference in polytechnic EFL learners' agentic engagement between the experimental and control groups.
- H₀12: There is no significant difference in polytechnic EFL learners' overall student engagement between the experimental and control groups.

1.7 Significance of the Study

In light of the importance of English speaking, it is essential to adopt more efficient instructional methods to engage EFL learners in speaking and enhance their speaking proficiency. PBL shifts from a traditional teacher-centered teaching method to a more dynamic and collaborative approach that actively engages learners in the learning process (Bagheri et al., 2013). This study holds significance in the following three aspects.

This study contributes to the existing literature by providing a more objective evaluation of the effects of PBL in the EFL context. While previous research has highlighted the impact of PBL on speaking proficiency through subjective analysis (Kristianto & Harendita, 2022; Zubaidi & Suharto, 2024) and examined student engagement using qualitative data (Park & Eisenhower, 2019; Aubrey, 2022), this study adopts a more comprehensive approach. By measuring speaking proficiency through CAF and analyzing student engagement from a multi-dimensional perspective, this research offers deeper insights into the effectiveness of PBL, particularly through video-creation activities. The findings will enhance the understanding of PBL as an instructional strategy in language education and provide valuable pedagogical implications for improving EFL learners' speaking proficiency and engagement.

This study provides empirical evidence to support the design of effective PBL activities that enhance students' English speaking proficiency and engagement. It emphasizes the significance of PBL through video-creation activities as an

innovative approach for enhancing students' speaking proficiency and engagement. By integrating video production into language learning, teachers can design more interactive and meaningful speaking tasks that encourage authentic communication. Additionally, engaging in video-creation projects helps teachers refine their instructional strategies, making English-speaking classes more dynamic and effective. This study provides an alternative PBL method that fosters student participation and confidence in speaking. Ultimately, the PBL activities offer a practical and engaging way for students to develop their communication skills in English.

This study can directly benefit curriculum designers who develop English-speaking curricula based on projects, as well policymakers and programme developers who aim to develop initiatives to improve speaking proficiency. The findings from this research can offer valuable information to enhance teaching methodologies and improve language learning outcomes in EFL settings. This would not only be significant for developing polytechnic EFL learners' speaking proficiency, but it would also help to promote English communicative competence among learners at other educational levels.

1.8 Scope and Limitation of the Study

The scope of the present study is limited to a polytechnic in China. Despite that, the polytechnic in this study is a public institution with a history spanning over thirty years and offers a number of renowned majors, including English Education. This polytechnic is situated in Guangdong Province, which has the

largest number of polytechnics in China. As a result, this polytechnic may serve as a representative example for other polytechnics in Guangdong province or throughout China. The findings of this study could be generalised to other polytechnics and major students.

The sampling of participants was viewed as another limitation for this study. The participants' random assignment to experimental groups was not possible, so the limitations inherent in quasi-experimental studies were unavoidable in this study. Despite the impossibility of random assignment in this study, the school administration system ensured the allocation of participants to intact groups, preventing them from selecting their own groups. The study findings could provide insights into the effectiveness of PBL in improving polytechnic learners' speaking proficiency and student engagement. These findings could also help to guide future research in this field.

The third limitation that should be mentioned is the length of the experiment. This study was carried out over a span of 12 weeks to assess the impact of PBL on speaking proficiency. It was anticipated that students exposed to PBL would enhance their speaking proficiency within this time frame. The measurements employed in the study show slight yet encouraging enhancements in speaking proficiency. However, for more significant improvements, an increase in experimental time and further investigation would likely be necessary.

1.9 Definitions of Terms

This study employed precise terminology, along with constitutive and operational definitions, which are crucial for fully comprehending the research.

1.9.1 Project-Based Learning

Project-Based Learning (PBL) is a student-centered instructional method where students acquire knowledge and skills by engaging in real-world, personally meaningful projects (Buck Institute for Education, 2022). PBL emphasizes active learning, collaboration, problem-solving, and the creation of tangible products. The method fosters critical thinking, communication, and creativity, encouraging students to develop solutions to real-world problems and present their findings in a public format.

PBL in this study refers to a student-centered method in which students are provided with increased opportunities to communicate in English and engage in authentic activities to collaboratively complete video-creation projects. The project incorporates essential PBL elements, such as driving questions, student voice and choice, sustained inquiry, and reflection (Larmer et al., 2015).

These elements can foster deeper engagement by connecting classroom learning to real-world contexts. The PBL process in this study involves the following eight phases (activities): (a) Introduce driving questions through topic discussion; (b) Determine project topics through idea sharing; (c) Scaffolding learning through script practice; (c) Structuring the project through rehearsal;

(d) Conducting the project through filming; (e) Creating a product through editing; (f) Presenting videos; (g) Evaluating videos. In this method, the teacher acts as a facilitator rather than a direct instructor. Students take active roles in their English-speaking learning by collaborating on video projects.

1.9.2 Conventional Teaching Method

A conventional teaching method is defined as a direct instruction model, where knowledge is transmitted from teacher to student in a structured and sequenced manner (Hoidn & Reusser, 2020). In oral English instruction, this translates into a focus on habit formation, repetition, and teacher-led drills, aiming to ensure grammatical correctness and pronunciation accuracy. In recent years, there has been a gradual shift in China toward blended learning approaches that integrate interactive and communicative methods to supplement traditional. However, teachers are more expected to follow prescribed textbooks, implement dialogue-based drills, and assess oral proficiency primarily through accuracy-based evaluations.

The conventional teaching method in this study is a teacher-centered approach where the teacher is the primary source of knowledge, guiding students to improve English speaking proficiency through structured activities focused on imitation, memorization, and repetition. This method prioritizes accuracy and linguistic correctness, often relying on textbook dialogues and controlled practice to develop students' speaking proficiency. Specifically, the conventional teaching method involves a five-step process: (a) Listening to

and reading dialogues; (2) Memorizing dialogues; (c) Imitating dialogues; (d) role-playing dialogues; and (e) Evaluating dialogues. In this method, the teacher acts as the primary instructor, delivering content through lectures, modeling pronunciation and assessing accuracy. Students primarily act as passive recipients of knowledge, listening and following teacher guidance to develop speaking skills with a focus on accuracy rather than spontaneous communication.

1.9.3 English Speaking Proficiency

English Speaking proficiency is conceptualised as a multi-dimensional concept captured by the three constructs of complexity, accuracy, and fluency (Ellis & Barkhuizen, 2005). Speaking proficiency in this study is defined as the ability to communicate in English accurately, fluently, and with complex structure, constructed by complexity, accuracy, and fluency.

1.9.3.1 Complexity

Complexity in actual EFL speech manifests in learners' ability to use a range of sophisticated syntactic structures and diverse lexical items (Suzuki & Kormos, 2020). In the current teaching curriculum and policy, complexity is observed through students' oral performance, which is often evaluated using task-based assessments and formative evaluations aligned with CLT principles. Teachers typically measure complexity through structured rubrics, oral proficiency scales, and fluency-focused assessments.

In this study, complexity was assessed using both syntactic and lexical dimensions. Syntactic complexity was measured by words per AS-unit (Norris & Ortega, 2009), reflecting students' ability to construct longer and more elaborate utterances. Lexical complexity was quantified using the type-token ratio (TTR) (Daller et al., 2003), which indicates the range and variety of vocabulary used in speech.

1.9.3.2 Accuracy

Accuracy in actual EFL speech reflects learners' ability to produce language that aligns with target language norms and minimizes errors in grammar, vocabulary, and pronunciation (Foster & Wigglesworth, 2016; Polio & Shea, 2014). In the current teaching curriculum and policy, accuracy is observed through structured oral tasks, dictation exercises, and teacher-led corrective feedback. Teachers assess accuracy through formative and summative assessments, using established rubrics and standardized oral proficiency scales.

In this study, accuracy was assessed in two dimensions: syntactic accuracy and pronunciation accuracy. Syntactic accuracy is recognized as one of the most comprehensive measures of accuracy (Michel, 2017). It was evaluated based on the ratio of error-free AS-units, reflecting the student's ability to produce grammatically correct sentences. Pronunciation accuracy was assessed using automatically generated subtitling software, a reasonably reliable method for objectively evaluating pronunciation (Spring, 2020).

Specifically, pronunciation accuracy was measured by the ratio of correctly pronounced words, which were automatically analyzed using IFlytek Voice Input (IVI), following an adaptation of Spring's (2020) methodology.

1.9.3.3 Fluency

Fluency in actual EFL speech manifests as learners' ability to produce smooth, continuous speech with minimal pauses, hesitations, or self-corrections (Michel, 2017; Suzuki & Kormos, 2020). In the current teaching curriculum and policy, fluency is observed through students' oral interactions in communicative activities such as storytelling, role-playing, and spontaneous discussions. Teachers encourage fluency development by emphasizing meaning-focused communication and reducing interruptions for error correction during speaking tasks.

In this study, fluency was assessed using two key measures: speech rate and self-repairs. Speech rate, widely recognized as a reliable quantitative measure (Mora, 2006), was calculated by the number of syllables produced per minute (Yousefi, 2016). Self-repairs, which indicate the extent of monitoring and hesitations during speech (Suzuki & Kormos, 2022), were measured by the number of pruned syllables per minute, capturing instances where students corrected or revised their utterances (Skehan, 2003).

1.9.4 Student Engagement

Student engagement is defined as the active participation and involvement of students in a learning activity (Fredricks et al., 2019). Student engagement in this study refers to the engagement of students in specific learning activities or within a particular course, comprising behaviour, emotion, cognition, and agency. Student engagement was measured by using the Classroom Student Engagement scale to investigate how students evaluated their behavioural, emotional, cognitive, and agentic engagement.

1.9.4.1 Behavioural Engagement

Behavioural engagement refers to the level of attention, effort, and perseverance demonstrated by students while actively participating in a learning activity (León et al., 2015). In this study, behavioural engagement was examined in both the experimental and control groups, focusing on the observable efforts students made in completing activities within the learning environment to improve their speaking proficiency. In the experimental group, behavioural engagement was observed through students' active participation in project-based learning activities, their willingness to collaborate, and their sustained effort in completing video-creation activities. In contrast, in the control group, behavioural engagement was primarily reflected in students' participation in traditional classroom activities, such as listening to lectures, answering questions, and completing structured exercises.

Behavioural engagement was measured using the Classroom Student Engagement Scale, which includes five key aspects: active listening, attention, effort to succeed, hard work, and class participation. These aspects were assessed through self-reported engagement levels to capture differences in student involvement between the experimental and control groups.

1.9.4.2 Emotional Engagement

Emotional engagement refers to the positive responses and feelings that students have toward the learning environment, their peers, and teachers, as well as their sense of belonging and interest (Bond & Bedenlier, 2020). In this study, emotional engagement was examined in both the experimental and control groups, focusing on how students emotionally responded to learning activities and the use of English in their tasks. In the experimental group, emotional engagement was observed through students' enthusiasm, curiosity, and motivation while using English to complete video-creation projects and collaborative learning activities. Their emotional involvement was reflected in their expressed interest, enjoyment of interactive activities, and willingness to persist in learning despite challenges. In the control group, emotional engagement was observed in more traditional classroom settings, where students' emotional responses were assessed based on their reactions to structured lessons, teacher-led instruction, and individual assignments.

Emotional engagement was measured using the Classroom Student Engagement Scale, which includes five key aspects: interest, fun, enjoyment

of learning, positive feelings, and engagement. These aspects were assessed through student self-reports to capture differences in emotional involvement between the two groups.

1.9.4.3 Cognitive Engagement

Cognitive engagement refers to the extent to which students actively employ strategic learning techniques, emphasizing deep learning strategies such as elaboration, critical thinking, and conceptual understanding rather than surface-level memorization (Reeve, 2013). In this study, cognitive engagement was examined in both the experimental and control groups, focusing on how students engaged with learning materials and applied cognitive strategies to process information. In the experimental group, cognitive engagement was observed through students' use of deep learning strategies while completing video-creation projects. This included their ability to connect learning to real-life experiences, integrate new ideas, and apply prior knowledge to solve problems in an authentic learning environment. Their engagement was also reflected in their ability to generate personal examples and explanations to reinforce their understanding. In the control group, cognitive engagement was observed in more structured learning settings, where students primarily engaged with teacher-directed instruction, followed step-by-step learning processes, and demonstrated understanding through traditional exercises and recall-based activities.

Cognitive engagement was measured using the Classroom Student Engagement Scale, which included four key aspects: connecting learning to experience, integrating ideas, relating new knowledge to prior knowledge, and creating examples for understanding. These aspects were assessed through student self-reports to capture differences in cognitive processing between the two groups.

1.9.4.4 Agentic Engagement

Agentic engagement refers to the intentional, proactive, and constructive involvement of students in the instructional process, where they take initiative in shaping their learning experiences (Reeve, 2012). In this study, agentic engagement was examined in both the experimental and control groups, focusing on how students actively influenced their learning environment and interactions with teachers. In the experimental group, agentic engagement was observed through students' active participation in project-based and task-driven learning. This included their willingness to communicate their needs, express interests, and provide feedback on their learning experiences. Students in this group were encouraged to take initiative by asking questions to deepen their understanding, suggesting modifications to tasks, and seeking additional resources to support their learning. In the control group, agentic engagement was observed in more structured learning environments, where students had fewer opportunities to shape their learning process. Here, engagement was mainly reflected in students' responsiveness to teacher-led instruction, occasional question-asking for clarification, and seeking help only when necessary.

Agentic engagement was measured using the Classroom Student Engagement Scale, which included five key aspects: communicating needs, sharing interests, expressing opinions, asking questions for learning, and seeking help. These aspects were assessed through student self-reports to identify differences in students' proactive involvement in learning between the two groups.

1.10 Summary

The improvement of speaking proficiency has become a global objective in education. High speaking proficiency is essential for EFL learners to achieve the academic and professional success. Despite this, many EFL students face significant challenges in communicating effectively in English. These could be attributed to limited opportunities for practicing spoken English and the reliance on conventional instructional methods in oral English classes. Student engagement is a crucial factor in enhancing speaking proficiency. PBL has been implemented to boost both speaking proficiency and student engagement among EFL learners. However, the actual impact of PBL on speaking proficiency (complexity, accuracy, and fluency) and student engagement (behavioural, emotional, cognitive, and agentic engagement) of polytechnic EFL learners in China remains uncertain. This study sought to examine the effects of PBL on these aspects. The subsequent chapter presents early research on PBL, speaking proficiency, and student engagement.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on Project-Based Learning (PBL), speaking proficiency, and student engagement. It begins by defining PBL and examining its key features and implementation in both EFL and ESL contexts. Next, it discusses the effects of PBL on English speaking proficiency, exploring the constructs of speaking proficiency and the influence of learners' language proficiency on speaking complexity, accuracy, and fluency. The chapter then investigates the impact of PBL on student engagement, analyzing its various dimensions and their interconnections. Following this, it identifies gaps in the existing literature. Finally, the chapter introduces the theoretical and conceptual frameworks that underpin the study.

2.2 Definition and Features of Project-Based Learning

PBL is usually defined as a model for organizing learning around all sorts of projects (Bell, 2010). Helle et al. (2006) defined PBL as a question or problem that organize and promotes activities, and forms a final product to solve the driving question. Galvan and Coronado (2014) shifted the paradigm in education to define PBL as a movement of students from passive learning to active learning, thereby improving learners' critical thinking skills. Kokotsaki et al. (2016) placed emphasis on a learner-centered approach and defined PBL

as a student-centered form of instruction that is characterized by students' autonomy, constructive investigation, collaboration, goal-setting, communication and reflection in real life practices. According to Torres and Rodríguez (2017), PBL is a student-centered teaching method in which students have the opportunity to work in groups and engage in social interaction to solve problems. Buck Institute of Education (2022) also defined PBL as a method in which students learn by actively engaging in real-world and personally meaningful projects. These definitions mentioned above highlight how PBL shifts the focus of education from being teacher-centered to student-centered, as it emphasizes engaging students in projects rather than relying on traditional lectures within the classroom. PBL in this study refers to a student-centered method in which students are provided with increased opportunities to communicate in English and engage in authentic activities to collaboratively complete video-creation projects.

Based on the various definitions, PBL is characterized by several essential features that distinguish it from traditional teaching methods. Scholars such as Thomas (2000), Krajcik and Shin (2014), and others have highlighted the central components of PBL, emphasizing student engagement, inquiry, collaboration, and the creation of tangible artefacts. Thomas (2000) outlined five key characteristics of a project, which include centrality, driving question, constructive investigations, autonomy and realism. The project is realistic rather than school-style. Additional aspects such as student collaboration, reflection, iterative redrafting, and presentations are emphasized in other literature (Patton, 2012). Krajcik and Shin (2014) identified six fundamental features of PBL, which include driving question, learning goals, scientific practices, collaboration, use of technological tools, and creation of artefacts.

PBL enhances student engagement by linking core concepts with scientific practices, fostering collaboration, leveraging digital tools, and producing tangible project outcomes (Krajcik & Shin, 2014). Unlike traditional teaching methods, these features collectively define PBL as a dynamic, student-centered approach that integrates scientific practices, technological tools, and iterative learning to enhance deep understanding and real-world application.

In the Gold Standard PBL model, Larmer and Mergendoller (2015) refined these features into seven essential elements for project design (see Figure 2.3). These elements encompass a challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public product, distinguishing them from traditional teaching methods.

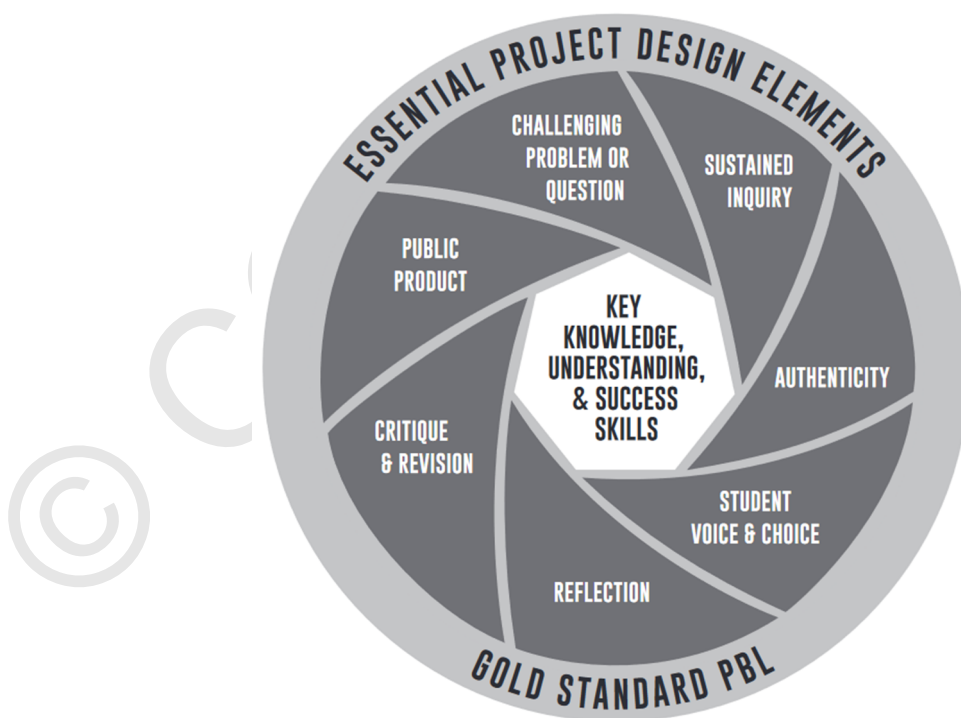


Figure 2.1: Essential Project Design Elements
(Larmer & Mergendoller, 2015)

One of the key elements of PBL is the emphasis on challenging problems and questions. Students in a PBL environment work on projects that require them to think critically, collaborate, and apply their learning in practical contexts. Traditional teaching methods, however, often rely on textbook exercises and theoretical content that may have limited relevance to students' lives. As a result, traditional methods may lack the same depth of engagement and critical thinking that PBL fosters (Wang et al, 2022).

Sustained inquiry is another distinguishing factor of PBL that differentiates it from traditional teaching methods. In a PBL environment, students engage in continuous research, posing questions and seeking answers over time. This ongoing process helps students develop a deeper understanding of the subject matter and promotes independent learning. Traditional teaching methods, on the other hand, generally follow a fixed curriculum with predetermined content that does not always allow for the same level of exploration or inquiry. This often results in more surface-level learning and less opportunity for students to actively pursue their own questions or interests (Shi & Li, 2019).

PBL also stands out due to its authenticity. The projects students work on in PBL are typically connected to real-world contexts, making the learning process more relevant and meaningful. This authentic approach helps students see the practical application of what they are learning, which can be particularly motivating. In contrast, traditional teaching methods often focus on abstract, theoretical knowledge, with less emphasis on how the content applies to the real world (Ismail & Kassem, 2022). As a result, students in traditional settings may struggle to see the practical value of what they are learning.

Another important difference between PBL and traditional methods is the degree of student autonomy. PBL empowers students by allowing them to choose topics, methods, and project outcomes. This autonomy encourages ownership of the learning process and fosters a sense of responsibility. Traditional teaching methods, however, tend to follow a more rigid structure where students have little control over the content or direction of their learning (Deng & Lu, 2021). This lack of choice can limit students' engagement and motivation.

Reflection is also a central element of PBL. Students and teachers regularly reflect on the learning process, challenges, and progress. This reflection helps students identify areas for improvement and deepen their understanding. In traditional classrooms, reflection is often limited to end-of-unit assessments or exams, which provide only a snapshot of student performance rather than an ongoing dialogue about their learning journey.

In PBL, critique and revision play a significant role in improving the quality of students' work. Through continuous feedback from peers and instructors, students are encouraged to revise and refine their projects, resulting in a more polished final product. Traditional methods, in contrast, often rely on summative assessments that are given after assignments or tests, with limited opportunities for revision or improvement based on feedback.

PBL also emphasizes the creation of a public product. Students are encouraged to present their projects to an audience, which enhances

accountability and fosters a sense of achievement. In traditional teaching methods, learning outcomes are typically assessed through tests, quizzes, and written assignments, with little emphasis on public presentation or sharing of work with others.

Due to its distinctive features, PBL has gained attention and significant support from educators, teachers, and learners. It can be effectively applied across various curricula and classroom settings (Nguyen, 2011). Furthermore, PBL aligns with current trends in higher education (Li et al., 2017), making it especially beneficial for EFL and ESL contexts.

2.3 Implementation of Project-Based Learning in EFL and ESL Contexts

PBL was introduced into the field of English education in the 1960s to be used as an alternative to the traditional, teacher-centered, behaviourist approach (Beckett, 1999; Legutke & Thomas, 1991). Earlier studies have shown the benefits and challenges of implementing PBL in EFL and ESL contexts (Handrianto & Rahman, 2018; Mohamad & Tamer, 2021).

PBL was seen as an effective method to improve language skills, soft skills, learning autonomy, and the affective domain. A number of studies reveal that PBL can help students improve their language skills, such as listening, speaking, reading, and writing (Putri et al., 2019; Abu Bakar et al., 2019; Imbaquingo & Cárdenas, 2023). To determine the impact of PBL on listening and speaking competence, Abu Bakar et al. (2019) conducted a quasi-

experimental study in a Communicative English course in Malaysia and found that PBL activities enhanced speaking and listening proficiency of ESL learners. Krisnoviani and Sulistyani's study (2022) revealed that PBL through group work has contributed to students' improvement in listening achievement. With regard to reading skills, Kavlu (2015) reported that there was an improvement in the reading comprehension and vocabulary proficiency of EFL learners through the implementation of PBL. Students who use PBL may be more active in their reading activities (Sari & Tridinanti, 2021; Imbaquingo & Cárdenas, 2023). As for writing, Syarifah and Emiliasari (2019) applied PBL to writing courses and found that PBL could facilitate the development of students' creativity and competence in writing narrative texts, particularly in their comprehension of the topic and understanding of narrative genres, including social functions, structure of text, and language features. semester and final semester scores. Mantra et al. (2023) also reported that PBL using brainstorming is an effective learning strategy for improving students' writing skills. All of these findings support the idea that PBL can be an effective approach to improving listening, speaking, reading, and writing skills (Newprasit & Seepho, 2015; Syarifah & Emiliasari, 2019).

Besides the obvious potential of enhancing learners' language skills, PBL can elevate various soft skills, such as collaborative skills, communication skills, and problem-solving skills (Hairuddin & Irmawati, 2024; Rachmawati et al., 2024). According to Chamberlain and Mendoza (2017), PBL can link skills to authentic learning and involve skills such as collaboration and reflection. Group investigation in PBL promotes students' social skills and friendships,

enabling them to understand teamwork and collaboration (Paschalis, 2017). Handrianto and Rahman (2018) elaborated that the implementation of PBL in the learning process has greatly helped to improve student performance by improving communication and collaboration skills. Additionally, Wahidati and Kharismawati (2023) reported that these group project activities help the students understand the value of interpersonal skills, project management, critical thinking and problem-solving, teamwork, and communication skills in completing a project. Through project activities, students can foster collaboration since they must work in groups (Hairuddin & Irmawati, 2023) and actively engage as problem solvers, decision-makers, and researchers (Novianti & Kusumayanthi, 2023). The problems and challenges presented within PBL projects stimulate learners to think creatively and use problem-solving skills.

PBL has demonstrated the potential to foster learner autonomy in EFL and ESL contexts. Imtiaz and Asif (2012) conducted a study in Pakistan and found that PBL facilitated the development of autonomy among students in English Access classrooms, as evidenced by improvements in language skills and increased learner autonomy. Díaz Ramírez (2014) conducted action research on developing learner autonomy through project work in an English for Specific Purposes class in Colombia. The findings reveal that cooperative work within PBL projects supports the development of learner autonomy by promoting shared interests and mutual support among students. In Vietnam, Loi (2017) investigated the impact of PBL on students' learner autonomy in English language skills and found that participation in PBL projects led to an increased

degree of learner autonomy. Additionally, Yuliani and Lengkanawati (2017) explored the effectiveness of PBL in enhancing Indonesian learners' autonomy in EFL. The findings demonstrate that PBL contributed to the development of learner autonomy, particularly in terms of self-instruction, self-direction, self-access learning, and individualised instruction. Anggraini (2023) suggested that drama is the best option to facilitate learners' experiences of autonomous learning and increase students' opportunities to learn English. Thus, project-based activities were effectively incorporated into English classes to develop autonomy in learning (Avsheniuk et al., 2023).

PBL can also positively influence students' attitudes and motivations in the affective domain. Vaidya's study (2015) highlighted that PBL, with its student-centered approach, indirectly fostered valuable qualities such as encouragement, enthusiasm, creativity, empathy, and competitiveness. According to Shin's (2018), the collaborative project involving the creation of a resume and cover letter video for future job interviews had a substantial effect on students' motivation to improve their English skills. In Kasmainsi and colleagues' study (Kasmainsi et al., 2023), students positively perceived PBL, feeling pleased and simple to implement. Aldobekhi and Abahussain (2024) reported that PBL significantly improved students' individual and social attitudes, autonomy, motivation, confidence, research skills, creativity, and collaborative learning skills. Therefore, all of these findings suggest that PBL could serve as a flexible and effective alternative to traditional English teaching methods.

However, the implementation of PBL has encountered various challenges. The main problem is that executing PBL is time-consuming. Using PBL usually takes more time than other teaching methods (Aldabbus, 2018) because it takes a lot of time to solve problems (Aksela & Haatainen, 2019). Students have difficulty executing a project within the school schedule because they have to complete certain topics within a certain timeframe (Aldabbus, 2018). Quint and Condliffe (2018) posited that the time issues associated with performing PBL at the high school level include students' limited time for scheduling, the teacher's focus on specific topics, and the challenge of integrating between subjects. Thus, students perceived project work in PBL classes as time-consuming and challenging (Yong & Saad, 2023; Hairuddin & Irmawati, 2023).

Difficulties arose concerning students' attitudes during the implementation of PBL. According to Mihic and Zavrski's study (2017), students lack experience in more active learning roles and even exhibit negative reactions to this change. According to them, the purpose of an EFL course is to teach language components, not cognitive or social skills. It is more acceptable for a teacher to dedicate a significant amount of class time to a careful and in-depth analysis of English texts, which includes introducing background information, explaining new words, highlighting grammatical points, translating difficult sentences, and occasionally organising pair work or small discussions. Meanwhile, the students would listen attentively, take notes, and occasionally participate. Such a method of focusing on detailed linguistic analysis is still popular in China, but students have difficulty accepting the view that they are the active agents of

their learning as part of PBL (Fan, 2018). Students in PBL classrooms transitioned from being active collaborators to adopting roles such as *team escapers* and *free riders* (Zheng et al., 2022).

Different studies emphasised the benefits and challenges of integrating PBL in the EFL and ESL contexts. PBL was seen as a method to improve language skills, soft skills, learning autonomy, and the affective domain. However, challenges such as being time-consuming and encountering passive attitudes were noted in PBL implementation, potentially leading to less satisfactory results. In the following section, the effectiveness of PBL in speaking proficiency and student engagement were reviewed and elaborated.

2.4 English Speaking Proficiency and Project-Based Learning

English speaking proficiency is a crucial skill that involves the ability to communicate effectively with appropriate complexity, accuracy, and fluency. Various factors, including learners' language proficiency, influence their speaking performance. PBL supports the development of speaking skills by engaging learners in meaningful, real-world tasks that promote active communication. A review of studies on English speaking proficiency and PBL was conducted to understand how PBL contributes to the improvement of English speaking skills, highlighting its impact on fluency, accuracy, and complexity.

2.4.1 Constructs of English Speaking Proficiency

Speaking proficiency is a multifaceted concept, with various definitions proposed to capture its different dimensions (Hughes, 2011). The conceptualization of speaking proficiency can differ based on the specific discourse aspects being analyzed, such as pragmatics, linguistics, functionality, interaction, conversation, and sociocultural contexts (Ellis & Barkhuizen, 2005). However, there remains ongoing debate and ambiguity regarding the precise definition of speaking proficiency, complicating its measurement and the comparison of results across studies (Housen et al., 2012). Linguistically, over the past three decades, researchers have frequently conceptualised speaking proficiency in terms of three constructs: complexity, accuracy, and fluency (Norris & Ortega, 2009).

2.4.1.1 Complexity

Complexity refers to the ability to employ an array of sophisticated structures and lexical items (Suzuki & Kormos, 2020). It is frequently seen as the most difficult component of the CAF framework (Michel, 2017) due to its susceptibility to task difficulty (Robinson, 2001). Complexity can be categorised into cognitive complexity and linguistic complexity (Housen et al., 2012). Although these two concepts interact and are occasionally used interchangeably in second language (L2) research, distinguishing between them is essential.

Cognitive complexity is a concept that varies and is subjective. It relates to the relative difficulty of managing language elements during L2 performance and learning, which is influenced by learners' backgrounds, including their abilities, motivation, memory capacity, and first language (Tagarelli et al., 2016; Housen et al., 2012). On the other hand, we should not confuse linguistic complexity with cognitive complexity, even though it is a crucial component of the latter. Unlike cognitive complexity, which differs among individuals, linguistic complexity is an objective measure that remains consistent across learners. It refers to the inherent formal or semantic-functional characteristics of L2 elements, such as their form, meaning, and relationship between form and meaning, as well as the properties of L2 systems (Housen et al., 2012). Linguistic complexity can be divided into four dimensions: lexical complexity (word and collocation levels), morphological complexity (inflectional and derivational levels), syntactic complexity (sentential, clausal, and phrasal levels), and phonological complexity (segmental and suprasegmental levels) (Koizumi & In'nami, 2014). Bulté and Housen (2012) provided a detailed and precise taxonomy of L2 complexity in their diagram:

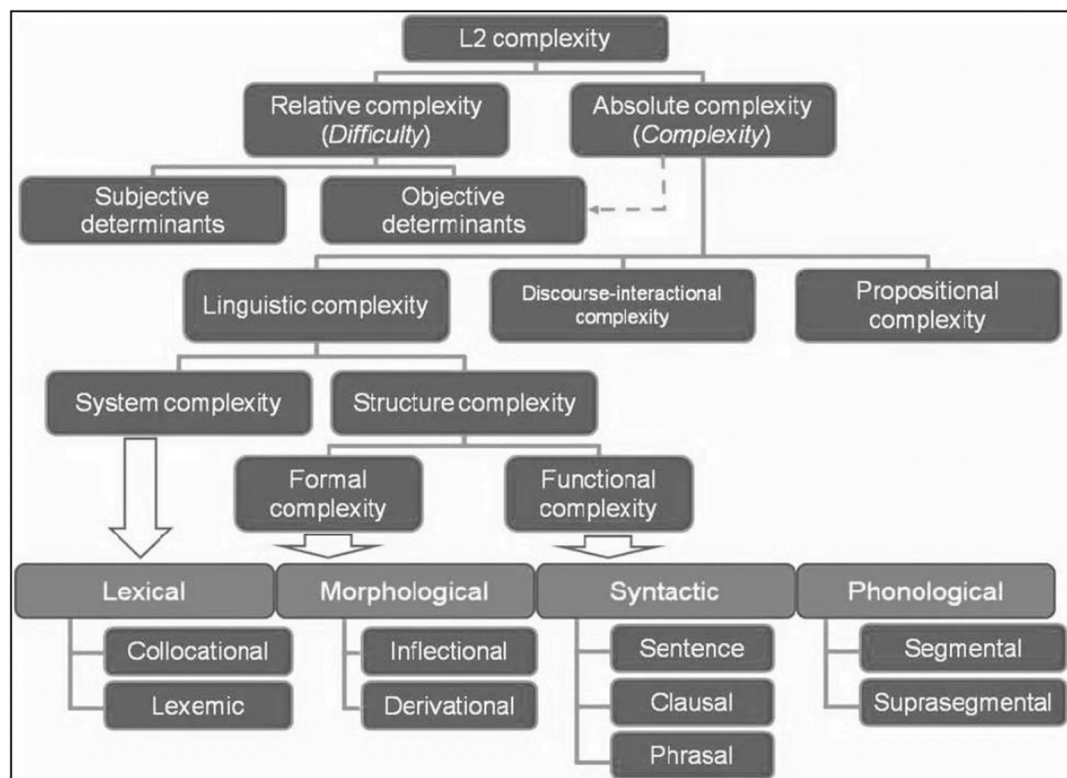


Figure 2.2: Taxonomic Model of L2 Complexity
(Bulte & Housen, 2012)

In evaluating the complexity of L2 speaking proficiency, researchers often concentrate on syntactic and lexical complexity due to their significant impact (Norris & Ortega, 2009). Syntactic complexity is assessed through various metrics. For instance, Robinson (2007) utilised statistics on specific verb forms (e.g., passive voice, tense forms), syntactic structures (e.g., comparatives), and even verb categories (e.g., modals or conditionals). According to Norris and Ortega (2009), the elaboration of language at three distinct syntactic levels requires three measures of syntactic complexity: global complexity (words per AS-unit), complexity by subordination (clauses per AS-unit), and phrase complexity (words per clause). Additionally, syntactic complexity includes more detailed metrics. For example, Révész, Ekiert, and Torgersen (2016)

suggest measuring the frequency of specific syntactic forms, such as tense, aspect, verb patterns, or clause types.

Lexical complexity can be assessed through several methods. One method is calculating the TTR, which is the number of unique word types divided by the total number of word tokens (Daller et al., 2003). Other researchers measure the number of distinct word families or the ratio of functional words to lexical words (Ellis & Barkhuizen, 2005). A more intricate method is the Guiraud adjustment of TTR (e.g., Kuiken et al., 2010), where the square root of the total tokens replaces the number of tokens. Additionally, the mean segmental TTR (MSTTR), which adjusts for text length effects, calculates the average TTR of segments containing 100, 50, or 10 words.

In this study, complexity was evaluated through syntactic and lexical complexity. These complexity measures are regarded as highly significant (Norris & Ortega, 2009). Syntactic complexity was determined by the number of words per AS-unit (Norris & Ortega, 2009), while lexical complexity was measured using the TTR (Daller et al., 2003).

2.4.1.2 Accuracy

Accuracy refers to the ability to produce language that conforms to target language norms and is free of errors (Foster & Wigglesworth, 2016; Polio & Shea, 2014). Errors represent deviations from native speakers' linguistic norms (Housen & Kuiken, 2009) and include lexical errors (such as incorrect

word choice), morphological errors (like incorrect inflectional and derivational forms), and syntactic errors (such as issues with word order or tense). Skehan (1989) added accuracy to the dichotomy of complexity and fluency, creating the current CAF triad. Within the CAF framework, accuracy is recognised as a distinct component (Lennon, 1990).

Accuracy can be divided into syntactic accuracy and lexical accuracy. Syntactic accuracy involves following grammatical rules, while lexical accuracy is about using appropriate words in specific contexts and for specific purposes (Skehan, 2009b). Speakers who focus on syntactic accuracy often depend on familiar language forms they have already learnt and may avoid using more complex or unfamiliar structures in the target language (Skehan, 2009b). In addition to syntactic and lexical accuracy, pronunciation accuracy is also considered crucial for evaluating speaking proficiency in various studies (e.g., Spring, 2020; Liu et al., 2019). Accurate pronunciation is essential for EFL learners, as too many errors or inconsistencies can impede understanding and lead to communication breakdowns (Park et al., 2020). While pronunciation accuracy is not traditionally included in accuracy assessments, it is vital for evaluating the speaking proficiency of EFL learners (Liu et al., 2019).

Accuracy is typically evaluated using global accuracy (Iwashita et al., 2008; Skehan & Foster, 1999) and the accuracy of specific linguistic forms (Vercellotti, 2012). Global accuracy, considered the most comprehensive accuracy measure, includes all types of errors and is generally measured by the percentage of error-free AS-units or error-free clauses (Michel, 2017). The

percentage of error-free AS-units encompasses AS-units without grammatical mistakes, including specific errors (e.g., past tense) and other common linguistic errors such as word order issues, morphological errors, and missing obligatory forms like pronouns (Iwashita et al., 2008). Despite its comprehensiveness, global accuracy may not detect subtle differences in learners with higher proficiency or changes from short-term interventions (Lambert & Kormos, 2014).

To analyse specific features, researchers often focus on particular error types such as verb tenses, third-person singular forms, plural markers, prepositions, and articles (Wigglesworth, 1997). Specific measures target the accuracy of certain forms in relevant contexts, deemed appropriate for essential tasks (Ellis & Barkhuizen, 2005). The choice of forms to measure depends on proficiency level. Robinson and Gilabert (2007) suggested that specific measures should complement global measures to assess the effects of resource-oriented tasks. For instance, when evaluating the teaching of the past tense, the past tense form (-ed) is chosen as the target-specific measure (Michel, 2011). Although specific error codes offer detailed descriptions of target form errors, they do not represent overall accuracy performance (Iwashita et al., 2008) and may not be generalizable to other contexts (Michel, 2011).

Pronunciation accuracy is often overlooked in objective speech analysis studies, which typically rely on subjective judgements by multiple native speakers. To objectively assess pronunciation and avoid inter-rater reliability issues, this study used automatically generated subtitling software. For

example, in Spring's (2020) research, pronunciation accuracy was measured by comparing the number of words accurately predicted by YouTube's automatically generated subtitles to human-created transcripts, providing a reliable method for assessing EFL pronunciation. Liu et al. (2019) highlighted that IFlytek Voice Input (IVI), an accessible automatic speech recognition platform, efficiently converts spoken words into text with over 90% accuracy, making it a reliable option for transcribing speech.

In this study, accuracy was measured by syntactic accuracy and pronunciation accuracy. Syntactic accuracy is regarded as the most comprehensive accuracy measure (Michel, 2017). Pronunciation accuracy was assessed using automatically generated subtitling software, a reasonably reliable method for objective pronunciation assessment (Spring, 2020). Specifically, syntactic accuracy was calculated by the ratio of error-free AS-units (Michel, 2017), while pronunciation accuracy was measured by the ratio of correctly pronounced words as generated by IVI (adapted from Spring, 2020).

2.4.1.3 Fluency

Fluency in language refers to the ability to express thoughts smoothly and clearly, characterised by minimal pauses, hesitations, or revisions (Michel, 2017; Suzuki & Kormos, 2020). It is widely recognised as a key indicator of language proficiency, closely associated with effective speaking skills (Iwashita et al., 2008). Fluency encompasses aspects such as ease, quality, and fluidity of language production, encompassing elements of accuracy and

complexity (Hilton, 2008). Automaticity, the ability to quickly retrieve linguistic information from memory, encode grammatical structures, and correct errors efficiently, plays a significant role in achieving oral fluency (Segalowitz, 2003).

Fluency is a multifaceted construct, although less contentious compared to complexity and accuracy (Michel, 2017). It includes various dimensions such as cognitive fluency, perceived fluency, and oral fluency, with oral fluency receiving considerable research attention (Segalowitz, 2016).

Researchers typically assess oral fluency through metrics such as speed fluency, repair fluency, and breakdown fluency (Mora, 2006). Speed fluency, related to procedural knowledge and control, is often quantified by measures like speech rate and the mean length of uninterrupted speech (Kormos & Dénes, 2004). Speech rate measures the number of syllables produced per minute, excluding pauses, and is considered effective due to its consideration of word lengths (Mora, 2006). The average length of uninterrupted speech refers to the mean syllable number between pauses, which is typically longer than 0.25 seconds (Kormos & Dénes, 2004). Repair fluency, indicating monitoring processes, is assessed through non-fluency markers such as corrections, repetitions, false starts, and replacements (Skehan, 2003). Breakdown fluency, measured by silence-related metrics like pauses, distinguishes between filled and unfilled pauses such as hesitation sounds (Skehan & Foster, 2007). The evaluation of pausing fluency poses challenges, particularly in distinguishing its relevance to L1 versus L2 proficiency (de Jong et al., 2015).

In this study, fluency was evaluated using two main criteria: speech rate as a reliable quantitative measure (Mora, 2006) and self-repairs as indicators of monitoring processes (Suzuki & Kormos, 2022). Speech rate was quantified by calculating syllables per minute of speech (Yousefi, 2016), while self-repairs were assessed by the rate of corrected syllables per minute (Skehan, 2003).

2.4.2 Role of Learners' Language Proficiency in Speaking Complexity, Accuracy, and Fluency

While numerous studies have investigated the impact of language proficiency on the complexity and accuracy of English writing (Vasylets & Marín, 2021; Tabari et al., 2023; Zhan et al., 2024), there has been comparatively less research focused on the CAF of English speaking across varying levels of speaking proficiency.

Previous studies highlight the complex interplay between proficiency levels and CAF (complexity, accuracy, and fluency) measures, revealing both consistent patterns and divergent outcomes. De Clercq (2017) analyzed 100 texts from secondary school learners, categorizing them into four proficiency levels based on age and syntactic complexity. The study found significant differences across proficiency levels, particularly in AS-unit length and clauses per AS-unit, reinforcing the role of syntactic development in language proficiency. Similarly, Bulté and Roothoof (2020) examined the relationship between L2 speech complexity and subjectively rated L2 proficiency in English learners across five IELTS levels. Their findings demonstrated that overall syntactic complexity increased with proficiency, further supporting the connection between linguistic complexity and proficiency levels.

Najmi et al. (2021) challenged Trade-Off Hypothesis, which suggests that improvements in one CAF component occur at the expense of another. Studying 60 Iranian learners categorized into elementary, intermediate, and advanced groups based on the Orford Placement Test, they found a significant positive relationship between proficiency and CAF measures. Notably, their results indicated that complexity, accuracy, and fluency developed simultaneously, with no evidence of trade-offs, suggesting that proficiency gains may facilitate balanced development across CAF dimensions.

Mostafa (2021) offered a different perspective by distinguishing between monologic and dialogic speech, emphasizing the task-dependent nature of proficiency development. The study tracked 60 ESL learners over eight months, measuring their oral proficiency using TOEFL iBT speaking tests and communicative adequacy ratings. Findings showed that in monologic speech, highly proficient speakers demonstrated greater syntactic and lexical complexity, whereas in dialogic speech, they exhibited faster speech rates. Additionally, proficiency development varied based on speech features: participants with lower phonation time relative to pauses improved over time in both monologic and dialogic speech, while those producing longer turns between pauses showed significant progress in dialogic speech. These results align with Robinson's Cognition Hypothesis (2001), which suggests that cognitive demands shape linguistic performance, highlighting the importance of task type in assessing L2 development.

Wang and Zhou (2023) further explored the nuanced relationship between oral proficiency and linguistic features among 120 Chinese learners categorized into four proficiency groups based on TEM4 (Test for English Majors-Band 4). Their analysis revealed that as proficiency increased, so did pronunciation, intonation, and lexical-grammatical accuracy. Higher proficiency levels also correlated with greater lexical richness and lower semantic similarity, except for the lowest-level group. However, fluency did not follow a linear progression, as the mid-low group exhibited significantly lower fluency than the mid-high group. This finding challenges the assumption of a straightforward proficiency-fluency relationship and suggests potential developmental plateaus or transitional phases in L2 acquisition.

These studies collectively emphasize the role of proficiency in shaping complexity, accuracy, and fluency but also reveal important variations based on task type and linguistic features. However, research on the relationship between language proficiency and CAF, particularly in the context of pedagogical interventions such as PBL, remains limited. Therefore, more evidence is needed to determine the specific impact of PBL on CAF among learners with different levels of language proficiency.

2.4.3 Effects of Project-Based Learning on English Speaking Proficiency

With the increasing attention given to PBL in EFL and ESL settings, studies have been carried out to explore the effectiveness of PBL in enhancing English speaking proficiency (Bataineh et al., 2020; Puspitasari & Sofiana, 2024). The

relevant studies were collected from a variety of important educational and psychological sciences databases, including Web of Science, ScienceDirect, and Scopus. Google Scholar was also used as a supplementary data source. In addition to database searches, the researcher employed the snowballing technique to locate pertinent studies. The search strategy involved the use of specific terms or combinations of terms with Boolean parameters, formatted as follows: “project-based” AND “speaking proficiency” OR “speaking skills” OR “communicative skills” OR “speaking ability” OR “oral production” OR “productive skills”. The search was restricted to studies published between 2012 and 2024. The results were filtered to include only articles written in English. In total, 142 articles were found. Considering the correlation to the theme about the effects of PBL on speaking proficiency, 142 articles were further analysed, and eventually 33 studies were selected for the current review (see Appendix A).

The majority of the 33 studies used mixed-methods research paradigms. Thirteen studies used mixed methods to explore the impacts of PBL on speaking proficiency, while eleven studies were quantitative research, and eight studies employed qualitative methods. The six main instruments adopted in these studies are tests, rubrics, interviews, questionnaires, observations, and documents. The top three research settings are Indonesia, Thailand, and Malaysia. Specifically, sixteen studies were conducted by the researchers in Indonesia, five in Thailand, four in Malaysia, one in China, and in other countries (e.g., Colombia, Jordan, Japan, Iran, and Korea). The majority of participants in these studies are undergraduates and secondary school

students. Participants in sixteen studies are from universities, and eleven studies involved participants at the secondary level; the rest of the studies included diploma students or recruited participants from vocational schools, colleges, and polytechnics. These studies reveal different effects of PBL on students' speaking proficiency.

Previous research demonstrated that PBL exhibited significant effects on speaking proficiency when compared to conventional methods. Abu Bakar et al. (2019) performed a quasi-experimental study with 44 diploma students taking a communicative English course at a technical college in Malaysia. This study involved a 12-week PBL intervention, featuring eight PBL activities. The findings indicate that PBL could significantly enhance the oral communicative competence of English language learners. In the same year, Wuryantari et al. (2019) also conducted a quasi-experimental study to examine the impact of PBL on speaking ability. This study included 61 Indonesian secondary-level students from two intact classes, showing that students taught through PBL using an e-poster significantly outperformed those taught using conventional methods. Similarly, Puspitasari and Sofiana (2024) employed a quasi-experimental design to evaluate the effectiveness of PBL combined with digital English books among Indonesian students. The results indicate that PBL with a digital English book could improve students' speaking abilities. Thus, PBL is believed to be a more effective teaching method to enhance speaking proficiency when contrasted with conventional methods.

PBL was found to improve students' speaking skills, especially fluency, accuracy, vocabulary, pronunciation, and grammar. In the study by Zare-Behtash and Sarlak (2017), 45 Iranian EFL beginners at a university participated in a 13-week investigation to assess the impact of PBL on speaking ability. The t-test comparison results indicate that PBL effectively enhanced speaking skills, including pronunciation, vocabulary, grammar, fluency, and organization. Similarly, Bataineh et al. (2020) explored the potential effectiveness of Web 2.0-supported PBL on the speaking fluency and accuracy of grammar and vocabulary among Jordanian EFL eleventh-grade students. The findings reveal that students receiving instruction through the computerised PBL treatment outperformed those receiving traditional instruction in both speaking fluency and accuracy of grammar and vocabulary. Additionally, Zubaidi and Suharto (2024) conducted research in Indonesia to evaluate the success of implementing project-based vlogs to improve students' speaking skills. Utilising observation sheets and pretest and posttest scores, the study indicates that integrating PBL with technology effectively enhanced students' speaking abilities by enabling them to create their own vlogs. PBL improved students' speaking skills in pronunciation, grammar, vocabulary, fluency, and understanding.

Concurrently, research explores how PBL influences speaking proficiency based on surveys of student opinion or reporting what the teachers felt went well. Marisah and Robiasih (2017) conducted an action research study to explore the impact of PBL on the speaking skills of 32 vocational school students in Indonesia. They collected data through observation and interviews.

The study demonstrates that PBL could serve as an alternative learning model that effectively supports the development of speaking skills. Torres and Rodríguez (2017) investigated the improvement of speaking skills among ninth-grade Colombian students in an EFL classroom using PBL. They gathered data from field notes, transcripts of oral performances, and one interview. The findings show that PBL aided students in enhancing their oral production by enhancing their vocabulary skills, overcoming their reluctance to speak English, and boosting their enthusiasm for learning about their school and community. Sayuti and colleagues (2020) conducted a qualitative case study over eight weeks to examine the speaking performance of Malaysian students both before and after the integration of Gold Standard PBL. They utilised observation, interviews, and document analysis as data collection methods. The findings indicate that students were able to improve their English-speaking skills following the introduction and implementation of Gold Standard PBL in their classroom activities.

Research also delves into the effectiveness of PBL on speaking proficiency, examining it in more specific areas. Ichsan and colleagues' study (2019) found that using PBL improved Indonesian students' speaking skills, particularly in speaking accuracy and fluency. The evidence from these studies was primarily subjective, based on the researchers' observations and the students' oral reports collected during interviews. Similarly, Kristianto and Harendita (2022) used interviews to describe how the implementation of PBL improved students' speaking skills in Indonesia. The results reveal that students perceived PBL as an effective and creative learning method that

enhanced their vocabulary, grammar, fluency, and confidence. In Malaysia, Oleiwi and Bunari (2022) carried out a study by interviewing seven undergraduate students regarding their experiences with video-making projects. The data was gathered through interviews. The results indicate that the students held very positive attitudes towards the benefits and use of video-making projects. They believed that their English communication skills had improved through acquiring new vocabulary, practicing pronunciation, and using correct grammar.

Additionally, more studies examine the effectiveness of PBL combined with quantitative and qualitative methods. Yang and Puakpong (2016) conducted a mixed-methods study to examine the impact of PBL on the speaking abilities and attitudes of eighty non-English major students at a Chinese university. Data were gathered through pretests and posttests for speaking, questionnaires, and semi-structured interviews. The findings indicate that PBL had positive effects on the students' speaking skills and their opinions on the method. Similarly, Tyas and Fitriani (2021) employed a mixed-methods approach to assess the effectiveness of PBL through the creation of video tutorials in enhancing students' speaking skills and understanding their attitudes towards PBL in Indonesia. Data collection techniques included testing, observation, and questionnaires. The results show significant improvements in students' speaking skills, particularly in pronunciation, grammar, and fluency, along with positive attitudes towards PBL. Firdaus and Septiady (2023) explored the impact of PBL on students' speaking abilities in Indonesia. Qualitative data were collected through interviews, observations, and

documentation, while quantitative data were obtained through pretests and posttests. The results indicate a notable impact of PBL on students' speaking skills, highlighting its effectiveness in enhancing speaking ability, fostering teamwork, improving problem-solving skills, and encouraging active, communicative, creative, and innovative behaviour among students.

Sirisrimangkorn conducted two mixed-method studies to validate the effectiveness of PBL in enhancing speaking skills through drama in 2018 and presentations in 2021. Sirisrimangkorn (2018) explored the benefits of PBL centered on drama for EFL learners majoring in English, specifically those enrolled in a Learning English through Drama course. Both quantitative and qualitative results demonstrate that PBL with a drama focus significantly improved the learners' speaking skills. In 2021, Sirisrimangkorn conducted another mixed-method study to further investigate the impact of PBL on speaking skills using presentations. This study involved 31 second-year undergraduates majoring in business English. Research instruments included speaking tests, PBL instructions, questionnaires, and interviews. The findings reveal significant improvements in students' speaking skills post-PBL implementation, consistent with the results of the 2018 study.

However, previous studies report little to no benefit to target language communication skills (Eguchi & Eguchi, 2006; Park & Eisenhower, 2019). Eguchi and Eguchi (2006) conducted a qualitative study to examine the effect of the PBL using English magazine projects on Japanese students' communication skills. 44 participants from two classes were selected to

explore their perceptions of the influence of PBL. The data was collected through questionnaire surveys and classroom observations. The findings reveal that PBL had no strong positive effects on students' learning, which is contrary to the findings of the previous literature (Abu Bakar et al., 2019; Ichsan & Rosnija, 2019; Zare-Behtash & Sarlak, 2017).

Park and Eisenhower's study (2019) provides evidence that PBL may not positively affect speaking skills. They integrated an art project into English language learning to assess the impact of an arts-based language programme on Korean EFL college students. Using questionnaires, speaking tests, observations, and interviews, they analysed the students' language improvement, changes in perceptions of English learning, and learning experiences. The results indicate no statistically significant difference in speaking skills between the experimental and control groups, with no notable improvements in vocabulary or overall confidence.

These findings suggest that the linguistic benefits of PBL in EFL classrooms remain inconclusive, with varying results across different studies. Although some studies indicate that PBL can improve communication skills, particularly speaking proficiency, the data-gathering methods have often been subjective or focused on students' perceptions of their learning rather than their actual learning outcomes. This may explain why there is a lack of consensus on the effectiveness of PBL and its impact on specific communication skills. It is widely acknowledged that speaking proficiency is a crucial indicator of spoken communicative competence and speaking ability. When objectively assessing

speaking proficiency, fluency, complexity, and accuracy have been established as three aspects of spoken language that are highly correlated with subjective evaluation (Thai & Boers, 2016).

Only one study was found to determine the effects of PBL on speaking proficiency, measured objectively by CAF. Spring (2020) conducted a study to investigate the impact of PBL on Japanese EFL learners' fluency, complexity, and accuracy. The study utilised speaking tests to objectively measure improvements in these aspects of proficiency. The findings reveal marginal progress in fluency, characterised by reduced pauses and a slight increase in speech rate. There were significant improvements in syntactic complexity as well as in syntactic and pronunciation accuracy. Gains in lexical complexity were not observed. Overall, the study suggests that PBL can lead to noticeable enhancements in oral proficiency. However, Spring employed a single-group experimental design without a control group, limiting the ability to compare the effects of PBL directly with conventional teaching methods. Therefore, while the study highlights improvements in certain aspects of oral proficiency, the broader comparative impacts of PBL on EFL learners' complexity, accuracy, and fluency remain uncertain.

Hence, it is necessary to gather more evidence to validate whether the integration of PBL can improve specific aspects of polytechnic EFL learners' speaking proficiency. The current study assesses this gap by examining the effectiveness of PBL in enhancing the speaking proficiency of Chinese polytechnic learners, as measured by CAF.

2.5 Student Engagement in Project-Based Learning

Student engagement is a multifaceted construct that encompasses behavioural, emotional, cognitive, and agentic dimensions. The interplay of these dimensions is particularly significant in English education, where PBL fosters authentic communication, collaboration, and problem-solving. Numerous studies have explored how PBL enhances student engagement by increasing motivation and encouraging deeper interaction with content. Understanding these effects provides valuable insights into optimizing instructional strategies to maximize student learning outcomes.

2.5.1 Dimensions of Student Engagement

Student engagement in the field of education is also called academic engagement or school engagement. It was originally proposed by Astin (1999), who used the term *student involvement* to express a similar meaning (Axelson & Flick, 2011). Student engagement is defined as students' active and productive involvement in learning activities (Fredricks et al., 2019). The definition emphasises *learning activity* because the focus of this study is narrowed to engagement, which is regarded as a task- or domain-specific event. Student engagement in this study refers to the engagement of students in specific learning activities or in a particular course.

Student engagement is perceived as a multidimensional construct. With in-depth research on its conceptualization, the number of sub-dimensions is

increasing. The early model contained two dimensions, including behaviour (e.g., participation, effort, and positive conduct) and emotion (e.g., affective responses to school experience) (Willms, 2003). Engagement is often characterised by two or three distinct components. Recent literature reviews have highlighted cognitive engagement as a crucial third element of student engagement. This includes mental efforts that enhance learning and performance, such as self-regulated planning and a preference for challenging tasks (Christenson et al., 2012). More recent studies have expanded from three dimensions to four. Reschly and Christenson (2006) stated that a fourth variable, “academic engagement” should be considered. In their model, academic engagement is composed of variables such as time on task, credits earned towards graduation, and assignment completion. Reeves and Tseng (2011) proposed a different four-interdependent engagement construct, adding agency as an important new aspect. According to Reeves and Tseng (2011), student engagement consists of four different and interrelated aspects: behavioural, emotional, cognitive, and agentic engagement.

2.5.1.1 Behavioural Engagement

Behavioural engagement was one of the two main components of engagement conceptualized in early studies. It has been considered as a subtype in classification of the three constructs (i.e. emotion, cognition, and behaviour) or four constructs (i.e. emotion, cognition, behaviour, and agentic) taxonomy. Previous studies have identified various indicators of behavioural engagement: (1) active conduct, including time spent on tasks and participation in class

discussions; (2) involvement in learning and academic tasks, such as maintaining attention and cooperating in a timely manner; and (3) engaging in previewing and reviewing activities (Hospel, et al., 2016; González & Paoloni, 2015). Nevertheless, the primary indicators of behavioural engagement are time dedicated to homework, class participation, involvement in school-based activities, effort, and academic interactions with peers and faculty (Krause & Coates, 2008).

Behavioural engagement refers to students' attention, effort, and persistence in learning activities (León et al., 2015). This definition aligns with the concept of behavioural engagement as proposed by Fredricks, Blumenfeld, and Paris (2004). According to Archambault et al. (2017), students who have bad behaviours typically exhibit lower behavioural engagement than their positive peers. Sinatra et al. (2015) indicated that a common goal of many educators is to motivate students' behaviour and keep students engaged and involved in the process of learning until they reach the level of self-directed continuous learning. An active learning process causes desirable changes in learners' behaviour. Therefore, if the goal of the assessment is to measure the effectiveness of the teaching and learning process, it is necessary to determine the nature of the expected change in the students' behaviour (Hugerat, 2016).

In this study, behavioural engagement concerns the behavioural efforts that students invest into completing projects in an authentic environment to improve speaking proficiency.

2.5.1.2 Emotional Engagement

Emotional engagement pertains to positive responses to the learning environment, peers, and teachers, along with a sense of belonging and interest (Bond & Bedenlier, 2019). An analysis of 243 studies by Bond and colleagues identified the top five indicators of emotional engagement within the context of student engagement: positive interactions with teachers and peers, enjoyment, a positive attitude towards learning, interest, motivation, and enthusiasm (Bond et al., 2020).

Emotional engagement is connected to various behavioural and cognitive outcomes (Maddox & Prinz, 2003; Osterman, 2000). Students who exhibit a strong sense of belonging or identification with their school demonstrate higher levels of motivation and effort compared to those with lower emotional engagement (Osterman, 2000). Taylor and Statler (2014) posited a connection between emotions and the learning process, suggesting that increased emotional engagement enhances learning, while a decrease in emotional involvement corresponds with diminished learning outcomes. Motivation can assist students in achieving high scores or qualifications and foster happiness and interest in their learning (Kahu, 2013). On the other hand, Newmann, Wehlage, and Lamborn (1992) suggested that students can still complete their work and learn effectively without necessarily engaging emotionally with the subject matter. However, emotional engagement enhances students' sense of responsibility towards one another, thereby motivating them to complete tasks (Jones, 2012).

Emotional engagement is defined in the present study as the positive emotional response from students through the use of English to complete projects.

2.5.1.3 Cognitive Engagement

Cognitive engagement is characterised by students utilising advanced rather than superficial learning strategies, such as elaboration over memorization (Reeve, 2013). It pertains to “learners’ mental effort and mental activity during the process of learning” (Hiver et al., 2021, p. 4). Reschly and Christenson (2012) identified several cognitive variables exhibited by cognitively engaged students: a sense of self-efficacy towards learning, positive outcome expectations, valuing of learning, goal setting and progress evaluation, selection of effective learning strategies, and maintaining focus while avoiding distractions. These descriptions support the outcome-oriented definition of cognitive engagement (Barko, 2005) as well as the learning strategy-oriented perspective (Walker et al., 2006).

Cognitive engagement is often associated with students’ self-regulation and the effective application of deep learning strategies (Fredricks et al., 2004). It encompasses the learning strategies students employ in their academic activities. Indicators of cognitive engagement include deep learning (Fredricks et al., 2004), concentration or focus (Bond & Bedenlier, 2019), and positive self-perceptions and self-efficacy. Deep learning refers to the thoroughness with which students understand the material, while self-regulation involves how

students prepare, seek out information, undertake additional work, and meet various academic requirements (Henrie et al., 2015).

In the present study, cognitive engagement is linked to students' investment in seeking conceptual understanding and use of various deep and personalised learning strategies.

2.5.1.4 Agentic Engagement

Reeve and Tseng (2011) introduced the concept of agentic engagement, which refers to students' intentional, proactive, and constructive involvement in shaping the instruction they receive (Reeve, 2012). They suggested that students demonstrate behavioural, emotional, and cognitive engagement during instructional activities, and these indicators can be utilised to predict their academic performance (Reeve & Tseng, 2011). However, they argued that students' engagement goes beyond these aspects. Students also actively express their preferences, provide input into the course, and ask questions to facilitate their own learning and progress. When they take such initiatives, students become active participants in the teaching and learning process they are involved in. This active engagement enables students to enhance their own functioning and improve their learning conditions (Bandura, 2018).

Further evidence underscores the importance of integrating agentic engagement into the broader engagement construct. First, agentic engagement accounts for a unique variance in students' academic progress.

In multiple regression analyses predicting students' final grades, agentic engagement significantly explained the variation in performance, even after accounting for behavioural, emotional, and cognitive engagement individually (Reeve, 2013; Reeve & Tseng, 2011; Patall et al., 2019). Thus, incorporating agentic engagement can strengthen the link between students' engagement efforts and their actual academic progress. Additionally, because agentic engagement reflects students' intrinsic motivations, it often elicits motivational responses and support from teachers. When students express their interests and preferences, teachers tend to increasingly support these openly expressed motivations (Fitzpatrick et al., 2018; Matos et al., 2018). This support serves as an indirect pathway to academic progress, as actions aimed at garnering teacher support help create optimal environmental conditions for academic success. Consequently, agentic engagement serves two purposes: enhancing students' academic abilities and attracting greater support from the learning environment.

The current study uses agentic engagement as one of the dimensions to explore students' participation in PBL. It is defined as students' efforts to create a more motivating and supportive learning environment for themselves, which allows educators to better support and facilitate students' active participation in their own learning.

2.5.2 Interplay of Behavioural, Emotional, Cognitive, and Agentic Engagement

Previous research has emphasized the dynamic relationship among behavioural, emotional, and cognitive engagement. Cognitive and emotional engagement have the potential to influence both behavioural engagement and academic achievement. In other words, whether students are actively involved or disengaged in their learning experiences cognitively and emotionally has a direct impact on their subsequent behaviours (Reschly & Christenson, 2012; Mystkowska-Wiertelak, 2022). However, students become behaviourally, emotionally, and cognitively in learning activities, which are considered to be indicators to predict achievement, but actually their impact extends beyond this prediction (Reeve & Tseng, 2011; Guo et al., 2023). Agentic engagement has been introduced as a fourth dimension, expanding the traditional model of student engagement. Agentic engagement plays a crucial role in this dynamic by serving two main purposes (Reeve & Tseng, 2011). First, it enhances students' academic functioning by encouraging them to take an active role in their learning process. Second, it facilitates greater support from the learning environment, fostering a collaborative and supportive atmosphere. Together, these four dimensions of engagement interact and reinforce one another, contributing to a more active and meaningful learning experience.

Figure 2.2 illustrates the interrelationship among the four dimensions of student engagement and their contribution to positive outcomes, represented by four horizontal lines. It also highlights the distinctive role of agentic engagement in driving constructive changes in the learning environment, depicted as a curved line at the base. The six curved lines with double-sided arrows indicate the positive correlations among behavioural, emotional,

cognitive, and agentic engagement, emphasizing their interconnected nature. Additionally, the single-arrow curved line at the bottom represents the unique contribution of agentic engagement in fostering a more supportive learning environment. Overall, the figure demonstrates that under motivationally supportive classroom conditions, these four engagement dimensions operate as an interconnected system. Emotional engagement initiates participation by fostering students' interest, enjoyment, and sense of belonging. Behavioural engagement reinforces active involvement in learning tasks, while cognitive engagement deepens understanding through critical thinking and problem-solving. Agentic engagement plays a key role in empowering students to take ownership of their learning, seek feedback, and contribute ideas, thereby shaping their educational experiences. This dynamic interaction ultimately enhances student outcomes, including learning, achievement, skill development, and talent growth.

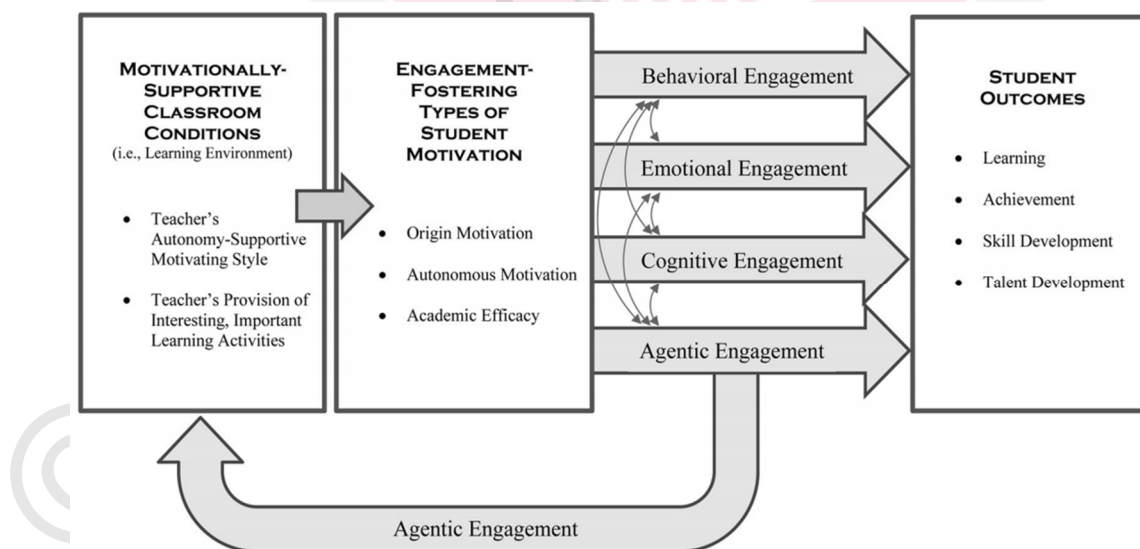


Figure 2.3: Four Aspects of Student Engagement
(Reeve & Tseng, 2011)

When applied to PBL, these four aspects of engagement collectively contribute to increasing student interaction in meaningful ways. Emotional engagement, characterized by students' interest, enjoyment, and sense of belonging, motivates them to actively participate in project discussions, group tasks, and peer interactions (Umar & Ko, 2024). Cognitive engagement ensures that students are deeply involved in problem-solving, critical thinking, and the application of knowledge, leading to rich and meaningful communication (Okolie et al., 2020). Behavioural engagement supports active participation in project activities, including research, presentations, and group collaboration, which are essential components of PBL (Sukacké, et al, 2022). Finally, agentic engagement empowers students to take ownership of their learning, propose ideas, seek feedback, and collaborate with both teachers and peers to shape the direction of their projects (Vaughn, 2021). As a result, integrating PBL with a strong focus on student engagement creates an interactive, student-centered learning environment that supports both language development and meaningful peer collaboration (Vaithianathan et al, 2024).

2.5.3 Impact of Project-Based Learning on Student Engagement in English Education

PBL is often considered superior to conventional teaching methods because of its impact on engagement and academically significant skills (Park & Eisenhower, 2019). Students enthusiastically do a group project and actively participate in the class, applying the PBL method (Young & Legister, 2018; Sivia et al., 2019; Makkonen et al., 2021). There have been many studies performed to provide evidence of the significant use of PBL to increase

students' engagement (Putri, 2018; Morais et al., 2021; Turcotte et al., 2022). The relevant studies were collected from a variety of important educational and psychological sciences databases, including Web of Science, ScienceDirect, and Scopus. Google Scholar was also used as a supplementary data source. The researcher manually searched the databases by using the following combinations of terms and the Boolean parameters: "project-based" AND engagement. The study period extended from 2012 to 2024. The articles were the material type of the results, and the language of these studies was English. In total, 280 articles were found. Then the articles were selected manually based on the theme of the effects of PBL on engagement. After that, there are 26 relevant studies left. However, most of these studies concentrate on subjects such as STEM (Craft & Capraro, 2017; Carrabba & Farmer, 2018; Turcotte et al., 2022), computer science and engineering (Morais et al., 2021; Kanigolla et al., 2014; Maros et al., 2021), chemistry and physics (Johnson & Delawsky, 2013; Makkonen et al., 2021), management (Young & Legister, 2018; Scahaddelee & McConnell, 2018), educational technology (Salam et al., 2016), and so on. Next, the researcher limited the 36 studies to the field of EFL or ESL. Eventually, 10 studies were selected for the current review, which is associated with the effects of PBL on engagement in the EFL or ESL context (see Appendix B).

Ten studies were conducted to achieve the goal of understanding the changes in student engagement in PBL in the EFL or ESL context (Aiedah & Audrey, 2012; Putri, 2018; Park & Eisenhower, 2019; Zheng et al., 2022; Aubrey, 2022). It is obvious that student engagement in PBL has received scant attention in

the fields of EFL and ESL. Although student engagement is important for English language teaching, discussions of engagement have been largely absent from the literature on English language teaching and learning (Mercer & Dörnyei, 2020). These research endeavours took either a mixed-methods or qualitative approach to investigate how effective PBL is in enhancing student engagement. Five studies opted for a qualitative paradigm, while four chose a mixed-methods approach and one used a quantitative method. The primary tools used in these studies were interviews, observations, and questionnaires. The top-ranked research setting was Indonesia, with three studies specifically conducted there, followed by China with two studies. Most participants in these studies were at the tertiary education level, encompassing universities, colleges, and polytechnics. However, the outcomes of the nine studies varied in terms of how PBL impacted student engagement.

Most studies have suggested that PBL can enhance student engagement in English learning, with several employing a qualitative paradigm to investigate EFL learners' engagement in PBL. Aiedah and Audrey (2012) investigated the impact of PBL on 55 university students' engagement in English language classes in Malaysia. The sources of data were observation, interviews, and focus groups. Four themes emerged from the data, including responsible learning, strategic learning, collaborative learning, and being energised by learning. The findings demonstrated that the students were highly engaged in their learning through PBL. Similarly, Putri (2018) conducted a study to understand how PBL activities enhance the learning process among Grade VII students from a junior high school in Indonesia. The qualitative data was

collected through an interview, an observation checklist, and an open-ended questionnaire test. The results show that the implementation of PBL could enhance students' learning processes. Park and Eisenhower (2019) examined the efficacy of an arts project-based language programme for Korean EFL college students. The investigation integrated an art project, based on a real-world task, into English language learning for college students of arts within a general English program. The researchers observed the entire process of students working on their projects and conducted interviews with them to gain insights into their learning experiences. The findings reveal positive perceptions of PBL in language learning among Korean EFL college students. These discoveries indicate that PBL became effective with students' engagement.

Research also investigated the effects of PBL on student engagement by employing a blend of quantitative and qualitative methods. In 2023, Hairuddin and Irmawati conducted a study employing a mixed-methods approach to examine students' perspectives regarding the potential English language enhancement of the implementation of a video-making project. Forty-eight students are enrolled in a business English course at a vocational higher education context in Indonesia. The results revealed that using a video-making project as a project-based language learning framework enhanced the students' English skills effectively. This method also enhances the students' engagement and practical application of the business English concept. Similar to the setting in Indonesia, Novianti and Kusumayanthi (2023) conducted a study utilising a project-based collaborative learning programme to enhance

student engagement in a speaking class. This research included fifty-three students from the English education department enrolled in a speaking course at the higher education level. The tools employed in this study were observation sheets and interviews. The findings indicated that the collaborative project-based learning method encouraged active student participation and positively impacted their engagement in the learning process.

Studies using a mixed-methods approach are not exclusive to Indonesia. Imbaquingo and Cárdenas (2023) conducted research in Spain using this approach. Their study aimed to boost primary students' interest in and proficiency in reading and comprehension. They used the analytical-synthetic method, which combines observation and questionnaires. Twenty students participating in PBL demonstrated increased motivation and improved reading abilities. They participated in meaningful projects related to their social and educational context. The results suggest that PBL is a dynamic and inventive strategy for enhancing student engagement. In China, Li and colleagues (2024) used a mixed-methods approach to examine how emotional and social engagement evolve over time in Chinese EFL students taking an English for Academic Purposes writing course. They collected data through questionnaires and interviews, involving seventy-one university students across seven sections taught by three instructors. Their findings indicate a general rise in emotional and social engagement throughout the students' learning journey.

Al-Bahadli and colleagues (2023) conducted a quantitative study to determine the impact of online PBL on student engagement in Ukraine. One hundred college students were exposed to various PBL activities in their online foreign language education. The instrument used to collect data was a Likert scale questionnaire. The findings reveal that PBL can be a useful methodology for L2 acquisition and can provide students with various challenging activities and topics that increase their motivation and engagement.

While the aforementioned studies indicate the beneficial impact of PBL on student engagement in English in EFL and ESL contexts, the results of certain studies diverge significantly. A study conducted by Zheng et al. (2022) showed students' negative changes in student engagement in PBL. They employed a longitudinal case study to investigate the changes in student engagement among a group of five Chinese EFL undergraduates in project-based collaborative writing. The analysis of the data was gathered through observations of group interactions, interviews, and student texts. The results reveal three patterns of students' engagement changes: (a) students are from active collaborators to *team escapers*; (b) students are from supporters to *free riders*; (c) students are unchanged dedicated writers. The first two changes reflect students' disengagement in the process of completing projects. The results also show that students' disengagement in PBL may be influenced by individual factors such as language proficiency, learning needs, and activity type.

Aubrey's study in 2022 examined how three learners maintained their engagement across three tasks that were part of a larger project in Japan. Data were collected from learner diaries, engagement questionnaires, and transcripts of task discussions. These sources were used to assess the level of engagement of each learner at critical points during the project. The results show that sustained engagement was influenced by conditions resembling flow during tasks, the cohesiveness of the group members, and a growing emphasis on the project's long-term goal. However, more research is necessary to offer stronger evidence regarding the impact of PBL on student engagement in EFL or ESL classrooms.

These studies sought to explore student engagement in an EFL or ESL classroom. There is a lack of evidence to support the improvement of student engagement in PBL within the EFL or ESL setting. These studies employing different research methodologies have yielded diverse outcomes and effects. Despite the perception of student engagement as a multi-dimensional construct, early studies have not extensively explored this concept in the EFL or ESL context, particularly from the perspectives of behaviour, cognition, emotion, and agent (Cynthia & Shannon, 2013; Mohammed, 2020). Guo et al. (2020) suggested that it is necessary to investigate the specific learning processes of students in future studies. As a result, this study sought to determine the impacts of PBL on polytechnic EFL learners' engagement in the Chinese context using four aspects of student engagement, including behavioural, emotional, cognitive, and agentic engagement.

2.6 Research Gaps

Drawing from the literature review, this study addresses several research gaps, including those related to conceptual categories, measurement methods, findings, theories as well as setting and participants.

Gaps in Conceptual Categories. Previous studies have assessed the effects of PBL on speaking proficiency using five broad conceptual categories: fluency, pronunciation, grammar, vocabulary, and content. However, this categorisation does not explicitly correspond to any comprehensive model of speaking proficiency, leaving the comparative impacts of PBL on EFL learners' CAF uncertain. Regarding student engagement, despite its recognition as a multi-dimensional concept, early research has not extensively examined this concept in the EFL context, particularly from the perspectives of behaviour, cognition, emotion, and agency.

Gaps in Measurement Methods. Previous studies have primarily relied on qualitative data from student interviews and observations, or subjective assessment methods through teachers' scoring. Only one study, conducted by Spring (2020), objectively measured the effects of PBL on speaking proficiency using CAF. However, this study utilised a single-group experimental design without a control group, limiting the ability to directly compare the effects of PBL with conventional teaching methods. Consequently, the broader comparative impacts of PBL on EFL learners' CAF remain uncertain.

Gaps in Findings. Prior research has yielded inconclusive findings about the effects of PBL in enhancing speaking proficiency. Although numerous studies have shown that PBL can significantly enhance students' speaking proficiency, certain investigations have failed to find any evidence of improvement. Moreover, prior research has yielded varied results about the influence of different levels of English proficiency on CAF, with only a few studies investigating its impact within the PBL context. In terms of student engagement, there is insufficient evidence to support the claim that PBL improves student engagement in EFL settings. Furthermore, existing research on this topic gives contradictory perspectives on the effectiveness of PBL.

Theoretical Gaps. This study utilises Skehan's Trade-Off Hypothesis (1998) as one of its theoretical frameworks, suggesting that complexity, accuracy, and fluency have trade-off effects on one another. However, there is an ongoing debate about whether these three constructs compete with each other or can develop simultaneously. It remains uncertain within the context of PBL.

Gaps in Setting and Participants. Previous studies have been conducted with diverse participants and in various settings. However, few have focused on polytechnic students, particularly in China. Consequently, it remains unclear whether PBL can enhance the speaking proficiency of polytechnic EFL learners in the Chinese context.

2.7 Theoretical Framework of the Study

The theoretical framework for this study is grounded in Sociocultural Theory (Vygotskyan, 1978), Self-Determination Theory (Ryan & Deci, 2000), the Comprehensive Output Hypothesis (Swain, 1985), and the Trade-Off Hypothesis (Skehan, 1998). Every theory complements the others, creating a framework that demonstrates how employing a PBL approach can enhance the speaking skills and engagement of English learners.

2.7.1 Sociocultural Theory

Vygotsky's Sociocultural Theory (SCT) derives from cognitive constructivist Piaget's early study, which shows that children have experienced various stages during their development (Schunk, 2020). Vygotsky extended Piaget's constructivist theory, proposing that the proper guidance of others develops learning. Vygotsky's view of learning places more emphasis on the social environment and how social interactions affect learning. It also highlights that the active involvement of collaboration is at the core of creating meaning in the concept of community. Considering the interactive, collaborative, and exploratory nature of PBL, this study used the lens of SCT to serve as one of the foundational theories. Figure 2.2 demonstrates the framework of SCT (adapted from Vygotsky, 1978).

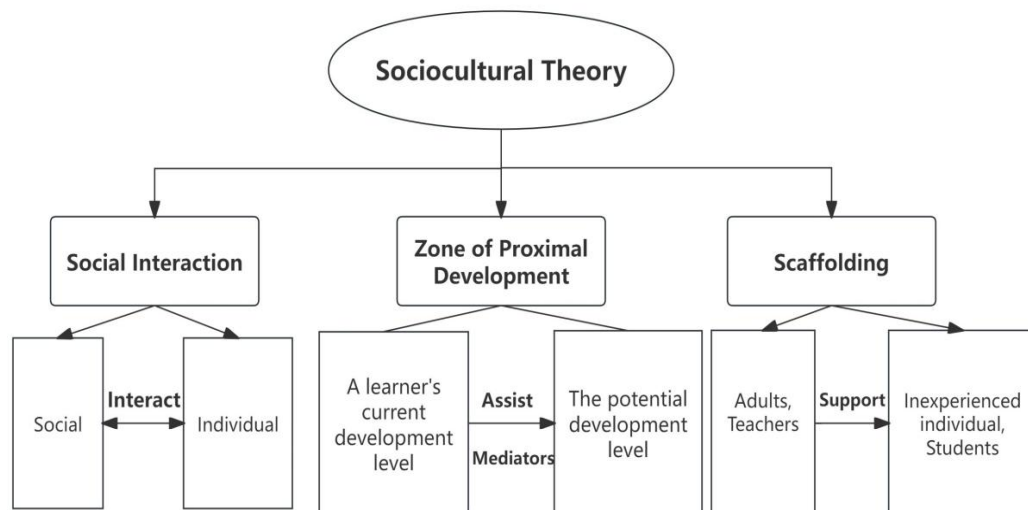


Figure 2.4: Sociocultural Theory
(Adapted from Vygotsky, 1978)

Vygotsky (1978) believed that much important learning is generated through social interaction. Without social interactions, a learner's progress would be limited. A learner starts by interacting with others and then internalises and processes the information and knowledge gained from the communication with other people (Vygotsky, 1978; 1986). Learning is "a necessary and universal aspect of the process of developing culturally organised, specifically human, psychological functions" (Vygotsky, 1978, p. 90). This dialectical process of social and individual learning leads to the acquisition of knowledge and information (Blake & Pope, 2008). In short, the mental and educational developments of a person are connected to the social, cultural, and historical context in which the learner is situated. It is cultural influences that shape the learner's mental development, not the learner that shapes culture (Vygotsky, 1978; 1986; Daniels, 2015).

Vygotsky (1978) introduced the theory of Zone of Proximal Development (ZPD) to understand how learning aligns with the developmental level of learners. The ZPD refers to the distance between a learner's current developmental level, as determined by their independent problem-solving abilities, and their potential developmental level, as observed when they engage in problem-solving tasks with the guidance of an adult or in collaboration with more capable peers (Vygotsky, 1978). According to the ZPD, learners are unable to reach higher levels of thinking or internalisation without the assistance of highly skilled teachers or mediators. Through interaction and collaboration with knowledgeable teachers, learners can acquire extensive cognitive knowledge. Vygotsky's ZPD serves as a framework for assessing and guiding learners, emphasising the active and participatory relationship between a learner and a supportive teacher (Panhwar et al., 2016). Vygotsky's ideas strengthen and explain the vibrant interdependence of social and individual practices and processes.

The most crucial aspect of the SCT is that it greatly supports cooperative learning strategies in the form of scaffolding (Panhwar et al., 2016). Scaffolding refers to the support provided by adults that assists a student or inexperienced individual in solving problems, performing tasks, or achieving goals that would be challenging without assistance (Blake & Pope, 2008; Bekiryazıcı 2015). In language learning contexts, where student-student and student-teacher interactions are crucial, SCT promotes interactive and collaborative learning while discouraging teacher-centered approaches. It suggests the implementation of cooperative strategies that actively engage both students

and teachers with sociocultural norms, values, and interactions (Blake & Pope, 2008). When students collaborate with others and engage in research, they make connections and deepen their understanding of related concepts (Rhoades, 2023). While the rate of language growth may vary among English learners, active engagement, collaboration, and participation contribute to and strengthen the learning process (Creider, 2016).

PBL, in alignment with the SCT, emphasises the creation of an environment conducive to applying knowledge and engaging in social interaction. This context of PBL reflects the learners' culture, community, and past experiences, ensuring that new knowledge is seen as relevant and meaningful (Langhout et al., 2002). Within PBL, interactions between peers and teachers offer learners valuable chances to collaborate meaningfully. During PBL activities, learners engage in collaborative discussions in English within group settings, allowing them to express their experiences and perspectives using the language. Additionally, as they work together to execute project plans, learners strive to achieve a common goal, fostering a supportive English-speaking environment. Within this environment, learning is scaffolded by more proficient peers or teachers, allowing learners to extend their speaking abilities beyond their current developmental level. By reaching the ZPD, learners' abilities are enhanced beyond mere repetition of previously mastered speaking skills or knowledge. Therefore, SCT provides valuable insight into how PBL facilitates the construction of new knowledge and speaking skills through collaborative interaction and scaffolding supported by the ZPD.

2.7.2 Self-Determination Theory

Self-Determination Theory (SDT) (Ryan & Deci, 2000) focuses on psychological needs as intrinsic motivational resources and stipulates their fundamental and nutritional relationship with students' motivation, high-quality engagement, and effective operation. SDT identifies the three psychological needs of autonomy, competence, and relatedness as the source of students' intrinsic and proactive motivation. Meeting these needs necessitates positive outcomes, allowing students to play a better role in the classroom. According to SDT, the social conditions that support the individual's experience of autonomy, competence, and relatedness promote the highest-quality types of engagement in activities (Ryan & Deci, 2000). Therefore, SDT is used as the second theoretical basis of this study in the expectation that SDT is key to understanding students' engagement in PBL activities. Figure 2.3 presents the framework of SDT (adapted from Ryan & Deci, 2000).

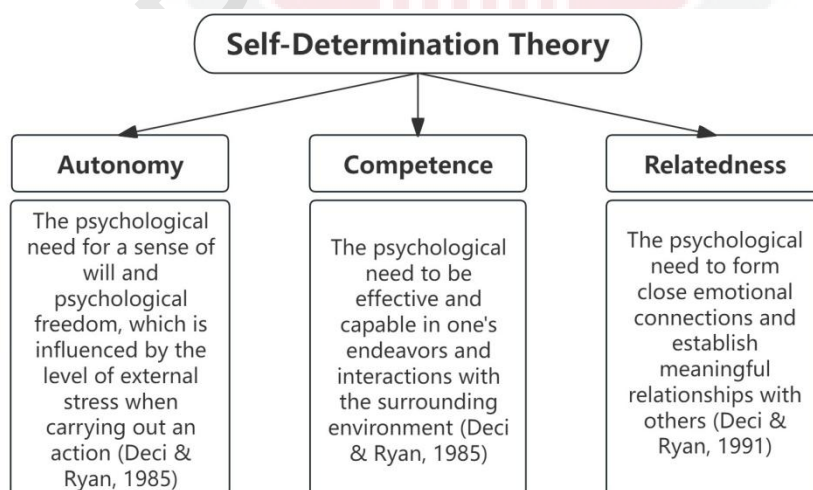


Figure 2.5: Self-Determination Theory
(Adapted from Ryan & Deci, 2000)

Autonomy refers to the psychological need for a sense of will and psychological freedom, which is influenced by the level of external stress when carrying out an action (Deci & Ryan, 1985). It is associated with self-initiation and self-regulation of actions (Deci & Ryan, 2000). Benson (2001) supports the idea that autonomy helps develop students' ability to control their own learning. Students who experience autonomy demonstrate positive academic achievements, emotions, and motivation. Furthermore, they tend to exhibit enhanced creativity and enjoyment (Kaur et al., 2015). Teachers' support for autonomy is believed to predict students' perceptions of autonomy (Reeve & Jang, 2006; Reeve & Tseng, 2011). In conditions where autonomy is supported, students feel less pressured, become more interested, put in more effort, and achieve better academic performance (Núñez & León, 2015). Extensive research has shown that autonomy-supportive teaching is associated with various educational benefits, including well-being, performance, and learning outcomes (Núñez & León, 2015). SDT explains that autonomy support offers students significant psychological benefits as it promotes the satisfaction of their needs for competence, relatedness, and particularly autonomy (Reeve et al., 2004).

Competence refers to the psychological need to be effective and capable in one's endeavours and interactions with the surrounding environment (Deci & Ryan, 1985). It reflects the desire to exercise one's abilities and skills to engage with the environment, seek out challenges, and master them. According to Nicholson (2013), students can develop their English language learning abilities by focusing on what they can do in English, acknowledging

the commonality of making mistakes, recognising the significance of interaction over accuracy, and sharing learning experiences. The need for competence can be fulfilled by providing structure, such as by establishing clear rules and demonstrating procedures. Specific methods include setting personal goals, promoting peer teaching, and involving students in designing and preparing classroom activities, thereby sharing responsibilities.

Relatedness refers to the psychological need to form close emotional connections and establish meaningful relationships with others (Deci & Ryan, 2012). It reflects students' innate desire to be emotionally engaged in warm, caring, and responsive relationships. To fulfil this need, teachers are required to shift their teaching approach from a traditional lecture-based mode to a more interactive and student-centered approach (Exeter et al., 2010). Additionally, the learning materials should be relevant to the students' familiar environment (Exeter et al., 2010). In order to address the need for relatedness, students often engage in communication with their peers and teachers. Teachers, in this context, act as facilitators who encourage students to actively participate through interpretation, affirmation, and feedback (Reeve & Jang, 2006). By providing supportive and positive feedback, as well as offering suggestions, teachers establish positive relationships with their students.

In this study, SDT provides the theoretical foundation for determining which aspects of the PBL environment will support or undermine students' engagement, specifically the conditions that influence students' perceptions of autonomy, competence, and relatedness. Research has demonstrated that

PBL enhances students' autonomy and provides them with the chance to delve deeper into concepts, thereby boosting their learning and engagement (Dean et al., 2015). PBL is a student-centered method that gives students greater autonomy in learning. The improvement of autonomy, as well as relatedness and competence, are obvious in PBL (Stefanou et al., 2013). In PBL activities, students take active roles in determining project themes, gathering information, and producing final products, while a teacher acts as a facilitator and a counsellor in facilitating autonomous language learning. The teacher-student relationship in PBL is friendly and harmonious. A friendly learning environment can help reduce students' speaking anxiety in class and improve their learning motivation (Awad, 2014). As a result, in the PBL learning environment, students show active engagement in learning activities and feel less anxious about speaking English.

2.7.3 Comprehensible Output Hypothesis

Speaking the target language without conscious effort is insufficient for the development of speaking skills (Goh & Burns, 2012; Skehan et al., 2012). L2 learners need comprehensible output, which compels them to produce accurate and appropriate language, thereby enhancing their speaking abilities (Swain, 1985). The Comprehensible Output Hypothesis, proposed by Swain (1985), describes comprehensible output as language that has been improved in terms of content, grammar, sociolinguistics, or discourse features (Swain & Lapkin, 1995). Consequently, generating precise and appropriate language encourages learners to focus on the linguistic elements required to effectively

convey their intended meaning (Swain, 1995). Additionally, comprehensible output facilitates the shift from semantic to syntactic processing, allowing learners to further analyse the grammar of the target language. Swain (1995, 2005) identifies three functions of output: noticing function, hypothesis-testing function, and metalinguistic (reflective) function.

The noticing function involves learners becoming aware of linguistic issues when they are unable to express their intended meaning accurately. This awareness prompts them to seek the necessary knowledge to fill the identified gaps. Learners encounter discrepancies between their desired expression and their actual language abilities, leading them to notice their partial or complete lack of knowledge in the target language.

The hypothesis-testing function suggests that learners use a “trial and error” approach to test their language production, anticipating feedback. When a learner produces language, there is an underlying hypothesis regarding aspects such as grammar. The learner tests this hypothesis through their utterance and receives feedback from an interlocutor, which enables them to reassess and modify the hypothesis if needed.

The metalinguistic (reflective) function involves using language as a tool for reflecting on the language used by teachers, peers, and themselves. Through this reflection, learners control and internalise linguistic knowledge, enhancing their understanding of the target language.

Thus, producing language through speaking and writing enables L2 learners to identify their linguistic gaps. This awareness acts as a catalyst for the cognitive processes essential for language learning. PBL provides numerous opportunities for learners to engage in language production through discussions, investigations, and presentations. In PBL settings, learners interact with peers to discuss project topics and plans in English, which helps them recognise areas where their expressive abilities are lacking. Feedback from peers further refines their speaking skills by highlighting areas needing improvement. Additionally, during project execution, such as scriptwriting and dubbing for videos, learners confront their linguistic limitations. Striving for accuracy and fluency, they become aware of deficiencies in grammar or pronunciation. Feedback from teachers and peers after presentations helps them identify and address these gaps. This iterative process of language production, reflection, and feedback in PBL fosters continuous language skill improvement. By recognising and addressing their linguistic gaps, learners can enhance their overall language proficiency and communication effectiveness.

2.7.4 Trade-Off Hypothesis

Skehan (1998) introduced the Trade-Off Hypothesis, also known as the limited attentional capacity model, which posits that speakers must allocate their limited attentional resources across the various processes required by a task, such as input selection, information processing, and response actions. When task demands surpass available resources, competition arises among performance areas (linguistic complexity, accuracy, and fluency). Consequently, the attentional control function prioritises certain performative aspects over others (Skehan, 2009b). Those aspects receiving sufficient

attention achieve optimal performance, while others, constrained by limited attention, may suffer from errors.

Foster and Skehan (1996) contend that the trade-off primarily occurs between accuracy and complexity. Similarly, Skehan and Foster (1997) observed this trade-off in a study examining the effects of planning on three oral tasks. Skehan (2009b) further suggested that accuracy and complexity rarely coincide. Conversely, other studies propose that the trade-off involves meaning, fluency, and either complexity or accuracy. For instance, research by Ahmadian and Tavakoli (2011), Wendel (1997), and Yuan and Ellis (2003) indicates a trade-off between fluency and accuracy. Brumfit (1984) emphasised the fluency-form distinction, asserting that fluency-oriented tasks aim for spontaneous, free-flowing language, while accuracy-oriented tasks focus on form and control. Skehan (1998) also noted that adult learners display diverse learning styles, with some prioritising fluency through example-based learning and others emphasising complexity or accuracy through analytical learning.

Contrary to the trade-off effects, Robinson (2001) suggested that the three constructs could simultaneously improve without detriment to each other, provided there are ample opportunities for input, practice, and output. He argued that increased cognitive demands could enhance learners' attention to linguistic forms and create opportunities for rehearsal and modification of output. Housen and Kuiken (2009) summarised the debate by acknowledging that while trade-off effects might occur in certain contexts, the three constructs can also develop concurrently when the appropriate cognitive demands are present.

Within the PBL context, a recognised trade-off exists among EFL learners between complexity, accuracy, and fluency. This study targets intermediate-low-level EFL learners, whose working memory and cognitive capacity limitations lead them to prioritise accuracy over complexity in English speaking. To address this challenge, learners must balance complexity, accuracy, and fluency, leveraging strengths in one area to compensate for weaknesses in another. Engaging in PBL activities is expected to cause an interaction and potential competition among these aspects of speaking proficiency.

The theoretical framework of the study is presented to summarise the above discussion and provide justifications to support the present study based on existing theories. Figure 2.4 illustrates the theories that serve as the study's structure and the constructs that set its boundaries.

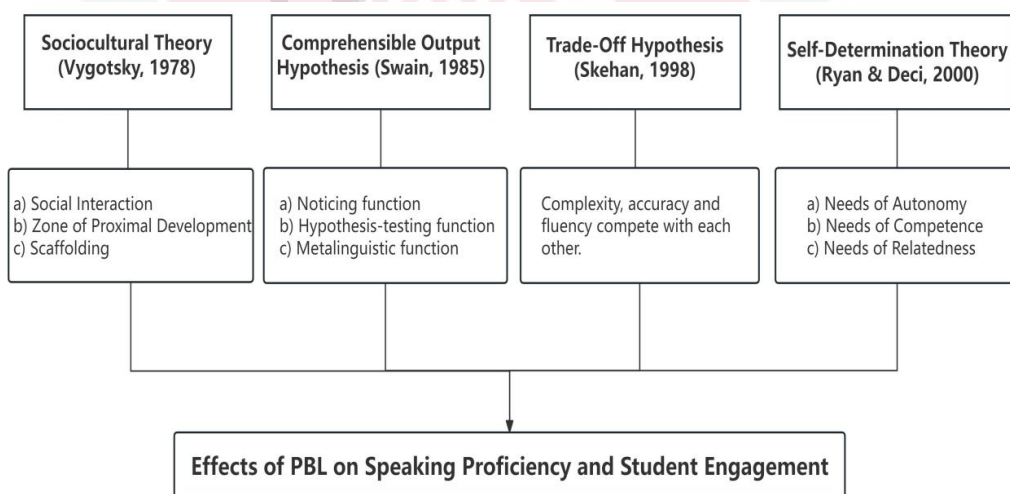


Figure 2.6: Theoretical Framework

2.8 Conceptual Framework of the Study

Based on the conceptualization of speaking proficiency and student engagement as meta-constructs, this study proposed a conceptual framework (Figure 2.5) for the effects of PBL on speaking proficiency and student engagement as follows when compared with the conventional teaching method.

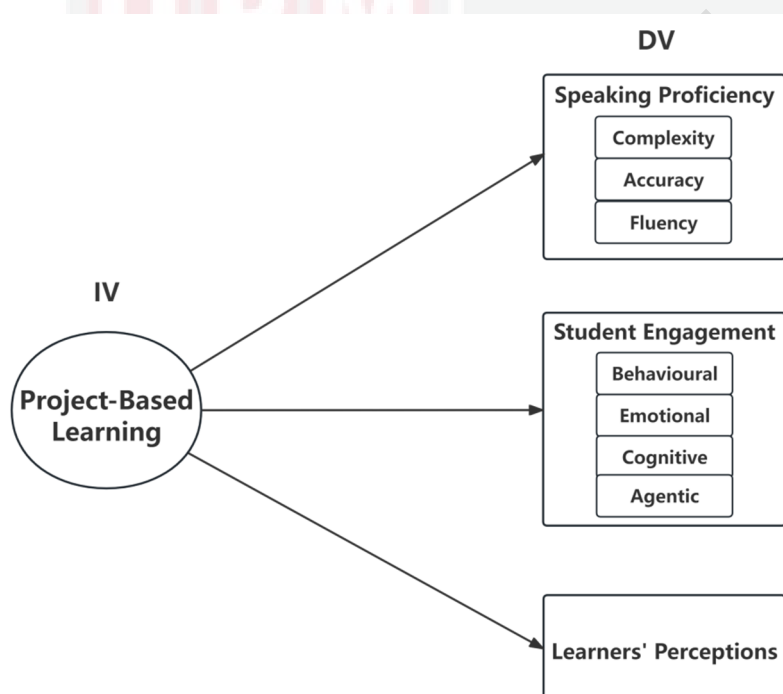


Figure 2.7: Conceptual Framework

The figure above presents a preliminary conceptual framework for the current study, which depicts the effects of PBL on EFL students' speaking proficiency and student engagement, as well as the effects of different levels of English proficiency on the complexity, accuracy, and fluency of high, medium, and low PBL subgroups. PBL was treated as an independent variable in the

measurement design, while speaking proficiency and student engagement were dependent variables. Speaking proficiency is constructed by complexity, accuracy, and fluency. Student engagement consists of four dimensions, which are behavioural, emotional, cognitive, and agentic engagement. This study examined the EFL learners' speaking proficiency (complexity, accuracy, and fluency) after receiving PBL in comparison to the conventional teaching method. This study also attempted to determine the differences in EFL learners' student engagement (behavioural, cognitive, emotional, and agentic engagement) before and after implementing PBL compared to the conventional teaching method. Finally, learners' perceptions were investigated to understand the implementation of PBL (benefits and challenges) in an English-speaking class.

2.9 Summary

PBL was conceptualised by many researchers in a variety of ways. Some researchers have described PBL as a synthesis of various instructional components and approaches, including former models of instruction that include inquiry-based learning, problem-based learning, and authentic learning (Galvan & Coronado, 2014). PBL in this study refers to an instructional method in which students collaborate to complete a project by using the target language in real-life practices to develop students' foreign language skills. PBL has huge potential in the EFL and ESL contexts, including increasing language skills, elevating soft skills, promoting learning autonomy, and improving students' attitudes and motivation. Speaking proficiency is a multi-dimensional

concept constructed by complexity, accuracy, and fluency. These three constructs are correlated, and the interactions between the CAF triad are controversial. Some studies show that PBL has significant effects on speaking proficiency, while others show little or no influence. Student engagement is also perceived as multi-dimensions of behaviour, including emotional, cognitive, and agentic engagement. There are positive interrelationships among the four aspects of student engagement. There is also disagreement on the effects of PBL on student engagement. More evidence should be offered to support the effectiveness of PBL on speaking proficiency and student engagement. The theoretical framework for this study was constructed from SCT, SDT, the Output Comprehensive Hypothesis, and the Trade-Off effects Hypothesis. The conceptual framework of this study was outlined and depicted as the paths resulting from the influence of PBL, respectively, on speaking proficiency (complexity, accuracy, and fluency) and student engagement (behavioural, emotional, cognitive, and agentic engagement). Finally, the research gaps were summarised to support the significance and contribution of this study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter commences by providing an overview of the research design. It proceeds by discussing the setting of the study, participants, and sampling procedures. Then it delves into a description of instruments and the validity and reliability of the instruments. Following this, it offers a comprehensive account of PBL intervention, encompassing project design and arrangement, stages of PBL, project-based lesson plans, and the procedures of the study. Subsequently, it elaborates on data collection procedures and data analysis. Lastly, the chapter concludes by addressing ethical considerations.

3.2 Research Design

This study employed a quasi-experimental research method with a non-equivalent pretest-posttest control group design. The quasi-experimental research method was used to measure the changes in the dependent variable after the intervention, which did not contain random assignment (Krysik & Finn, 2013), and independent variables were not manipulated (Gravetter & Wallnau, 2000). In this study, the quasi-experimental research method was utilised to measure the differences in pretest and posttest scores and questionnaire results between experimental and control groups. Table 3.1 presents the structure of the non-equivalent pretest-posttest control group design.

Table 3.1: Non-Equivalent Pretest-Posttest Control Group Design

Group	Pretest	Treatment	Posttest
Experimental	O1	X	O2
Control	O1	-	O2

X: Project-Based Learning (PBL)

O1: Measurement of dependent variables at pretest

O2: Measurement of dependent variables at posttest

The non-equivalent pretest and posttest control group design is widely used in educational research (Shadish et al., 2002). In this study, the experimental group and the control group were selected without random assignment. Both groups took a pretest and a posttest to measure their improvement in English speaking proficiency and student engagement. Only the experimental group received the treatment, which involved implementing PBL through video-creation activities. To gain deeper insights, a combination of quantitative assessments and qualitative interviews was used to evaluate EFL students' English speaking proficiency and engagement, as well as to explore their perceptions of implementing PBL.

3.3 Research Setting

The study was conducted at Yangjiang polytechnic located in Guangdong Province, China. Guangdong Province is a prime location to pilot the new educational policy in China, and has the largest number of polytechnics. According to the Educational Quality Annual Report of Guangdong Province (2023), there were eighty-eight polytechnics in Guangdong up until 2023. Yangjiang Polytechnic is a public institution located in the western part of Guangdong Province. It has a history of over thirty years and offers several popular programmes, including English Education. To be admitted into the

English Education programme, students must participate in the (Nation Matriculation Test in Spring) NMTS and achieve a score that meets the required threshold. For example, the minimum score achieved by NMTS for this programme in 2024 was 346 out of a total score of 450. The polytechnic could serve as a model for other polytechnics in Guangdong province or across China.

This polytechnic offers diverse academic curricula that cater to distinct objectives of English instruction and acquisition. One of the mandatory and specialised curricula for English Education is Oral English. Oral English was specifically developed for English majors with the aim of enhancing their oral proficiency in order to effectively communicate with individuals from other countries in both personal and professional contexts. Oral English is divided into two courses: Oral English I and Oral English II, which are respectively held in the fall and spring semesters of the first year. In the fall semester, Oral English I consists of a total of fourteen lessons, each lasting for 90 minutes and held once a week. When it comes to the spring semester, Oral English II comprises sixteen 90-minute lessons. The courses are taught by full-time Chinese instructors. Oral English I was selected to conduct such a study from the second week of the fall semester until the end, as it facilitated the participants' familiarisation with their college and classmates.

3.4 Participants

The participants in this study are 96 EFL learners from two intact classes at a polytechnic. They were first-year students majoring in English Education. The

selection of first-year English Education majors was based on two primary reasons: (a) the ability to speak English was considered a crucial professional skill for English Education majors; (b) first-year students typically had no prior exposure to PBL, as confirmed by a background questionnaire on their previous learning experiences, specifically any exposure to PBL instruction (Refer to Appendix C). Therefore, selecting first-year English Education majors ensured that the participants were EFL learners who paid much attention to English speaking but had not previously experienced PBL.

The participants were a homogeneous group of 96 first-year English major students enrolled in an Oral English I course. The participants consisted of 92 females and 4 males, with an age range of 17 to 21. All the participants were native speakers of Mandarin Chinese. They had studied English for ten years prior to class enrollment, including a combined four years in primary school and six years in junior and senior high school. None of the participants had lived abroad or visited another country for longer than a month (see Appendix C).

3.5 Sampling Procedures

In this study, purposive sampling was used to select participants for both quantitative and qualitative phases in this study.

In the quantitative phase, purposive sampling was used to select participants. According to Mills and Gay (2019), a nonequivalent control group design, different from a pretest-posttest group design in true experiment design, is that

it does not involve random assignment. Purposive sampling meets the requirement of a nonequivalent control group design, because it is a kind of nonprobability sampling, which does not include any selection from a population (McMillan & Schumacher, 2014). Purposive sampling is based on the principle that selecting the most suitable cases for a study leads to the generation of the most valuable data, and the research outcomes directly stem from the sampled cases (Mweshi & Sakyi, 2020). In these regards, purposive sampling was considered to select participants from the population. The sampling frame in this study was the first-year English Education majors from four intact classes at a polytechnic in Guangdong, China. Two of the four classes were purposefully selected and assigned to either the experimental group ($N = 49$) or the control group ($N = 47$) based on their comparability in key characteristics such as prior academic performance and demographic factors. The selection was informed by their English scores in the NMTS, ensuring a similar baseline proficiency level. Following this, a pretest assessing speaking proficiency was conducted to further confirm equivalence between the groups. Additionally, factors such as age, gender, and previous English learning experiences were considered to minimize potential biases. This careful matching process enhanced the study's internal validity, ensuring that any observed differences in outcomes could be attributed to the intervention rather than pre-existing disparities.

The sample size was determined using G-Power statistical software (Faul et al., 2007), which is widely used in research for conducting power analyses to ensure adequate sample sizes. G-Power was chosen because it allows

researchers to calculate the required sample size based on the selected statistical tests, effect size, significance level, and statistical power, ensuring the results of the study are reliable and generalizable. Based on the research objectives and hypotheses, three statistical tests from the F-test family were used: the Independent Samples t-test, Multivariate Analysis of Variance (MANOVA), and two-way Analysis of Variance (two-way ANOVA). Using the Compromise power analysis method, the effect size was set to 0.25, which is considered moderate (Cohen, 1992), with a β/α ratio of 1:1, the standard ratio in basic research. Given a total sample size of 96 participants for two groups, the computed power was greater than 0.80 (see Table 3.2), meeting the conventional threshold for detecting statistically significant effects.

Table 3.2: Power of the Study based on Different Statistical Tests

F tests	Analysis	Power (1-β error probability)
Independent Samples t-test	Fixed effects (Compromise: Compute implied α & power)	0.80
MANOVA	Fixed effects (Compromise: Compute implied α & power)	0.80
Two-way ANOVA	Fixed effects (Main effects and interactions, Compromise: Compute implied α & power)	0.80

In the qualitative phase, purposive sampling was employed to select participants for semi-structured interview sessions. Purposive sampling, commonly used in qualitative research, allows researchers to select participants based on their knowledge of the population and research objectives (Mweshi & Sakyi, 2020). A total of 10 participants from the PBL class were selected for individual interviews to gain in-depth insights into their perceptions of PBL implementation. The selection of 10 participants for the

interviews was based on key characteristics, including English proficiency levels and demographic diversity. The 10 participants were chosen from high, medium, and low speaking proficiency groups, as determined by their NMTS scores, and represented a variety of genders, backgrounds, and learning experiences to ensure a well-rounded perspective. This sample size was considered adequate for achieving data saturation while allowing for a detailed analysis. According to Guest et al. (2006), saturation typically occurs within 6 to 12 interviews, further validating the appropriateness of this selection.

3.6 Instruments

Three instruments were employed for data collection: speaking tests, questionnaires, and semi-structured interviews. Speaking tests were used to measure the changes in the participants' speaking proficiency when using the PBL and the conventional teaching method. Questionnaires were utilised to measure student engagement in PBL for both groups. Semi-structured interviews were used to get insight into the participants' perspectives on the usefulness of PBL.

3.6.1 Speaking Tests

Speaking tests were utilised in the study to assess the participants' speaking proficiency before and after implementing the PBL lessons. The format of the International English Language Testing System (IELTS) Speaking Test was adapted as the pretest and posttest in the study because the IELTS Speaking Test has become an integral component of numerous global large-scale language proficiency assessments (Karim & Haq, 2014). An oral descriptive

task taken from the section of the IELTS Speaking Test was used in the study. The reason for selecting the descriptive task in the IELTS speaking test was because the format and content align closely with the tasks taught in this course.

Four topics were chosen in this study, respectively, for the pretest (see Appendix D) and posttest (see Appendix E). The topics covered in the pretest and posttest were similar, but they were not exactly the same. For example, in the pretest, students were asked to describe a job they liked to do, while in the posttest, they were asked to describe a job they did not like to do. In the tests, the participants were given a task card on a descriptive topic. They were allowed two minutes to prepare before answering, and then they were asked to speak for up to two minutes. When participants felt that they had sufficiently answered the question, they were allowed to stop speaking, but non-answers were not allowed. A timer was used during the tests, and participants were instructed to stop their speech within two minutes. Prior to commencing the tests, participants were informed about this time limitation.

3.6.2 Questionnaires

Questionnaires were administered before and after the implementation of PBL to investigate the changes in student engagement in PBL. The Student Classroom Engagement (SCE) scale (Reeve, 2013) was adopted to measure emotional, behavioural, cognitive, and agentic dimensions of student engagement. This scale was chosen due to its demonstrated ability to generate scores that predict significant student outcomes (Skinner et al., 2009; Reeve & Tseng, 2011; Wolters, 2004).

The SCE scale includes 19 items: 5 for emotional and behavioural engagement respectively, 4 for cognitive engagement, and 5 for agentic engagement (see Appendix F for Chinese translation and Appendix G for the English original form). According to Reeve (2013), the items of emotion and behavioural engagement were adapted by Skinner et al. (2009), and those of cognitive engagement were adapted by Wolters (2004), while the items of genetic engagement were developed by himself. The questionnaire was expected to take 15–20 minutes for participants to complete. Participants self-reported their level of classroom engagement by using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

3.6.3 Interviews

Semi-structured interviews were conducted following the speaking posttest to explore participants' perspectives on the implementation of PBL in the English-speaking class. The interview was done individually with purposefully chosen samples of 10 students from the PBL group. The decision to interview 10 students was based on achieving data saturation, as saturation typically occurs within 6 to 12 interviews (Guest et al., 2006). Individual interviews were chosen over focus group discussions to allow students to express their thoughts freely without the influence of peer dynamics. The students participated in the semi-structured interviews guided by, but not limited to, a list of interview questions (see Appendix H for the original Chinese version and Appendix I for an English translation). Twelve interview questions were formulated to examine students' perspectives on the implementation of PBL in

the English-speaking class: benefits and challenges. The interview was conducted in an informal setting to promote students' authentic expression of thoughts in Chinese regarding PBL, without concerns about creating a negative impression on the interviewer or impacting their final course marks.

3.7 Validity and Reliability of the Instruments

The validity and reliability of instruments influence the conclusions made by researchers. Consequently, all research instruments should go through a rigorous process of validity and reliability checking.

3.7.1 Validity of the Instruments

Validity refers to the degree to which a tool accurately measures what it intends to measure (Roberts & Priest, 2006). It is the most important consideration in developing and evaluating measuring instruments. To establish the validity of the measuring instrument, content, face, and construct validity are utilised (Bryman, 2012). Content validity usually depends on the judgement of experts in the field (Almanasreh et al., 2019). It was strongly recommended to employ content validity when developing a new instrument (Taherdoost, 2016). In this study, content validity was applied to all the instruments of the study.

The topics in the speaking tests were checked and validated by two English educational experts (Appendix J). Eight different topics in the speaking tests were selected by the researcher from the previous IELTS speaking tests. These topics were validated by two English educational experts, who have

more than twenty years of experience in oral English teaching and assessment and are familiar with the IELTS test. The modifications made to the items in the speaking tests primarily focused on adjusting the complexity of the questions. The two experts concurred that the speaking test, structured similarly to the IELTS speaking test, demonstrated robust face validity due to its perceived effectiveness in terms of organisation, topic selection, and scoring criteria.

With regards to the questionnaire, a back-to-back translation was conducted to support its validity. The questionnaire utilised Reeve's SCE scale (2013), which was translated from English into Chinese to be better understood by the participants. For this reason, a back-to-back translation was conducted by three professional translators and the researcher (Appendix J). The questionnaire was translated into Chinese by the researcher because she is generally familiar with the context of the study. Then, the Chinese version was checked by a professional translator for further review and possible improvement. Lastly, English back-translations were performed by the other two professional translators. In the event of any inconsistencies among the translators, discussions were held to resolve the discrepancies and reach a consensus on the translation.

The interview questions were validated by two subject-field experts. Ten questions were firstly developed by the researcher based on the objectives of the study. The interview questions were validated by two English educational experts who are knowledgeable in PBL and qualitative methodology (Appendix J). Both the two experts expressed that the interview questions were quite broad, especially regarding inquiries about speaking proficiency and student

engagement. They suggested offering more precise information to ensure that the participants had good comprehension. For instance, the question “Can project-based learning enhance your speaking fluency?” was changed to “Can project-based learning improve your speaking speed or reduce pauses?” Furthermore, this question was elaborated by asking, “If yes, how? If not, why not?” In other words, if the answer is affirmative, in what manner may it be accomplished? If the answer is negative, what is the reason for it? In this way, participants were able to ascertain their responses and state their reasons. Eventually, two questions were removed, and four new questions were developed. Twelve interview questions were developed to explore students’ perspectives on the implementation of PBL in the English-speaking class.

Double-back translation was also carried out for the interview questions to enhance their validity. The interviews were performed in Chinese to facilitate students’ expression of their viewpoints with greater clarity. The back-to-back translation was conducted for interview questions. The researcher translated the interview questions into Chinese, which were then reviewed and improved by a professional translator. Subsequently, two other professional translators performed English back-translations to ensure similarity and accuracy in meaning between both versions.

3.7.2 Reliability of the Instruments

Reliability, as a crucial quality criterion for an instrument, refers to its capability to produce consistent results over time, across different locations, or when administered by different observers (Terwee et al., 2007). It encompasses aspects such as coherence, stability, equivalence, and homogeneity.

Cronbach's alpha is a widely used measure to evaluate the reliability or internal consistency of a questionnaire (Singh, 2017). It was computed by correlating the score for each item with the total score for each observation (typically survey respondents) and comparing it to the variance of all individual item scores. In this study, Cronbach's alpha was calculated by using SPSS 27.0 to ensure the internal reliability of the CSE questionnaire data. The resulting α coefficient of reliability ranges from 0 to 1 and provides an overall assessment of the measure's reliability (Singh, 2017). The reliability test reveals that the Cronbach's alpha coefficients for emotional, behavioural, cognitive, and agentic engagement are 0.926, 0.914, 0.941, and 0.953, respectively. The overall scale exhibits a Cronbach's alpha of 0.962, and all results fall within the range of 0 to 1, denoting a high degree of reliability.

To ensure the reliability of the data from speaking tests, the oral transcripts were reviewed, and the outcomes of manual coding were assessed through an inter-rater reliability test. Initially, the speaking tests were recorded and generated into text by IVI. IVI can efficiently convert spoken words into text with a high pronunciation accuracy rate exceeding 90% (Liu et al., 2019). Despite that, the researcher and the other English teacher independently checked the transcripts by listening to the original recordings. They cross-checked the transcripts and discussed the discrepancies until there was an agreement on the results. Syntactic and lexical complexity were calculated using the Coh-Metrix, a programme that used natural language processing to analyse discourse. Speech rate and self-repairs were calculated manually with the help of Syllable Counter, an online platform for automatic syllable analysis.

As for syntactic accuracy, the researcher and the other English teacher coded manually. Both the researcher and the English teacher accepted training in CAF analysis prior to the coding. The proportion of repeated annotations used for inter-rater reliability testing typically ranges from 10% to 25% of the total sample size (O'Connor & Joffe, 2020). In this study, the proportion of repeated annotations was set at 20% (i.e., twenty pieces of transcripts). The analysis results of syntactic accuracy revealed that the inter-rater reliability coefficient (Cohen's Kappa) was 0.86, indicating high reliability (George & Mallery, 2019).

In order to ensure the reliability of the interview data, participants were invited to review the transcripts of the interview. The participants checked to make sure the transcriptions adequately conveyed what they said. Following this, two teachers (the researcher and the other English teacher) conducted thematic analysis and coding on the interview data using Nvivo 12. The inter-rater reliability of their coding results was then assessed. To ensure consistency, the two teachers reviewed a randomly chosen 20% of the data to reach a consensus on their findings. In cases where there were discrepancies in their assessments, they engaged in discussions until they resolved the disagreements.

3.8 Pilot Study

A pilot study, serving as a small-scale trial, was conducted at the polytechnic where the main study took place. The purpose of the pilot study was to validate the experimentation procedure and the instruments used in the experiment. Van Teijlingen and Hundley (2002) proposed that if researchers could solve

problems that appeared in a pilot study, a lot of time and effort would be saved later when running the actual study. Any possible problems occurring during the research would be detected and rectified. The experience from conducting the pilot study and analysing the data was utilised to improve the design of the current study.

In the pilot study, the procedures of the experiment and the teaching materials were evaluated. The pilot study involved 45 first-year students majoring in English Education in an intact class. In the pilot study, PBL will be applied to the class in the Oral English course. Two projects were carried out by eight groups (four to six members per group) during four weeks. Each group was required to finish one mini-project every two weeks. However, after the pilot study, students expressed that completing a project within two weeks was insufficient. They recommended extending the project duration to three weeks each and suggested that executing three to four projects per semester was more appropriate. As a result, changes were made to require all groups to complete four projects within a twelve-week period, with each project allotted three weeks for completion. Besides, PBL plan forms, self-evaluation forms, and peer-evaluation forms were piloted to ensure the successful implementation of PBL. Minor changes in self-evaluation were made after the pilot test. For example, two reflective questions were added to the self-evaluation form to understand what the students contributed to and learnt from the project.

All the instruments were piloted prior to the start of the current study. To begin with, the 45 students were tested on their speaking proficiency by using speaking tests before and after the treatment. Based on the students' oral performance, the eight speaking topics in the tests were identified. Next, the questionnaire was piloted with the students to validate the time needed for distributing, completing, and collecting the questionnaire. According to the pilot test, it was necessary to complete the questionnaire within twenty minutes. Subsequently, the interview questions were piloted with ten students. Each student was encouraged to answer questions and elaborate on their answers. After piloting the questions, the twelve interview questions were finally decided to explore the students' perceptions of the effectiveness and challenges of using PBL.

3.9 Threats to Experimental Validity

The validity of an experimental study is ensured by using random assignment to allocate participants to the experimental and control groups (Rogers & Revesz, 2019). However, in a quasi-experimental design, random assignment is not feasible, which increases threats to experimental validity. Therefore, in this study, it was essential to address and eliminate any pre-existing factors that could potentially influence the validity of the experiment.

3.9.1 Threats to Internal Validity

In an experimental design, threats to internal validity refer to factors that can compromise the accuracy of establishing causality, potentially leading to

results being attributed to causes other than the treatment being studied. These threats can manifest in various forms, including history, statistical regression, maturation, testing, instrumentation, experimental mortality, diffusion of treatment, and subject effects. In this study, these threats to internal validity were considered and controlled.

History. The history threat arises when external events between the first and second measurements influence the dependent variable, and these events are not part of the experimental treatment. However, in multi-group designs involving two groups, such as this study, which compared two different groups on dependent variables, the history effect becomes less of a concern. This is because the experimental group was compared with a control group, and as long as the history effect affected all groups equally, it was effectively controlled.

Maturation. Maturation refers to the natural changes that occur in participants over time and are unrelated to the treatment being studied. These changes can include factors such as aging, increased coordination, changes in anxiety levels, motivation, or even boredom. To mitigate the maturation threat, using a control group is an effective method. In this study, participants in the experimental and control groups were carefully selected to have similar characteristics, including maturation and experiences, ensuring that maturation did not significantly impact the validity of the experiment.

Statistical Regression. The statistical regression threat occurs when participants are selected based on extreme scores, causing their subsequent scores to move toward the average. To minimize this threat, it is important for

the groups in the study to have similar mean scores in their pretest results, ensuring comparability at the start of the study. If there were significant differences in the pretest mean scores among the two groups in this study, it could affect the validity of the results. Therefore, controlling for this potential issue by ensuring no significant differences in the pre-test mean scores among the groups helped address the statistical regression threat.

Testing. The testing threat refers to the impact of taking a pretest on participants' subsequent test scores. A pretest may sensitize participants and influence their post-test performance due to increased familiarity. In this study, using a control group helped mitigate the testing effect. Any changes in participants' pretest and post-test scores could be adequately compared between the experimental and control groups. Additionally, since the experiment lasted twelve weeks, with a significant interval between the pre-test and post-test, these measures effectively minimized potential threats related to testing.

Instrumentation. The instrumentation threat arises when unreliable or inconsistent measurement instruments lead to inaccurate assessments of participants' performance. To address this concern, it is crucial to review and validate the measurement instruments with input from experts in the field. This validation process ensures that the instruments are valid and capable of collecting relevant data. In this study, all instruments and materials, including lesson plans and interview questions, underwent validation. Additionally, the test instruments and questionnaires were assessed for reliability to minimize the instrumentation threat.

Experimental Mortality. Mortality, in the context of research, refers to participants dropping out of the study before its completion, which can introduce bias into the results. Mortality is considered a significant threat in single posttest designs. However, in pretest and posttest designs, any loss of participants during the experiment can be addressed by excluding their pretest scores without affecting the overall selection process. In this study, if any participants dropped out for any reason, they were excluded from the analysis to prevent any impact on the validity of the results.

Diffusion of Treatment. Diffusion of treatment occurs when participants in the control and experimental groups communicate about the intervention during the study. To prevent this issue, participants in this study were consistently reminded not to share any information about the intervention with members of other groups until the study was completed. This measure effectively minimized the threat of treatment diffusion and helped maintain the integrity of the study.

Subject Effects. Participants may alter their behaviour simply because they know they are being studied, a phenomenon known as the Hawthorne effect. To minimize this threat to validity, the researcher instructed the instructor not to emphasize that an experiment was taking place. Since participants were not directly observed in the classroom, they attended the class as they normally would, reducing the likelihood of behaviour changes due to awareness of the research.

3.9.2 Threats to External Validity

External validity refers to the extent to which findings from a particular study can be applied to a larger or different target population (Findley et al., 2021). In this study, the use of purposive sampling and intact groups may limit the generalizability of the findings to a broader population. However, a quasi-experimental design provides practical advantages over a true experimental design, particularly in minimizing the reactive effects of experimental procedures (Campbell & Stanley, 2015). The sample for this study consisted of English Education majors at a polytechnic in China. Therefore, the findings could be reasonably applicable to similar contexts involving polytechnic students majoring in English Education. However, it is important to acknowledge that different results might occur under different conditions or with students from other academic disciplines.

3.10 The Treatment and Comparison Method

The treatment in the experimental group is PBL while the comparison method is the conventional teaching method in the control group. Both approaches aimed to enhance speaking proficiency in Oral English classes.

3.10.1 Project-Based Learning

According to Larmer et al. (2015), Project-Based Learning (PBL) adheres to the principles outlined in the Gold Standard PBL, which defines key elements

for effective project design and recommended instructional practices. For a project to be classified as PBL, it must incorporate essential design components, including (a) a challenging problem or question, (b) sustained inquiry, (c) authenticity, (d) student voice and choice, (e) reflection, (f) critique and revision, and (g) public product (Larmer et al., 2015).

The project design in this study encompasses project themes, formats, and scheduling arrangements (see Table 3.3). Four project themes were designed, including (a) Interviewing new friends, (b) Introducing scenic spots, (c) Survey on ideal jobs, (d) Inviting and receiving visitors. The project themes were created based on the three considerations. Firstly, the projects were designed on the basis of the curriculum contents. Secondly, the projects were connected with students' college lives and environments, giving them the chance to discuss meaningful information from their own experiences and realities. Thirdly, the project theme's setting included the knowledge and ability level required by the syllabus and was close to the actual situation of students' lives and communication to reflect the practical problems of today's society. The project format consisted of a video that included an embedded interview, a field excursion, a field survey, or a short drama. Each project had a duration of three weeks.

Table 3.3: Projects for the Experimental Group

Project	Format	Week
Interviewing New Friends	An interview video	3
Introducing Scenic Spots	A video of field trip	3
A Survey on Ideal Jobs	A video of field survey	3
Inviting and Receiving Visitors	A video of short drama	3

The implementation of each project processes eight phases. The eight PBL phases are also referred to as the main video-creation activities in the present study. These phases are the foundation of the PBL lessons. Table 3.4 shows the eight phases in the PBL intervention.

Table 3.4: Phase of PBL through Video-Creation Activities

Phase/Activity	Description
Phase 1	Introducing driving questions through topic discussion
Phase 2	Determining project topics through idea sharing
Phase 3	Scaffolding learning through script practice
Phase 4	Structuring the project through rehearsal
Phase 5	Conducting the project through filming
Phase 6	Editing a video
Phase 7	Presenting the video
Phase 8	Evaluating the video

Introducing driving questions through topic discussion. To spark students' interest and engagement, the teacher introduces driving questions through a topic discussion, using videos, pictures, and brainstorming activities. The lesson begins with an entry event, which may include watching videos, engaging in discussions, or singing songs to create an immersive learning environment. Once students' curiosity is piqued, the teacher presents the driving questions, prompting deeper exploration. To facilitate this process, students are organized into small groups of four to six members, based on their interest in the topic. Each group assigns a leader and a spokesperson, with these roles rotating among members to ensure equal participation and leadership experience.

Determining project topics through idea sharing. For the first project, the teacher suggests possible topics, guiding students in their selection. From the

second project onward, students take greater ownership by brainstorming and choosing their own topics within their groups. This approach fosters autonomy and interest, encouraging them to invest in their learning. Throughout this process, the teacher provides support by offering guidance during group formation and topic selection, ensuring that students choose feasible and meaningful topics for their projects.

Scaffolding learning through script practice. To help students acquire the necessary knowledge and skills for their projects, the teacher provides structured scaffolding activities such as listening and speaking exercises. These activities build students' competence in spoken English and prepare them for scriptwriting and video production. The teacher also introduces video creation guidelines, helping groups develop a structured project plan. Within each group, tasks are equitably assigned based on individual strengths, promoting collaboration and responsibility. The scaffolding phase includes lessons, learning materials, and direct instruction to ensure students have a solid foundation before advancing to the next stage.

Structuring the project through rehearsal. Once students have a clear understanding of their project goals, they begin gathering and analyzing relevant information using various research methods, such as interviews, surveys, and literature reviews. During this phase, groups work on shaping their video content by structuring their research findings into a coherent project plan. The plan includes key elements such as project topic, project content, implementation procedures, member responsibilities (see Appendix K). Each

student is assigned a task based on their strengths to ensure equitable participation. Throughout this process, the teacher offers ongoing support and constructive feedback, helping students refine their ideas and improve the feasibility of their projects.

Conducting the project through filming. After gathering and analyzing data, students move on to scripting and filming their video projects. The content format may vary, including interviews, field excursions, surveys, or short dramas, depending on the topic and students' creative choices. The teacher provides guidance throughout the filming process, assisting students in overcoming technical or conceptual challenges. Students actively engage in evaluating the significance of their collected information, deciding which aspects to highlight in their final production. Once the script is finalized, they proceed with filming, ensuring that their project aligns with the learning objectives.

Editing a video. Following the filming phase, students edit their videos to enhance clarity and coherence. Each group presents their final video in class, responding to questions from both peers and the teacher. This presentation serves as an opportunity to develop public speaking and communication skills, as well as to showcase their work. The teacher provides continuous support, helping students navigate any technical or content-related challenges that arise during the editing and finalization process.

Presenting the video. During the presentation phase, students showcase their completed videos to the class. They participate in self-evaluation and peer evaluation, using structured forms to assess their own work and that of their classmates. The teacher facilitates a discussion, encouraging constructive feedback and critical reflection. Students answer questions posed by their peers and the teacher, further reinforcing their understanding of the project content and improving their ability to articulate ideas.

Evaluating the video. In the final stage, the teacher provides a comprehensive evaluation of each group's video and presentation, highlighting strengths and areas for improvement. Students' performance is assessed through self-evaluation and peer evaluation (see Appendix L and Appendix M). The teacher summarizes the key takeaways from each project, offering constructive feedback that guides students in refining their skills for future learning experiences. This reflection phase encourages students to recognize their progress, address challenges, and continuously improve their language and project development abilities.

These PBL through video-creation activities follow a structured process that actively engages students in collaborative and inquiry-driven learning. This structured yet flexible approach fosters creativity, communication, and collaboration, empowering students to take ownership of their learning while improving their English speaking proficiency. The project-based lesson plans for the four projects contained details of the specific teaching objectives,

teaching procedures, main teacher and student activities, teaching materials, and equipment needed in each lesson (see Appendix N).

3.10.2 The Conventional Teaching Method

A conventional teaching method was followed by the control group in this study. The conventional teaching method is a teacher-centered method where the instructor serves as the primary source of knowledge. This approach emphasizes improving students' English speaking proficiency through structured activities that involve imitation, memorization, and repetition. The primary focus is on accuracy and linguistic correctness, with textbook dialogues and controlled practice playing a significant role in skill development.

Aligned with the project themes, four curriculum-based topics were covered: (a) New friends, (b) Scenic spots, (c) Ideal jobs, and (d) Visitors. The typical learning outcome format was a role-play, with each topic being taught over a three-week period (Refer to Table 3.5).

Table 3.5: Topics for the Conventional Group

Topic	Format	Week
New Friends	Role play	3
Scenic Spots	Role play	3
Ideal Jobs	Role play	3
Visitors	Role play	3

The conventional method is implemented through a sequence of five phases, which serve as the core activities in traditional lessons. Table 3.6 outlines these five phase used in the comparison group.

Table 3.6: Phase of the Conventional Teaching Method

Phase/Activity	Description
Phase 1	Listening and reading dialogues
Phase 2	Learning dialogues
Phase 3	Imitating dialogues
Phase 4	Role-playing dialogues
Phase 5	Evaluating the role play

Listening and reading dialogues. At the beginning of each class, the teacher plays recorded sample dialogues for the students to listen to, emphasizing pronunciation, intonation, and fluency. The teacher highlights key aspects of pronunciation and rhythm. After listening, the students read the dialogues aloud, concentrating on accurate pronunciation and natural flow. The teacher actively monitors their pronunciation and provides corrective feedback when necessary.

Learning dialogues. The teacher explains the vocabulary, sentence structures, and expressions found in the dialogues to ensure the students understand their meaning and usage. To reinforce comprehension, the teacher may offer additional examples, explanations, and contextual applications. The students actively engage by asking questions and taking notes, while the teacher ensures they grasp correct language forms and appropriate usage in different contexts.

Imitating dialogues. The students practice by repeating and mimicking the dialogues, focusing on pronunciation accuracy, intonation, and grammatical correctness. They carefully follow the teacher's or the recorded model's phrasing to perfect their speech. The teacher observes their practice, corrects

mistakes, and provides individual feedback to guide them toward accurate language production.

Role-playing dialogues. The students create their own dialogues using the vocabulary and sentence structures they have learned. Working in pairs or small groups, they rehearse and then perform their conversations in front of the class. The teacher facilitates the activity, offering support and corrections when needed while ensuring that the students use appropriate language and stay within the lesson's objectives.

Evaluating the role-play. After the role-play, the teacher assesses the students' performances, focusing on pronunciation, fluency, and accuracy. The students are encouraged to provide peer feedback, offering constructive comments on language use. The teacher gives final evaluations, highlighting strengths and areas for improvement, ensuring that the students have effectively internalized the targeted vocabulary, structures, and expressions.

Following the steps of conventional teaching method, the teacher maintained a structured and guided approach, ensuring that students followed a prescribed sequence of activities. Unlike the experimental group, which engaged in video-creation project activities, the control group primarily relied on rote learning, imitation, and controlled speaking exercises to develop their English speaking skills.

3.11 Data Collection Procedures

The experiment lasted for one semester (14 weeks), from the end of September to the end of December. In the first week, both groups completed English speaking tests and questionnaires as pretests. From the second to the thirteenth week, the two groups received different treatments: PBL for the experimental group and the conventional teaching method for the control group. At the end of the semester, both groups completed English speaking tests and questionnaires. Additionally, participants in the experimental group were selected to answer interview questions after the treatment. The study procedures are illustrated in Figure 3.1 below.

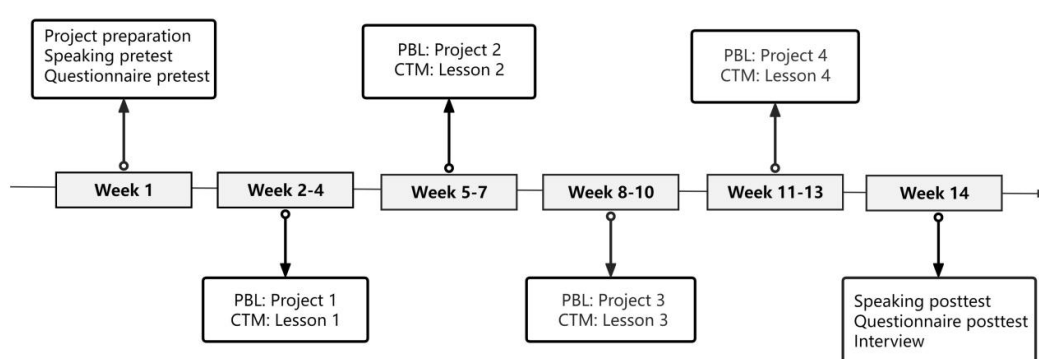


Figure 3.1: Procedures of the Study

3.11.1 Pre-Intervention Stage

All participants in both groups were required to take the speaking pretest and complete the questionnaire during the pre-intervention stage. The participants' oral productions were recorded and transcribed verbatim. The questionnaire was edited using the Wenjuanxing app and shared with the WeChat group

before and after the treatments during class. All the participants needed to submit the questionnaire within 20 minutes. Additionally, in the experimental group, the researcher introduced the PBL, described its benefits according to the literature, clearly explained the purposes of the experiment, and asked the students who were willing to participate to sign the consent form.

3.11.2 While-Intervention Stage

Both groups received different instructional methods during the while-intervention stage, namely PBL for the experimental group and the conventional teaching method for the control group (see Table 3.7). Both groups were taught by the same instructor and used the same teaching materials to ensure consistency. The participant in the two groups were exposed to the different activities for the entire duration of the study, which lasted 12 weeks, with each session lasting 90 minutes.

Table 3.7: Different methods in the two groups

Project-Based Learning (Experimental Group)	Conventional Teaching Method (Control Group)
(a) Introducing driving questions	(a) Listening and reading dialogues
(b) (topic discussion)	(b) Learning dialogues
(c) Determining project topics (idea sharing)	(c) Imitating dialogues
(d) Scaffolding learning (script practice)	(d) Role-playing dialogues
(e) Structuring the project (rehearsal)	(e) Evaluating the role play
(f) Conducting the project (filming)	
(g) Editing a video	
(h) Presenting the video	
(i) Evaluating the video	

In the PBL group, students engaged in video-creation project activities for 13 weeks. This 13-week PBL plan consists of four projects, each focusing on developing students' speaking proficiency through video creation (See Table

3.8). For Project 1 (weeks 2-4), students watched and analyzed interviews, selected interviewees, and developed interview skills. They designed questions, conducted interviews, and created a video. Finally, they presented and evaluated their work. Moving on to Project 2 (week 5-7), students explored global scenery, chose a local scenic spot, and developed descriptive skills. They wrote and rehearsed an introductory speech, filmed a field trip, and presented their video for evaluation. During Project 3 (weeks 8-10), students brainstormed job names, discuss ideal jobs, and develop survey skills. They designed and conducted a campus survey, created a video, and presented their findings for assessment. Lastly, for Project 4 (weeks 11-13), students watched film scenes, shared experiences, and refined communication skills. They wrote and rehearsed scripts, filmed a short drama, created a video, and presented it for peer and teacher evaluation. Throughout this process, the teacher acted as a facilitator, providing guidance, support, and constructive feedback, while students took an active role in their learning, engaging in research, collaboration, and creative production.

Table 3.8: Project Completion Steps

Week	Project	Steps
2	Project 1	Watch and analyze interviews, select interviewees and topics, and develop listening and speaking skills
3	Project 1	Design interview questions and assign roles, rehearse and conduct the interview, and produce the interview video
4	Project 1	Present the final video, evaluate and reflect
5	Project 2	Explore global scenery, select a local scenic spot, and develop descriptive skills
6	Project 2	Write and rehearse an introductory speech, prepare for the field trip, and film the field trip
7	Project 2	Present the video, and evaluate and reflect
8	Project 3	Brainstorm job names, discuss ideal jobs for college students, and develop descriptive skills
9	Project 3	Design a survey, conduct the survey on campus, and create a survey video
10	Project 3	Present the video, and evaluate and reflect
11	Project 4	Watch a film scene, share personal experiences, and develop communication skills
12	Project 4	Write and rehearse scripts, film the short drama, and create a video
13	Project 4	Present the video, evaluate and reflect

Conversely, the control group was taught using a conventional teaching method to develop students' speaking proficiency four key topics over 13 weeks (See Table 3.9). As for Topic 1 (weeks 2-4), students listen to and read dialogues about meeting new people, learning relevant vocabulary and phrases. They practice by mimicking dialogues and exchanging introductory information. Finally, they pair up for role-play and evaluate their performance. Moving on to Topic 2 (weeks 5-7), students explore dialogues about scenic spots, learning descriptive phrases. They practice describing places, engage in partner role-plays on recommending scenic spots, and assess their conversational effectiveness. For Topic 3 (weeks 8-10), students study dialogues about jobs, focusing on key vocabulary. They mimic discussions on career aspirations, practice asking job-related questions, and role-play a job interview scenario before evaluating their performance. Finally, in Topic 4 (week 11-13), students listen to and repeat dialogues on inviting and receiving visitors. They practice hosting and inviting scenarios, role-play real-life invitations, and evaluate their interactions. Unlike the experimental group, which engaged in video-creation project activities, the control group primarily relied on rote learning, imitation, and controlled speaking exercises to develop their English speaking skills. While the teacher directs learning, provides corrections, and evaluates performances, students engage passively by practicing set dialogues and participating in peer assessments.

Table 3.9: Topic Completion Steps

Week	Topic	Steps
2	Topic 1	Listen to and read sample dialogues and learn vocabulary and phrases related to meeting new people and making friends
3	Topic 1	Repeat and mimic the dialogues and practice exchanging introductory information
4	Topic 1	Pair up and role-play the dialogues where you introduce yourselves and evaluate the role play
5	Topic 2	Listen to and read sample dialogues and learn phrases and sentence structures for describing scenic spots
6	Topic 2	Repeat and mimic dialogues that describe various scenic spots and practice describing a specific scenic spot
7	Topic 2	Role-play with a partner on recommendations for scenic spots and evaluate the role play
8	Topic 3	Listen to and read dialogues, and learn key vocabulary and sentence structures for discussing jobs
9	Topic 3	Repeat and mimic dialogues discussing ideal jobs and practice asking questions about career goals
10	Topic 3	Pair up and role-play a conversation on job interview and evaluate the role play
11	Topic 4	Listen to and read dialogues and learn the key phrases and vocabulary related to receiving and inviting visitors
12	Topic 4	Repeat and mimic the dialogues on inviting and receiving visitors and practice inviting someone over or receiving guests into your home or space
13	Topic 4	Role-play a scenario where one person invites the other to visit and evaluate the role play

3.11.3 Post-Intervention Stage

All participants took the speaking posttest and completed the questionnaire during the post-intervention stage. Their oral productions were recorded and transcribed verbatim. The transcripts were then coded and scored to analyze differences in English speaking proficiency between the PBL and control groups, as well as changes in complexity, accuracy, and fluency among PBL subgroups at varying proficiency levels. The questionnaire data were used to assess changes in student engagement between the PBL and control groups. Additionally, ten participants from the PBL class were interviewed to explore their perceptions of using PBL. The semi-structured interviews were conducted online, each lasting between 30 and 40 minutes. The interviews were recorded

using an audio-recording device, after which the data were transcribed, coded, and summarized.

3.12 Data Analysis

The collected data was analysed by the researcher using various types of analysis methods. The oral production data from the speaking tests were scored by CAF measurements, and generated inferential statistics by using independent samples t-test, one-way MANOVA, and two-way repeated measures ANOVA in SPSS 27.0. The questionnaire data was run by using independent samples t-test and one-way MANOVA in SPSS 27.0. The interview data was coded and categorized, and created themes through thematic analysis by NVivo 12.0.

3.12.1 CAF Analysis

The oral transcripts were analysed to assess the participants' speaking proficiency using CAF measures (Table 3.10) adapted from previous studies (e.g., Norris & Ortega, 2009; Yousefi, 2016; Ahmadian & Tavakoli, 2011). Complexity was assessed by two measures: syntactic complexity (Norris & Ortega, 2009) and lexical complexity (Daller et al., 2003). Accuracy was assessed by using syntactic accuracy (Michel, 2017) and pronunciation accuracy (Spring, 2020). Fluency was measured by using speech rate (Mora, 2006) and self-repairs (Suzuki & Kormos, 2022).

Table 3.10: Measures of CAF

CAF	Measure	Coding Tool
Complexity	Syntactic complexity	Coh-Metrix
	Lexical complexity	Coh-Metrix
Accuracy	Syntactic accuracy	Manual coding
	Pronunciation accuracy	IVI
Fluency	Speech rate	Syllable Counter
	Self-repairs	Syllable Counter

Complexity in the current study was assessed by syntactic and lexical complexity. According to Norris and Ortega (2009), complexity was analysed by two types of measures: syntactic complexity and lexical complexity. Syntactic complexity was measured by words per AS-unit, while lexical complexity was calculated by TTR. Syntactic and lexical complexity were calculated by using Coh-Metrix, a programme that uses natural language processing to analyse discourse. When counting the number of words per AS-unit, false starts, repetitions, reformulations, and replacements are taken into account. However, when calculating the TTR, the repeated or partially self-corrected within the same AS-unit are excluded.

Accuracy was focused on two types of measures: syntactic accuracy and pronunciation accuracy. Syntactic accuracy was measured by the ratio of error-free AS-units, while pronunciation accuracy was calculated by the ratio of correctly identified words. Regarding error-free clauses, errors related to verb forms and lexical choice are considered errors. When assessing pronunciation accuracy, IVI was used in this study. Pronunciation accuracy was assessed by dividing the number of words accurately predicted through IVI by the total number of words. Syntactic accuracy was measured and coded manually. Five types of errors were addressed in this study: run-on sentences, subject-verb

agreement, singular/plural forms, prepositions, and word/phrase choices (Cheng & Zhang, 2024). These structures were chosen because the pilot study identified them as the most frequently occurring error types.

Fluency analysis was focused on speech rate and self-repairs. Speech rate was measured by using the number of syllables per minute (Yousefi, 2016). Syllables were measured using Syllable Counter, an online platform for automatic syllable analysis. Subsequently, speech rate and self-repairs were calculated manually. Before assessing self-repairs, all repeated, reformulated, or replaced syllables, words, and phrases should be excluded from the analysis (Ahmadian & Tavakoli, 2011). The analysis of fluency was conducted prior to examining complexity and accuracy, which was illustrated in some examples (see Appendix O).

3.12.2 Statistical Analysis

In order to statistically solve the first research question, independent samples t-tests and one-way MANOVA were used to test the four null hypotheses (H_{01} , H_{02} , H_{03} , and H_{04}) by analysing the oral transcripts in SPSS 27.0. First of all, a series of independent samples t-tests were used to compare the mean scores of complexity, accuracy, or fluency between the experimental and control groups. After that, one-way MANOVA was used to compare the overall mean levels of speaking proficiency (complexity, accuracy, and fluency) between the PBL and conventional groups. One-way MANOVA was employed to test the effects of an independent variable on several dependent variables

(George & Mallery, 2019). Consequently, one-way MANOVA fits the study to determine whether there was a significant difference in overall speaking proficiency (complexity, accuracy, and fluency) between the PBL and conventional groups.

With regard to the second research method, two-way repeated measures ANOVA was used to test the three hypotheses (H_{05} , H_{06} , and H_{07}). A series of two-way repeated measures ANOVA was run to compare the mean scores of complexity, accuracy, and fluency across the PBL subgroups with high, medium, and low English proficiency between pretest and posttest. Two-way repeated measures ANOVA is applied to test for differences between two or more independent groups, where the dependent variable is continuous and is measured for each group across each level of the repeated factor (Pallant, 2020). Thus, the two-way repeated measures ANOVA was suitable to determine the differences in complexity, accuracy, or fluency between the high, medium, and low proficiency PBL groups between the pretest and posttest.

To statistically address the third research question, the data from the questionnaires was analysed by using independent samples t-tests and one-way MANOVA to test the five null hypotheses (H_{08} , H_{09} , H_{010} , H_{011} , and H_{012}).

The process of the statistical analysis here was the same as that used in the first question. A series of independent sample t-tests was first run to compare the mean scores of behavioural, emotional, cognitive, or agentic engagement between the experimental and control groups. Next, one-way MANOVA was employed to compare the overall mean levels of student engagement

(behavioural, emotional, cognitive, and agentic) between the PBL and conventional groups.

3.12.3 Thematic Analysis

The interview data from ten respondents in the PBL group was transcribed verbatim using IVI. Then the transcripts were analysed using six steps of Braun and Clarke's (2006) thematic analysis (adapted) with the help of NVivo 12.0. The thematic analysis includes six steps. First, be familiar with the data. The interview transcripts were read multiple times to gain initial familiarity with the data. Second, originate initial codes. The initial codes were assigned to different words, phrases, sentences, or paragraphs in each transcript through an inductive coding approach. Third, search for categories or themes. Potential categories or themes were searched for by organising and gathering relevant codes. Fourth, review themes. Themes were reviewed by repeatedly examining all the codes, categories, and themes to ensure consistency across the entire dataset and alignment with participants' accounts. Fifth, refine and name the themes. Every theme was refined and named based on the coded data and the connections between the codes and research questions. Sixth, produce the report. A report was produced, which involved drawing comprehensive conclusions about the data. The selection of data was conducted to provide evidence and support for the identified themes.

In summary, research questions, hypotheses, and the methods of data analysis used in this study are presented in Table 3.11.

Table 3.11: Questions, Hypothesis and Data Analysis Methods

	Questions and Hypotheses	Data Analysis Method
RQ1	Does PBL have any effects on polytechnic EFL learners' speaking proficiency when compared to the conventional teaching method?	
	H ₀ 1: There is no significant difference in polytechnic EFL learners' complexity between the experimental and control groups.	Independent samples t-test
	H ₀ 2: There is no significant difference in polytechnic EFL learners' accuracy between the experimental and control groups.	Independent samples t-test
	H ₀ 3: There is no significant difference in polytechnic EFL learners' fluency between the experimental and control groups.	Independent samples t-test
	H ₀ 4: There is no significant difference in polytechnic EFL learners' overall speaking proficiency between the experimental and control groups.	One-way MANOVA
RQ2	Does PBL have any effects on complexity, accuracy and fluency of polytechnic EFL learners with different levels of speaking proficiency?	
	H ₀ 5: There is no significant interaction effect on complexity between time (pretest and posttest) and subgroups (high, medium and low proficiency).	Two - way repeated measures ANOVA
	H ₀ 6: There is no significant interaction effect on accuracy between time (pretest and posttest) and subgroups (high, medium and low proficiency).	Two - way repeated measures ANOVA
	H ₀ 7: There is no significant interaction effect on fluency between time (pretest and posttest) and subgroups (high, medium and low proficiency).	Two - way repeated measures ANOVA
RQ3	Does PBL have any effects on polytechnic EFL learners' engagement when compared to the conventional teaching method?	
	H ₀ 8. There is no significant difference in polytechnic EFL college learners' behavioural engagement between the experimental and control groups.	Independent samples t-test
	H ₀ 9. There is no significant difference in polytechnic EFL learners' emotional engagement between the experimental and control groups.	Independent samples t-test
	H ₀ 10. There is no significant difference in polytechnic EFL learners' cognitive engagement between the experimental and control groups.	Independent samples t-test
	H ₀ 11. There is no significant difference in polytechnic EFL learners' agentic engagement between the experimental and control groups.	Independent samples t-test
	H ₀ 12: There is no significant difference in polytechnic EFL learners' overall student engagement between the experimental and control groups.	One-way MANOVA
RQ4	What are the polytechnic EFL learners' perspectives on the implementation of PBL in an English-speaking class?	Thematic Analysis

3.13 Ethical Considerations

Ethical considerations were taken into account in this study. The study received approval from the Ethics Committee for Research Involving Human Subjects of Universiti Putra Malaysia. Subsequently, the procedure proceeded

by acquiring formal authorization to carry out the study at Yangjiang Polytechnic (see to Appendix P).

Consent forms were obtained from the participants prior to the study (see Appendix Q in Chinese and Appendix R in English). The participants were provided with an informed consent form that included a simple description of the research before the treatment. This form provided participants with adequate information about the purpose and nature of the study, the benefits of participation, and the influence of participation on their academic outcomes. Participants could withdraw from the study at any time. Additionally, the CSE scale in this study also obtained permission from the author before being used in the study (see Appendix S). The author also provided some suggestions on how to use the scale.

The confidentiality of the participants was taken into account at all points throughout the process. The participants' names were kept confidential and coded throughout the study results. The electronic data were kept secure on the computer, which only the researchers could access. All physical documents, including consent forms, were stored in a lockbox in my home for three years and then destroyed.

3.14 Summary

This study employed a quasi-experimental research method with a non-equivalent pretest-posttest control group design. A total of 96 participants were selected purposefully from two intact classes at a polytechnic in China to form the experimental and control groups. The experimental group was administered PBL, whilst the control group adhered to the conventional teaching method. The experiment lasted for 14 weeks. The instruments to collect data in this study comprise of speaking tests, questionnaires, and semi-structured interviews. Multiple methods were used to acquire and analyse the collected data, namely focusing on CAF analysis, statistical analysis, and thematic analysis. Finally, ethical considerations were taken into account.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and interpretation of the results and findings encompassing both quantitative and qualitative data. Initially, the demographic details of the participants are presented. Statistical methods were employed to address the initial three research questions and associated hypotheses, while thematic analysis was utilised to address the fourth research question. Ultimately, the results from both quantitative and qualitative analyses were deliberated upon.

4.2 Demographic Information

The study involved 96 first-year EFL learners from a polytechnic in China. The selection of participants demonstrated homogeneity, as evidenced by similarities in demographic attributes such as gender, age, and language background (see Appendix C). Table 4.1 provides a concise overview of the demographic characteristics of the participants, presented in terms of frequency and percentage.

Table 4.1: Participants' Profile of the Two Groups

Profile	Category	PBL Group (N=49)		Control Group (N=47)		Total (96)
		Freq.	Percent (%)	Freq.	Percent (%)	Percent (%)
Gender	Male	2	4.08	2	4.26	4.17
	Female	47	95.92	45	95.74	95.83
Age	17	2	4.08	3	6.38	5.21
	18	24	48.98	27	57.45	53.13
	19	17	34.69	13	27.66	31.25
	20	5	10.20	4	8.51	9.38
	21	1	2.04	-	0	0
Language	Mandarin	49	100.00	47	100.00	100.00
	> 120	7	14.29	8	17.02	15.63
English Scores in NMTS (The total score: 150)	100-119	5	10.20	6	12.77	11.46
	80-99	22	44.90	15	31.91	38.54
	60-79	14	28.57	16	34.04	31.25
	59 >	1	2.04	2	4.26	3.13

As depicted in Table 4.1, the study participants consisted of a predominantly female (95.83%) cohort, with a small percentage being male (4.17%). All participants were exclusively native speakers of Mandarin Chinese (100%). However, there was diversity in terms of age and English proficiency as measured by the English test of the NMTS. Participant ages ranged from 17 to 21 years, with the majority being 18 years old (53.13%). Regarding their English language academic background, English scores in NMTS varied, with percentages as follows: above 120 (15.63%), 100-119 (11.46%), 80-99 (38.54%), 60-79 (31.25%), and below 59 (3.13%). It is notable that a significant proportion of participants (69.79%) obtained scores between 60 and 99. The mean score of the participants' English test in the NMTS is 93.05, indicating an intermediate to low proficiency level (the total average score is 96.42).

The interview phase comprised 10 participants chosen from the PBL group, all of whom were considered capable of offering detailed interview responses. Table 4.2 provides an overview of the demographic details of these participants, encompassing pseudonyms, gender, age, and English scores in the NMTS.

Table 4.2: Participants' Profile for the Interview

Pseudonyms	Gender	Age	English Scores in NMTS
Chen	Male	20	58
Liu	Male	18	102
Gan	Female	19	98
Jiang	Female	18	107
Li	Female	18	80
Xie	Female	18	114
Gong	Female	18	89
Luo	Female	17	75
Feng	Female	18	99
Liang	Female	19	67

As shown in Table 4.2, pseudonyms were assigned to the participants to maintain confidentiality. The participant group consisted of 2 males and 9 females, with ages ranging from 17 to 20 years old. Their English scores in the NMTS varied between 58 and 114.

4.3 Preliminary Analysis

A preliminary analysis of the speaking tests and questionnaire scores was conducted in this section. The assumptions of independent samples t-test, one-way MANOVA, and two-way repeated measured ANOVA were tested. The outcomes of this assessment are detailed in the subsequent section.

4.3.1 Test of Normality

According to Stevens (2012), reporting normality for all inferential statistics in educational research is required. Normality denotes the normal distribution of values of variables in the study (Erickson & Thiessen, 2015). Data is considered normally distributed when Skewness and Kurtosis values are

between -2 and +2 (George & Mallery, 2019). The tests of Skewness and Kurtosis distribution in this study were performed to assess the normality of the data from the speaking pretest and posttest in the experimental and control groups. Tables 4.3 and 4.4 present the results of the tests in the two groups.

Table 4.3: Skewness and Kurtosis of Speaking Test Scores of the Experimental Group

Speaking Test			N	Statistic	Experimental Group			
					Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
Complexity	Pretest	49	.747	.340	.909	.668		
	Posttest	49	.245	.340	1.723	.668		
Accuracy	Pretest	49	.290	.340	-.214	.668		
	Posttest	49	-.330	.340	-.169	.668		
Fluency	Pretest	49	-.115	.340	-.229	.668		
	Posttest	49	.483	.340	-.087	.668		

Table 4.4: Skewness and Kurtosis of Speaking Test Scores of the Control Group

Speaking Test		N	Statistic	Control Group			
				Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error
Complexity	Pretest	47	.437	.347	-.592	.681	
	Posttest	47	.404	.347	-.561	.681	
Accuracy	Pretest	47	-.159	.347	-.344	.681	
	Posttest	47	.745	.347	-.157	.681	
Fluency	Pretest	47	.412	.347	-.205	.681	
	Posttest	47	.821	.347	-.519	.681	

The results of Table 4.3 reveal that the Skewness test was within the range of -0.330 to 0.747, and the Kurtosis test was within the range of -0.229 to 1.723 for all research variables of speaking test scores in the experimental group. The results of Table 4.4 show that the Skewness test was within the range of -0.159 to 0.821, and the Kurtosis test was within the range of -0.157 to -0.592 for all research variables of speaking test scores in the control group. The normality tests for Skewness and Kurtosis reveal a normal distribution of data

across all tests in both the experimental and control groups, with a Skewness/Kurtosis ratio of -2 to 2.

Boxplot was also used to assess the normal distribution of complexity, accuracy, and fluency of the two groups at the pretest and posttest. The boxplot helps identify outliers, which can skew group averages, particularly in smaller groups. (Larson-Hall, 2010). The boxplots (see Appendix T) show there were no outliers for the complexity pretest and CAF posttest scores. However, there were one to three outliers in the data sets of complexity and fluency at pretest in the experimental group, and one to three outliers of fluency at pretest and accuracy at posttest in the control group. Pallant (2020) suggested retaining the original mean when the trimmed mean does not significantly differ from the original mean. Thus, in this study, since the trimmed mean was not much different from the original mean, the outliers were not taken out.

Skewness and Kurtosis were performed to check the normality of the questionnaire scores in this study. Tables 4.5 and 4.6 show the questionnaire scores at the pretest and posttest of the two groups.

Table 4.5: Skewness and Kurtosis of Questionnaire Scores of the Experimental Group

Engagement		N	Statistic	Experimental Group			
				Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error
Behavioural	Pretest	49	.071	.340	-.308	.668	
	Posttest	49	.171	.340	-.715	.668	
Agentic	Pretest	49	.833	.340	1.615	.668	
	Posttest	49	.667	.340	1.007	.668	
Cognitive	Pretest	49	.018	.340	.041	.668	
	Posttest	49	.371	.340	-.140	.668	
Emotional	Pretest	49	.211	.340	-.348	.668	
	Posttest	49	.056	.340	-.705	.668	

Table 4.6: Skewness and Kurtosis of Questionnaire Scores of the Control Group

Engagement			N	Statistic	Control Group			
					Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
Behavioural	Pretest	47	.100	.347	.776	.681		
	Posttest	47	.450	.347	-.280	.681		
Agentic	Pretest	47	-.028	.347	-.578	.681		
	Posttest	47	.179	.347	.950	.681		
Cognitive	Pretest	47	.084	.347	.013	.681		
	Posttest	47	.686	.347	.011	.681		
Emotional	Pretest	47	-.219	.347	.920	.681		
	Posttest	47	-.804	.347	.322	.681		

The results of Table 4.5 reveal that the Skewness test was within the range of 0.018 to 0.833, and the Kurtosis test was within the range of -0.140 to 1.615 for all research variables of questionnaire scores in the control group. The results of Table 4.6 show that the Skewness test was within the range of -0.804 to 0.686, and the Kurtosis test was within the range of -0.578 to 0.950 for all research variables of questionnaire scores in the control group. Both the experimental and control groups' questionnaire test scores followed a normal distribution with a Skewness/Kurtosis ratio of -2 to 2.

Boxplot was utilised to assess the normal distribution of behavioural, agentic, cognitive, and emotional engagement in both groups at the pretest and posttest stages. The boxplots (see Appendix U) reveal there were one to five outliers in the agentic engagement data sets at both tests and in the cognitive engagement data set at the posttest for the experimental group. Similarly, there were two to four outliers in the emotional engagement data sets at both tests and in the agentic engagement data set at the posttest for the control group. Therefore, since the trimmed mean was not significantly different from the original mean, the outliers were not removed.

4.3.2 Homogeneity Test of Variance

The homogeneity test of variances is required for each combination of the groups. The assumption of homogeneity of variance demonstrates that the variance of the group is equivalent. Levene's test was employed to test this assumption of homogeneity of variances. Table 4.7 displays the outcomes of Levene's test for complexity, accuracy, and fluency.

Table 4.7: Levene's Test of CAF

Speaking Test	Levene Statistic	df1	df2	Sig.
Complexity	.025	1	94	.874
Accuracy	.512	1	94	.476
Fluency	.845	1	94	.360

As shown in Table 4.7, there was homogeneity of variance ($p > .05$) in the speaking tests of complexity ($p = .874$), accuracy ($p = .476$), and fluency ($p = .360$). The obtained significance values confirm the assumption of homogeneity of variance.

The Levene's test was performed to test the homogeneity of the variance of questionnaire data in the study before applying statistical tests. Table 4.8 presents the results of Levene's test of behavioural, agentic, cognitive, and emotional engagement.

Table 4.8: Levene's Test of Four Engagement Dimensions

Engagement	Levene Statistic	df1	df2	Sig.
Behavioural	2.231	1	94	.139
Agentic	3.518	1	94	.064
Cognitive	.062	1	94	.804
Emotional	1.864	1	94	.173

As seen from Table 4.8, there was homogeneity of variance ($p > .05$) in the survey of behavioural ($p = .139$), agentic ($p = .064$), cognitive ($p = .804$), and emotional ($p = .173$). The obtained significance values indicated that the assumption of homogeneity of variance was met.

4.3.3 Test of No Multicollinearity

Multicollinearity was run to check whether there is a correlation between dependent variables. Multicollinearity refers to a condition where there is a very high correlation between dependent variables, and a value that exceeds 0.90 is considered high (Laerd Statistics, 2018). Previous research suggested that MANOVA and repeated measures ANOVA function most effectively when the correlation among dependent variables is highly negatively correlated (Tabachnick & Fidell, 2007). In this study, a correlation test was performed to meet the assumptions of one-way MANOVA. Table 4.9 below shows the results of the correlation test between complexity, accuracy, and fluency.

Table 4.9: Correlation between CAF of the Two Groups

		Complexity	Accuracy	Fluency
Complexity	Pearson Correlation	1		
Accuracy	Pearson Correlation	-.384**	1	
Fluency	Pearson Correlation	-.348*	.285*	1

In Table 4.9, complexity and accuracy correlated at $r = -.384^{**}$, complexity and fluency correlated at $r = -.348^{*}$, accuracy and fluency correlated at $r = .285^{*}$. The Pearson correlation analysis among the three variables at the posttest indicated that the variables were moderately correlated. The value which was

lower than .90 confirmed that the assumption of no multicollinearity between the dependent variables was met.

In order to meet the assumptions of two-way repeated measure ANOVA, the dependent variables should be correlated. Multicollinearity was conducted to check whether there is a correlation between dependent variables. Table 4.10 below shows the results of the correlation test between complexity, accuracy, and fluency at the pretest and posttest.

Table 4.10: Correlation between CAF of the Different Proficiency Learners

		Complexity Pretest	Accuracy Pretest	Fluency Pretest
Complexity Pretest	Pearson Correlation	1		
Accuracy Pretest	Pearson Correlation	-.415**	1	
Fluency Pretest	Pearson Correlation	.404**	-.301*	1
		Complexity Posttest	Accuracy Posttest	Fluency Posttest
Complexity Posttest	Pearson Correlation	1		
Accuracy Posttest	Pearson Correlation	.415**	1	
Fluency Posttest	Pearson Correlation	.360*	.337*	1

In Table 4.10, complexity and accuracy at the pretest correlated at $r = -.415^{**}$, complexity and fluency correlated at $r = .404^{**}$, and accuracy and fluency correlated at $r = -.301^{*}$. Similarly, complexity and accuracy at posttest correlated at $r = .415^{**}$, complexity and fluency correlated at $r = .360^{**}$, and accuracy and fluency correlated at $r = .377^{*}$. The Pearson correlation analysis of the three affective variables at the pretest and posttest indicated that they were moderately correlated. The value, less than .90, validated the assumption of no multicollinearity among the dependent variables.

In order to run the one-way MANOVA, the variables should be moderately correlated with each other. Multicollinearity was first checked by using a correlation test. Table 4.11 below shows the correlation test results for behavioural, agentic, cognitive, and emotional engagement.

Table 4.11: Correlation between Four Engagement Dimensions

		Behavioural	Agentic	Cognitive	Emotional
Behavioural	Pearson Correlation	1			
Agentic	Pearson Correlation	.640**	1		
Cognitive	Pearson Correlation	.755**	.671**	1	
Emotional		.846**			1

In Table 4.11, behavioural and agentic engagement correlated at $r = .640^{**}$, behavioural and cognitive engagement correlated at $r = .755^{**}$, agentic and cognitive engagement correlated at $r = .671^{**}$, and behavioural and emotional engagement correlated at $r = .846^{**}$. The value, which was lower than .90, confirmed that the assumption of no multicollinearity between the dependent variables was met.

4.3.4 Comparison of Baseline Condition

Before the experiment, speaking pretest scores were compared to ensure homogeneity between the experimental and control groups regarding complexity, accuracy, and fluency. The independent samples t-test was computed on the participants' pretest scores in the speaking test to determine whether there was any significant difference between the experimental group and the control group at the beginning of the study. The test results are displayed below in Table 4.12.

Table 4.12: Comparison of Complexity at Pretest between the Two Groups

Pretests	Groups	N	Mean	SD	t	df	Sig.
Complexity	Experimental	49	6.341	1.714	-.404	94	.687
	Control	47	6.489	1.867			
Syntactic	Experimental	49	12.119	3.466	-.382	94	.703
	Control	47	12.400	3.752			
Lexical	Experimental	49	.563	.121	-.598	94	.552
	Control	47	.577	.100			

Table 4.12 reveals there was no significant difference in the pretest mean scores for complexity ($t = -.404$, $p = .687 > .05$) between the experimental group ($M = 6.341$, $SD = 1.714$) and the control group ($M = 6.489$, $SD = 1.867$). To be more specific, no significant differences were found in the pretest mean scores for syntactic complexity ($t = -.382$, $p = .703 > .05$) between the experimental group ($M = 12.119$, $SD = 3.466$) and the control group ($M = 12.400$, $SD = 3.752$). Similarly, there was also no significant difference in the mean scores for lexical complexity ($t = -.598$, $p = .552 > .05$) between the experimental group ($M = .563$, $SD = .121$) and the control group ($M = .577$, $SD = .100$). The results indicate that the students from both groups were comparable in terms of complexity (syntactic and lexical complexity) at the beginning of the study.

Table 4.13 presents the results of the comparison of accuracy at pretest between the experimental and control groups.

Table 4.13: Comparison of Accuracy at Pretests between the Two Groups

Pretests	Groups	N	Mean	SD	t	df	Sig.
Accuracy	Experimental	49	.714	.125	1.282	94	.203
	Control	47	.707	.127			
Syntactic	Experimental	49	.465	.243	.111	94	.912
	Control	47	.459	.249			
Pronunciation	Experimental	49	.964	.042	1.139	94	.258
	Control	47	.955	.029			

Table 4.13 shows there was no significant difference in the pretest mean scores for accuracy ($t = 1.282$, $p = .203 > .05$) between the experimental group ($M = .714$, $SD = .125$) and the control group ($M = .707$, $SD = .127$). Similarly, no significant differences were found in the pretest mean scores for syntactic accuracy ($t = .111$, $p = .912 > .05$) between the experimental group ($M = .465$, $SD = .243$) and the control group ($M = .459$, $SD = .249$). Moreover, there was also no significant difference in the mean scores for pronunciation accuracy ($t = 1.139$, $p = .258 > .05$) between the experimental group ($M = .964$, $SD = .042$) and the control group ($M = .955$, $SD = .029$). The results suggest that students from both groups demonstrated similar levels of accuracy (syntactic and pronunciation accuracy) at the start of the study.

Table 4.14 presents the results of the comparison of fluency at the pretest between the experimental and control groups.

Table 4.14: Comparison of Fluency at Pretests between the Two Groups

Pre-tests	Groups	N	Mean	SD	t	df	Sig.
Fluency	Experimental	49	1.600	.847	1.185	94	.239
	Control	47	1.406	.756			
Speech rates	Experimental	49	1.656	.850	1.294	94	.199
	Control	47	1.444	.753			
Self-repairs	Experimental	49	1.544	.850	1.070	94	.287
	Control	47	1.367	.762			

According to Table 4.14, there was no significant difference in the pretest mean scores for fluency ($t = 1.185$, $p = .239 > .05$) between the experimental group ($M = 1.600$, $SD = .847$) and the control group ($M = 1.406$, $SD = .756$). Similarly, no significant difference was found in the pretest mean scores for speech rate ($t = 1.294$, $p = .199 > .05$) between the experimental group ($M = 1.656$, $SD = .850$)

and control group ($M = 1.444$, $SD = .753$). There was also no significant difference in the mean scores for self-repairs ($t = 1.070$, $p = .287 > .05$) between the experimental group ($M = 1.544$, $SD = .850$) and the control group ($M = 1.367$, $SD = .762$). The results suggest that, at the beginning of the study, students from both groups were similar in fluency, as measured by speech rate and self-repairs.

Questionnaire pretest scores were compared to ensure homogeneity between the experimental and control groups regarding behavioural, agentic, cognitive, and emotional engagement. The independent samples t-test was computed on the participants' pretest scores in the questionnaire to determine whether there was any significant difference between the experimental and control groups at the beginning of the study. The test results are presented in Table 4.15.

Table 4.15: Comparison of Four Engagement Dimensions at Pretest between the Two Groups

Engagement	Groups	N	Mean	SD	t	df	Sig.
Behavioural	Experimental	49	3.820	.614	.282	94	.779
	Control	47	3.787	.535			
Agentic	Experimental	49	3.612	.298	.064	94	.949
	Control	47	3.609	.276			
Cognitive	Experimental	49	3.714	.736	.046	94	.963
	Control	47	3.707	.706			
Emotional	Experimental	49	3.751	.698	.044	94	.965
	Control	47	3.745	.721			

Table 4.15 shows no significant differences in pretest scores of behavioural ($t = .282$, $p = .779 > .05$), agentic ($t = .064$, $p = .949 > .05$), cognitive ($t = .046$, $p = .963 > .05$), and emotional ($t = .044$, $p = .965 > .05$) between the two groups. The experimental group's mean scores on the four engagement dimensions

were slightly higher than those in the control group. The average score of behavioural engagement in the experimental group ($M = 3.820$, $SD = .614$) is somewhat higher than that in the control group ($M = 3.787$, $SD = .535$). The average score of agentic engagement in the experimental group ($M = 3.612$, $SD = .298$) is marginally higher compared to the control group ($M = 3.609$, $SD = .276$). The average scores of cognitive engagement in the experimental group ($M = 3.714$, $SD = .736$) are marginally higher than those in the control group ($M = 3.707$, $SD = .706$). The average emotional engagement score in the experimental group ($M = 3.751$, $SD = .698$) is somewhat higher than that in the control group ($M = 3.745$, $SD = .721$). The results indicate that students from both groups were comparable in their levels of behavioural, agentic, cognitive, and emotional engagement at the beginning of the study.

4.4 Descriptive Statistics

Descriptive statistics were applied to analyse the scores of the speaking tests and questionnaires for the experimental and control groups at the pretest and posttest.

4.4.1 Speaking Tests Scores of Two Groups

The descriptive statistics for complexity (syntactic and lexical complexity), accuracy (syntactic and pronunciation accuracy), and fluency (speech rate and self-repairs) at pretest are presented for the experimental and control groups in Table 4.16.

Table 4.16: Descriptive Statistics for CAF at Pretest

Pretest	Groups	N	Mean	SD	Std. Error Mean
Complexity	Experimental	49	6.341	1.714	.245
	Control	47	6.489	1.867	.272
Syntactic Complexity	Experimental	49	12.119	3.466	.495
	Control	47	12.400	3.752	.547
Lexical Complexity	Experimental	49	.563	.121	.017
	Control	47	.577	.100	.015
Accuracy	Experimental	49	.714	.125	.018
	Control	47	.707	.127	.020
Syntactic Accuracy	Experimental	49	.465	.243	.035
	Control	47	.459	.249	.036
Pronunciation Accuracy	Experimental	49	.964	.042	.006
	Control	47	.955	.029	.004
Fluency	Experimental	49	1.600	.847	.121
	Control	47	1.406	.756	.110
Speech rate	Experimental	49	1.656	.850	.121
	Control	47	1.444	.753	.110
Self-repairs	Experimental	49	1.544	.850	.121
	Control	47	1.367	.762	.111

As seen in Table 4.16, the mean score of complexity in the pretest for the experimental group ($M = 6.341$, $SD = 1.714$) is slightly lower than the control group ($M = 6.489$, $SD = 1.867$). Similarly, both the mean scores of syntactic ($M = 12.119$, $SD = 3.466$) and lexical complexity ($M = .563$, $SD = .121$) in the experimental group are slightly lower than those of syntactic ($M = 12.400$, $SD = .577$) and lexical complexity ($M = .577$, $SD = .100$) in the control group. Conversely, the mean scores of accuracy ($M = .714$, $SD = .125$) and fluency ($M = 1.600$, $SD = .847$) in the pretest for the experimental group are slightly higher than those of accuracy ($M = .707$, $SD = .127$) and fluency ($M = 1.406$, $SD = .756$) in the control group. When it comes to accuracy, the experimental group did better on both syntactic ($M = .465$, $SD = .243$) and pronunciation ($M = .964$, $SD = .042$) than the control group did on syntactic ($M = .459$, $SD = .249$) and lexical complexity ($M = .955$, $SD = .029$). The findings indicate that the differences between the two groups are minor, suggesting that both groups started at a relatively comparable level.

The descriptive statistics for complexity (syntactic and lexical complexity), accuracy (syntactic and pronunciation accuracy), and fluency (speech rate and self-repairs) at posttest are presented for the two groups in Table 4.17.

Table 4.17: Descriptive Statistics for CAF at Posttest

Posttest	Groups	N	Mean	SD	Std. Error Mean
Complexity	Experimental	49	7.302	1.936	.277
	Control	47	6.632	1.708	.249
Syntactic Complexity	Experimental	49	13.915	3.866	.552
	Control	47	12.416	3.437	.501
Lexical Complexity	Experimental	49	.688	.107	.015
	Control	47	.647	.131	.019
Accuracy	Experimental	49	.730	.115	.016
	Control	47	.735	.106	.015
Syntactic Accuracy	Experimental	49	.482	.227	.032
	Control	47	.503	.206	.030
Pronunciation Accuracy	Experimental	49	.980	.020	.003
	Control	47	.967	.033	.005
Fluency	Experimental	49	2.612	1.096	.157
	Control	47	2.060	1.833	.158
Speech rate	Experimental	49	2.660	1.094	.156
	Control	47	2.163	1.150	.168
Self-repairs	Experimental	49	2.564	1.103	.158
	Control	47	1.957	1.032	.151

Table 4.17 reveals the changes in the mean scores of complexity, accuracy, and fluency at the posttest between the two groups. The mean score of complexity in the experimental group ($M = 7.302$, $SD = 1.936$) is higher than the control group ($M = 6.632$, $SD = 1.708$). The mean scores of syntactic ($M = 13.915$, $SD = 3.866$) and lexical complexity ($M = .668$, $SD = .107$) are also higher than those of syntactic ($M = 12.416$, $SD = 3.437$) and lexical complexity ($M = .647$, $SD = .131$) in the control group. However, the mean score of accuracy in the experimental group ($M = .730$, $SD = .115$) is slightly lower than the control group ($M = .735$, $SD = .106$). Of the two types of accuracy, the average score of syntactic accuracy in the experimental group ($M = .482$, $SD = .227$) gets slightly lower than the control group ($M = .503$, $SD = .206$), while

that of pronunciation accuracy in the experimental group ($M = .980$, $SD = .020$) is still higher than the control group ($M = .967$, $SD = .033$). Lastly, the experimental group still scored higher on average in fluency ($M = 2.612$, $SD = 1.096$) compared to the control group ($M = 2.060$, $SD = 1.833$). The findings indicate that, at the posttest, the PBL group surpassed the conventional group in terms of complexity, fluency, and pronunciation accuracy among polytechnic EFL learners, but not in syntactic accuracy.

4.4.2 Speaking Tests Scores of Different Proficiency Learners

The descriptive analysis focused on the speaking scores among high, medium, and low proficiency learners who followed PBL. Table 4.18 illustrates the descriptive statistics for complexity, accuracy, and fluency across various PBL subgroups.

Table 4.18: Descriptive Statistics for CAF between Time and Subgroups

Speaking Proficiency	Subgroup	Test	N	Mean	SD
Complexity	High	Pretest	15	8.289	.831
		Posttest	15	8.371	1.009
	Medium	Pretest	15	6.360	.595
		Posttest	15	7.424	.868
	Low	Pretest	15	4.631	.673
		Posttest	15	6.470	.940
Accuracy	High	Pretest	15	.728	.107
		Posttest	15	.767	.088
	Medium	Pretest	15	.740	.077
		Posttest	15	.745	.102
	Low	Pretest	15	.724	.120
		Post	15	.727	.126
Fluency	High	Pretest	15	1.701	.297
		Posttest	15	2.355	.744
	Medium	Pretest	15	1.641	.310
		Posttest	15	2.100	.514
	Low	Pretest	15	1.441	.315
		Posttest	15	1.741	.745

Table 4.18 illustrates the shifts in average scores for complexity, accuracy, and fluency across time (pretest and posttest) and proficiency subgroups (high, medium, and low). Notably, the mean complexity scores for all proficiency levels in the pretest (High: $M = 8.298$; Medium: $M = 6.360$; Low: $M = 4.631$) exceed those in the posttest (High: $M = 8.371$; Medium: $M = 7.424$; Low: $M = 6.470$). Similarly, mean accuracy scores in the pretest (High: $M = .734$; Medium: $M = .727$; Low: $M = .724$) are higher compared to those in the posttest (High: $M = .767$; Medium: $M = .739$; Low: $M = .727$). Additionally, mean fluency scores in the pretest (High: $M = 1.701$; Medium: $M = 1.641$; Low: $M = 1.441$) are also greater than those in the post-test (High: $M = 2.355$; Medium: $M = 2.100$; Low: $M = 1.741$). In summary, the PBL learners with different proficiency levels exhibited improved performance in the posttest compared to the pretest.

4.4.3 Questionnaire Scores of Two Groups

Descriptive statistics were utilised to examine the scores gathered from the questionnaire. The mean and standard deviation of the four engagement dimensions were assessed in the experimental group, with the findings delineated in Table 4.19.

Table 4.19: The Mean and SD of Four Engagement Dimensions in the Experimental Group

Engagement	Pretest		Posttest	
	Mean	SD	Mean	SD
Behavioural				
1. When I'm in this class, I listen very carefully.	3.96	.763	4.22	.654
2. I pay attention in this class.	3.80	.816	4.12	.634
3. I try hard to do well in this class.	3.63	.698	4.04	.676
4. In this class, I work as hard as I can.	3.98	.692	4.35	.597
5. When I'm in this class, I participate in class discussions.	3.73	.785	4.10	.714
Agentic				
6. I let my teacher know what I need and want.	3.45	.709	3.65	.779
7. let my teacher know what I am interested in.	3.43	.612	3.67	.801
8. During this class, I express my preferences and opinions.	3.65	.481	3.63	.755
9. During class, I ask questions to help me learn.	3.84	.426	3.73	.758
10. When I need something in this class, I'll ask the teacher for it.	3.62	.602	3.49	.739
Cognitive				
11. When I study for this class, I try to connect what I am learning with my own experiences.	3.65	.805	3.98	.750
12. I try to make all the different ideas fit together and make sense when I study for this class.	3.69	.769	3.90	.743
13. When doing work for this class, I try to relate what I'm learning to what I already know.	3.82	.755	4.04	.661
14. I make up my own examples to help me understand the important concept I study for this class.	3.69	.769	3.98	.661
Emotional				
15. When we work on something in this class, I feel interested.	3.86	.816	4.04	.676
16. This class is fun.	3.78	.848	4.06	.747
17. I enjoy learning new things in this class.	3.80	.735	4.27	.605
18. When I'm in this class, I feel good.	3.65	.779	4.06	.719
19. When we work on something in this class, I get involved.	3.67	.826	4.10	.714

Table 4.19 reveals the mean and standard deviation of the items encompassing behavioural, agentic, cognitive, and emotional engagement within the PBL group. Notably, Item 4 underscored the participants' commitment to exerting maximum effort, exhibiting the highest mean scores both at pretest ($M = 3.98$, $SD = .692$) and posttest ($M = 4.35$, $SD = .597$) among the 19 items surveyed. Conversely, Item 7, which pertained to letting the teacher know what they are interested in, recorded the lowest mean score at pretest ($M = 3.43$, $SD = .612$), while the mean score of Item 10, which was

about asking the teacher what they needed in class, listed the lowest at posttest ($M = 3.49$, $SD = .739$). The results show that the items of behavioural engagement in the PBL group received the highest mean scores in both the pretest and posttest, while the items of agentic engagement received the lowest mean scores.

The cumulative mean and standard deviation of the four engagement dimensions were assessed in the experimental group. The results are presented in Table 4.20.

Table 4.20: The CM and SD of Four Engagement Dimensions in the Experimental Group

Engagement	Pretest		Posttest	
	Mean	SD	Mean	SD
Behavioural	3.820	.614	4.617	.523
Agentic	3.612	.298	3.637	.616
Cognitive	3.714	.736	3.969	.618
Emotional	3.751	.698	4.106	.586

Table 4.20 shows that the average scores for behavioural ($M = 3.820$, $SD = .614$), agentic ($M = 3.612$, $SD = .298$), cognitive ($M = 3.714$, $SD = .736$), and emotional ($M = 3.714$, $SD = .698$) engagement were lower at pretest compared to the scores for behavioural ($M = 4.617$, $SD = .523$), agentic ($M = 3.637$, $SD = .616$), cognitive ($M = 3.969$, $SD = .618$), and emotional engagement ($M = 4.106$, $SD = .586$) at posttest in the experimental group. Moreover, the level of behavioural engagement was the highest at both the pretest ($M = 3.820$, $SD = .614$) and posttest ($M = 4.617$, $SD = .523$). Emotional engagement and cognitive engagement were also high, but slightly lower than behavioural engagement. On the other hand, agentic engagement had the lowest mean at

both the pretest ($M = 3.612$, $SD = .298$) and posttest ($M = 3.637$, $SD = .616$). Therefore, the findings indicate that learners in the BPL group primarily demonstrated their behavioural engagement, followed by different degrees of engagement in the emotional, cognitive, and agentic aspects. The findings indicate that the learners' behavioural, agentic, cognitive, and emotional involvement increased following the implementation of PBL.

Descriptive statistics were used to analyse the mean and standard deviation of the four engagement dimensions in the control group. The results are presented in Table 4.21.

Table 4.21: The Mean and SD of Four Engagement Dimensions in the Control Group

Engagement	Pretest		Posttest	
	Mean	SD	Mean	SD
Behavioural				
1. When I'm in this class, I listen very carefully.	3.81	.741	3.96	.658
2. I pay attention in this class.	3.81	.711	3.72	.615
3. I try hard to do well in this class.	3.68	.783	3.64	.605
4. In this class, I work as hard as I can.	3.89	.787	4.15	.589
5. When I'm in this class, I participate in class discussions.	3.74	.793	3.83	.637
Agentic				
6. I let my teacher know what I need and want.	3.43	.580	3.35	.764
7. I let my teacher know what I am interested in.	3.51	.585	3.47	.718
8. During this class, I express my preferences and opinions.	3.49	.804	3.68	.695
9. During class, I ask questions to help me learn.	3.85	.551	3.81	.576
10. When I need something in this class, I'll ask the teacher for it.	3.81	.537	3.74	.530
Cognitive				
11. When I study for this class, I try to connect what I am learning with my own experiences.	3.71	.749	3.70	.690
12. I try to make all the different ideas fit together and make sense when I study for this class.	3.70	.805	3.81	.711
13. When doing work for this class, I try to relate what I'm learning to what I already know.	3.72	.772	3.79	.690
14. I make up my own examples to help me understand the important concept I study for this class.	3.70	.720	3.62	.644
Emotional				
15. When we work on something in this class, I feel interested.	3.74	.846	3.72	.852
16. This class is fun.	3.68	.837	3.74	.846
17. I enjoy learning new things in this class.	3.94	.791	3.87	.536
18. When I'm in this class, I feel good.	3.68	.783	3.83	.601
19. When we work on something in this class, I get involved.	3.69	.784	3.85	.691

Table 4.21 displays the average and variability of the items related to behavioural, agentic, cognitive, and emotional engagement within the control group. In contrast to the PBL group, Item 7 in the domain of emotional engagement had the highest average scores at the pretest ($M = 3.94$, $SD = .791$). This item specifically measured the participants' delight in learning new topics in class. However, during the posttest, the participants' commitment to expending maximum effort moved to Item 4, which had the highest mean score of 4.15 ($SD = .589$). In the agentic engagement domain, the experimental group had the same lowest average scores in both the pretest and posttest as the control group. The mean scores for Item 6, which pertained to communicating their needs and desires to the teacher, remained the lowest both before the exam ($M = 3.43$, $SD = .580$) and after the test ($M = 3.35$, $SD = .764$). The findings indicate that the conventional group and the PBL group were comparable in behavioural engagement, which had the highest average scores. Similarly, agentic engagement had the lowest average scores in both groups.

The cumulative mean and standard deviation of the four engagement dimensions were assessed in the control group. The results are presented in Table 4.22.

Table 4.22: The CM and SD of Four Engagement Dimensions in the Control Group

	Pretest		Posttest	
	Mean	SD	Mean	SD
Behavioural	3.787	.535	3.830	.384
Agentic	3.609	.276	3.623	.401
Cognitive	3.707	.706	3.713	.549
Emotional	3.745	.721	3.804	.513

Table 4.22 shows that the average scores for behavioural ($M = 3.787$, $SD = .535$), agentic ($M = 3.609$, $SD = .276$), cognitive ($M = 3.707$, $SD = .706$), and emotional ($M = 3.745$, $SD = .721$) engagement were lower at pretest compared to the scores for behavioural ($M = 3.830$, $SD = .384$), agentic ($M = 3.623$, $SD = .401$), cognitive ($M = 3.713$, $SD = .549$), and emotional engagement ($M = 3.804$, $SD = .513$) at posttest in the control group. In the control group, behavioural engagement had the highest average score at both the pretest ($M = 3.787$, $SD = .535$) and posttest ($M = 3.830$, $SD = .384$). Emotional engagement and cognitive engagement had slightly lower average scores. Agentic engagement had the lowest average score at both the pretest ($M = 3.609$, $SD = .276$) and posttest ($M = 3.623$, $SD = .401$). The findings indicate that the learners who received the conventional teaching methods mainly exhibited their behavioural engagement, followed by varying levels of engagement in the emotional, cognitive, and agentic aspects. The findings further demonstrate that the learners' behavioural, proactive, cognitive, and emotional engagement significantly increased after the instruction of the conventional teaching method.

4.5 Comparison of Effects of Project-Based Learning on Speaking Proficiency between Groups

This section addresses the first research objective and question. The research objective was to determine the effect of the PBL method on polytechnic EFL learners' speaking proficiency. To achieve this, the speaking pretest and posttest were used to measure the differences in speaking proficiency (complexity, accuracy, and fluency) between the two groups. The first to fourth null hypotheses for the first research question were formulated for testing.

4.5.1 Comparison of Effects on Complexity, Accuracy and Fluency between Groups

H₀1: There is no significant difference in polytechnic EFL learners' complexity between the experimental and control groups.

The first hypothesis posits that there is no significant difference in complexity between the experimental and control groups. To test this hypothesis, an independent samples t-test was performed to compare the effect of PBL and conventional teaching methods on polytechnic EFL learners' complexity. Table 4.23 provides the summary statistics of the independent samples t-test of the scores of complexity in terms of syntactic and lexical complexity at the posttest.

Table 4.23: Comparison of Complexity at Posttest between the Two Groups

Posttest	Groups	N	Mean	SD	t	Sig.	d
Complexity	Experimental	49	7.302	1.936	2.063	.042*	.421
	Control	47	6.632	1.708			
Syntactic	Experimental	49	13.915	3.866	2.005	.048*	.409
	Control	47	12.416	3.437			
Lexical	Experimental	49	.688	.107	1.679	.094	.343
	Control	47	.647	.131			

As demonstrated in Table 4.23, a notable difference emerged between the two groups concerning complexity ($t = 2.063$, $p = .042 < .05$). The mean complexity score for the experimental group ($M = 7.302$, $SD = 1.936$) slightly exceeded that of the control group ($M = 6.632$, $SD = 1.708$), with an effect size ($d = .421$) indicating a small effect. Specifically, a significant effect was detected in syntactic complexity ($t = 2.005$, $p = .048 < .05$), while no substantial difference was noted in lexical complexity ($t = 1.679$, $p = .094 > .05$). Similarly, the mean syntactic complexity score for the experimental group ($M = 13.915$, $SD = 3.866$) surpassed that of the control group ($M = 12.416$, $SD = 3.437$), with an effect

size ($d = .409$) suggesting a small to medium effect. These findings indicate that complexity scores significantly differed between the PBL and conventional teaching method groups.

In brief, the first hypothesis was rejected as there was a notable difference in complexity ($p = .042$). Consequently, the PBL group exhibited superior performance over the conventional group, particularly in terms of syntactic complexity.

H₀₂: There is no significant difference in polytechnic EFL learners' accuracy between the experimental and control groups.

The second hypothesis suggests that there is no significant difference in accuracy between the experimental and control groups. To test this hypothesis, an independent sample t-test was performed to compare the effect of PBL and conventional teaching methods on polytechnic EFL learners' accuracy. Table 4.24 displays the summary statistics of the independent samples t-test of the scores of accuracy, syntactic accuracy, and pronunciation accuracy at the posttest.

Table 4.24: Comparison of Accuracy at Posttest between the Two Groups

Posttest	Groups	N	Mean	SD	t	Sig	d
Accuracy	Experimental	49	.730	.115	-.207	.837	-.042
	Control	47	.735	.106			
Syntactic	Experimental	49	.482	.227	-.459	.648	-.094
	Control	47	.503	.206			
Pronunciation	Experimental	49	.980	.020	2.365	.020*	.483
	Control	47	.967	.033			

According to Table 4.24, there was no significant difference in accuracy between the two groups ($t = -.207$, $p = .837 > .05$). The PBL group's mean accuracy score ($M = .730$, $SD = .115$) was slightly higher than the conventional group's accuracy mean score ($M = .735$, $SD = .106$), with a trivial effect size ($d = -.042$). To be more specific, there was a significant difference in pronunciation accuracy ($t = 2.365$, $p = .020 < .05$, $d = .483$) but not in syntactic accuracy ($t = -.459$, $p = .648 > .05$). The mean scores of syntactic ($M = .482$, $SD = .227$) and pronunciation accuracy ($M = .980$, $SD = .020$) for the PBL group were slightly higher than those of syntactic ($M = .503$, $SD = .206$) and pronunciation accuracy ($M = .967$, $SD = .033$) for the conventional group. The findings indicate that while there was a significant difference in pronunciation accuracy between the PBL and conventional groups, the overall improvement in accuracy did not reach statistical significance.

Essentially, the second hypothesis was supported. The improvement between the PBL and conventional teaching method groups was not statistically significant in overall accuracy ($p = .837$) and syntactic accuracy ($p = .648$). However, the significant effects were detected specifically in pronunciation accuracy ($p = .020$). The findings indicate that the PBL group excelled in pronunciation accuracy compared to the conventional group, but there was no difference in overall accuracy or syntactic accuracy.

H₀₃: There is no significant difference in polytechnic EFL learners' fluency between the experimental and control groups.

The third hypothesis suggests there is no significant difference in accuracy between the experimental and control groups. To test this hypothesis, an

independent samples t-test was performed to compare the effect of PBL and conventional teaching methods on polytechnic EFL learners' fluency. Table 4.25 presents the summary statistics of the independent samples t-test of the scores of fluency, speech rates, and self-repairs at the posttest.

Table 4.25: Comparison of Fluency at Posttest between the Two Groups

Posttest	Groups	N	Mean	SD	t	Sig.	d
Fluency	Experimental	49	2.612	1.096	2.479	.015*	.506
	Control	47	2.060	1.083			
Speech rates	Experimental	49	2.660	1.094	2.169	.033*	.443
	Control	47	2.163	1.150			
Self-repairs	Experimental	49	2.564	1.103	2.779	.007**	.567
	Control	47	1.957	1.032			

As shown in Table 4.25, there was a significant difference between the two groups in fluency ($t = 2.479$, $p = .015 < .05$). The mean fluency score for the experimental group ($M = 2.612$, $SD = 1.096$) was higher than the mean score for the control group ($M = 2.060$, $SD = 1.083$). The effect size ($d = .506$) suggests a medium impact. Similarly, significant effects were also observed in speech rates ($t = 2.169$, $p = .033 < .05$) and self-repairs ($t = 2.779$, $p = .007 < .05$). The mean scores of speech rates ($M = 2.660$, $SD = 1.094$) and self-repairs ($M = 2.564$, $SD = 1.103$) for the experimental group were also higher than those of speech rates ($M = 2.163$, $SD = 1.150$) and self-repairs ($M = 1.957$, $SD = 1.032$) for the control group. The effect size ($d = .443$) of speech rates was small to medium, while the effect size ($d = .567$) of self-repairs was medium. The results indicate that the PBL group outperformed the conventional teaching method group in fluency, including both speech rates and self-repairs.

In summary, the third hypothesis was rejected. Significant effects were observed on fluency ($p = .015$), including speech rate ($p = .033$) and self-repairs ($p = .007$). The findings indicate that the PBL group demonstrated superior performance in fluency, as evidenced by their speech rates and self-repairs compared to the conventional group.

4.5.2 Comparison of Effects on Overall Speaking Proficiency between Groups

H₀₄: There is no significant difference in college EFL learner' overall speaking proficiency between the experimental and control groups.

The fourth hypothesis states that there is no significant difference in overall speaking proficiency between the two groups. In order to test this hypothesis, a one-way MANOVA procedure was performed to determine the effects of the PBL and conventional teaching methods on the three dependent variables (complexity, accuracy, and fluency) that defined the overall speaking proficiency in this study. The homogeneity of covariance matrices was first checked during the one-way MANOVA procedure. The obtained significance value of .074 concluded that the assumption of homogeneity of covariance matrices was met. Table 4.26 below presents the results of the multivariate test.

Table 4.26: Results of MANOVA on Speaking Proficiency between the Two Groups

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's Trace	.098	3.319 ^b	3.000	92.000	.023	.098
Wilks' Lambda	.902	3.319^b	3.000	92.000	.023*	.098
Hotelling's Trace	.108	3.319 ^b	3.000	92.000	.023	.098
Roy's Largest Root	.108	3.319 ^b	3.000	92.000	.023	.098

Table 4.26 shows that a significant difference was found between the two groups on the overall speaking proficiency ($F(3, 92) = 3.319, p = .023 < .05$). Wilks' Lambda was selected in this study because it is considered more robust when the assumption of equal covariance matrices is met (George & Mallery, 2019). The partial eta squared value of .098 showed a small effect, which meant that only 9.8% of the changes in speaking proficiency could be explained by the treatment. The findings indicate that the PBL method could significantly improve students' speaking proficiency compared to the conventional teaching method.

In brief, the fourth hypothesis was rejected. This is because there was a significant effect on polytechnic EFL learners' overall speaking proficiency ($p = .023$) between the PBL and conventional groups. Thus, when compared to the conventional teaching method, PBL has the potential to notably enhance students' overall speaking proficiency.

4.6 Comparison of Effects of Project-Based Learning on Complexity, Accuracy and Fluency among Different Proficiency Learners

This section addresses the second research question, focusing on assessing the effects of the PBL method on complexity, accuracy, and fluency between time and subgroups. To delve deeper into this investigation, the researcher categorised the PBL participants into high, medium, and low proficiency subgroups based on the normal distribution of their scores at the speaking pretest. Fifteen participants were selected randomly from the high, medium, and low proficiency subgroups, respectively. Their speaking proficiency,

assessed in terms of complexity, accuracy, and fluency, was evaluated before and after the intervention to gauge the extent of improvement. By categorising the polytechnic EFL learners in the PBL group into high, medium, and low proficiency subgroups, the aim was to ascertain whether the changes observed between the pretest and posttest varied among these subgroups. The underlying assumption was that if the PBL method was truly effective, all groups would exhibit significant improvement. The fifth to seventh null hypotheses were formulated for testing.

4.6.1 Comparison of Effects on Complexity among Different Proficiency Learners

H₀₅: There is no significant interaction effect on complexity between time (pretest and posttest) and subgroups (high, medium and low proficiency).

The fifth hypothesis posits that there is no significant interaction effect on complexity between time (pretest and posttest) and proficiency subgroups (high, medium, and low proficiency). In order to test this hypothesis, a two-way repeated measures ANOVA was administered to determine the interaction effect of the PBL between time (pretest and posttest) and subgroups (high, medium, and low) on complexity.

The homogeneity of covariance matrices was checked during the repeated measures ANOVA procedure. The obtained significance value of .760 indicates that the assumption of homogeneity of covariance matrices was satisfied. An additional assumption in repeated measure ANOVA is sphericity, which refers to the condition in which the variances of the differences between all

combinations of related groups (levels) are equal. Mauchly's sphericity test was used for the homogeneity assumption for repeated measures designs. If this assumption is violated, there are some correction procedures, such as Greenhouse-Geisser, for adjustments of degrees of freedom (Verma, 2015). In this study, the sphericity assumption for Mauchly's test was not met in this procedure ($p = .000 < .001$), and thus, the values of Greenhouse-Geisser were accepted. The results of the effects of time and subgroups on complexity are shown in Table 4.27.

Table 4.27: Interaction Effect of Time and PBL Subgroups on Complexity

Variable		N	Mean	SD	F	Sig.	Partial Eta Squared
Time	Pretest	45	6.426	1.661	33.059	.000**	.440
	Post	45	7.422	1.209			
Subgroup	High	15	8.330	.909	81.694	.000**	.795
	Medium	15	6.892	.910			
	Low	15	5.551	1.232			
Time*Subgroup					8.618	.001**	.291

As shown in Table 4.27, the results reveal there is a significant difference in complexity mean scores between pretest and posttest ($F(1, 42) = 33.059$, $p = .000 < .05$, partial $\eta^2 = .440$). The mean complexity score for PBL students at the pretest was significantly higher than the mean score for students at the posttest. Significant effects on complexity were also found among various PBL subgroups ($F(2, 42) = 81.694$, $p = .000 < .05$, partial $\eta^2 = .795$). It means that students showed a statistically significant difference in level of complexity among high, medium, and low proficiency learners. Additionally, the findings demonstrate a significant interaction between time and subgroups ($F(2, 42) = 8.618$, $p = .001 < .05$, partial $\eta^2 = .291$). According to Pallant (2020), the effect sizes are .01 for small, .06 for medium, and .138 for large. The observed

magnitude of differences in the obtained means was significant. The findings indicate that the PBL method significantly influenced the speaking complexity among high, medium, and low proficiency learners in the PBL group over time.

Furthermore, the post hoc comparison by using the Tukey HSD test was used to compare the difference in complexity between the high, medium, and low proficiency subgroups. The results of pairwise comparisons are presented below.

Table 4.28: Comparison of PBL Subgroups on Complexity

Subgroup	PBL Subgroup	N	Mean Difference	Std. Error	Sig.
High	Medium	15	1.437*	.218	.000**
	Low	15	2.779*	.218	.000**
Medium	High	15	-1.437*	.218	.000
	Low	15	1.342*	.218	.000**
Low	High	15	-2.779*	.218	.000
	Medium	15	-1.342*	.218	.000

The results of Table 4.28 reveal that there were significant differences in complexity between high and medium ($p < .001$), high and low ($p < .001$), and medium and low ($p < .001$) English proficiency groups. These findings indicate that PBL students' complexity increased with an increase in their speaking proficiency.

In summary, the fifth hypothesis was rejected. The PBL method notably impacted complexity across different PBL subgroups over time. Moreover, significant differences in complexity were observed among the three subgroups. Thus, the PBL learners' complexity increased significantly as their English speaking proficiency improved.

4.6.2 Comparison of Effects on Accuracy among Different Proficiency Learners

H₀6: There is no significant interaction effect on accuracy between time (pretest and posttest) and subgroups (high, medium and low proficiency).

The sixth hypothesis states that there is no significant interaction effect on accuracy between time (pretest and posttest) and subgroup (high, medium, and low proficiency). In order to test this hypothesis, a two-way repeated measures ANOVA was administered to determine the interaction effect of the PBL between time (pretest and posttest) and subgroups (high, medium, and low) on accuracy.

The homogeneity of covariance matrices was checked during the two-way repeated measures ANOVA procedure. The obtained significance value of .139 indicated that the assumption of homogeneity of covariance matrices was satisfied. However, since the sphericity assumption for Mauchly's test was not met in this procedure ($p = .000 < .001$), the values of Greenhouse-Geisser were accepted. The results are presented in Table 4.29.

Table 4.29: Interaction Effect of Time and PBL Subgroups on Accuracy

Variable		N	Mean	SD	F	Sig.	Partial Eta Squared
Time	Pretest	45	.731	.101	.406 ^b	.528	.010
	Post	45	.744	.098			
Subgroup	High	15	.748	.098	.549	.582	.025
	Medium	15	.743	.090			
	Low	15	.734	.012			
Time*Subgroup					.381 ^b	.686	.018

According to Table 4.29, neither time (pretest and posttest) ($F(1,42) = .406^b$, $p = .528 > .05$) nor proficiency subgroups ($F(2,42) = .549$, $p = .582 > .05$) exhibited significant effects on accuracy. Similarly, the interaction effect between time and proficiency subgroups showed no significant difference in accuracy ($F(2,42) = .381^b$, $p = .686 > .05$). The findings indicate that the PBL method did not significantly affect the accuracy of various proficient PBL learners over time.

Furthermore, the post hoc comparison using the Tukey HSD test was used to compare the difference in complexity between the high, medium, and low proficiency subgroups.

Table 4.30: Comparison of PBL Subgroups on Accuracy

Subgroup	PBL Subgroup	N	Mean Difference	Std. Error	Sig.
High	Medium	15	.005	.026	1.000
	Low	15	.025	.026	.992
Medium	High	15	-.005	.026	1.000
	Low	15	.021	.026	1.000
Low	High	15	-.025	.026	.992
	Medium	15	-.021	.026	1.000

The results of Table 4.30 reveal that there were no significant differences in accuracy between high and medium ($p = 1.000 > .05$), high and low ($p = .992 > .05$), and medium and low ($p = 1.000 > .05$) English proficiency groups.

These findings indicate that PBL students' accuracy did not improve with an increase in their English-speaking proficiency.

To sum up, the sixth hypothesis was confirmed. The PBL method did not exert a significant influence on accuracy across various PBL subgroups over time.

Additionally, there was no significant difference in accuracy observed among learners with high, medium, and low levels of English-speaking proficiency. Thus, the enhancement in speaking proficiency among PBL learners did not lead to a significant increase in accuracy.

4.6.3 Comparison of Effects on Fluency among Different Proficiency Learners

H₀₇: There is no significant interaction effect on fluency between time (pretest and posttest) and subgroups (high, medium and low proficiency).

The seventh hypothesis tested whether there is no significant interaction effect on fluency between time (pretest and posttest) and subgroup (high, medium, and low proficiency). In order to test this hypothesis, a two-way repeated measures ANOVA was administered to determine the interaction effect of the PBL between time (pretest and posttest) and subgroups (high, medium, and low) on fluency.

The homogeneity of covariance matrices was checked during the two-way repeated measures ANOVA procedure. The obtained significance value of .815 concluded that the assumption of homogeneity of covariance matrices was met. However, since the sphericity assumption for Mauchly's test was not met in this procedure ($p = .000 < .001$), the values of Greenhouse-Geisser were accepted. The results of the effects of time and subgroups on fluency are presented in Table 4.31.

Table 4.31: Interaction Effect of Time and PBL Subgroups on fluency

Variable		N	Mean	SD	F	Sig.	Partial Eta Squared
Time	Pretest	45	1.594	.321	15.904	.000**	.275
	Post	45	2.066	.321			
Subgroup	High	15	2.028	.649	6.175	.004**	.227
	Medium	15	1.871	.483			
	Low	15	1.591	.583			
Time*Subgroup					.235	.480*	.034

Table 4.31 reveals significant effects of time (pretest and posttest) ($F(1,42) = 15.904$, $p = .000 < .05$, partial $\eta^2 = .275$). The mean fluency score for the PBL students at the pretest was significantly higher than that at the posttest. Significant effects are also found on fluency among various PBL subgroups ($F(2,42) = 6.175$, $p = .004 < .05$, partial $\eta^2 = .227$). It means that students showed a statistically significant difference in level of fluency among high, medium, and low proficiency learners. However, the interaction effect between time and subgroups demonstrated no significant difference in fluency ($F(2,42) = .235$, $p = .480 > .05$). The results indicate that the PBL method did not exhibit effects on different proficiency learners' fluency over time.

Furthermore, the post hoc comparison using the Tukey HSD test was used to compare the difference in fluency between the high, medium, and low proficiency subgroups. The results of pairwise comparisons are presented below.

Table 4.32: Comparison of PBL Subgroups on fluency

Subgroup	PBL Subgroup	N	Mean Difference	Std. Error	Sig.
High	Medium	15	.158	.126	.654
	Low	15	.437*	.126	.004
Medium	High	15	-.158	.126	.654
	Low	15	.280	.126	.096
Low	High	15	-.437*	.126	.004**
	Medium	15	-.280*	.126	.096

The results of Table 4.32 reveal that there were no significant differences in fluency between high and medium proficiency subgroups ($p = .654 > .05$). Similarly, no similar effects were found on fluency between the medium and low proficiency subgroups ($p = .094 > .05$). However, there was a significant difference in fluency between high and low proficiency subgroups ($p = .004 < .05$). These findings indicate that PBL students' fluency did not enhance with the increase in their English-speaking proficiency.

In summary, the seventh hypothesis received support. The PBL method did not have a significant impact on fluency across different PBL subgroups over time. The only significant difference in fluency was observed between high and low proficiency learners. Therefore, the PBL learners' fluency did not increase to the same extent as the improvement in speaking proficiency.

4.7 Comparison of Effects of Project-Based Learning on Student Engagement

This section focuses on the third research objective and the associated research question. The second research objective was to determine the effect of the PBL method on polytechnic EFL learners' student engagement.

Questionnaires were conducted to measure the changes in student engagement (behavioural, emotional, cognitive, and agentic) between the experimental and control groups.

4.7.1 Comparison of Effects on Behavioural, Emotional, Cognitive and Agentic Engagement between Groups

- H₀8:** There is no significant difference in polytechnic EFL learners' behavioural engagement between the experimental and control groups.
- H₀9:** There is no significant difference in polytechnic EFL learners' emotional engagement between the experimental and control groups.
- H₀10:** There is no significant difference in polytechnic EFL learners' cognitive engagement between the experimental and control groups.
- H₀11:** There is no significant difference in polytechnic EFL learners' agentic engagement between the experimental and control groups.

The eighth to eleventh hypotheses tested whether there are no significant differences in polytechnic EFL learners' behavioural, emotional, cognitive, and agentic engagement between the experimental and control groups. To test these null hypotheses, a series of independent samples t-tests were performed to compare the effect of PBL and conventional teaching methods on polytechnic EFL learners' behavioural, emotional, cognitive, and agentic engagement. Table 4.33 presents the results of the independent samples t-tests for the four engagement dimensions at the posttest.

Table 4.33: Comparison of Four Engagement Dimensions at Posttest between the Two Groups

Engagement	Groups	N	Mean	SD	t	Sig.	d
Behavioural	Experimental	49	4.167	.523	3.589	.001**	.733
	Control	47	3.830	.384			
Emotional	Experimental	49	4.106	.586	2.680	.009**	.547
	Control	47	3.804	.513			
Cognitive	Experimental	49	3.969	.618	2.147	.034*	.438
	Control	47	3.713	.549			
Agentic	Experimental	49	3.637	.401	.225	.823	.878
	Control	47	3.613	.618			

Table 4.33 reveals a significant difference in posttest scores for behavioural, cognitive, and emotional engagement between the two groups, but there was no significant difference in agentic engagement. Initially, a significant difference was found in behavioural engagement between the experimental and control groups ($t = 3.589$, $p = .001 < .05$). The average score denoting behavioural engagement within the PBL group ($M = 4.167$, $SD = .523$) exceeded the average of the conventional group ($M = 3.803$, $SD = .384$) to a significant degree. The effect size (d) of behavioural engagement was medium to large (.773). The findings indicate that a substantial improvement in behavioural engagement resulting from the use of PBL as compared to the conventional method.

Similarly, there was a notable disparity between the PBL and conventional groups in the post-test ratings for emotional engagement ($t = 2.680$, $p = .009 < .05$). The mean score representing student engagement in the PBL group ($M = 4.106$, $SD = .586$) exhibited a statistically notable increase compared with the conventional group ($M = 3.804$, $SD = .513$). The effect size (d) of emotional engagement was medium (.547). The results support the conclusion that PBL displayed a substantial enhancement in emotional engagement when contrasted with the conventional group.

Furthermore, there was a significant difference between the PBL and conventional groups in the posttest scores for cognitive engagement ($t = 2.147$, $p = .034 < .05$). When compared to the control group ($M = 3.713$, $SD = .549$), the experimental group's mean score on cognitive engagement ($M = 3.969$, $SD = .618$) showed a statistically significant rise. The effect size (d) of cognitive engagement was small to medium (.438). The findings indicate that the PBL group displayed better performance in cognitive engagement than the conventional group in the posttest.

However, there was no substantial difference in agentic engagement ($t = .225$, $p = .823 > .05$). The average score in the experimental group ($M = 3.637$, $SD = .401$) was higher than the control group ($M = 3.613$, $SD = .618$). The results show no significant enhancement in agentic engagement when employing PBL as compared to the conventional method.

To sum up, these hypotheses were partially rejected. Significant differences were detected in behavioural ($p = .001$), emotional ($p = .009$), and cognitive engagement ($p = .034$) between the two groups. However, no significant disparities were observed in agentic engagement ($p = .823$). The findings indicate that, during the posttest, the PBL group exhibited superior performance in behavioural, emotional, and cognitive engagement compared to the conventional group, although there was no difference in agentic engagement.

4.7.2 Comparison of Effects on Overall Student Engagement between Groups

H₀12: There is no significant difference in polytechnic EFL learners' overall student engagement between the experimental and control groups.

The twelfth hypothesis states that there is no significant difference in polytechnic EFL learners' overall student engagement between the experimental and control groups. The one-way MANOVA procedure was conducted to determine the effects of the PBL and conventional teaching methods on the overall student engagement (behavioural, emotional, cognitive, and agentic engagement) of polytechnic EFL learners in this study. The homogeneity of the covariance matrices was checked during the one-way MANOVA procedure. The obtained significance value of .175 indicated that the assumption of homogeneity of covariance matrices was satisfied. Table 4.34 below presents the results of the multivariate test.

Table 4.34: Results of MANOVA on Speaking Proficiency between the Two Groups

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's Trace	.183	5.111 ^b	4.000	91.000	.001	.183
Wilks' Lambda	.817	5.111^b	4.000	91.000	.001**	.183
Hotelling's Trace	.225	5.111 ^b	4.000	91.000	.001	.183
Roy's Largest Root	.225	5.111 ^b	4.000	91.000	.001	.183

Table 4.34 shows a significant difference in overall student engagement between the two groups ($F(4, 91) = 5.111, p = .001 < .05$). The partial eta squared value of .183 showed a large effect, which meant that only 18.3% of the changes in student engagement could be explained by the treatment. The

findings indicate that PBL could significantly improve student engagement compared to the conventional teaching method.

In summary, the twelfth hypothesis was refuted as a significant difference was observed in overall student engagement between the experimental and control groups ($p = .001$). Thus, the PBL group could outperform the conventional group in overall student engagement.

4.8 Students' Perspectives on the Implementation of Project-Based Learning

This section sought to present the findings of the fourth research question about college EFL students' perspectives on the benefits and challenges of PBL in an English-speaking class. The semi-structured interview data was analysed using thematic analysis to understand the college students' perceptions. Five themes emerged from the interview data, including improvement in speaking proficiency, enhancement of student engagement, development of soft skills, boost in self-confidence and courage, and challenges of PBL. To facilitate a systematic presentation, the five themes have been distinctly expounded upon.

4.8.1 Improvement in Speaking Proficiency

The first theme of the implementation of PBL is the improvement of speaking proficiency. According to the qualitative data, all the participants agreed that their speaking proficiency was promoted through the PBL method. As the

participant Gan mentioned, “Through this project-based learning method, I can greatly improve my English proficiency.” Gong also stated, “I might only speak English in English class, but through project-based learning, I now dare to speak English outside of class. I can speak English effectively.” Specifically, the improvement of speaking proficiency was categorised into three categories: improved pronunciation and reduced grammar errors, increased fluency and reduced pauses, and broader vocabulary and more complex clauses.

4.8.1.1 Improved Pronunciation and Reduced Grammar Errors

Improved pronunciation and reduced grammar errors emerged as the primary focus for improving speaking proficiency. The majority of participants noted an improvement in their speaking accuracy following the adoption of the PBL method, which manifested in more precise pronunciation and fewer grammatical errors. Participants attributed their improved speaking accuracy to actively learning correct pronunciation of unfamiliar words during the project execution process. Chen and Gan detailed their experiences as follows:

This teaching method (PBL) mainly focuses on improving our oral expression skills. For example, during the guest-receiving theme, I had to accurately pronounce words, especially the unfamiliar words on English invitations, to invite others to my birthday party. This helped improve my pronunciation.
(Chen)

Project-based learning can help me speak English more accurately.

Sometimes we might encounter unfamiliar words. We searched for how to pronounce these words that might be unclear due to the stress. We utilised our understanding of phonetic symbols and stress to enhance our ability to learn and pronounce the word accurately. (Gan)

According to Chen and Gan, they tried to pronounce accurately unfamiliar words related to project themes by understanding phonetic symbols and stress patterns. During project explorations, participants frequently encountered unfamiliar words, which they looked up in dictionaries to learn the correct pronunciations. Consequently, their pronunciation accuracy improved.

Participants also conveyed that their English speaking accuracy improved as a result of receiving corrections from their peers and teachers regarding pronunciation errors during various project activities such as presentations, discussions, and dubbing processes. Gong, Liu, and Luo highlighted this aspect.

I used to pronounce some word endings a bit heavily, like the word 'like', but through this project and especially after the project presentations, our teacher pointed out any mispronunciations in our videos. I went back and practiced pronunciation more. Also, during the project execution, if my pronunciation was not accurate, my group members would correct me, which I think is good for improving pronunciation accuracy. For instance, once we were discussing the word 'opposite', I kept pronouncing it as /ɒpə'saɪt/, and she pronounced it as /'ɒpəzɪt/. I thought my pronunciation was correct before, so I bet with her, but

I lost and had to give her a bag of chips. I realised my pronunciation errors in this way. (Gong)

In projects, we (group mates) communicated with each other and expressed ourselves in English. We offered feedback and corrected errors with each other, which helped improve our pronunciation. So, I believe project-based learning can help us speak English more accurately. (Liu)

This experience improved the accuracy of my pronunciation. Especially during the dubbing process of this project, everyone supervised each other and pointed out any pronunciation inaccuracies. After the project presentations, the teacher also pointed out any mispronunciations and corrected them. (Luo)

Gong, Liu, and Luo indicated that their pronunciation accuracy improved due to feedback and corrections from both teachers and peers at various stages of project-based learning. Gong, in particular, engaged in a bet with a group member to clarify word pronunciations, which motivated her to pronounce words accurately.

At the same time, participants emphasised the significance of grammar and made concerted efforts to employ more precise grammatical structures. The perspectives of the participants are outlined below.

My English grammar usage has become more accurate. Before engaging in project-based learning, I didn't pay much attention to English grammar, and I

was quite confused. But after project-based learning, especially when I was tasked with writing scripts and doing voiceovers, I started to pay more attention to English grammar. (Feng)

My English expression has become more accurate, for example, by using correct grammar. To present the project better to my classmates, I would carefully draft scripts. If there were any grammar issues I didn't understand, I would promptly search online and then note them down for further study. (Luo)

During the scenario communication required by the project, we were encouraged to seek and learn relevant grammar knowledge and practice continuously. Eventually, we expressed our thoughts fully using correct grammar knowledge. This self-internalisation and absorption process helped us understand correct grammar knowledge. (Li)

Feng, Luo, and Li focused on improving their grammar accuracy through project-based learning. They emphasised that a solid understanding of grammar was necessary for completing the projects. Li further noted that the learning process helped her internalise grammar knowledge and use correct grammar consistently.

These results suggest that the implementation of PBL could assist students in improving their speaking accuracy and using correct grammar forms by incorporating self-correction, peer-correction, and teacher-correction at every stage of projects.

4.8.1.2 Increased Fluency and Reduced Pauses

The second category, highlighting improved speaking proficiency, centered around increased fluency and reduced pauses during speech. PBL afforded students the chance to engage in English communication while carrying out and showcasing their projects. Feedback from participants suggests that their English fluency improved and they experienced fewer pauses in their speech following their engagement in PBL. Li, Gong, and Gan enthusiastically endorsed this method.

Project-based learning can help me speak English more fluently. In executing projects, we either discussed or summarised and reported, which gave us more opportunities to speak English. When we interviewed others, we also practiced our oral skills. At times, we needed to grasp specific information, so we committed some scripts to memory, which facilitated the acquisition of additional memory techniques. This, in turn, increased our speaking speed. Memorising scripts has become skilful, resulting in fewer pauses. (Li)

Before, I spoke English somewhat haltingly, with many pauses, a slow speed, and a low voice. However, because of project-based learning, my speech speed has increased, becoming faster but still moderate enough for listeners to understand. My pauses have decreased, and overall, I feel much more fluent. During the project execution, we would practice vocabulary, grammar, and sentences related to the project content in advance. Then, during the filming process, we would speak more fluently. (Gong)

In projects, we expressed ourselves orally, which helped enhance our fluency. Collaborating with others on projects required real-time communication, which helped us speak English quickly and reduce pauses. As a result, my English oral skills have greatly improved, and my fluency has significantly increased. (Gan)

Li, Gong, and Gan concurred that PBL facilitated enhanced real-time communication, resulting in increased speech speed and fewer pauses. Li specifically noted that memorising scripts was beneficial in minimising speech pauses. Gong underscored that the process of project execution encouraged advanced practice, promoting greater speech fluency.

Participants experienced nervousness and stuttering when speaking English prior to participating in project activities. However, they were pleasantly surprised to find that they became more fluent in their speaking proficiency after being exposed to the PBL method. Liu, Jiang, and Feng expressed their feelings as follows:

Before each class, I prepared some materials, and initially, I felt nervous, but gradually, I became less nervous and could speak English fluently. I used to be good at writing, but not speaking. Now, I can write and speak, although there used to be more hesitation in my speech. I feel that my English has become more fluent. (Liu)

Project-based learning indeed helps me speak English more fluently. Initially, I hesitated to speak English, as I was more comfortable with written expression. However, after engaging in project-based learning, I found myself speaking more fluently. For example, in oral classes, I actively ask questions, and instead of jotting down notes, I now draft my thoughts mentally and express them verbally. (Jiang)

I can speak English more fluently now. Previously, although I could speak English, I would feel nervous and stutter when communicating with others, and sometimes I couldn't fully express myself. But after engaging in project learning this semester, regularly practicing spoken English, and communicating with others in English, I can now speak English more fluently. (Feng)

Liu, Jiang, and Feng transitioned from speaking English nervously and hesitantly before engaging in PBL to speaking fluently afterward. PBL effectively reduced participants' nervousness, facilitating more fluent English speaking.

The findings indicate that the PBL offers increased opportunities for learners to enhance their speaking fluency by enabling them to speak more smoothly and with reduced pauses.

4.8.1.3 Broader Vocabulary and More Complex Clauses

The third category of improved speaking proficiency involved the development of a broader vocabulary and more complex clauses. Participants viewed the

PBL method as an effective means to expand their vocabulary and acquire additional clauses. Liang, Luo, and Jiang shared their experiences of learning and integrating more words or clauses during project-based learning.

Thematic project of each unit involves many related words and clauses. As we completed these projects, we accumulated related vocabulary and grammar knowledge, enriching our vocabulary and language skills. (Liang)

I can speak more English, such as by using more subordinate clauses. As projects required oral preparation, I used vocabulary and related grammar to draft scripts, then transformed them into relevant grammatical clauses. This not only improved my oral English but also allowed me to learn more English sentence structures. (Luo)

During project interviews, I incorporated these transitional phrases and clauses into my responses, along with recently learnt vocabulary. (Jiang)

Participants, such as Liang, Luo, and Jiang, expanded their vocabulary and use of clauses, subsequently integrating these elements into their oral English following their engagement in PBL. Participants further elaborated on how the PBL method aided them in acquiring a greater number of words and clauses throughout the project-based learning process. Examples provided by Chen and Gan are as follows:

We were required to describe pictures in English, using single words, phrases, or even sentences to describe whatever we saw. This helped expand our vocabulary and enrich our expressions. Additionally, during the part where we introduced scenic spots, such as Hailing Island in Yangjiang, we used various adjectives and complex sentences to enhance our expressions. Moreover, during the concluding part, I also used inversion (e.g., not only... but also) and exclamatory sentences to summarize. This practice has enriched my expression and improved my English oral skills. (Chen)

Project-based learning could help us speak more English. For example, in executing this project, we might encounter some unfamiliar words. From this, we could gain knowledge about the pronunciation, form, and meaning of the word, as well as how to collocate subordinate clauses, understand its grammatical logical structure, and determine if the sentence is correct. It could make these sentences more advanced and use more words and subordinate clauses, thus improving my ability to speak English. (Gan)

These findings indicate that participants were able to expand their vocabulary and acquire additional grammar knowledge through the completion of each project, enabling them to utilise this knowledge to speak English with greater complexity.

In summary, the college students perceived that the PBL method had a positive impact on their speaking proficiency in English. They reported speaking more accurately, with improved pronunciation and fewer grammar errors.

Additionally, they experienced increased fluency, with fewer pauses during conversations. Their vocabulary expanded, allowing them to express themselves more effectively, incorporating a wider range of clauses.

4.8.2 Enhancement of Student Engagement

The second theme that emerged from the interview data is the enhancement of student engagement. Based on the qualitative data, participants unanimously acknowledged that PBL enhanced their engagement. This theme was divided into four categories: strong interest and enjoyment, intense concentration and effort, active application of cognitive strategies, and proactive contribution to learning flow.

4.8.2.1 Strong Interest and Enjoyment

The initial category of enhanced student engagement was characterised by a strong sense of interest and enjoyment. Participants conveyed their interest in the project themes, which served as an emotional factor for their active participation in the learning process. This sentiment was articulated by Feng and Liu.

I'm interested in the theme of introducing scenic spots. My roommates and I chose the old streets of Yangjiang. I feel that the place has a very antique charm with a strong historical atmosphere. There are many historical relics there, as well as street vendors and a coffee shop filled with historical photos. I enjoy scouting for locations for this theme. (Feng)

I'm excited about the idea of receiving visitors. It entails appropriately conversing with guests. This project taught me many different meanings of expressions, such as the word 'anytime', which the teacher used in class. I found it interesting that I could use it in conversations with guests to indicate a willingness to serve at any time. (Liu)

Feng and Liu identified "introducing scenic spots" and "receiving visitors" as engaging project themes. Feng was particularly interested in the theme of introducing scenic spots, as it allowed her to explore the scenic spot while working on the project. Liu found the theme of receiving visitors appealing due to the opportunity to learn practical expressions. Other participants also found these two themes to be intriguing and motivating.

Meanwhile, participants expressed their keen interest and enjoyment during the phases of topic discussion and project execution. They derived significant pleasure and satisfaction from engaging in project activities. This sentiment was shared by Gong and Li.

I'm quite interested in discussing topics because it involves all the group members gathering together, sharing their opinions, and having lively discussions with different perspectives. It's interesting to me because everyone could express their own opinions and viewpoints and execute projects. (Gong)

During the discussion phase, I enjoyed hearing everyone's ideas and finding common ground. Planning the project, allocating tasks, and executing it were fascinating. When we executed the project, we realised discrepancies between our plans and reality. For instance, when we invited someone to dinner over the phone as outlined in our script, we found that we needed to improve our English communication skills. I found this process very engaging. (Li)

Gong and Li appreciated the discussion phase of the topics, as it allowed them to share opinions and exchange diverse ideas. Additionally, Li found satisfaction in the project execution phase, recognising it as an opportunity to improve their communication skills.

The results indicate that the PBL method has the potential to enhance students' emotional engagement by stimulating their interest and enjoyment through captivating themes and project activities.

4.8.2.2 Intense Concentration and Effort

The second category highlighting the enhancement of student engagement is characterised by intense concentration and effort. It is linked to behavioural engagement, which entails students' attentive focus and sustained dedication. Participants emphasised their active participation and concentrated focus both in and after class. Gong, Chen, and Gan highlighted this aspect.

When the teacher explained what the project was about, I actively participated in our group meetings. For example, when we discussed topics related to our theme, I would express my opinions and viewpoints actively. When given tasks, I would diligently and conscientiously complete them. (Gong)

During the question-and-answer session, my participation was also high. If I observed other groups presenting videos and couldn't understand something, we would approach them and actively listen to their answers or suggestions. Whether I was presenting or not, if other groups questioned my group leader, I would remain active and constantly consider how to respond, resulting in a high participation rate. (Chen)

After class, I took out my oral English book and reviewed the project. When I encountered any problems or had any suggestions, I discussed them with my group members to further improve our project work. (Gan)

Gong and Chen demonstrated high levels of participation in topic discussions, task completion, and question-and-answer sessions during class. Gan extended her engagement by continuing discussions with her group members after class, indicating sustained dedication to learning.

Luo and Feng believed that a feeling of belonging and responsibility motivated them to focus and dedicate effort to the project activities.

Project activities required teamwork. Everyone divided tasks and cooperated, which made me realise the importance of teamwork. My roommates were very active, which encouraged everyone to participate in the project. (Luo)

We didn't have time to be lazy because everyone else was working, and being the only one slacking was not good. For example, when discussing a topic, everyone expressed their opinions. If we were just sitting there silently, it felt strange, as if we were being lazy and not genuinely participating. This was not right, so we ended up speaking out. (Feng)

Luo and Feng developed a strong sense of belonging when working in groups, feeling a responsibility to actively contribute rather than remaining silent. This sense of responsibility motivated them to participate actively and avoid complacency.

These findings indicate that students' behavioural engagement improved as they demonstrated greater concentration and exerted more effort in project-based learning.

4.8.2.3 Active Application of Cognitive Strategies

The third category identified for enhancing student engagement was the active application of cognitive learning strategies. It is associated with the utilisation of sophisticated, deep, and personalised learning approaches. Participants endeavoured to employ a variety of learning strategies to internalise the new knowledge acquired through the PBL method, as illustrated below.

I paraphrased during interviews with classmates. After interviewing them, I paraphrased some questions and gathered their answers to summarise in the final video...I associated classmates' answers and questions to identify core points, categorised similar ones, discussed differences, and then summarised. (Li)

In our second group video about ideal jobs, we didn't know much about what to do during interviews. Since this was our group theme, we searched online to learn what to watch and do during interviews. We had some prior knowledge about what to pay attention to during job interviews, but it wasn't comprehensive enough, so we sought out new knowledge to better understand what to pay attention to during job interviews. This is where the association strategy came into play. (Chen)

I reviewed the content learnt on the same day and summarised it in my mind or on paper... I chose some sentence patterns or grammar to start associating. I thought association should be imaginative, which helped enrich expressions. (Feng)

Li, Chen, and Feng discussed the frequent use of association strategies to link previously acquired knowledge with new information. Li and Feng also employed paraphrasing and summarising strategies to reinforce their understanding of the learning materials. These strategies not only facilitated better retention but also enhanced the integration of new concepts with existing knowledge, ensuring a more comprehensive grasp of the subject matter.

These findings indicate that students' cognitive engagement increased as they utilised cognitive learning strategies to acquire and solidify new knowledge throughout the project-based learning process.

4.8.2.4 Proactive Contribution to Learning Flow

The fourth category concerning the enhancement of student engagement revolves around proactive contributions to Learning flow. It involves actively engaging in learning activities and improving the learning process, rather than passively absorbing information. Participants noted that they actively facilitated learning in class through interactions with the teacher, such as asking and answering questions. Chen and Liu mentioned that they proactively sought clarification from the teacher by asking questions or requesting assistance when they encountered difficulties.

I actively raised my hand to ask questions in class. Following each project presentation, we held a question and answer session, during which I raised questions. (Chen)

When I encountered something I didn't understand, I asked the teacher. Every time I raised my hand to ask questions, I learnt new things from the answers. (Liu)

Chen and Liu reported being proactive in raising questions when they encountered difficulties in understanding. Liu believed that she could acquire

new knowledge through the responses received. Both demonstrated an active approach to learning in class.

Participants Gan, Feng, and Li stated that they willingly volunteered to actively respond to teachers' questions.

I was very active. I would raise my hand to answer questions every time. (Gan)

I was always the first to raise my hand to answer questions. Actually, I was quite nervous, but I was not afraid. I could bravely express myself. (Feng)

Sometimes, the teacher asked questions in class that required us to express our thoughts in English. If no one raised their hand, I tried to do so, even though I might struggle a bit with expressing myself in English. (Li)

Gan, Feng, and Li demonstrated a high level of engagement in responding to the teacher's questions. Gan frequently raised his hand to answer, while Feng was consistently the first to do so. Li stepped in to respond when no one else did. These participants actively contributed to a positive learning environment in the classroom.

However, two participants expressed that they passively absorbed the information they learnt and remained silent in class. Liang and Jiang stated:

I listened to what the teacher said, but I might not be very proactive in learning.

(Liang)

I actively thought about the teacher's questions, but I didn't always speak up.

(Jiang)

Only two of the ten students preferred to silently listen to the teacher without responding. The results also indicate that students exhibited increased agentic engagement in the PBL classroom, actively interacting with teachers to facilitate learning.

In summary, college students perceived that the PBL method positively influenced their engagement levels. They expressed a keen interest in speaking English and found the process enjoyable. Furthermore, they reported heightened concentration and increased effort in completing projects. Additionally, they actively employed cognitive learning strategies to enhance their learning experience and strived to be active participants in English-speaking classes.

4.8.3 Development of Soft Skills

In addition to improvements in speaking proficiency and student engagement, another key finding from the qualitative data was the development of soft skills. The soft skills were grouped under communication, collaborative, and problem-solving skills.

4.8.3.1 Communication Skills

Communication and collaborative skills were primarily highlighted by the participants. The participants noted that they had become more extroverted and proactive in interacting with others compared to previously. They also observed an improvement in communication and collaborative skills, not only with roommates but also in professional settings. They believed that interviewing others and handling diverse opinions improved their communication skills. Li, Xie, and Gan further explained that their communication skills were refined during the execution of interview projects. For instance,

We often faced rejection during interview projects. In these situations, we communicated with them, explaining that our interviews were in spoken language, not requiring precise English, and that we should take it easy and speak normally. This is a communication skill. (Li)

I had to approach strangers to communicate and convince them to cooperate because I didn't know who I could invite to the interview. (Xie)

If we had differing opinions, we discussed together and chose the best solution, which enhanced communication and adaptability. (Gan)

Li and Xie noted that their communication skills improved during the interview process, as they had to invite participants and explain the purpose of the

interview, which required effective communication. Luo also highlighted, “During interviews, we could improve our communication skills with others.” Gan observed that communication was further strengthened when disagreements arose during discussions. In summary, participants were able to enhance their communication skills through project-based learning, especially during the interview and discussion sessions.

4.8.3.2 Collaborative Skills

The participants shared their thoughts on how PBL could enhance their collaborative skills. They recognised the significance of collaboration and its improvement through project complementation. Feng and Liang articulated their views as follows:

Project activities required teamwork, so when we collaborated, we demonstrated teamwork. Everyone divided tasks and cooperated, which made me realise the importance of collaboration. When discussing topics with our whole group, we could improve our collaborative skills. (Feng)

After our presentation ended, classmates asked questions, which really tested our group's teamwork because if a presenter on stage couldn't answer, our group members would assist. (Liang)

Feng and Liang reported that working in groups required them to collaborate and assist their team members, which led to an improvement in their

collaborative skills. Chen also emphasised, “When completing projects with our whole group, we could improve our collaborative skills.” Based on the participants’ summary, the enhancement of collaborative skills stemmed from the shared objective of completing projects. Thus, participants perceived PBL as promoting students’ collaborative skills.

4.8.3.3 Problem-Solving Skills

The improvement of problem-solving skills was highlighted in the interview data. Participants identified solutions to address issues that arose during project completion, leading to their belief in improved problem-solving skills. Gan, Gong, and Chen articulated this feeling as follows:

Sometimes the problems encountered are quickly resolved. For example, when I had to interview others, I had to prepare questions, and I was afraid of saying something wrong and delaying everyone’s recording time. I was also afraid of making mistakes or forgetting words. Later, through the exercise of several projects, I gradually solved these problems. (Gan)

I came up with a good solution because I had joined many clubs and knew many senior students. I asked them if they would accept my English interview. My solution was to contact the interviewees in advance. If they were worried about not performing well, they would let us give them the questions so they could familiarise themselves with them before the interview, which would make the interview process smoother. (Gong)

Firstly, we divided the tasks among the six group members: one for interviewing, one for filming and editing, and another for summarising and presenting. This division of labour ensured collaboration among team members. If conflicts arose, we resolved them peacefully. (Chen)

Gan addressed the issues of misspeaking and forgetting English words during filming. Gong ensured a smooth interview process by successfully contacting the interviewees in advance. Chen resolved the problem of job division in the group. These findings reveal that students were able to successfully address various problems to complete projects. PBL has the potential to enhance students' problem-solving skills.

4.8.4 Boost in Self-Confidence and Courage

Participants highlighted another significant benefit of PBL, which is the boost in self-confidence and courage. Feng, Luo, and Liang articulated their perspectives on this matter.

Previously, I could only speak English in English class, but thanks to project-based learning, I now dare to speak English outside of class. This increased my confidence in speaking English, and I am now able to speak confidently. (Feng)

When it comes to executing projects, like when we were interviewing, we went to different places on campus to meet different people, which helped boost my

confidence. I used to be quite shy and not very confident in talking to people, but this has improved it. (Luo)

The most significant change is that I used to be afraid to speak English, but now I can confidently do so. Previously, when I spoke or answered questions, if I made a mistake, it felt like others were silently mocking me. However, now, when I speak or share my opinions, even if I'm wrong, it doesn't seem to matter because no one really cares. This sudden surge in confidence has been great. (Liang)

Feng reported an increased confidence in using English both inside and outside the classroom. Luo noted that participating in project activities, such as collecting data in various locations and interacting with diverse individuals, greatly contributed to their enhanced confidence. Furthermore, Liang found that making mistakes was not a daunting experience, as others paid little attention to them, thereby reducing their fear of speaking English and boosting their confidence.

Participants also felt that their courage grew because they were no longer fearful of making mistakes. This courage was bolstered through their involvement in project tasks. Specifically, Gong and Liu expressed the following sentiments.

In class, I mainly spoke up and had the courage to do so because I was not afraid of making mistakes. I believe life is about trial and error, and progress comes from making mistakes. I'm not afraid to make mistakes. (Gong)

It has improved my courage, both during interviews and while presenting projects. (Liu)

As Xie mentioned, through prolonged training, practice makes perfect, and it has made them more confident in expressing their opinions in English. PBL has the potential to enhance students' confidence and courage.

4.8.5 Challenges of Project-Based Learning

The impact of PBL extends to improving speaking proficiency, student engagement, soft skills, as well as self-confidence and courage, but it also presents certain challenges. The fifth theme in learners' perceptions of PBL implementation focuses on these challenges, which are categorised into collaborative issues and video-making issues.

4.8.5.1 Collaborative Issues

Despite the enhancement of students' collaborative skills through PBL, they still encountered difficulties with collaboration. Participants expressed challenges in coordinating tasks among themselves, as mentioned by Chen and Jiang.

I wasn't accustomed to this teaching method, as I used to work independently. But with this method, teamwork and cooperation were required. These were the problems. (Chen)

Sometimes team members had different ideas and schedules, making it challenging to coordinate tasks. (Jiang)

Chen and Jiang acknowledged that collaboration was challenging for them due to their limited experience with cooperation. They also found that differing ideas often led to challenges. However, participants identified that problems arose when they neglected to consider the emotions of the entire team. In order to address these issues, they held collective discussions where everyone shared their shortcomings and expresses their thoughts. They also suggested negotiating to ensure project completion and pooling their free time for research. They were confident that these issues were minor since they were committed to completing the project successfully.

4.8.5.2 Video-Making Issues

Video creation is another challenge for the students because video was used as a final product in the PBL class. Concerns emerged regarding video editing and filming, particularly because participants lacked prior experience in these areas. They mainly relied on self-learning through online instructional videos, and they encountered difficulties during the video creation process. For instance,

I encountered some difficulties in video editing. I didn't know how to edit videos for the first video. (Li)

The problem is that during the filming process, some students might be introverted or overly cheerful, which led to laughing during filming. This means, just like shooting a movie, if you didn't do well, you had to reshoot it several times to get it right. (Xie)

Li found video editing difficult due to her lack of prior experience with it. Xie encountered challenges during filming, as some students' laughter required multiple reshoots. Although the participants had video-related issues, they tried to ask classmates for help to overcome the problem. As Liu stated, she was not very familiar with video editing, but because everyone needed to participate, she learnt some editing methods from her classmates.

4.9 Discussion

The findings of this study are discussed to support the effectiveness of employing PBL to enhance speaking proficiency and student engagement among polytechnic EFL learners at a polytechnic in China. This section consolidates the responses to the four research questions, all of which are examined collectively to clarify the focus of the research.

4.9.1 Effects of Project-Based Learning on Speaking Proficiency between Groups

RQ1: Does PBL have any effects on polytechnic EFL learners' speaking proficiency compared to the conventional teaching method?

The first research question in the study sought to determine the effects of PBL on polytechnic EFL learners' speaking proficiency when compared to the

conventional teaching method. The results of the study reveal that there was a significant difference in polytechnic EFL learners' speaking proficiency between the PBL and conventional groups. The results suggest that the college learners made demonstrable improvements in overall speaking proficiency through PBL. The findings are in line with research that indicates that PBL can help improve the speaking skills of learners compared to conventional teaching methods (Wuntu et al., 2022; Firdaus & Septiady, 2023; Zubaidi & Suharto, 2024).

These results could be explained by the fact that the college learners were exposed to an authentic learning environment that maximised their capability to speak English. PBL, in alignment with SCT, emphasises the creation of an environment conducive to social interaction. PBL provides more opportunities for learners to speak English outside the classroom in real-life situations because PBL begins with a problem presented in the same context as it will be encountered in real life (Ngadiso et al., 2021). The learners engaged in real communication and utilised topical knowledge, language, and speaking skills. They could vary their exposure to sources of knowledge through the genuine use of the target language, which is positive for improving speaking skills (Sirisrimangkorn, 2021). PBL offers valuable chances for the learners to participate in meaningful interaction, where they actively practice their speaking abilities during the learning process.

Another explanation for the improvement in college learners' speaking proficiency could be collaboration within the PBL framework. Collaboration

within PBL, in the form of scaffolding, is believed to be a significant element that contributes to the positive results. Omar et al. (2012) asserted that the establishment of collaboration in PBL through group projects among learners fosters peer support and scaffolding, enabling the stronger students to assist the weaker ones in their learning. Peer feedback and assistance, such as translation, were provided, particularly for students who were struggling with communication and the task at hand (Torres & Rodriguez, 2017). This also provided them with vocabulary, the pronunciation of some words, and sentence structure (Wuryantari et al., 2019). Through constant collaboration, the learners in the PBL class received much of the scaffolding within the ZPD from peers. They communicated in English and cooperated to achieve the common goal of successfully completing projects. PBL supports the concept of scaffolding and offers a supportive English-speaking environment that encourages students to speak English.

The findings of this study further indicate that the complexity and fluency of PBL learners significantly improved compared to those who followed the conventional teaching method. However, there was no significant enhancement in accuracy between the PBL and conventional groups. Regarding complexity, the results reveal that the learners who underwent PBL in this study demonstrated enhanced complexity compared to those taught through the conventional method. Particularly, the enhancement of complexity among the PBL learners was found in the measure of syntactic complexity, but it does not seem that they made strong gains in lexical complexity. This finding aligned with Spring's (2020) study, in which PBL learners exhibited significant

improvement in syntactic complexity but not lexical complexity. One possible reason for this is that, according to Vercellotti (2017), lexical complexity does not exhibit linear growth in the same way that accuracy and fluency tend to. Instead, Vercellotti (2017) suggests that lexical complexity dips first and then later exhibits a steeper increase. The results of this study appear to align with Vercellotti's findings in this regard. Another possible reason why lexical complexity did not show the same level of improvement could be due to the communicative nature of PBL. According to Lu (2012), while the use of more lexical expressions may lead to a higher perceived oral proficiency among native English speakers, in the sessions, students primarily communicated with other EFL learners rather than native English speakers. When speaking to EFL learners, using a large amount of fringe vocabulary could potentially impede others' understanding, leading to a breakdown in communication (Spring, 2020). Therefore, students in the PBL class might not perceive the use of a larger vocabulary as particularly important or helpful, potentially contributing to the lack of improvement in this area.

However, there was a notable discrepancy in syntactic complexity between the PBL group and the conventional teaching group. These results can be attributed to the discrepancy observed by learners between their own oral production and that of their peers. According to the Comprehensive Output Hypothesis (Swain, 1985), learning occurs when learners recognise a deficiency in their understanding of the second language. This awareness prompts them to adjust their output, leading to the acquisition of new linguistic knowledge. In PBL, learners noticed disparities in sentence structures

between their own oral expressions and those of their peers during English discussions and communications. For instance, learners observed that while they used simpler sentences, their peers incorporated dependent clauses in their oral production. Subsequently, they began to reflect on these differences and attempted to incorporate more dependent clauses in their oral communication, mirroring their peers' usage.

With regards to fluency, the results demonstrated a significant improvement in college learners' fluency, as evidenced by the increased speech rate and significant reduction in self-repairs among college learners. This appears to be due to the fact that repetitive rehearsal leads to more fluency in the speech production process (Bozorgian & Kanani, 2017). According to Lambert et al. (2017), repetition allows L2 learners to rely on previously conceptualised task content and to activate recently used linguistic constructions to express their message. Within the PBL setting, learners engaged in practicing the oral lines for video scenarios and repeatedly revised oral drafts for dubbing the final video product. Through iterative practice, they gradually spoke English more fluently, with fewer pauses and filler words. This repetition allowed them to memorise their lines, reducing the cognitive demands associated with conceptualising, encoding, and monitoring their messages simultaneously, thereby enhancing English fluency. As the participants mentioned in the interview, they then memorised some scripts, which allowed them to learn more techniques to better remember them, and then their speaking speed increased. When memorising scripts became skilful, there were fewer pauses. These findings are consistent with the previous studies, which stated that

rehearsal or repetition has been shown to have the most robust effects on L2 fluency (Ahmadian & Tavakoli, 2011; Wang, 2014).

The improvement in fluency could also be attributed to a less-anxious PBL environment. According to Salem and Ai Dyiar (2014), speaking anxiety adversely affects oral fluency in the English language. PBL creates an enjoyable and low-pressure learning environment for learners (Di & Nattaya, 2016). During PBL class sessions, learners participated in English discussions about project topics and shared related interesting anecdotes, creating a relaxing atmosphere (Baker et al., 2019). Additionally, beyond the classroom, the learners conducted interviews and surveys and visited captivating sites for making videos, deriving enjoyment and satisfaction from these experiences. In such a relaxing setting, learners were less inclined to closely monitor their own language performance, leading to reduced instances of pauses and self-corrections while speaking, consequently enhancing speaking fluency. These findings were further confirmed by qualitative data. As Li mentioned in the interview, “Before each class, I prepare some materials, and initially, I feel nervous, but gradually, I become less nervous and can speak English fluently.” These findings support the results of Zein et al.’s study (2023), in which using a video project in teaching speaking eliminates students shyness in speaking and improves students’ speaking fluency in English.

However, PBL learners did not show any improvement in accuracy, as evidenced by no significant changes in syntactic accuracy compared to those in the conventional groups. One reason for this result was that the PBL did not

target grammatical forms. PBL is a highly communicative method that prioritises semantic over systematic forms (Spring, 2020). The PBL learners primarily prioritised expressing their opinions or ideas in English to ensure understanding, rather than focusing on grammatical forms. Furthermore, the teacher did not explicitly instruct grammar in the PBL class. As a result, there was not a substantial improvement noted in syntactic accuracy. However, qualitative data suggested that learners believed PBL to improve their syntactic complexity, as they highlighted grammatical errors when reviewing and correcting written scripts until they were error-free. While there was some perceived enhancement in syntactic accuracy, it did not demonstrate a significant difference when measured through CAF analysis.

Another reason for the lack of improvement in syntactic accuracy could be the trade-off effects between CAF (Foster & Skehan, 1996). The Trade-Off Hypothesis states that attentional capacity and working memory are limited; therefore, spending more attentional resources on one aspect negatively impacts one or both of the other aspects (Skehan, 2009a). Fluency competes with accuracy, while accuracy competes with complexity (Housen & Kuiken, 2009). When learners produce language, their attention is sometimes directed to complexity and fluency, and as a result, accuracy suffers. In this study, the complexity and fluency of the college learners increased, while compensating and decreasing attention to syntactic accuracy. Thus, the PBL group did not outperform the conventional group where syntactic accuracy was concerned.

In terms of pronunciation accuracy, PBL learners had a significant difference compared to learners instructed by the conventional teaching method. One reason for the improvement in pronunciation accuracy could be their attention to the pronunciation errors. According to the Comprehensive Output Hypothesis (Swain, 1985), learners who notice the inadequacy in what they say and learn can produce precise and appropriate output. PBL provides more opportunities for college learners to notice their pronunciation errors. To create their short videos, students had to practice saying their lines multiple times both before and during filming. They had to rehearse the oral draft and do dubbing for the video, in which pronunciation was checked and pronunciation errors were corrected by peers and the teacher. Deliberate attention to pronunciation can have positive effects (Pennington, 2021). Furthermore, these gains in pronunciation accuracy may be due in part to the need for learners to maintain a certain level of accuracy in their spoken output during discussions. If too many pronunciation errors occurred, it is possible that other group members could not understand what they were saying, which would lead them to redouble their efforts to speak more accurately (Spring, 2020). Additionally, the qualitative data revealed that college learners reported improved pronunciation accuracy by receiving more pronunciation corrections and feedback from both teachers and peers during various project activities. Thus, such activities place a heavy emphasis on pronunciation accuracy, as they need to be sure that they are pronouncing their lines correctly (Hardison & Sonchaeng, 2005).

4.9.2 Effects of Project-Based Learning on Complexity, Accuracy and Fluency among Different Proficiency Learners

RQ2: Does PBL have any effects on complexity, accuracy, and fluency across polytechnic EFL learners of different speaking proficiency?

The second research question aimed to investigate the effects of PBL on complexity, accuracy, and fluency across the high, medium, and low proficiency learners between the pretest and posttest. The findings demonstrate that the PBL method had a significant effect on complexity across the various proficiency learners over time, but not on accuracy and fluency. Moreover, significant differences in complexity were evident among the three subgroups, while no significant effects were observed on accuracy. Additionally, a noticeable distinction in fluency was observed only between high and low proficiency learners. The findings of this study indicate that among the aforementioned speaking features, only complexity can differentiate between PBL learners at different levels of speaking proficiency, while accuracy and fluency can only distinguish no or specific proficiency levels. These findings are consistent with the research, which indicates that as learners' language proficiency improves, complexity, accuracy, and fluency do not demonstrate linear development (Gu et al., 2019).

The results reveal that the PBL method notably impacted complexity across learners with different proficiency levels over time. Furthermore, notable variances in complexity were noted among high and medium, high and low, as well as medium and low proficiency learners. These findings suggest that various learners' complexity significantly increased with the improvement of speaking proficiency after participating in PBL. The possible reason could be

that high proficiency learners presumably have a greater store of linguistic chunks and can use them more automatically than lower proficiency learners (Ellis, 2005b; Awwad & Tavakoli, 2022). In the PBL environment, high proficiency learners typically can use precise language to elaborate on details in their narrative, while lower proficiency learners can only express themselves using limited language. Due to limited linguistic cognitive resources compared to high proficiency learners, low to medium proficiency learners can only express relevant content through a limited vocabulary. This study supports the findings in the studies (Crossley et al., 2009; Vyatkina, 2012), in which complexity is an important indicator of progression from lower to higher levels among learners.

Another possible reason is the underlying principle of PBL, which emphasises autonomous learning (Almazroui, 2023; López et al., 2020). As proficiency and autonomy levels rose, there was a corresponding increase in the frequency of vocabulary learning strategy usage (Abadi & Baradaran, 2013; Liu, 2015). In the PBL environment, the learners autonomously searched for and analysed the information to complete a short video. During the autonomous learning process, learners with higher proficiency employed a greater number of strategies to acquire more vocabulary compared to those with lower proficiency. This increased use of learning strategies enabled high proficiency learners to gain more language knowledge, enhancing their cognitive capacity to construct more complex sentences. Thus, the high proficiency learners' complexity in oral production would be higher than that of the low and medium proficiency learners in the PBL context.

However, the PBL method did not exert a significant impact on accuracy across various PBL subgroups over time. Additionally, there was no significant difference in accuracy observed among learners with different proficiency. However, these results contradict prior research (Williams & Korko, 2019), which suggests that high proficiency learners exhibit greater accuracy compared to low proficiency learners. Williams and Korko (2019) found that participants with higher language proficiency were more capable of attending to form during task processing because high proficiency participants demonstrated a higher degree of language automatization and thus reduced cognitive resources. The varying results may be attributed to the participants' overall English proficiency, which ranges from intermediate to low. Their language acquisition has not progressed to the automated stage; instead, it remains in the controlled stage. When the PBL learners communicated with their peers in English, they still needed to consciously regulate their attention. Since they focused more on their complexity, it is hard for them to release more cognitive resources on accuracy (Skehan, 1998; Thorstad, 2024). As a result, PBL learners with varying levels of speaking proficiency did not exhibit improvements in accuracy over time after undergoing PBL instruction. These findings align with Spring's (2020) study indicating that learners with limited processing capacity tend to focus on lexical searches more than grammatical accuracy when producing oral language.

Another possible reason is that, as mentioned in the last section, the PBL method is highly communicative without targeting grammatical forms (Spring, 2020). The teacher in the PBL class did not directly instruct grammar.

Consequently, there was no improvement in accuracy across the PBL learners with different speaking proficiency over time.

Furthermore, the PBL method did not have a significant impact on fluency across different proficiency learners over time. The only notable difference in fluency was observed between high and low proficiency learners. One possible reason could be that, according to Karpovich et al. (2021), compared to high proficiency learners, low proficiency learners can only facilitate smooth oral output by slowing down their speech to free up attentional resources. Low proficiency learners have limited L2 resources and lower levels of proceduralisation in their second language knowledge (Vafaei & Suzuki, 2020). As a result, during their oral expression, they have to speak English slowly, employing a restricted vocabulary, and often make numerous self-corrections.

Another potential explanation could be that the more proficient speakers have a higher level of participation in speaking activities to enhance their oral fluency in the PBL environment. According to Akpur (2021), there existed a direct correlation between language proficiency levels and class participation, with higher proficiency learners demonstrating greater engagement. Within the PBL environment, learners with higher proficiency levels tend to be more proactive during group discussions and readily volunteer to respond to teachers' inquiries. This increased engagement provides them with more chances to enhance their speaking proficiency and attain fluency. Consequently, the effects of PBL on fluency are primarily observed between learners with high and low proficiency levels.

4.9.3 Effects of Project-Based Learning on Student Engagement between Groups

RQ3: Does PBL have any effects on polytechnic EFL learners' engagement compared to the conventional teaching method?

The third research question sought to determine the effects of the PBL method on polytechnic EFL learners' student engagement in comparison to the conventional teaching method. The findings reveal that there was a significant difference in polytechnic EFL learners' student engagement between the PBL and conventional groups. The results suggest that college learners experienced tangible enhancements in student engagement through the implementation of PBL. These findings align with the results of certain other studies (Park & Eisenhower, 2019; Imbaquingo & Cárdenas, 2023; Li et al., 2024), which highlighted the potential of PBL in facilitating learning processes and improving student engagement.

The main reason for the improvement in student engagement can be attributed to the presence of student autonomy inherent in PBL. Unlike conventional instructional methods, PBL is a student-centered teaching method, which grants students a greater level of autonomy in their educational endeavours. According to SDT, students' psychological need for a sense of will and psychological freedom was influenced by the level of external stress when carrying out an action. In conditions where autonomy is supported, students feel less pressured, become more interested, put in more effort, and achieve better academic performance (Núñez & León, 2015). PBL effectively bestows upon students the autonomy-supportive conditions to make informed decisions

regarding their educational pathways. By affording participants a voice in the learning process and enabling them to exercise choice, students become active agents in their learning journey. Through the empowerment of students and the facilitation of their active involvement in shaping their own learning experiences, there is a noticeable shift in their levels of engagement (Sackstein, 2017). Consequently, student engagement was enhanced in the autonomy-supportive PBL learning environment.

With regard to emotional engagement, these findings reveal that students involved in PBL show higher emotional engagement in the process of acquiring knowledge in comparison to the conventional group. Emotional engagement is related to the presence of facilitating emotions, such as interest, enjoyment, satisfaction, and so on (Reeve, 2012). One partial reason for the improvement of emotional engagement could be due to intriguing project topics. According to Carrabba and Farmer (2018), PBL could engage students' interest by presenting them with genuine and life-related projects. The project topics explored in this study are closely tied to students' academic and personal experiences, thereby igniting their enthusiasm for learning. For instance, the initial subject revolves around college life, followed by discussions on ideal career paths, scenic spots, and receiving visitors. As freshmen, the students were particularly intrigued by these topics as they sought to familiarise themselves with college life and share their aspirations with peers. Additionally, they showed keen interest in exploring local attractions and the prospect of welcoming visitors. Through interviews in this study, participants also expressed genuine enthusiasm for the project themes. Consequently, these

interesting topics serve as a catalyst for emotionally engaging students in PBL sessions (Liu & Zuo, 2022).

Another partial reason could be due to the enjoyable experiences. According to Phung et al. (2021), enjoyable experiences also play an important role in shaping students' emotional experiences during PBL activities. According to the qualitative data, students derive significant enjoyment and satisfaction from participating in project activities, particularly during the phases of project discussion and execution. In groups, learners engaged in free and joyful discussions with their peers about project-related topics. Additionally, they had enjoyable experiences while carrying out the projects. For instance, they interviewed sophomore or junior students about college life and visited scenic spots to gather material for writing scripts and creating videos. These experiences provided students with enjoyment and satisfaction, which was further supported by the warm and collaborative relationships among peers. According to SDT, students innately desire to be emotionally engaged in warm, caring, and responsive relationships. Students communicated and collaborated with their peers in the project experiences to address the need for their innate relatedness. In the current study, students' emotional and engagement levels in the PBL process were significantly influenced by interesting topics and enjoyable experiences.

As for behavioural engagement, the findings suggest that students' behavioural engagement showed greater enhancement within the framework of PBL when contrasted with the conventional method. Behavioural

engagement is indicated by concentration, effort, and persistence. An explanation contributing to the enhancement of engagement in PBL classrooms could be collaborative learning. PBL promotes behavioural engagement by offering students opportunities to participate in collaborative learning (Stephanou et al., 2013; Reid-Griffin et al., 2020). Students could concentrate on learning by collaboratively planning projects, researching information and materials by interviewing or visiting a place, and eventually creating videos. Students were motivated to engage in collaborative tasks, which led to positive modifications in their behaviour. As evidenced in the interview data, participants emphasised their active participation and concentrated on collaborative learning. Moreover, the collaborative setting provided a sense of teamwork, where students worked together towards a common goal. Additionally, collaborative learning played a role in helping students overcome speaking anxiety, leading to increased behavioural engagement in learning activities. All of these elements within the collaborative activities contribute to the increase in PBL behavioural engagement.

Another explanation comes from the dynamic relationship between emotional and behavioural engagement. In the framework of student engagement proposed by Reeve (2012), four aspects of engagement are interrelated and contribute to the experience of learning flow. Emotional engagement was believed to have the ability to impact behavioural engagement (Reschly & Christenson, 2012). The PBL students experienced positive emotions such as interest, enjoyment, and satisfaction in learning from collaborative learning activities; they were more likely to be intrinsically motivated to engage

behaviourally in learning activities. With increased emotional engagement, they were more attentive and focused on learning. Students achieve higher academic performance when they are emotionally involved in the educational process (Reyes et al., 2012). Consequently, as students become more emotionally invested in the process of PBL, their level of behavioural engagement tends to rise accordingly.

Additionally, the findings show that PBL substantially enhances students' cognitive engagement as opposed to the conventional method. Cognitive engagement is correlated with the extent to which students actively employ strategic learning techniques, focusing on the use of advanced strategies rather than superficial ones (Reeve, 2013). One possible reason for the increase in cognitive engagement was the inquiry-based nature of PBL. PBL offers a durable framework for engaging in profound inquiry-based learning, which frequently results in developing students' cognitive learning. Students within the PBL context were motivated by an authentic problem and engaged in an ongoing search for solutions. Eventually, they found the answers and solved the problem by employing profound learning strategies. PBL can offer more opportunities for students to engage in inquiry-based learning and strategic learning (Aiedah & Audrey, 2012). However, the PBL setting differs from the conventional classroom setting, which emphasises teacher-focused instruction and more regulated tactics. These constrained circumstances hinder students' ability to think or learn in innovative manners. Therefore, the PBL class presented a question to students to explore, generate potential solutions, and enhance their cognitive learning.

Another possible reason for the increase in cognitive engagement could be ascribed to the types of activities within the framework of PBL. Zheng et al. (2022) reported that a type of activity, when considered as a contextual component, might have a beneficial effect on cognitive engagement in PBL. The activity types in this study focused on collaboratively creating original short videos based on several research projects and in the conditions where the students participated in the activities that spanned twelve weeks. In order to complete the projects, students needed to participate in interrelated tasks or activities taking place within and beyond the classroom (e.g., discussing topics, collecting and analysing the data, writing scripts, creating videos, and dubbing for the video). It permitted more room for student-led work allocation, decision making, problem solving, and using various learning strategies to complete the tasks. Students' cognitive engagement was enhanced in the process of completing the various types of activities.

However, agentic engagement, unlike the other aspects of engagement, did not exhibit a comparable degree of enhancement in this study when compared with the conventional teaching method. One possibility is that this was the students' first PBL class and they had little teacher interaction. According to Reeve and Tseng (2011), agentic engagement is considered to be a sequence of dialectical interactions between the learner and the teacher. However, students initially participated in the PBL class and did not know how to be more active when interacting with the teacher. As Mihic and Zavrski (2017) stated, students had limited experience assuming more proactive learning roles in PBL. Students in the PBL class faced limitations when it came to actively

engaging with the teacher. As the two participants in the interviews noted, they tend to prefer attentive listening over active participation in PBL classes. These students typically follow a similar approach to their behaviour in traditional classes, opting to listen attentively, take notes, and occasionally engage, which makes it challenging for them to fully embrace the concept of actively interacting with teachers in a PBL setting. Because the students had limited prior exposure to PBL, their lack of expertise may explain why there was no notable disparity in agentic engagement between the two groups.

Another possible reason that agentic engagement did not significantly improve could be due to teachers' lack of experience in using PBL. According to Hidayat et al. (2024), teachers still have weaknesses in using PBL to teach English speaking, and their misunderstanding of the PBL learning model's final product is another weakness. The teacher in this study, who used PBL for the first time to teach English speaking, lacked understanding, knowledge, and practice of using PBL. Although the teacher has more than ten years of teaching experience in English speaking and received related training prior to the experiment, she still did not really master the essential teaching elements of PBL. Students in PBL need teacher guidance despite being the center of learning. Thus, teachers should maximise PBL understanding to help students.

4.9.4 Perspectives on Implementation of Project-Based Learning

RQ4: What are the polytechnic EFL learners' perspectives on the implementation of PBL in an English-speaking class?

The fourth research question in the study aimed to explore how polytechnic EFL learners perceived the implementation of PBL in an English-speaking class. The results from the interview data reveal five themes: improvement in speaking proficiency, enhancement of student engagement, development of soft skills, boost in self-confidence and courage, and challenges of PBL related to collaboration and video creation. These findings reinforce that PBL enhances speaking proficiency (Bataineh et al., 2020; Zubaidi & Suharto, 2024), student engagement (Novianti & Kusumayanthi, 2023; Li et al., 2024), soft skills (Rachmawati et al., 2024; Karan & Brown, 2022), and self-confidence and courage (Kurniasih et al., 2023). Meanwhile, participation in PBL was associated with several challenges (Aksela & Haatainen, 2019; Hussein, 2021; Hairuddin & Irmawati, 2023; Hidayat et al., 2024).

Students reported that PBL positively influenced their speaking proficiency, leading to improvements in pronunciation and a reduction in grammatical errors. Additionally, they experienced increased fluency with fewer pauses and an expanded vocabulary that included more complex sentence structures. These findings are consistent with Spring's study (2020), which demonstrated that PBL improved students' fluency, accuracy, and syntactic complexity, as well as Sulistyo and Lutviana's study (2023), which asserted that PBL could improve learners' fluency and accuracy. In this study, PBL learners actively

acquired accurate pronunciation of unfamiliar words throughout the learning process. They received feedback and corrections from peers and teachers during various project activities. Collaborating in a relaxed and supportive environment helped these learners reduce anxiety and build confidence, leading to more fluent English speech with fewer pauses during conversations. Moreover, PBL learners were able to broaden their vocabulary and gain additional grammatical knowledge through the completion of each project. This aligns with the findings of Vaca Torres and Gómez Rodríguez (2017), which demonstrated that PBL encourages learners to enhance their oral production by facilitating vocabulary acquisition. The qualitative findings partially corroborated the quantitative results, indicating that PBL could indeed improve college students' speaking proficiency, particularly in terms of fluency, pronunciation accuracy, and syntactic complexity.

Students believed PBL positively influenced their engagement levels. These findings align with the previous studies (Mercer & Dörnyei, 2020; Novianti & Kusumayanthi, 2023; Li et al., 2024), in which PBL could enhance student engagement in learning. The enhancement of student engagement is associated with strong interest and enjoyment, intense concentration and effort, active application of cognitive learning strategies, and proactive contribution to the flow of learning. In this study, students conveyed their interest in the project themes, which served as a motivating factor for their active participation in the learning process. They expressed their keen interest and enjoyment during the phases of project discussion and execution. These findings were consistent with previous research, such as Hidayat et al. (2024), which found that

adapting project work to students' perspectives and interests increased their motivation, engagement, and enjoyment. In this study, students participating in this research experienced considerable enjoyment and fulfilment from participating in project-based activities, which identified the findings in Hairuddin and Irmawati's study (2023) indicating that students conveyed an overwhelming feeling of enjoyment and enthusiasm while participating in the project. Students also noted a heightened level of focus and dedication, both inside and outside of class, to ensure the successful finishing of projects. Additionally, they actively utilised cognitive learning techniques to improve their learning journey and aimed to engage in English-speaking sessions. However, these qualitative findings supported the quantitative results in enhancing emotional, behavioural, and cognitive performance through PBL, but there was a disagreement about the effectiveness of PBL in agentic engagement. Based on the qualitative data, students felt that their active participation in the learning process had improved. The findings show that students felt they contributed more in PBL classes. The reason for this could be that PBL learners perceived themselves as more involved in both teaching and learning activities and were more motivated to demonstrate their performance to others (Hidayat et al., 2024).

Students also developed their soft skills, including communication, collaborative and problem-solving skills, after participating in PBL. According to Huang (2021), PBL has evidenced success in enhancing students' communication and collaborative skills through interaction. The students involved in this study acknowledged the importance of collaboration and noted

its improvement through project completion. They observed enhancements in their collaborative and communication skills, particularly through activities like interviewing others and dealing with diverse viewpoints. The students also remarked that they had become more outgoing and proactive in their interactions with others compared to their earlier behaviours. These findings are in accordance with the studies (Trisdiono et al., 2019; Owens & Hite, 2022), which indicate that PBL can improve the ability to work in groups.

Students highlighted the improvement of problem-solving skills through PBL. According to Wahidati and Kharismawati (2023), students could acquire problem-solving skills by completing a project. Students in the study identified solutions to address issues that arose during project completion, leading to their belief in improved problem-solving skills. Students actively engage in problem solving, decision-making, and research through PBL (Novianti & Kusumayanthi, 2023). Students were able to successfully complete projects by addressing various problems. These findings are consistent with the studies (Wahidati & Kharismawati, 2023; Yong & Saad, 2023) in which PBL has the potential to enhance students' problem-solving skills.

Students felt more confident using English both inside and outside of the PBL classroom. These findings align with the studies (Yusuf & Ali, 2023), which indicated that BPL could develop students' self-confidence. Bakeer et al. (2023) stated that discussion in PBL provided a flexible and enjoyable learning activity that enhanced students' self-confidence through active involvement with real communicative situations. Students in this study noted that engaging in project

activities, such as gathering data in diverse locations and interacting with different individuals, contributed significantly to their increased confidence. Students also discovered that making mistakes was not a dreadful experience, as nobody paid much attention to them, thus reducing their fear of speaking English and becoming more confident. Their self-confidence and courage were bolstered through their involvement in project tasks. These findings align with Jara et al.'s study (2019), in which PBL gave everyone equal opportunities to speak, respond, and comment, motivating them to excel in their project and boost their self-confidence.

Despite the enhancement of students' collaborative skills through PBL, they still encountered difficulties with collaboration. PBL presents a challenge to collaboration because it takes the form of a group project. Participants expressed challenges in coordinating tasks among themselves. Group members were sometimes lazy and did not participate in the project implementation preparation (Kasmairi et al., 2023). These findings are consistent with the study (Aksela & Haatainen, 2019; Hussein, 2021; Hidayat et al., 2024), in which collaboration is ensured as one of the implementation challenges between students enrolled in a project assignment. In order to address these issues, students in this study hold collective discussions where everyone shares their shortcomings and expresses their thoughts. They also proposed negotiating to ensure project completion and pooling their free time for research. Hussein (2021) suggested that the challenge of collaboration can be successfully addressed by applying a structured project-management approach to planning, communication, and follow-up. A collaborative

environment based on inclusion, openness, and support enables students to respond to emerging problems and disagreements.

With regard to video-making issues, students expressed their concerns regarding video editing and filming, particularly because participants lacked prior experience in these areas. These findings align with Aksela and Haatainen's study (2019), which stated that students regarded making videos as a challenge in the implementation of PBL and attributed it to their non-existent information and communication technology skills. Students in this study tried to address the video-making issues through online instruction or by asking classmates for help. Hairuddin and Irmawati (2023) proposed that these obstacles may be overcome by providing more explicit guidelines or allocating additional resources. Although these challenges are faced in the implementation of PBL, they can still be solved by students through collaboration with their fellow students, attending training, or discussing it with students with the same interests related to PBL (Kasmaini et al., 2023).

4.10 Summary

This chapter presents and discusses the research findings. The study examined the effects of the PBL method on speaking proficiency and student engagement among polytechnic EFL learners. Both quantitative and qualitative data were analysed to realise the research objectives. Based on the research objectives, questions, and hypotheses, this study produces a rich set of results: (a) The findings for the first research question reveal that PBL could

significantly improve the polytechnic EFL learners' overall speaking proficiency, as measured by CAF. Furthermore, the findings show that the PBL learners outperformed the conventional learners in syntactic complexity, pronunciation accuracy, and fluency (speech rate and self-repairs), but there was no significant difference in syntactic accuracy or lexical accuracy. (b) The results for the second research question reveal that there were significant interaction effects between different English proficiency levels and time on the PBL learners' complexity but not on accuracy and fluency. The study also found a significant improvement in complexity across learners with different proficiency levels over time, along with a significant difference in fluency between high and low proficiency subgroups, but no significant changes in accuracy across these subgroups over time. (c) The results for the third research question reveal that the PBL method could significantly improve polytechnic EFL learners' engagement. Furthermore, the quantitative data reveal that there were significant differences in behavioural, emotional, and cognitive engagement between the PBL and conventional groups, while there was no significant discrepancy in agentic. (d) The findings for the fourth research question indicate that learners highly perceived PBL as being an effective method to improve speaking proficiency, student engagement, soft skills, self-confidence and courage. However, the implementation of PBL faced challenges, particularly in the areas of collaboration and video-making. These findings support the use of BPL in improving the speaking proficiency and student engagement of polytechnic EFL learners.

CHAPTER 5

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

5.1 Introduction

This final chapter provides a summary of the research findings, discusses their implications, and offers recommendations for future studies. Lastly, a final conclusion is presented.

5.2 Summary

Numerous EFL learners encounter difficulties in speaking English and participating in class due to a lack of authentic communication opportunities, low levels of motivation, and passive learning settings. To overcome these challenge, Project-Based Learning (PBL) was implemented to foster active participation and improve English speaking proficiency. The study aimed to determine the effects of PBL on polytechnic EFL learners' speaking proficiency, measured by complexity, accuracy, and fluency, and student engagement, in terms of behavioural, emotional, cognitive, and agentic dimensions. This study used a quasi-experimental research method with a non-equivalent pretest-posttest control group design. The 96 participants from two intact classes at a polytechnic in China were assigned to the experimental and control groups. Speaking tests were used to measure the effects of PBL on the speaking proficiency of college learners and learners with different proficiency levels.

Meanwhile, questionnaires were employed to assess the effects of PBL on the college learners' student engagement. Semi-structured interviews were employed to explore the effectiveness and challenges of using PBL in an English-speaking class. The quantitative data from both the speaking test and questionnaire were analysed using independent samples tests, one-way MANOVA, and one-way repeated measures ANOVA. The qualitative data from the semi-structured interviews was analysed by thematic analysis.

The results from speaking tests reveal that the PBL method could significantly improve college learners' speaking proficiency compared to the conventional teaching method, supported by an increase in syntactic complexity, pronunciation accuracy, and fluency (speech rate and self-repairs). These findings indicate that EFL learners who participated in PBL outperformed those who received conventional teaching methods in speaking proficiency. PBL provides increased opportunities for learners to develop their speaking proficiency, surpassing those in traditional learning environments. Specifically, PBL can improve college learners' complexity (syntactic complexity) and fluency (speech rate and self-repairs) due to its communicative nature. PBL creates an interactive setting where learners can produce more complex sentences and speak with greater fluency. PBL can also improve college learners' pronunciation accuracy by providing them with more pronunciation correction and feedback from both teachers and peers. However, PBL could not lead to significant improvements in accuracy (syntactic accuracy) for EFL learners. This could be attributed to the emphasis of PBL on communication rather than strict adherence to syntactic forms. Moreover, learners often focus

more on complexity and fluency in PBL, which can lead to a trade-off in accuracy due to limited cognitive resources. Learners may not see notable improvements in syntactic accuracy after engaging in PBL.

Furthermore, there were interaction effects of PBL on complexity across the learners with different proficiency levels over time. Interaction effects on fluency were observed solely among learners with high and low proficiency levels, with no notable changes in accuracy seen across various proficiency levels throughout the study period. These findings indicate that PBL could significantly enhance complexity across college learners with different proficiency levels over time. PBL also resulted in significant enhancements in fluency, specifically for learners with high and low proficiency levels. However, there was no notable improvement in accuracy across learners with high, medium, and low proficiency levels. These results can be attributed to the automated stage and varying attentional resources among learners with different proficiency levels within the context of PBL. PBL emerges as a potent instrument for enhancing complexity across learners with different proficiency levels and fluency between high and low proficiency learners. Thus, these findings offer strong evidence that college learners' complexity significantly increased with the development of their speaking proficiency after receiving PBL. Additionally, the increase in fluency was only significantly observable between learners with high and low speaking proficiency following PBL.

The results from questionnaires show the PBL method could greatly enhance college learners' engagement compared to the conventional teaching method,

as evidenced by the improvements in behavioural, emotional, and cognitive engagement. These findings indicate that learners in the PBL class were more engaged in learning activities than those in the conventional class. PBL, being a student-centered teaching approach, provides students with more autonomy in their learning process. In this democratic learning environment, students are motivated to participate in learning activities. Specifically, PBL has the potential to enhance college learners' behavioural, emotional, and cognitive engagement. This is because PBL can generate student interest, involve them in learning tasks, and foster the development of cognitive learning abilities through authentic and inquiry-based projects. Thus, it can be concluded that college learners' student engagement was significantly enhanced through PBL compared to the conventional teaching method, particularly in terms of behavioural, emotional, and cognitive aspects.

Additionally, the findings from semi-structured interviews indicate that PBL has the potential to improve college learners' speaking proficiency and student engagement. The reported improvements in speaking proficiency and student engagement support the quantitative findings. Furthermore, PBL enhances participants' soft skills, including communication, collaboration, and problem-solving abilities. However, challenges related to collaboration and video creation were noted in the implementation of PBL. This study suggests that while PBL offers significant benefits in an English-speaking class, it also presents challenges, providing teachers and students with valuable insights for employing and participating in PBL.

In summary, PBL is a highly communicative and student-centered teaching method, which has been shown to be an effective teaching method to enhance college learners' speaking proficiency and student engagement when compared to the conventional teaching method.

5.3 Implications

This study not only supports existing theories such as SCT, SDT, Comprehensible Output, and the Trade-Off Hypothesis but also offers insights into how PBL can enhance speaking proficiency and student engagement. These insights contribute to the understanding of how PBL functions as a powerful pedagogical approach in language learning, with important implications for theory and practice.

5.3.1 Theoretical Implications

The findings of this study have important implications for the theories underpinning the research, offering insights into how these theories might be further developed or modified based on the results. One significant theoretical contribution is the support for SCT, which posits that learners maximize their learning through social interactions and collaborative activities. According to SCT, learners' potential is fully realized when they are guided by more knowledgeable peers or instructors within a collaborative environment. This study supports the application of SCT within the context of PBL, where social interaction plays a critical role in knowledge construction. The PBL

environment encourages not only content development but also the creation of a context that fosters knowledge application and social interaction, allowing students to engage in collaborative tasks that provide scaffolding from both peers and teachers. As Puntambekar (2022) notes, such interactions within a learning community allow learners to work within the ZPD, thus fully utilizing their potential. This study reinforces the idea that group collaboration, as promoted in PBL, is essential for the construction of knowledge, supporting the emphasis of SCT on the importance of social interactions in the learning process.

The findings of this study validate SDT and expand its theoretical implications by revealing the differential impact of PBL on various dimensions of engagement. The findings of this study provide strong empirical support for SDT, reinforcing its relevance in the context of PBL for language learning. SDT posits that individuals have fundamental psychological needs for autonomy, competence, and relatedness, which, when satisfied, lead to enhanced intrinsic motivation and engagement. PBL fostered a democratic and supportive learning environment where students could actively participate in authentic tasks, express their ideas, and take ownership of their learning. The teacher's role in PBL shifted from an authoritative figure to that of a facilitator and mentor, further promoting autonomy and learner agency. However, beyond validating SDT, this study extends its application by demonstrating that PBL has differential effects on various dimensions of engagement, specifically, behavioural, emotional, and cognitive engagement, while showing limited impact on agentic engagement. Consequently, while PBL effectively enhances

motivation through autonomy and collaborative learning, its influence on students' proactive involvement in shaping their own learning trajectory may require additional instructional strategies.

These findings reinforce the Comprehensible Output Hypothesis and extend its theoretical implications by demonstrating how PBL facilitates meaningful language production and self-monitoring. According to this results of the study, PBL learners showed significant improvements in syntactic complexity and pronunciation accuracy, suggesting that interactive activities such as discussions, scriptwriting, dubbing, and presentations create optimal conditions for noticing linguistic gaps. However, while the Comprehensible Output Hypothesis emphasizes the role of output in language learning, these findings suggest that structured feedback and reflection play a crucial role in maximizing its benefits. The study indicates that learners improved their syntactic complexity and pronunciation by identifying differences in oral production between themselves and others, highlighting the importance of peer interaction and feedback within the PBL framework. This suggests a potential refinement of the theory, emphasizing that merely producing comprehensible output may not be sufficient opportunities for structured reflection and feedback should be incorporated to enhance language development.

This study supports the Trade-Off Hypothesis by offering theoretical implications on how PBL influences the balance between fluency, complexity, and accuracy in speaking proficiency. The results indicate that PBL learners

made significant gains in fluency and complexity, while their accuracy remained largely unchanged, reinforcing the idea that trade-offs occur in second language development. These findings suggest that while PBL is effective in enhancing fluency and complexity, additional instructional scaffolding may be necessary to support accuracy development. The study highlights the need for pedagogical interventions, such as integrating form-focused instruction or corrective feedback within PBL activities, to mitigate the trade-off effects and ensure a more balanced improvement across all linguistic dimensions. Furthermore, while the Trade-Off Hypothesis posits a competition between linguistic dimensions, this study raises the question of whether targeted scaffolding could help minimize such trade-offs.

5.3.2 Practical Implications

The main practical implication derived from this study pertains to the instruction of PBL. The findings suggest that applying PBL to improve students' speaking proficiency and engagement is beneficial. PBL demonstrated a notably greater improvement in speaking proficiency and student engagement compared to the conventional teaching method. Therefore, it is recommended to use PBL as an effective method to enhance speaking proficiency and student engagement.

This study provides implications for educators on how to effectively transition from a traditional lecture style to a PBL approach. PBL is a student-centered teaching method in which students have the opportunity to work in groups and

engage in social interaction to solve problems (Torres & Rodríguez, 2017). Based on the research, innovative teaching methods like PBL could be incorporated into the English-speaking curriculum gradually and as a supplemental approach. These methods engage and keep the students active in the learning process. Learning by doing and working in groups should be encouraged (Stanley & Marsden, 2012). Student-centered learning, such as PBL instruction, should be incorporated into the development programmes and training workshops for academic staff to teach and correct the various misconceptions about PBL and use it in classes. The colleges may also plan to consider and use the newly developed instructional methods to achieve similar improvements with other courses.

Due to the complexity of implementing PBL, teachers, particularly in the EFL field, can obtain implications from practical insights on how to use PBL effectively to enhance English proficiency and engagement. This study illustrates how PBL was integrated into an Oral English course at the tertiary level within a typical academic semester. The teaching procedures outlined in the study offer valuable guidance for teachers aiming to adopt PBL in their English language classes. The activities carried out during the PBL intervention, such as the main PBL tasks, support activities, and assessments, can be replicated in other EFL or ESL classrooms with the same goal of improving the speaking skills and engagement of English learners.

PBL could be a valuable solution for EFL learners facing the obstacle of limited opportunities to practice speaking English. The restricted chances for EFL

learners to practice speaking English present a significant barrier to improving their speaking proficiency. PBL creates opportunities for students to engage in English communication through exploring a real-life-related project. Teachers can enhance English language usage opportunities by creating and implementing more real-world PBL activities. This study utilised a range of activities to increase learners' English communication exposure, including extensive discussions, interviews, investigations, presentations, and more. Learners are motivated to actively participate in these authentic activities, leading to increased motivation, engagement, and speaking proficiency.

This study also implies that PBL as a teaching method is compatible with various levels of learners. Regarding the features of different proficiency learners, teachers can adjust PBL to meet the requirements of different proficiency learners. For high proficiency learners, PBL should focus on expanding vocabulary diversity, combining listening exercises to increase the input of substantive knowledge, and avoiding overly simplistic oral expressions. For learners with medium proficiency, the emphasis of PBL should be on increasing the frequency of oral output to enhance the level of automated expression. As for low-proficiency learners, more attention should be given to basic pronunciation training and solidifying foundational grammar knowledge.

5.4 Recommendations for Future Research

Future research could investigate the effects of combining PBL with ICT tools on learners' speaking proficiency and student engagement. This study

integrated the use of short video into PBL to assess its effects on speaking proficiency and student engagement. To expand on this, additional ICT tools could be considered for integration with PBL to evaluate their effects. For instance, combining PBL with flipped classrooms or online learning could be further examined to gauge their effectiveness in enhancing speaking proficiency and student engagement.

Future research could delve into the factors impacting learners' speaking proficiency within the PBL context. There are a number of confounding factors that could have influenced students' improvement, such as individual effort and group size (Foss, 2007). However, the sample size of this study, while enough to draw conclusions about whether or not improvement could be seen in the class, is not large enough to make a statistical analysis of these various factors. Therefore, future research should work to find out whether there are any correlations between certain aspects of the project and specific gains in speaking proficiency. For example, studies on using PBL could aim to discover whether there was more or less improvement in speaking proficiency depending on how often students spoke in class, and their roles in groups.

Future research could examine the impact of PBL on speaking proficiency and engagement among different participant demographics. This study primarily focused on general college students. Incorporating various participant groups, such as introverted and extroverted learners, learners with various learning styles or strategies, and students at different academic levels (e.g., freshmen or sophomores), could provide insights into the differences in speaking proficiency and engagement.

Further research could investigate the perspectives of teachers who have used PBL. The present study focuses solely on students' views regarding how PBL enhances speaking proficiency and student engagement. Investigating teachers' perspectives on implementing PBL, challenges faced during implementation, and recommendations for enhancing this method could be a valuable area for future direction.

5.5 Conclusion

This study confirms that PBL is an effective approach for enhancing EFL learners' speaking proficiency and engagement. The findings demonstrate that PBL fosters improvements in fluency, syntactic complexity, and pronunciation accuracy while significantly enhancing behavioural, emotional, and cognitive engagement. By providing a collaborative and interactive learning environment, PBL aligns with key language acquisition theories, including Sociocultural Theory (SCT), Self-Determination Theory (SDT), the Comprehensible Output Hypothesis, and the Trade-Off Hypothesis. Although challenges such as collaboration dynamics and the complexity of implementation exist, the overall pedagogical benefits of PBL outweigh these difficulties. The study offers practical insights into how PBL can be effectively integrated into language classrooms, highlighting its adaptability for learners of different proficiency levels. By promoting active learning, motivation, and real-world communication skills, PBL emerges as a powerful instructional method for fostering meaningful language acquisition and long-term engagement in EFL learners.

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APPENDICES

Appendix A

Summary of Previous Studies on Effects of PBL on Speaking Proficiency in English Education

No	Authors	Participants	Location	Research Methodology	Instruments	Key Results
1	Kettanun (2015)	N=21 Level: University	Thailand	Mixed methods research	- Pre-test and post-tests - Journals - Interviewed	Yield positive learning outcomes; Improve cognition, work ethics, and interpersonal skills.
2	Dewi (2016)	N=Unknown Level: Vocational school	Indonesia	Action research (Quanti and quali)	- Observation sheets - Tests - Questionnaire sheets	Improve students' speaking achievement; Make students more motivated, happy, and confident to speak English.
3	Yang & Puakpong (2016)	N=80 University	China	Mixed methods research	- Pre-test & post-test, - Questionnaire - Interview.	Enhance non-English major students' speaking ability.
4	Putri (2017)	N=44 Level: Seventh grade	Indonesia	Mixed methods research	- Speaking tests - Interview guide - Observation checklist - Open questionnaire - Field note.	Promote English productive skills; Improve enthusiasm, confidence, creativity, self-directed learning and collaborative learning skills.
5	Torres & Rodríguez (2017)	N=30 Level: Ninth grade	Colombia	Action research (Quali)	- Field notes - Students' oral performance - Interview	Increase oral production through vocabulary learning; Help learners to overcome fears of speaking in L2; Raise students' interest in talking about their experiences and the community.
6	Poonpon (2017)	N=47 Level: Undergraduate	Thailand	Qualitative research	Interview	Enhance language skills.
7	Marisah & Robiasih (2017)	N=32 Level: Vocational school	Indonesia	Action research (Quali)	- Observation - Interview	Provide an opportunity for students to develop ideas in speaking class; Speak more confidently with the other members; Improve social skill and cooperation.
8	Zare-Behtash & Sariak (2017)	N=45 Level: University	Iran	Quantitative research	Pre-test & post-test	Promote EFL students' speaking ability.

No	Authors	Participants	Location	Research Methodology	Instruments	Key Results
9	Riswandi (2018)	Level: Seventh grade	Indonesia	Action research (Quanti and quali)	- Observation checklist - Field notes, - Performance tests - Questionnaire - Interview	Improve students' speaking skill, including students' fluency, vocabulary, pronunciation, grammar, and comprehension.
10	Siririmangkorn (2018)	N=32 Level: University	Thailand	Mixed methods research	- Speaking tests - Interviews - Students' reflections	Improve learners' speaking skills through PBL focusing on drama.
11	Ichsan, et al. (2019)	N=36 Level: Eleventh grade	Indonesia	Action research (Quanti and quali)	- Observation - Tests	Improve students' speaking skill particularly in accuracy and fluency.
12	Bakar, et al. (2019)	N=44 Level: Diploma students	Malaysia	Quantitative research	- Pre-tests & post-tests, - Questionnaire	Improve the oral communicative competence of the English language learners through PBL.
13	Wuryantari Winasih, et al. (2019)	N=61 Level: Secondary level	Indonesia	Quantitative research	Pre-test & post-test	Improve students' speaking ability.
14	Kurniawati, et al. (2019)	N=5 Level: Ninth grade	Indonesia	Qualitative research	- Observation - Recording of video	Promote students' communication skill.
15	Park & Eisenhower (2019)	N=98 Level: College	Korea	Mixed methods research	- Pre- and post-questionnaire - A test - Interview	No statistically significant improvement in the speaking skills in both groups.
16	Sayuti, et al. (2020)	N=30 Level: Intermediate year three	Malaysia	Qualitative research	- Observation - Interview - Classroom Based Assessment report	Enhance students' English language speaking skill.
17	Qisthi & Arifani (2020)	N=56 Level: Junior high school	Indonesia	Quantitative research	Pre-test & post-test	Improved students' speaking skill through PBL via Instagram.
18	Bataineh, et al. (2020)	N=43 Level: eleventh grade	Jordan	Quantitative research	Pre-test & post-test	Improve both speaking fluency and accuracy of vocabulary and grammar through computerized PBL.
19	Spring (2020)	N= 41 Level: University	Japan	Quantitative research (No control group design)	Post-test	Project-based learning can result in clear improvements in oral proficiency; The greatest gains are likely to be made in both syntactic and pronunciation accuracy and syntactic complexity, but no significant improvement in lexical complexity.
20	Siririmangkorn (2021)	N=31 Level: University	Thailand	Mixed methods research	- Speaking tests - Questionnaires - Interviews.	Improve students' speaking skills through oral oral-presentation PBL.
21	Tyas & Fitriani (2021)	N=30 Level: University	Indonesia	Mixed methods research	- Tests, - Questionnaire - Observation	Improving students' speaking skill.
22	Kristianto & Harendita (2022)	N=30 Level=University	Indonesia	Qualitative research	- Questionnaires - Interviews	Improve vocabulary, grammar as well as fluency and confidence in speaking.

No	Authors	Participants	Location	Research Methodology	Instruments	Key Results
23	Olewi & Bunari (2022)	N=7 Level: University	Malaysia	Qualitative research	Interviews	Improve students' English communication skills, including gaining new words, practicing better pronunciations, and using correct grammar.
24	Widiyati & Pangesti (2022)	N=59 Level: Seventh grade	Indonesia	Quantitative research	Pre-test & post-test	Improve young-learner students' speaking skills.
25	Mantra, et al (2022)	Level: University	Indonesia	Action research (Quanti and quali)	- Pre-test & post-test - Questionnaire	Be effective for learning speaking skills.
26	Wuntu & Rorintulus (2022)	N=27 Level: University	Indonesia	Quantitative research	Pre-test & post-test	Improve students' speaking ability.
27	Olewi & Bunari (2022)	N=7 Level: University	Malaysia	Qualitative research	Interview	Making video projects improved their speaking skills, encouraged self-reflection, and helped in the monitoring and organization of speaking processes.
28	Sulistyo & Lutviana (2023)	N=37 Level: University	Indonesia	Quantitative research (No control group design)	- Speaking test - Questionnaires	There was a general enhancement in speaking proficiency through PBL using video; Improvements in fluency and accuracy were noted, but there was not significant progress in complexity.
29	Firdaus & Septiady (2023)	N=35 Level: University	Indonesia	Mixed methods research	- Interview - Observation - Documentation - Pre-test and post-test	It improves students' speaking ability, build students' team work skills, increase students' problem-solving skill, and stimulates students to be active, communicative, creative, and innovative.
30	Ariani, Hidayat, & Girikallo (2023)	N=24 Level: Polytechnic	Indonesia	Quantitative research (No control group design)	- Pre-test & post-test - Observation	An improvement in students' English-speaking skills after the implementation of PBL in Blended Learning System (BLS); PBL in BLS also succeeded in changing the students' learning attitude and in promoting students' creativity.
31	Puspitasari & Sofiana (2024)	N=80 Level: Grade ten	Indonesia	Quantitative research	Pre-test & post-test	PBL combined with Digital English Book is effective to improve students' speaking skill.
32	Zubaidi & Suharto (2024)	N=15 Level: Vocational	Indonesia	Mixed methods research	- Pre-test & post-test - Observation	The students' speaking skill improved through PBL with Vlogs in the aspects of pronunciation, grammar, vocabulary, fluency and understanding.
33	Aldobekhi & Abahussain (2024).	N=12 Level: University	Saudi Arabia	Mixed methods research	- Test - Interviews - Observation	Students' speaking and writing performance improved after using the PBL strategies. Significantly improved students' English proficiency, including linguistic proficiency, individual and social attitudes, autonomy, motivation, confidence, research skills, creativity, and collaborative learning skills.

Appendix B

Summary of Previous Studies on Effects of PBL on Student Engagement in English Education

No	Authors	Participants	Location	Research Methodology	Instruments	Key Results
1	Aiedah & Audrey (2012)	N(total)=85 N(interview)=16 Level: College	Malaysia	Qualitative research	- Focus groups - Interviews - Observations	Students were highly engaged in their learning.
2	Putri (2017)	N=44 Level: Junior High school	Indonesia	Mixed methods research (Qualitative design for engagement)	- Interview - Observation checklist - Open-ended questionnaire test	PBL enhanced students learning quality in term of critical thinking skill, creativity, communicative, and collaborative learning ability.
3	Park & Eisenhower (2019)	N(total)=49 N(quali)=16 Level: College	Korea	Mixed methods research (Qualitative design for engagement)	- Observation - Interview	PBL become efficient with art-related works and students' engagement.
4	Zheng & Tong (2022)	N=5 Level: University	China	Qualitative research	- Observations of group interactions - Interviews - Student texts	- Three patterns of engagement changes: - From active collaborators to 'team escapers', - From a supporter to a 'free rider' - Unchanged dedicated writers
5	Aubrey (2022)	N(total)=24 N(quali)=3 Level: University	Japan	Mixed methods research (Qualitative design for engagement)	- Learner diaries - engagement - Questionnaires - Transcripts of task conversations	Engagement is sustained in PBL by certain flow-like conditions during tasks (i.e., control, interest, challenge-skill balance), group cohesion among project members, and a growing focus on the long-term goal of the project.
6	Novianti & Kusumayanthi (2023)	N=53 Level: Higher education	Indonesia	Mixed Methods	- Observation sheet - Questionnaire - Interview	The collaborative project-based learning approach could facilitate the students to be actively involved in learning as well as give positive impact to the students' engagement in learning.
7	Hairuddin & Irmawati (2023)	N= 48 Level: Vocational higher education	Indonesia	Mixed methods research	Questionnaire	- Using video-making project as a Project Based Language Learning framework enhanced the students' English skills effectively. - It also enhanced the students' engagement and practical application of Business English concept.
8	Imbaquingo & Cárdenas (2023)	N=20 Level: Primary school	Spain	Mixed methods research	- Observation - Questionnaires	PBL offers an active and innovative approach to foster student engagement and improve reading and comprehension skills.
9	Al-Bahadli, Al-Obaydi & Pikhart (2023)	N=100 Level: college	Ukraine	Quantitative research	Questionnaires	PBL can significantly affect communication, engagement, motivation, and academic success in online Education.
10	Li, Chen & Zheng (2024)	N=71 Level: university	China	Mixed methods research	- Questionnaires - Interview	- An overall increase of emotional and social engagement during students' learning process. - Engagement changes were mainly driven by peer influence, task completion in Project Based Language Learning, leadership, and preference for Project Based Language Learning.

Appendix C

Questionnaire on Background Information of Participants

1. Your name _____

2. Your age _____

3. Your gender

☐ Male ☐ Female

4. Scores of English subject in Nation Matriculation Test in Spring

5. In which school or which grade did you start to learn English? For example, grade three, primary school

6. Did you go abroad? If yes, please write down 1) country, 2) purpose of visit, e.g. holiday or English study, 3) where did you go, 4) length of your study, e.g. two weeks.

7. Have you ever participated in project-based activities? If yes, in which grade or which subject?

Appendix D
Speaking Pretest

Direction: Select one of the task cards. Prepare for the topic in two minutes and speak for up to two minutes.

Task Card 1

Describe the first day you went to college

You should say:

Where the college is

How you went there

What happened that day

And how you felt about that day

Task Card 2

Describe a job you want to do in the future

You should say:

What it is

Where you want to do it

How you knew the job

And explain why you want to do it

Task Card 3

Describe a city you have ever been to

You may say:

What the city is

When did you go

Who did you go with

And explain why you like it or not

Task Card 4

Describe an experience you received visitors

You should say:

When it is

Where it is

Who you received

And explain how you felt

Appendix E

Speaking Posttest

Direction: Select one of the task cards. Prepare for the topic in two minutes and speak for up to two minutes.

Task Card 1

Describe an impressive English lesson you had and enjoyed

You should say:

What it was about

When you had it

What the teacher did

And why you enjoyed the lesson

Task Card 2

Describe a job that you would not like to do in the future

You should say:

What it is

Where you know it from

Is it difficult or easy

And explain why you would not like to do it

Task Card 3

Describe a place where you are able to relax

You should say:

Where it is

What it is like

How often you go there

And how you feel about this place

Task Card 4

Describe an experience you visited a friend

You should say:

Who you visited

What you did

Why you visited him or her

And how you felt about it

Appendix F

Student Classroom Engagement Scale (Chinese Version)

请在下列选项中圈出你的答案。

1 2 3 4 5
非常不同意 不同意 中立 同意 非常同意

学生课堂投入度	1	2	3	4	5
1. 当我上这门课时，我会很仔细地听讲。					
2. 我上这门课时很专心。					
3. 我努力在这门课上表现好。					
4. 在这门课上，我尽可能地努力学习。					
5. 我上这门课时参与课堂讨论。					
6. 我让我的老师知道我需要什么，我想要什么。					
7. 我让我的老师知道我对什么东西感兴趣。					
8. 在课堂上，我表达了我的喜好和意见。					
9. 在课堂上，我会问一些问题来帮助我学习。					
10. 当我在课上需要一些东西时，我会向老师提出来的。					
11. 当我学习这门课时，我尝试把我所学的东西和我自己的经历联系起来。					
12. 当我学习这门课时，我尝试把所有不同的想法结合在一起，使之有意义。					
13. 当我学习这门课时，我尝试把我所学到的和我已经知道的联系起来。					
14. 当我学习这门课时，我编造自己的例子来帮助我理解其中的重要概念。					
15. 当我们做课堂活动的时候，我感到很有趣。					
16. 这门课很有趣。					
17. 我喜欢在这门课上学习新东西。					
18. 当我上这门课时，我感觉很好。					
19. 当我们做课堂活动的时候，我会参与进来。					

Appendix G

Student Classroom Engagement Scale (English Version)

Directions: Please circle your answer from the choices below.

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

	Engagement	1	2	3	4	5
1.	When I'm in this class, I listen very carefully.					
2.	I pay attention in this class.					
3.	I try hard to do well in this class.					
4.	In this class, I work as hard as I can.					
5.	When I'm in this class, I participate in class discussions.					
6.	I let my teacher know what I need and want.					
7.	I let my teacher know what I am interested in.					
8.	During this class, I express my preferences and opinions.					
9.	During class, I ask questions to help me learn.					
10.	When I need something in this class, I'll ask the teacher for it.					
11.	When I study for this class, I try to connect what I am learning with my own experiences.					
12.	I try to make all the different ideas fit together and make sense when I study for this class.					
13.	When doing work for this class, I try to relate what I'm learning to what I already know.					
14.	I make up my own examples to help me understand the important concept I study for this class.					
15.	When we work on something in this class, I feel interested.					
16.	This class is fun.					
17.	I enjoy learning new things in this class.					
18.	When I'm in this class, I feel good.					
19.	When we work on something in this class, I get involved.					

Appendix H

Interview Questions (Chinese Version)

访谈问题
I. 个人信息
1. 你来自哪里?
2. 你多少岁?
3. 你在春季高考的英语成绩是多少?
II. 关于项目学习效果
1. 你对哪个项目主题最感兴趣? 为什么?
2. 你对项目的哪个部分最感兴趣, 例如, 讨论主题、计划项目、执行项目, 还是制作和编辑视频? 为什么?
3. 你是如何参与项目学习活动的?
4. 你在基于项目学习活动中使用了什么策略? 例如, 释义、联想或推理策略。
5. 你对项目学习活动有何贡献?
6. 项目学习法能帮助你提高课堂参与度吗? 如果能, 如何帮助你提高? 如果不能, 为什么?
7. 项目学习法能帮助你提高口语水平吗? 如果是, 如何帮助你提高? 如果不能, 为什么?
8. 项目学习法能帮助你更准确地说英语吗? 例如, 发音准确, 语法正确。如果能, 如何帮助你提高? 如果不能, 为什么?
9. 项目学习法能帮助你更流利地说英语吗? 例如, 加快语速或减少停顿。如果能, 如何帮助你提高? 如果不能, 为什么?
10. 项目学习法能帮助你更多的英语吗? 例如, 使用更多的单词或更多的从句。如果能, 如何帮助你提高? 如果不能, 为什么?
11. 项目教学法是否提高了你其他的软技能? 例如交际能力、合作能力或解决问题的能力。如果是, 如何提高? 如果不是, 为什么?
12. 你在参与项目式学习时遇到过哪些问题? 你是如何解决这些问题的?

Appendix I

Interview Questions (English Version)

Interview Questions
I. Questions on Personal Information
1. Where are you from?
2. How old are you?
3. What is your English Score in the Spring college Entrance Examination?
II. Questions on the Effectiveness of Project-Based Learning
1. Which project themes are you mostly interested in? Why?
2. Which parts of a project are you mostly interested in, for example, discussing topics, planning projects, executing projects, or making and editing videos? Why?
3. How did you participate in the project activities?
4. What strategies did you use in the project-based learning activities? For example, paraphrasing, association or reasoning strategies.
5. How did you contribute to the project-based learning?
6. Can the project-based learning method help you to enhance your engagement in class? If yes, how? If no, why not?
7. Can the project-based learning method help you to improve your speaking proficiency? If yes, how? If no, why not?
8. Can the project-based learning method help you to speak English more accurately? For example, pronouncing accurately and using correct grammars. If yes, how? If no, why not?
9. Can the project-base learning method help you to speak English more fluently? For example, faster speaking speed or less pause. If yes, how? If no, why not?
10. Can the project-based learning method help you to speak more English? For example, using more words or more clauses? If yes, how? If no, why not?
11. Can the project-based learning help you improve your soft skills? For example, communicative, cooperative and problem solving skills? If yes, how? If no, why not?
12. What problems did you encounter when participating in the project-based learning? How did you solve these problems?

Appendix J

Panel of Experts

Experts for content validity of speaking tests

- A. Wanzhuan Chen
Associate Professor, Dean of Faculty of Foreign Languages
Yangjiang Polytechnic, China
- B. Xingmei Li
Associate Professor, Deputy Dean of Faculty of Foreign Languages
Yangjiang Polytechnic, China

Experts and teachers for translating of questionnaire and interview questions

- A. Lingzhi Zeng
Associate Professor, Head of Department of English Education
Yangjiang Polytechnic, China
- B. Yueqiao Lin
Senior Lecturer, Faculty of Foreign Languages
Yangjiang Polytechnic, China
- C. Jin Yan
Senior Lecturer, Faculty of Foreign Languages
Yangjiang Polytechnic, China

Experts for content validity of interview questions

- A. Meifeng Yong
Previous Associate Professor, Faculty of Modern Languages and Communication
Universiti Putra Malaysia, Malaysia
- B. Joanna Joseph
Senior Lecturer, Faculty of Educational Studies
Universiti Putra Malaysia, Malaysia

Teachers for coding transcripts of speaking tests and interview

- A. Yueqiao Lin
Senior Lecturer, Faculty of Foreign Languages
Yangjiang Polytechnic, China
-

Appendix K

Project Plan Form

Group Name: _____ Group Leader: _____

Group Members (Matric No): _____

Project Theme		
Project Topic		
Content		
	1	
	2	
	3	
	4	
	5	
	6	
Procedures		
	1	
	2	
	3	
	4	
	5	
	6	
Member Responsibilities		
	1	
	2	
	3	
	4	
	5	
	6	

Appendix L

Self-Evaluation Form

Project Theme: _____ **Group Name:** _____

Your Name: _____ **Matric No:** _____

Direction: Circle the extent to which you agree with the statement on the left, using a scale of 1–6 (1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = slightly agree; 5 = agree; 6 = strongly agree). Total the number lastly.

Fluency		Scale					
1. I could speak smoothly.		1	2	3	4	5	6
2. I could speak with few pauses (without having much interval).		1	2	3	4	5	6
3. I could speak speedily.		1	2	3	4	5	6
4. I could speak without repetitions.		1	2	3	4	5	6
5. I could speak naturally.		1	2	3	4	5	6
Subtotal							
Accuracy		Scale					
1. I could speak accurately.		1	2	3	4	5	6
2. I could speak using accurate grammar.		1	2	3	4	5	6
3. I could speak using accurate verb tenses.		1	2	3	4	5	6
4. I could speak using accurate articles (e.g., a, the).		1	2	3	4	5	6
5. I could speak using accurate verbs and nouns.		1	2	3	4	5	6
Subtotal							
Complexity		Scale					
1. I could speak using difficult grammar.		1	2	3	4	5	6
2. I could speak using long sentences.		1	2	3	4	5	6
3. I could speak using a combination of various sentences.		1	2	3	4	5	6
4. I could speak using clauses.		1	2	3	4	5	6
5. I could speak using unfamiliar sentences.		1	2	3	4	5	6
Subtotal							
Total							

Direction: Please answer the questions in details based on your learning experience.

1. What did you contribute to the project work?

2. What did you learning from the project?

Appendix M

Peer-Evaluation Form

Project Theme: _____ Group Name: _____

评价指标	不及格 (1-2)	基本达标 (3-4)	达标 (5-6)	得分
流利性 与连贯性	- 作答有明显停顿，且语速有时缓慢，出现频繁重复及自我纠正 - 能连接简单句子，但重复使用简单的连接词，有时缺乏连贯性	- 能用简单的语言进行流利的表达，但在进行更为复杂的交流时则表达不畅 - 能使用一系列连接词及语篇标记，但无法保持一贯恰当	- 表达流利，较少出现重复或自我纠正的情况； - 表达连贯，衔接手段的使用恰当	
发音准确性	经常出现发音错误，对听者理解造成一些困难	发音基本准确，表达过程中听者基本能理解，但部分单词或发音不准确导致有时清晰度下降	发音准确，虽偶尔出现偏差，但表达过程中始终易于听者理解	
语法复杂性 与准确性	极少使用从句，常出现错误，且会造成误解	使用有限的复杂句式结构，但有时会出现错误	能正确使用多种语法结构，大部分语句准确无误	
内容表达	使用较少的、不恰当的、或不相关的描述、事实、细节或例子来支持想法，有限的语言会导致难以理解	使用一些描述、事实、细节和一些支持想法的例子，但可能还不够，或者有些是不相关的，所使用的语言是可理解的	使用相关的、精心选择的描述、事实、细节和例子来支持主张、发现或论证，所使用的语言容易理解	
问题回答	不回答观众的问题（不寻求澄清就偏离话题或误解）	回答一些观众的问题，但并不总是清楚或完全的	- 清晰完整地回答观众的问题 - 在无法回答问题时能解释如何找到答案	
团队参与	并非所有的团队成员都参与其中，只有一两个人发言	所有的团队成员都参与其中，但并不平等	所有团队成员参与的时间大致相同，所有的团队成员都能够回答关于整个主题的问题	
Total				

Appendix N

PBL Lesson Plan 1

Project 1	Interviewing New Friends	
Teaching Material	Advanced Vocational English Listening and Speaking Course (3 rd Edition) (2023)	
Class Type	Oral English	
Class Hours	90mins per week, 3 weeks in total	
Teaching Objectives	Knowledge objectives	To learn some useful expressions of describing a person.
	Ability objectives	To introduce new friends accurately and fluently by using new words and expressions.
	Quality objectives	To understand how to make a video on interviewing people.
Teaching Method	Project-Based Learning	
Teaching Aids	Textbook, multimedia, videos, pictures, Internet, etc	
Teaching Procedures		
1. The teacher plays a video and draws students' attention to some questions. Then students discuss and answer the questions as follows:		
(1) What is the relationship between the interviewer and the interviewee?		
(2) What questions did the interviewer ask in the interview?		
(3) What did the interviewee answer?		
(4) How do we conduct an interview?		
		
2. The teacher let students form groups to discuss and determine who they would like to interview and what they want to know from the interviewees.		
3. The teacher provides scaffolding activities to develop students' knowledge and skills on describing persons.		
4. Activity 1: Students listen to Lee talking about somebody who is important to him. Read the questions and tick the ones she gives information about. Then the teacher informs the students of expressions of describing a person.		
5. Activity 2: Based on Lee's talking and the expressions, students are going to tell their group mates about a person who is important to them. The teacher makes comments and then summarizes the knowledge and skills required in describing a person.		
3. The teacher guides students to structure the project, such as creating interview questions and dividing jobs.		
4. Students rehearse and conduct interviews. The teacher offers guidance.		
5. Students make a video on interviewing new friends. The teacher offers guidance.		
6. Groups display their videos to the class. They needed to answer questions raised by other students.		
7. Students make self-evaluation and peer-evaluation. The teacher makes comments on students' products.		

PBL Lesson Plan 2

Project 2	Introducing Scenic Spots	
Teaching Material	Advanced Vocational English Listening and Speaking Course (3 rd Edition) (2023)	
Class Type	Oral English	
Class Hours	90mins per week, 3 weeks in total	
Teaching Objectives	Knowledge objectives	To learn some words and expressions of describing scenic spots.
	Ability objectives	To use new words and expressions to introduce new friends accurately and fluently;
	Quality objectives	To understand how to make an interview of a field trip on introducing scenic spots.
Teaching Method	Project-Based Learning	
Teaching Aids	Textbook, multimedia, videos, pictures, Internet, etc	
Teaching Procedures		
1. The teacher introduces the project by presenting some pictures of scenic spots. Then the teacher asks the students to answer the questions:		
(1) Can you tell where it is?		
(2) Have you ever visited the places?		
		
2. The teacher and students discuss the project topic together. Then the students determine the project topic-An interesting place in Yangjiang, such as Jinshan Botanical Garden, Yuanyang Lake Park, Kite Museum and so on.		
3. The teacher organizes two scaffolding activities to develop students' knowledge and skills associated with describing scenic spots.		
Activity 1: Students listen to Emma talking about the best place she has ever visited. Read the questions and tick the ones she gives information about. Then the teacher informs the students of expressions of describing a place.		
Activity 2: Based on Emma's talking and the expressions, students are going to tell their group mates about the best place they have ever visited. The teacher makes comments and then summarizes the knowledge and skills required in describing a place.		
4. The teacher guides to write an introductory speech by using the following framework. After that, students rehearse it orally.		

Framework of introducing a scenic spot

Craft a Captivating Title	For example, "Discover the Hidden Gem: [Scenic Spot Name] – A Journey into Paradise."
Introduction	Begin your article with a strong, engaging introduction.
Body	Natural Beauty: Describe the landscape, unique rock formations, bodies of water, flora, fauna, and any seasonal changes in scenery. Cultural Significance: Explain the historical or cultural context of the spot, including any myths, legends, or traditions associated with it. Activities and Recreation: Discuss the activities visitors can enjoy at the location, whether it's hiking, wildlife watching, photography, or cultural experiences.
Conclusion	Summarize the key points of your article and reiterate why the scenic spot is a must-visit destination.

- Students search information on the internet or make a field trip to the place to gather information or shoot videos.
- Students organizing a speech about describing the interesting place and create a short video for it.
- Groups display their videos to the class. The presentation group answer questions raised by other groups.
- Students make self-evaluation and peer-evaluation. The teacher makes comments on students' products.

PBL Lesson Plan 3

Project 3	Survey on Ideal Jobs	
Teaching Material	Advanced Vocational English Listening and Speaking Course (3 rd Edition) (2023)	
Class Type	Oral English	
Class Hours	90mins per week, 3 weeks in total	
Teaching Objectives	Knowledge objectives	To learn some words and expressions of introducing jobs;
	Ability objectives	To use new words and expressions to introducing jobs accurately and fluently.
	Quality objectives	To understand how to make a video of a survey on jobs
Teaching Method	Project-Based Learning	
Teaching Aids	Textbook, multimedia, videos, pictures, Internet, etc	
Teaching Procedures		
1. The teacher let students brainstorm on names of various jobs. Then the teacher introduces the question: 2. What are the ideal jobs among college students from different majors? 3. The teacher organises students to discuss the following questions: (1) What's your ideal job? (2) Why do you want to be? (3) What is your career goal? 4. The teacher organizes two scaffolding activities to develop students' knowledge and skills on describing jobs.		
Activity 1: Students listen to two dialogues about jobs and complete the dialogues by choosing correct words and expressions. The teacher highlights the new word and expressions of describing jobs.		
Activity 2: Based on the dialogues, students are going to make dialogues about their job career. The teacher makes comments and summarizes the knowledge and skills required in describing jobs as follows.		

What are the ideal jobs among college students from different majors?

Key points in the Investigation & Summary:

- 1. Jobs: ...?
- 2. responsibilities: ...?
- 3. Reasons: ...?
- 4. How to realize: ...?
- ...

Information 1

- **1. Major:** English Education
- **Job:** Elementary School Teacher
- **Responsibilities:** Deliver age-appropriate lessons in subjects like math, science, language arts, and social studies, create lesson plans, and manage classrooms
- **Reasons to Choose:** Inspire young minds, ensures job security, leaves a lasting impact, and provides a balanced work-life schedule.
- **How to Realize:** Pursue a bachelor's in education, obtain teaching certification, gain hands-on experience through student teaching, stay updated through professional development, apply for teaching positions, and keep learning for ongoing growth.

5. Students design survey on ideal jobs and refine it. The teacher provides guidance.
6. Students conduct the survey at campus.
7. Students make a video of survey on ideal jobs of college students.
8. Groups display their videos to the class. The presentation group answer questions raised by other groups.
9. Students make self-evaluation and peer-evaluation. The teacher makes comments on students' products.

PBL Lesson Plan 4

Project 4	Inviting and Receiving visitors	
Teaching Material	Advanced Vocational English Listening and Speaking Course (3 rd Edition) (2023)	
Class Type	Oral English	
Class Hours	90mins per week, 3 weeks in total	
Teaching Objectives	Knowledge objectives	To learn some words and expressions of inviting and receiving visitors.
	Ability objectives	To use new words and expressions to invite and receive visitors accurately and fluently.
	Quality objectives	To understand how to make a video of a short drama on inviting and receiving visitors.
Teaching Method	Project-Based Learning	
Teaching Aids	Textbook, multimedia, videos, pictures, Internet, etc	
Teaching Procedures		
- The teacher plays a film scene on inviting and receiving visitors. The teacher introduces the following question: - Where or what occasions do we usually invite and receive visitors? - Students share their experiences of inviting and receiving visitors, guided by the following questions: (1) Have you ever received visitors? Please share your experiences. (2) What should we pay attention to when we receive visitors? - The teacher organizes two scaffolding activities to develop students' knowledge and skills on inviting and receiving visitors.		
Activity 1: Students listen to two dialogues about inviting and receiving visitors and complete the dialogues by choosing correct words and expressions. The teacher highlights the new word and expressions of inviting and receiving visitors.		
Activity 2: Based on the dialogues, students are going to make dialogues about inviting and receiving visitors. The teacher makes comments and summarizes the knowledge and skills as follows.		

Receiving visitors at the party

- **1. Warm Welcome:**
 - - Host: Hey there! Welcome to the party! I'm so glad you could make it!
 - - Visitor: Thanks for having me! This place looks amazing!
- **2. Introduction to Others:**
 - - Host: I want you to meet some friends. This is Mary.
 - - Visitor: Hi, Mary! Nice to meet you. This party is fantastic!
- **3. Expressing Excitement:**
 - - Host: I've been looking forward to this. How was your trip here?
 - - Visitor: Not too bad. Your invitation got me all pumped up for a good time!
- **4. Offering Drinks:**
 - - Host: Can I get you a drink? We've got a little bit of everything.
 - - Visitor: Sure, surprise me! Let's make it a good night!

- **5. Checking In:**
 - - Host: Is everything going well so far? Need anything?
 - - Visitor: Everything's perfect! You've done an amazing job.
- **6. Sharing the Party Plan:**
 - - Host: We've got some games set up and a dance floor later. Feel free to jump in!
 - - Visitor: Sounds like a blast! I'm definitely up for some fun.
- **7. Complimenting the Host:**
 - - Visitor: Seriously, this party is incredible. How did you manage to organize all of this?
 - - Host: It took some effort, but seeing everyone enjoy themselves makes it all worth it!
- **8. Expressing Gratitude:**
 - - Visitor: Thanks for inviting me. This is exactly what I needed!
 - - Host: Anytime! I'm just happy you could make it. Let's make it a memorable night!

5. Students write scripts of short drama on inviting and receiving visitors. Then they assign roles to every member.
6. Students rehearse the short drama.
7. Students create a video of a short drama on inviting and receiving visitors.
8. Groups display their videos to the class. The presentation group answer questions raised by other groups.
9. Students make self-evaluation and peer-evaluation. The teacher makes comments on students' products.

Appendix O

Examples of Manual Coding

Transcripts were pruned based on the Analysis Speech of Unit (As-unit). According to Foster et al. (2000), AS-unit is “a single speaker’ s utterance consisting of an independent clause or sub-clausal unit, together with any subordinate clause(s) associated with it” (p. 365). AS-unit boundaries were noted an upright slash (//) (Example 1). Within an AS-unit, a clause boundary was indicated by a comma ([,]) (Example 2). Chinese and English fillers were enclosed in brackets. False starts (Example 3), functionless repetitions (Example 4), reformulations (Example 5), and replacements (Example 6) were enclosed in braces {...}. A coordinated clauses that was considered part of the same AS-unit are illustrated in Example 7. Grammatical errors were underlined (Example 8).

Example 1: //Last summer vacation I went to Beijing.//

Example 2: //I think[the popular sport at campus is running].//

Example 3: //{Playing basketball is (ah) is (ah)}playing basketball can keep fit.//

Example 4: //After that I felt in love with {with} English.//

Example 5: //(E~) my favourite subject is English, [because learning English makes {make} me confident].//

Example 6: //{He is} She is my best friend.//

Example 7: //[I sent the gift to my mother] and she felt moved.//

Example 8: She like books.

Appendix P

Approval Letter from Yangjiang Polytechnic

阳江职业技术学院

APPROVAL LETTER

This is to certify that Zhong Jianer has permission to conduct her study entitled "Effects of Project-Based Learning on Speaking Proficiency and Student Engagement among College EFL Learners in China" in English Department, Yangjiang Polytechnic, which is for Zhong Jianer's Doctoral thesis in Faculty of Educational Studies, Universiti Putra Malaysia.



Appendix Q

Consent Form (Chinese Version)

11th July, 2023 Version 2



JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

表 2.4：受试者信息表和知情同意书

请仔细阅读以下信息，不要犹豫与研究人员讨论您可能遇到的任何问题。

1. 研究标题：项目式学习对中国大学英语学习者口语水平和学习投入度的影响

2. 简介：我是马来西亚博特拉大学教育研究学院的博士生。我正进行一项题为“项目式学习对中国大学英语学习者口语水平和学习投入度的影响”的研究。你被要求参与此项研究。本研究旨在提高中国大学英语学习者的口语水平和参与度。你的帮助对于改善目前的中国大学英语口语教学很重要。

3. 你要做什么？

您将被要求参加基于项目式学习的英语口语课程（一个学期），问卷调查和访谈。

4. 谁不应该参与研究？

如果学生不想参与研究，他或她可以不参与。

5. 这项研究的好处是什么：

(a) 对作为参与者的您？

您将受益于项目式学习法，以实现用英语进行有效沟通的目标。

(b) 对调查者？

调查者将从研究结果中受益，根据项目制定英语口语课程和设计项目活动，从而提高学生口语水平。

6. 可能的风险是什么？

唯一一个很小的风险是，你在参与研究时可能会受伤。如果是这样，您将会得到短期的医疗护理和适当的健康保健产品的补偿。

7. 您提供的信息和您的身份是否会保密？

对您提供的信息和您的身份将保密。所有的研究记录将保存在安全的地方。您的个人信息不会在任何与本研究相关的论文或演示中披露。

8. 如果您在研究过程中有其他问题，您应该联系谁？

如果你有其他问题，你应该联系通过项目式学习法教授英语口语课程的老师。您可以随时提出有关这项研究的问题。

如果您对作为本研究参与者的权利有任何疑问，请联系：

秘书处，JKEUPM，电子邮件地址 jkeupm@upm.edu.my

如果您已经阅读并理解了本页的内容，请在此处签名_____

9. 同意

我（姓名）..... 身份证号.....
地址.....
自愿同意参加上述研究*(临床/药物试验/录像/焦点小组/访谈/问卷)。

本人已被告知该项研究的性质，包括研究方法、可能的不良影响和问题(如受试者的信息表所述)。我明白，我有权在任何时候退出这项研究，而无需给予任何理由。我也明白这项研究是保密的，所有关于我身份的信息都将保密。

我*希望/不希望知道与我参与这项研究有关的结果

我同意/不同意与我有关的图像/照片/录像/录音被用于任何形式的出版或展示(如适用)

*删去必要的地方

签名..... 签名

(受试者) (见证者)

日期 :..... 名字:.....

学号:.....

本人确认已向答辩人解释上述研究的性质及目的。

日期 签名

(研究者)

Appendix R

Consent Form (English Version)

11th July, 2023 Version 2



**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA**

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE : Effects of Project-Based Learning on Speaking Proficiency and Student Engagement among College EFL Learners in China

2. INTRODUCTION: I am a PhD student at Faculty of Educational Studies, Universiti Putra Malaysia (UPM). I am conducting a study on titled "Effects of Project-Based Learning on Speaking Proficiency and Student Engagement among College EFL Learners in China". You are asked to participate in this research. The purpose of this research is to improve Chinese college EFL learners' speaking proficiency and engagement. Your help is important to improve the current college oral English teaching in China.

3. WHAT WILL YOU HAVE TO DO?

You will be asked to participate in an oral English course using Project-Based Learning (one semester), questionnaires and interviews.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

The student does not have to participate in research if he or she does not want to.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will benefit from the PBL Method to achieve the goal of communicating effectively in English.

(b) TO THE INVESTIGATOR?

The investigator will benefit from the findings to develop English speaking curriculum based on projects, and design project activities to enhance students' speaking proficiency.

5. WHAT ARE THE POSSIBLE RISKS?

There is a small risk that you will possibly injure when participating in the research. If so, you would be provided with short-term medical care and be compensated with appropriate healthy care products.

6. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

Yes. The information that you provide and your identity will remain confidential. All the research records will be kept in a secure location. Your personal information will not be disclosed in any paper or presentation related to this study.

7. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

You should contact the instructor who teaches the oral English course by using Project-Based Learning, if you have additional questions. You are free to ask questions about this research anytime.

If you have any questions about your rights as a participant in this study, please contact:
The Secretariat, JKEUPM, at email address jkeupm@upm.edu.my

Please initial here if you have read and understood the contents of this page _____

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to take part in the research stated above
*(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature
(Respondent)

Signature
(Witness)

Date :.....

Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date

Signature
(Researcher)

Appendix S

Permission to Use Questionnaire

2023/5/30 15:10

University Putra Malaysia Mail - Permission to use questionnaire



ZHONG JIANER / UPM <gs62625@student.upm.edu.my>

Permission to use questionnaire

3 messages

ZHONG JIANER / UPM <gs62625@student.upm.edu.my>
To: johnmarshall.reeve@acu.edu.au

Mon, May 22, 2023 at 5:07 PM

Dear Professor Dr. Johnmarshall Reeve,

Hello. My name is Zhong Jianer, and I am a PhD student at Universiti Putra Malaysia. Your research on engagement has inspired me to write a thesis entitled "Effects of Project-Based Learning on Student Engagement in English Speaking". I am about to collect data for the study.

I am writing to you to seek permission to use the Student Classroom Engagement scale you developed and used in a study (Reeve & Tseng, 2011). The questionnaire scale includes 21 items on a 7-point Likert scale. The said questionnaire is in the attached file.

I will be using the questionnaire to answer the following research question:

What are the effects of Project-Based Learning on EFL students' behavioral, emotional, cognitive and agentic engagement in English speaking?

I would be really grateful if you would allow me to use the above mentioned questionnaire scale for my study. Please feel free to ask me any questions regarding my study if you need further clarifications.

Thank you very much.

Zhong Jianer

 **STUDENT CLASSROOM ENGAGEMENT SCALE.docx**
13K

Johnmarshall Reeve <Johnmarshall.Reeve@acu.edu.au>
To: ZHONG JIANER / UPM <gs62625@student.upm.edu.my>

Mon, May 22, 2023 at 9:57 PM

Hi Zhong Jianer,

Yes, you have my permission to use the engagement scale(s).

However, I recommend you use the somewhat updated version of the questionnaire in the attached document.

For instance, the Reeve (2013) measure of agentic engagement is a 5-item scale.

Good luck on the project-based learning study!
Johnmarshall

From: ZHONG JIANER / UPM <gs62625@student.upm.edu.my>
Sent: Monday, May 22, 2023 7:07 PM
To: Johnmarshall Reeve <Johnmarshall.Reeve@acu.edu.au>
Subject: Permission to use questionnaire

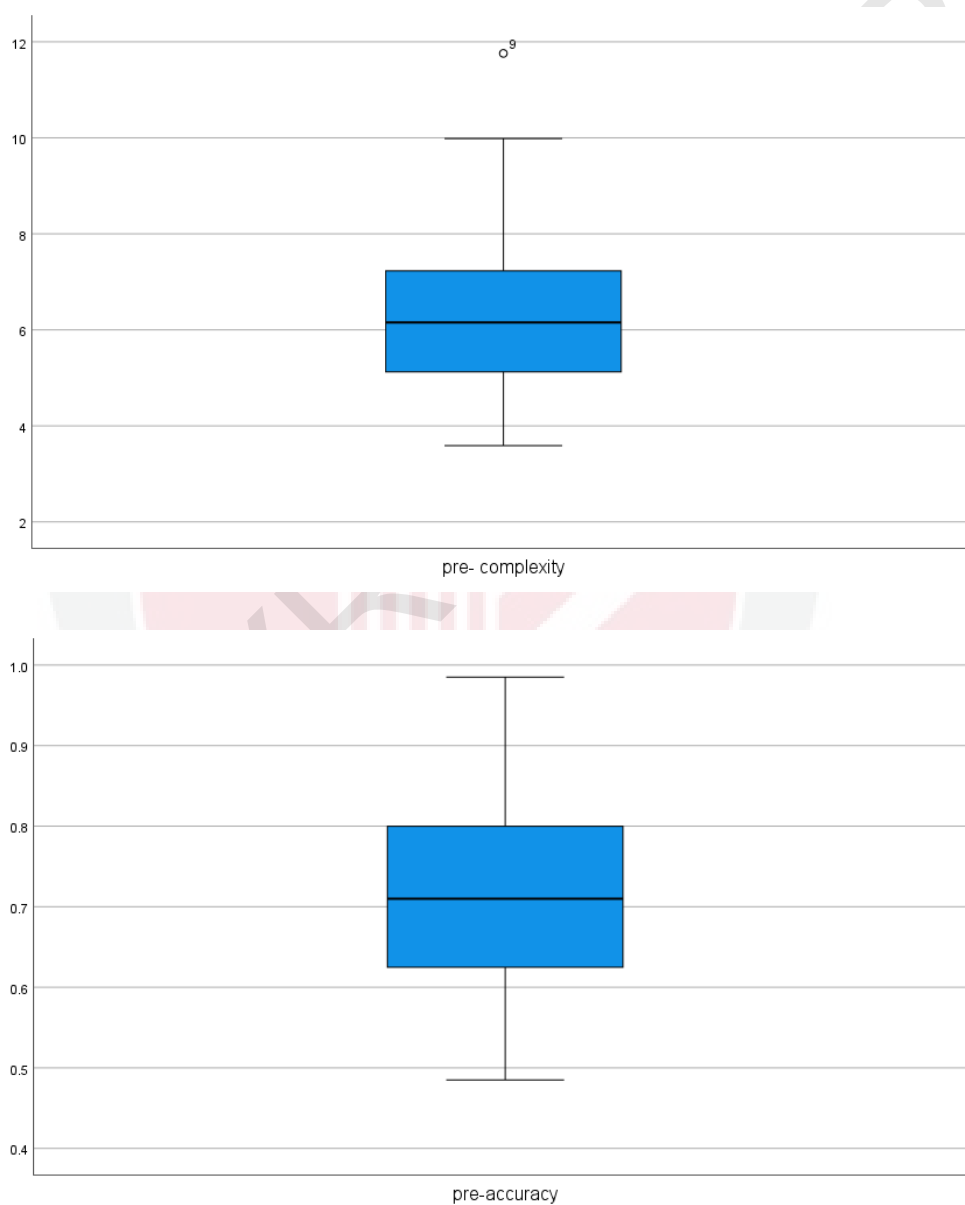
You don't often get email from gs62625@student.upm.edu.my. [Learn why this is important](#)

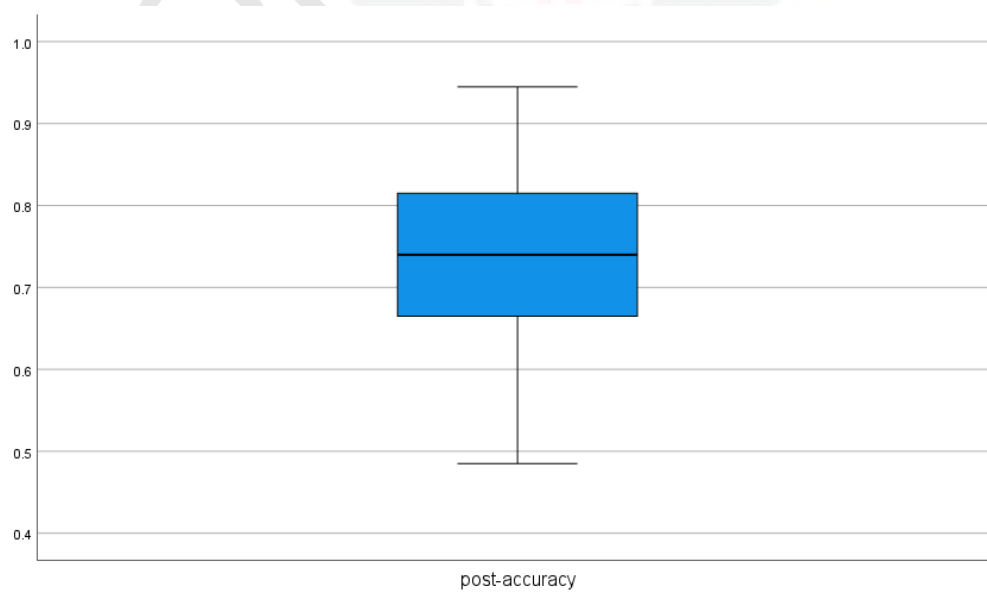
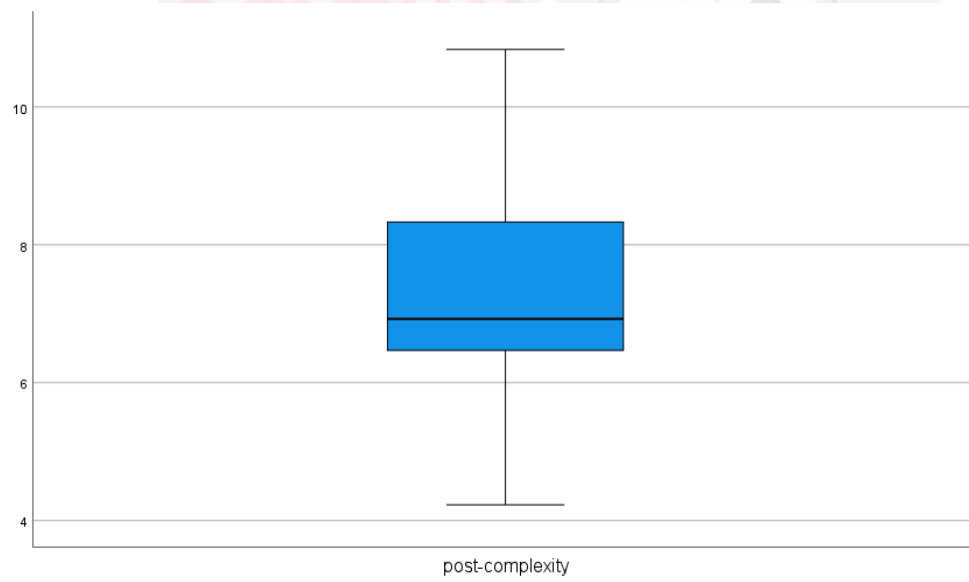
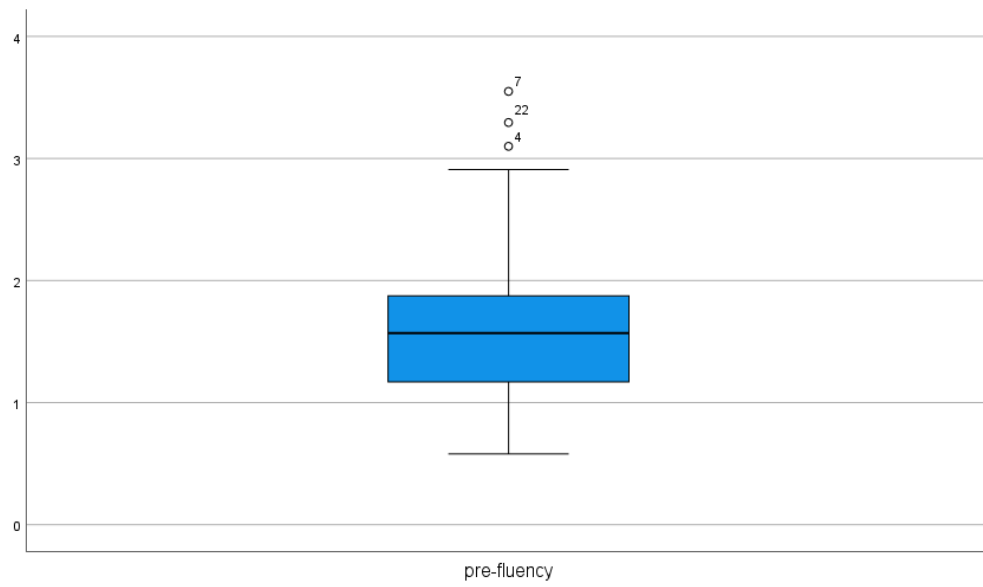
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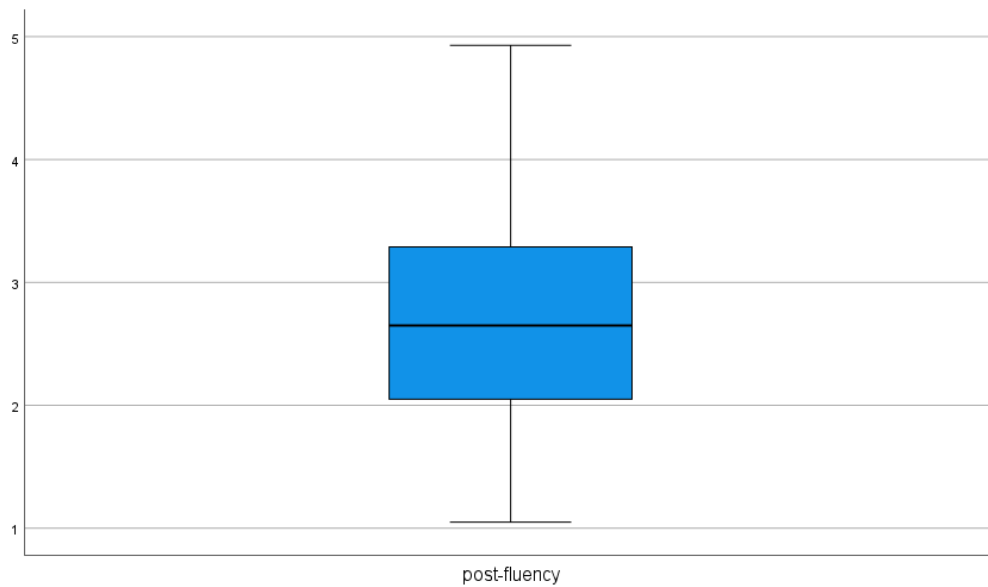
Appendix T

Boxplots of Distribution of CAF Scores

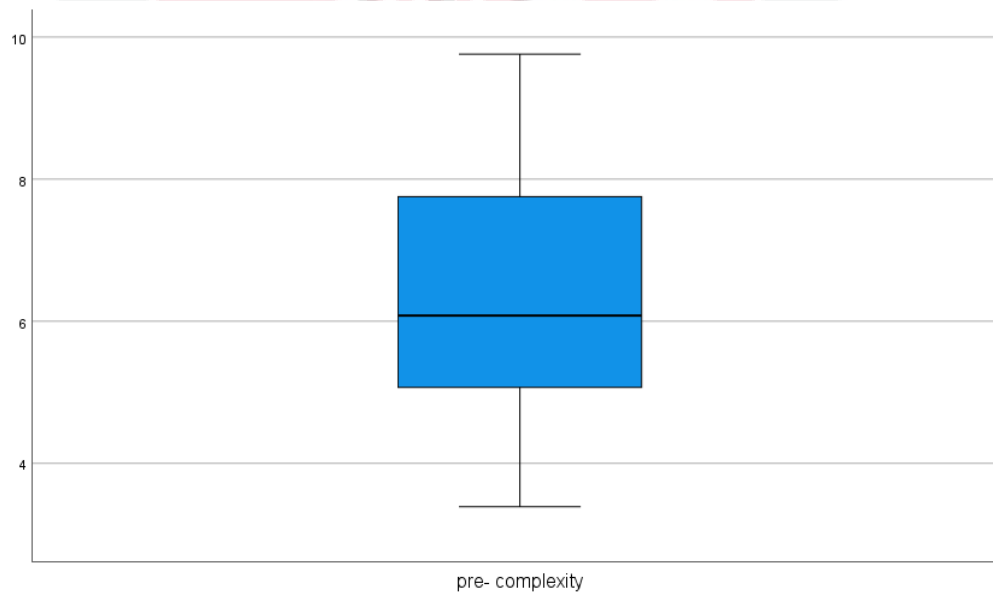
The boxplots showed the distribution of CAF scores of the experimental group at pretest and posttest as follows.

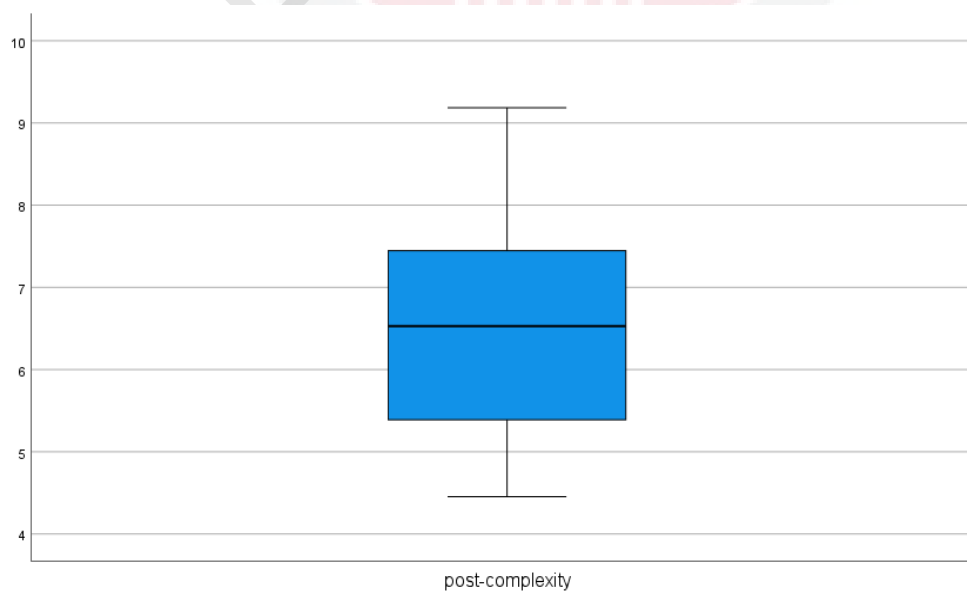
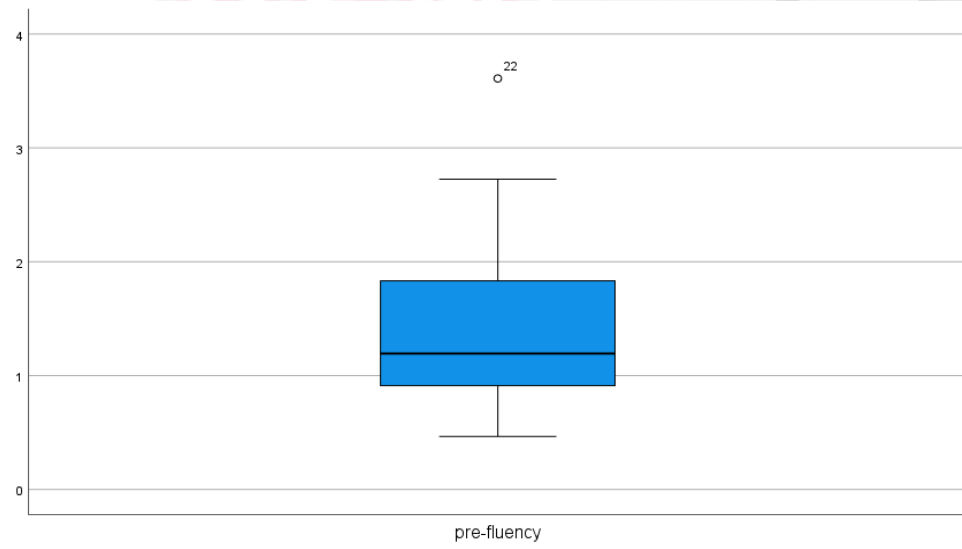
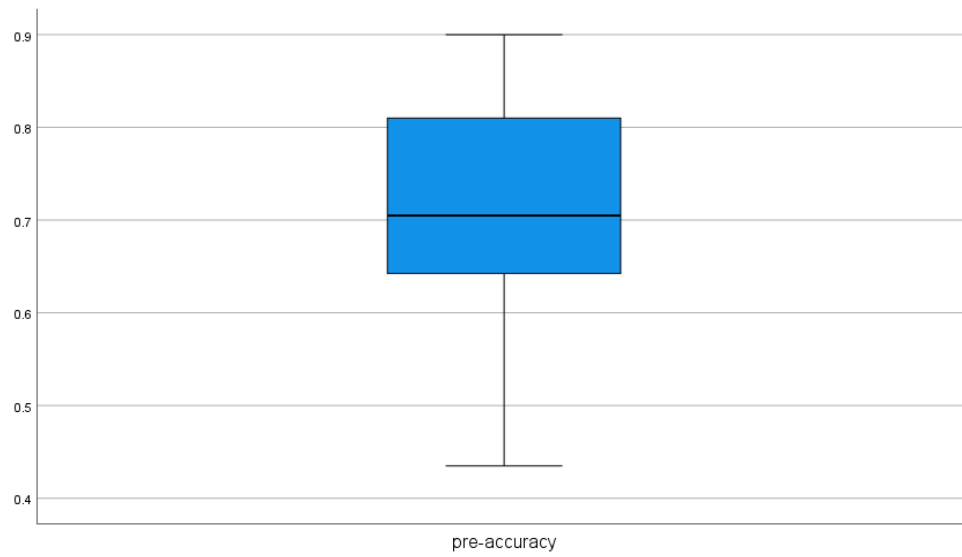


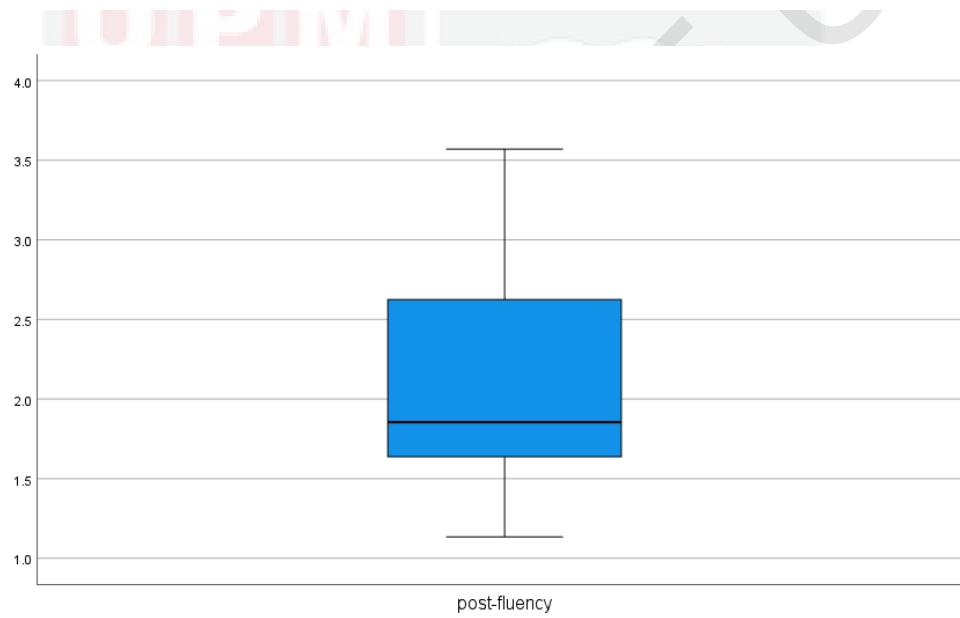
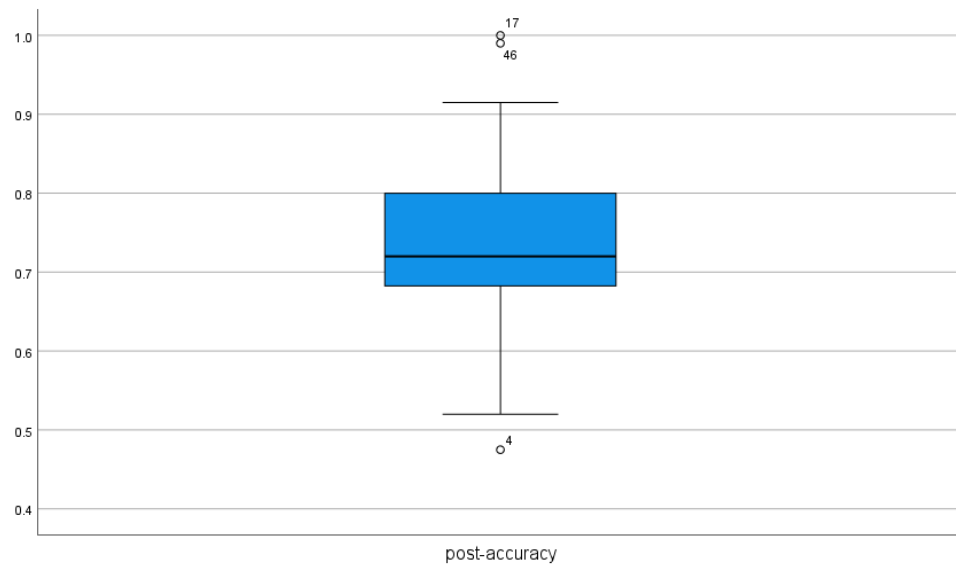




The boxplots showed the distribution of CAF scores of the control group at pretest and posttest as follows.



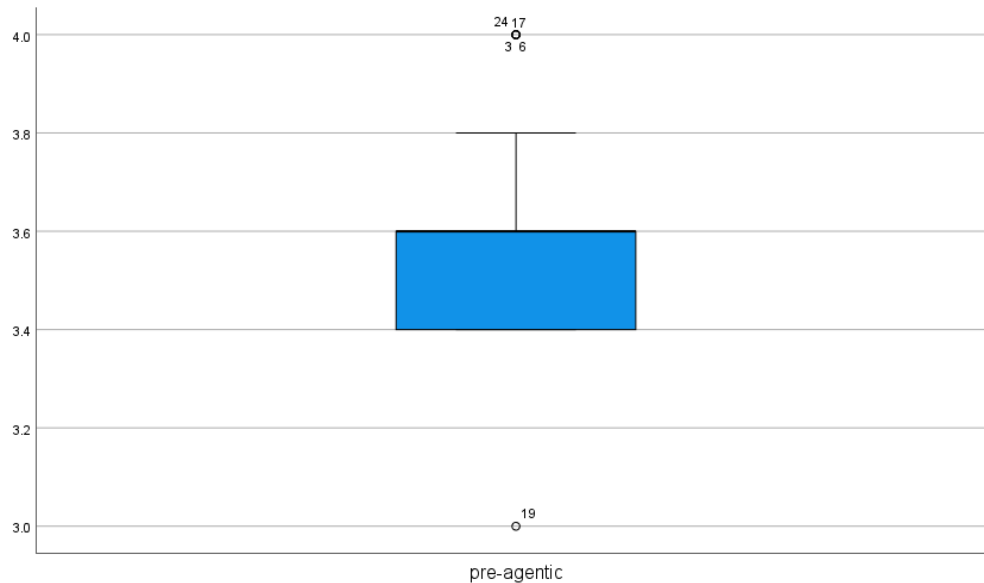
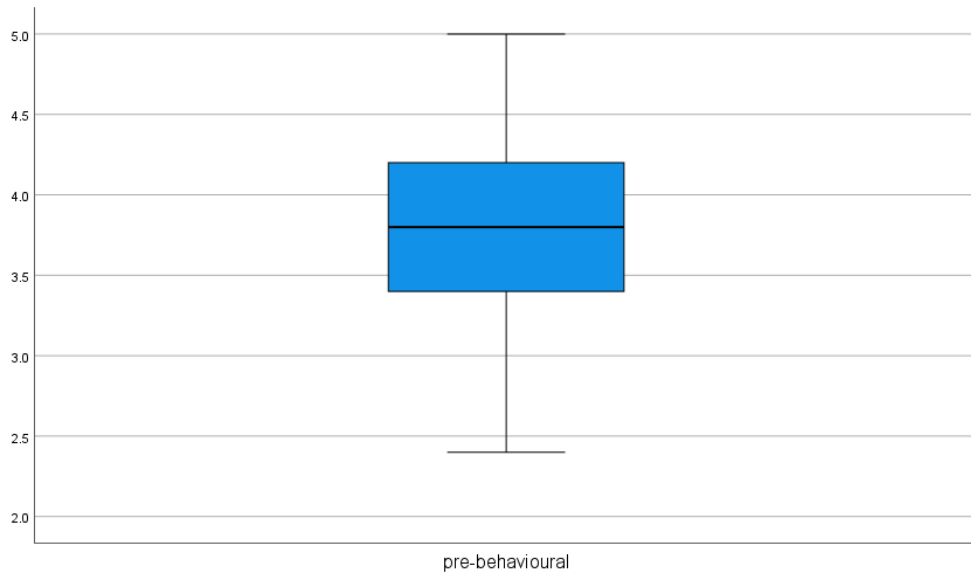


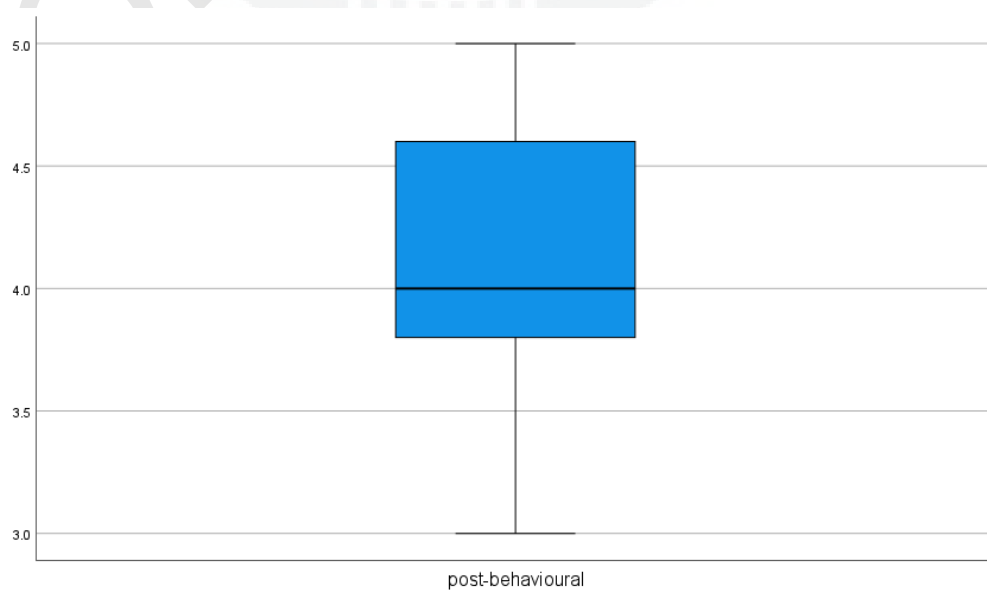
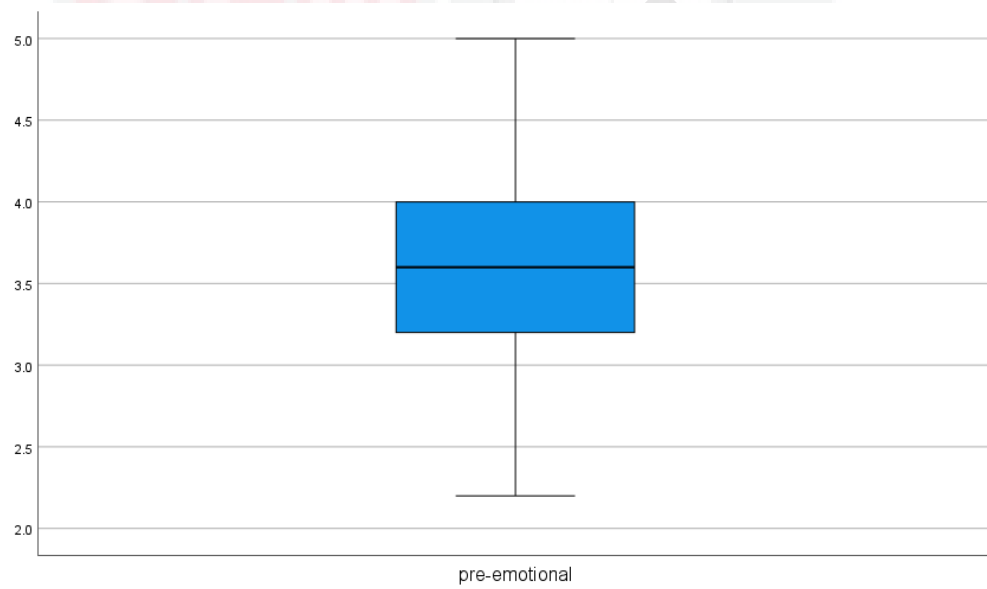
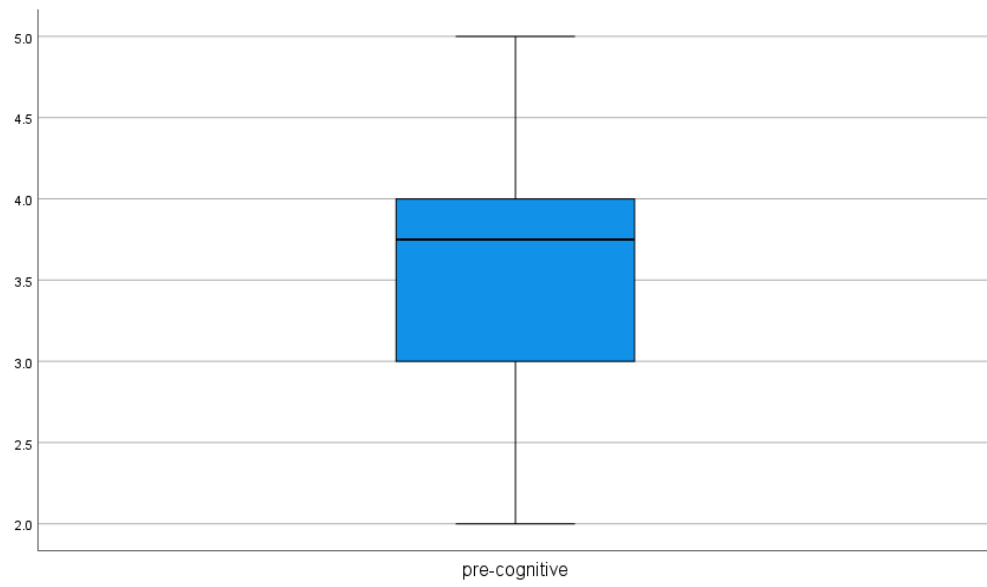


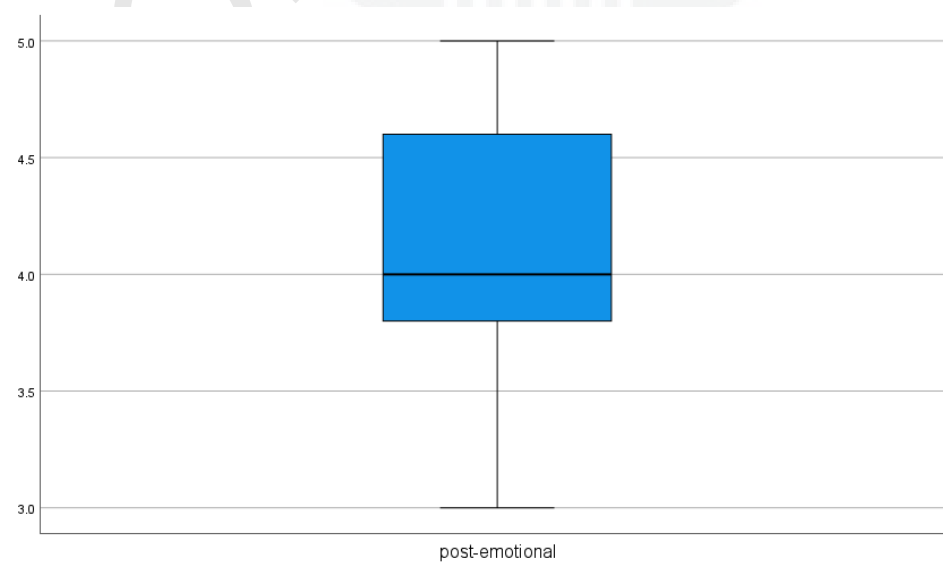
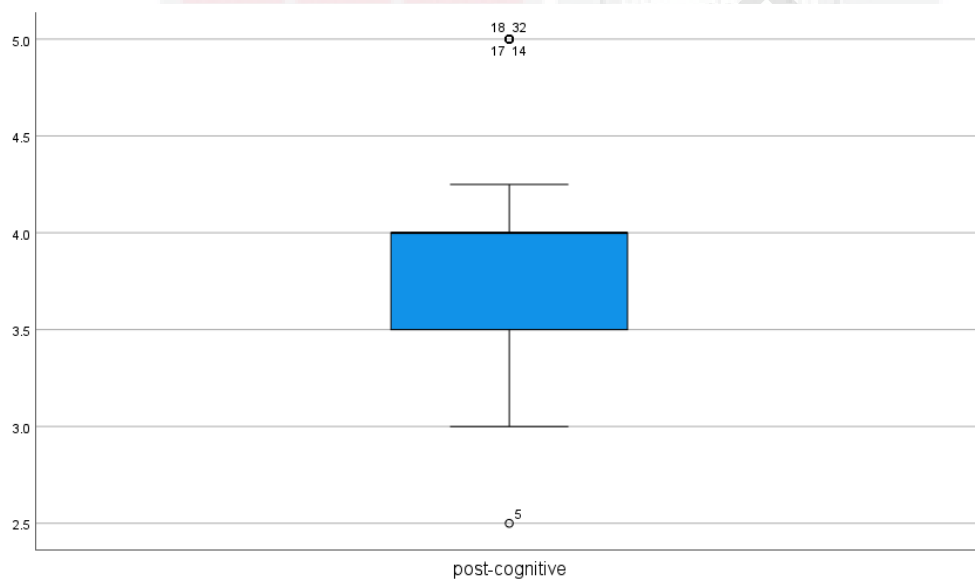
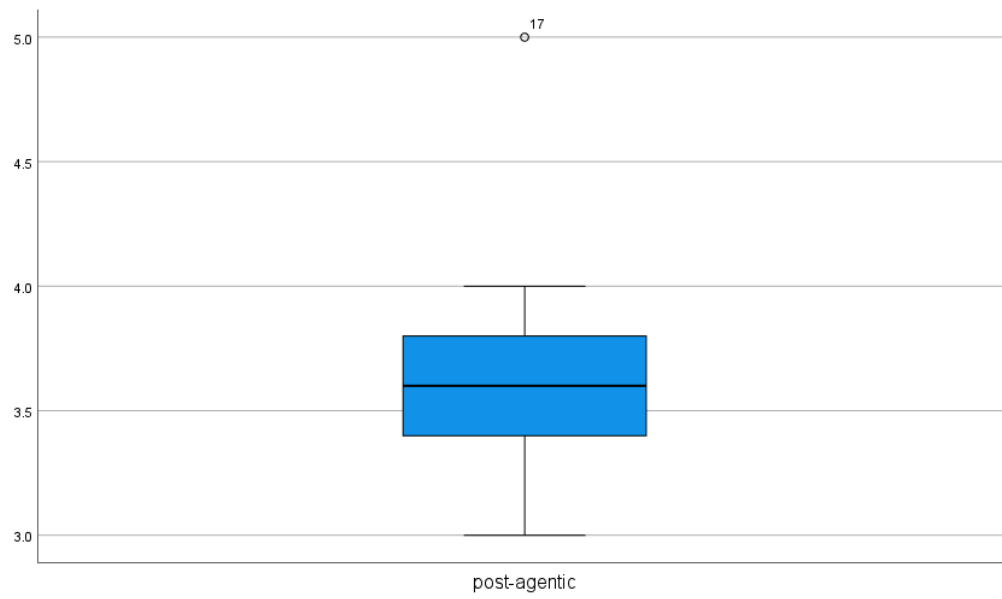
Appendix U

Boxplots of Distribution of Student Engagement

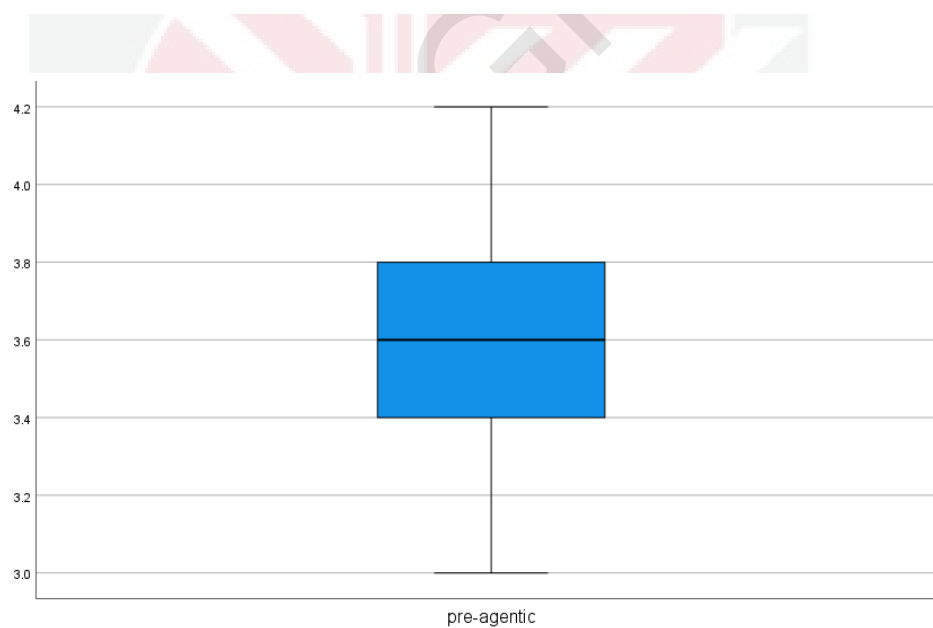
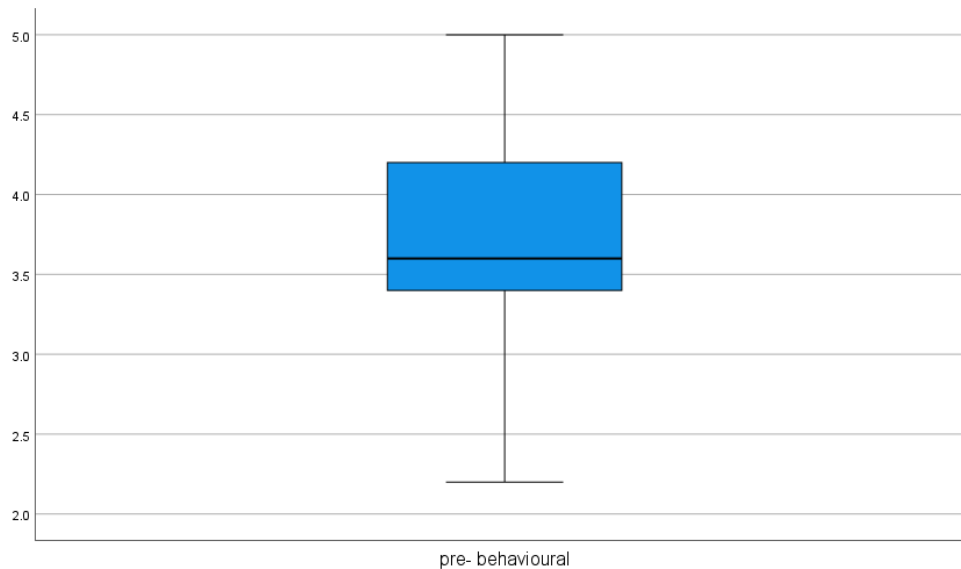
The boxplots showed the distribution of four dimension engagement scores of the experimental group at pretest and posttest as follows.

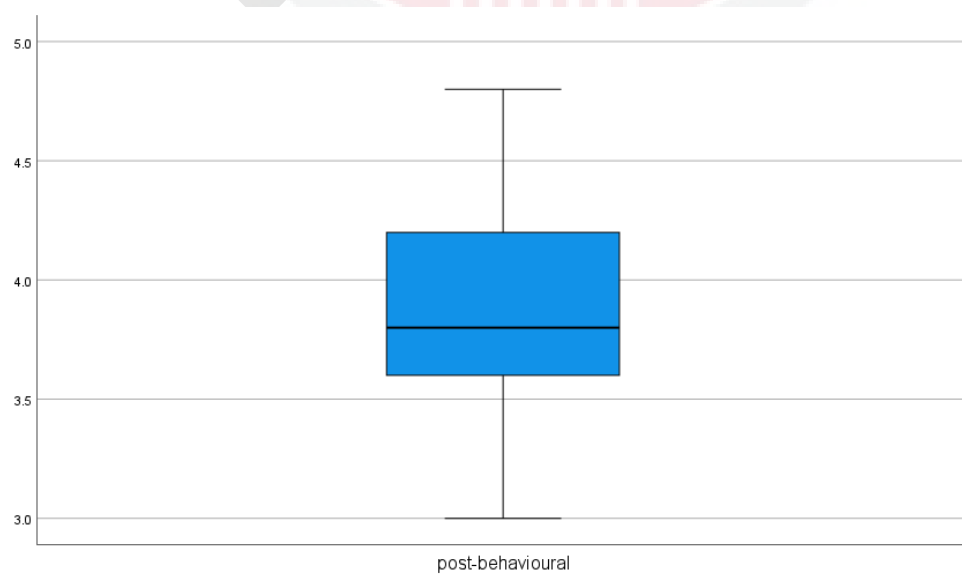
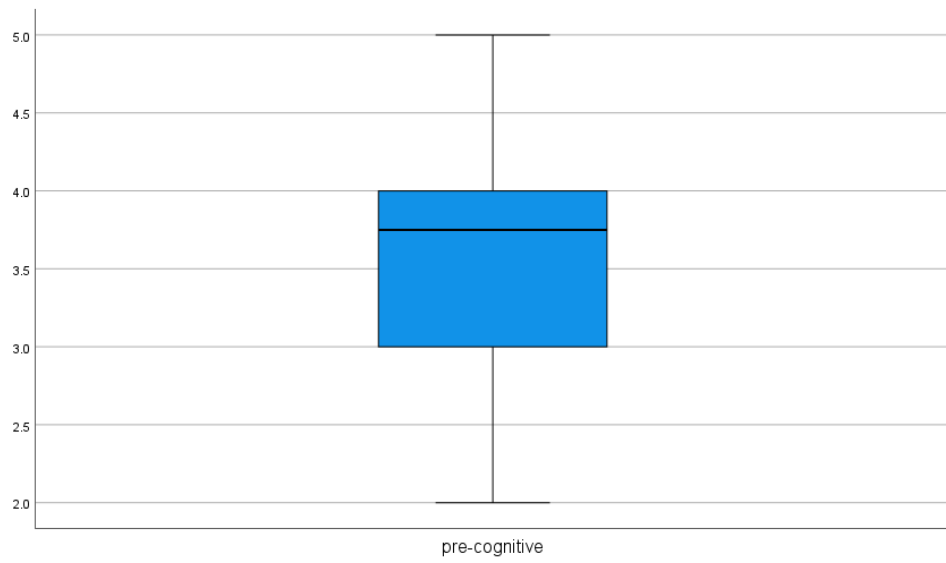


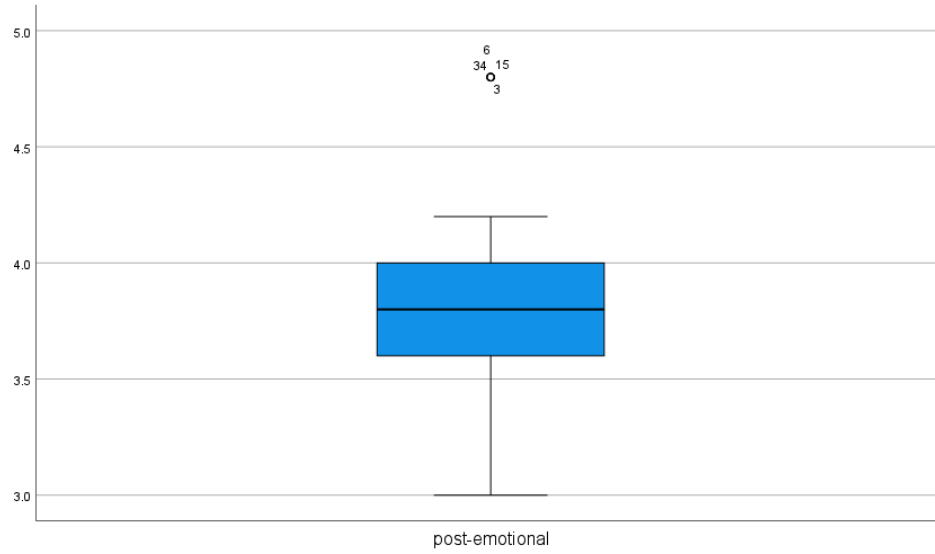
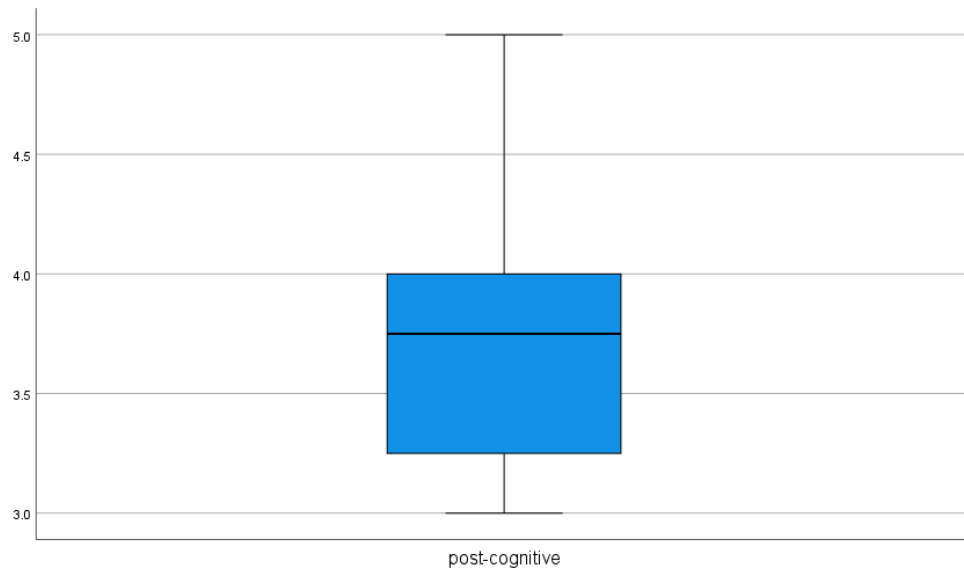
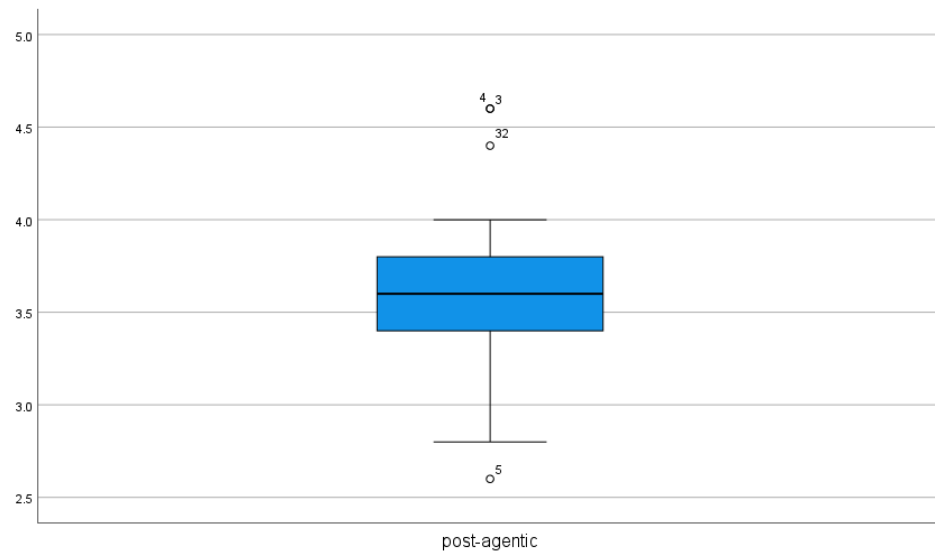




The boxplots showed the distribution of four dimension engagement scores of the control group at pretest and posttest as follows.







BIODATA OF STUDENT

Zhong Jianer is an Associate Professor at Yangjiang Polytechnic, Guangdong Province, China. She has taught college students English, especially oral English, for over 20 years. In 2021, she pursued her Ph.D. in Teaching English as a Second Language (TESL) at Universiti Putra Malaysia, Serdang, Selangor. Her areas of interest include L2 speaking, project-based learning, and applied linguistics.



LIST OF PUBLICATIONS

Journals

Jianer Zhong, Lilliaty Ismail & Norhakimah Khalessa Ahmad (2024). Factors influencing engagement in project-based learning among college EFL speakers. *International Journal of Learning, Teaching and Educational Research*, 23(1), 318-338. <https://doi.org/10.26803/ijlter.23.1.16>

Jianer Zhong, Lilliaty Ismail & Norhakimah Khalessa Ahmad (2024). Linguistic features of different proficiency learners' oral performance in a project-based learning context. *Arab World English Journal*, 15(3), 347-363. <https://dx.doi.org/10.24093/awej/vol15no3.21>

Proceedings

Jianer Zhong, Lilliaty Ismail & Norhakimah Khalessa Ahmad (2023). Effects of project-based learning on EFL college students' engagement in an English-Speaking Class. In *Proceedings of the 12th Malaysia International Conference on Languages, Literatures and Culture* (pp.173-176). <http://micollac.upm.edu.my>

Conferences

Jianer Zhong, Lilliaty Ismail & Norhakimah Khalessa Ahmad (2023). Effects of project-based learning on EFL college students' engagement in an English-Speaking class. Paper Presentation. *The 12th Malaysia International Conference on Languages, Literatures and Culture*. Penang, Malaysia.

Jianer Zhong, Lilliaty Ismail & Norhakimah Khalessa Ahmad (2023). Factors influencing student engagement in project-based learning for EFL speakers. Paper Presentation. *The 3rd Malaysian Association of Applied Linguistics International Conference (MAALIC)*. Kuala Lumpur, Malaysia.

Jianer Zhong & Lilliaty Ismail (2024). Effects of project-based learning on EFL learners' L2 oral proficiency. Paper Presentation. *The 3rd "Socialcultural Theory and Foreign Language Education Research" Academic Conference*. Guangdong, China.

