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Linguistic Features of Different Proficiency Learners' Oral Performance in a Project-Based Learning Context

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Abstract
Project-Based Learning (PBL) can potentially enhance learners' oral proficiency. However, little evidence supports how PBL improves learners' complexity, accuracy, and fluency, particularly for learners with different proficiency levels. This study examined the changes and linguistic features of varying proficiency learners' complexity, accuracy, and fluency within a PBL context. It involved a homogeneous group of 45 Chinese college learners, categorized into high (N=15), medium (N=15), and low proficiency learners (N=15). Their oral complexity, accuracy, and fluency were assessed using speaking tests before and after PBL. The changes in their oral performance were evaluated using objective measures of complexity, accuracy, and fluency. The transcripts were also used to analyze the linguistic features of different proficiency learners. The results indicate that PBL significantly enhances syntactic complexity as learners' proficiency levels increase. Significant differences were observed in lexical complexity, pronunciation accuracy, and self-repairs between high and low-proficiency learners. However, no significant differences were found in syntactic accuracy and speech rate across high, medium, and low proficiency learners. The findings also indicate that different proficiency learners reveal various linguistic features of syntactic complexity, syntactic accuracy, and self-repairs in their oral performance. This study provides implications for educators to design project-based activities for different proficiency learners to improve their complexity, accuracy, and fluency.

Keywords: linguistic features, learners' oral performance, oral proficiency, project-based learning
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Introduction

In recent years, English educational researchers have gained much attention for linguistic features of learners' oral performance (Hsieh & Wang, 2019). Analyzing oral characteristics across different proficiency levels enabled researchers to investigate the progression of speaking proficiency as it evolved (Gu & Hsieh, 2019). Researchers employed various teaching methods and strategies to examine the impact on learners' oral proficiency (Wulan Wuryantari et al., 2019; Tiu et al., 2023). Project-Based Learning (PBL), as a highly communicative teaching method, was widely employed to incorporate to develop EFL learners' oral proficiency (Sirisrimangkorn, 2021; Firdaus & Septiady, 2023). PBL offers students ample opportunities to improve their oral fluency, accuracy, and the overall quality of their work throughout the different stages of the project (Thakur et al., 2019). Participation in PBL within authentic learning environments has been demonstrated to enhance students' language skills, content knowledge, and cognitive abilities (Sari & Tridinanti, 2021; Hairuddin & Irmawati, 2024).

The previous studies reveal that PBL could enhance learners' various features of speaking proficiency (Bataineh et al., 2020; Zubaidi & Suharto, 2024). Kristianto and Harendita (2022) reported that students perceived PBL as an effective learning method to enhance their vocabulary, grammar, and fluency. Zubaidi and Suharto's study (2024) indicated that PBL could improve students' speaking skills in pronunciation, grammar, vocabulary, fluency, and understanding. However, these studies on oral performance within PBL focus primarily on five overarching conceptual categories commonly scrutinized in empirical research: fluency, pronunciation, grammar, vocabulary, and content. These studies used human ratings to assess students' oral features. Only one study examined the changes in EFL learners' oral features after PBL implementation based on objective measurement of complexity, accuracy, and fluency (Spring, 2020). Limited studies investigated different proficiency learners' complexity, accuracy, and fluency.

This study aimed to examine the changes in complexity, accuracy, and fluency among learners of different proficiency levels in a PBL context and to identify the linguistic features in their oral performance. Two research questions are addressed in this study.

1. What are the changes in different proficiency learners' complexity, accuracy, and fluency before and after using PBL?
2. What are the linguistic features of different proficiency learners' complexity, accuracy, and fluency in a PBL context?

Literature Review

PBL, rooted in social constructivism, is a student-centered pedagogical approach where students collaborate in groups and engage in social interactions to address problems (Torres & Rodríguez, 2017). PBL creates opportunities for students to tackle real-world issues, linking learning to personal experiences by establishing connections beyond the classroom. It shifts from a teacher-centered to a student-centered method, providing English learners with more opportunities to use the target language in real communicative situations.

PBL has been extensively utilized to enhance students' oral proficiency in English language education (Mohamad & Tamer, 2021; Imbaquingo & Cárdenas, 2023). Researchers employed various instruments to evaluate the impact of PBL on students' speaking proficiency. Several studies utilized speaking tests to examine the influence of PBL on oral features such as fluency, accuracy, vocabulary, pronunciation, and grammar (Zare-Behtash & Sarlak, 2017).

Bataineh et al. (2020) examined the potential effectiveness of PBL on the speaking fluency and grammatical and lexical accuracy of eleventh-grade Jordanian EFL students. Their findings revealed that students who received computerized PBL instruction outperformed traditional instruction in both oral fluency and grammatical and lexical accuracy. Zubaidi and Suharto (2024) conducted research in Indonesia to assess the effectiveness of implementing project-based vlogs to enhance students' speaking skills. The study indicated that integrating PBL with technology significantly improved students' speaking abilities by enabling them to create their vlogs, as evidenced by observation sheets and pretest and posttest scores. Overall, PBL enhanced students' speaking skills in pronunciation, grammar, vocabulary, fluency, and comprehension.

Research also explored students' perspectives on oral performance within a PBL framework, primarily through observations and interviews. Ichsan and colleagues (2019) used observational data and student interviews to assess oral performance, finding that PBL improved Indonesian students' speaking accuracy and fluency. Kristianto and Harendita (2022) utilized interviews to illustrate how PBL implementation enhanced speaking skills among Indonesian students. The results revealed that the students viewed PBL as a practical and creative approach for improving vocabulary, grammar, and fluency. Oleiwi and Bunari (2022) conducted a study involving interviews with seven Malaysian undergraduates about their experiences with video-making projects. The interview data showed that students felt their English communication skills had improved through acquiring new vocabulary, practicing pronunciation, and using correct grammar.

However, these studies examined oral performance in PBL primarily through five broad conceptual categories commonly investigated in empirical research: fluency, pronunciation, grammar, vocabulary, and content. This classification of language skills does not directly correspond with any comprehensive model of L2 oral proficiency, as outlined by Purpura (2017). Only one study, conducted by Spring (2020), explored learners' complexity, accuracy, and fluency within a PBL context. Spring (2020) investigated the impact of PBL on the fluency, complexity, and accuracy of Japanese EFL learners, utilizing speaking tests to measure the changes objectively. The findings indicated marginal progress in fluency, characterized by reduced pauses and a slight increase in speech rate, alongside significant improvements in syntactic and pronunciation accuracy. However, gains in lexical complexity were not observed. The linguistic features of complexity, accuracy, and fluency among learners with different levels of English proficiency remain under-explored. Limited research provides descriptive evidence on how learners of varying proficiency levels develop their complexity, accuracy, and fluency within a PBL context. This study sought to investigate the changes in complexity, accuracy, and fluency and understand the linguistic features of complexity, accuracy, and fluency among learners with varying levels of English proficiency in a PBL context.

Methodology

Research Design

This study utilized a one-group pretest-posttest quasi-experimental design. This research design is advantageous when a random assignment of participants to groups or the inclusion of a control group is not feasible (Abbuhl et al., 2013). By employing this design, the study aimed to compare and describe the linguistic features of oral performance among learners of different proficiency levels before and after implementing PBL.

Participants

A homogeneous group of 45 Chinese college students from an oral English class at a polytechnic was selected for this study. The participants, aged from 17 to 21, consisted of 2 males and 43 females. They were divided into three subgroups based on their oral performance in the pretest. Two instructors evaluated the participants' complexity, accuracy, and fluency using a five-point scale modified by Nitta and Nakatsuhara (2014). According to the distribution of mean scores in the pretest, the learners were categorized into high (N=15), medium (N=15), and low (N=15) proficiency groups. These learners participated in the study to investigate the various changes and characteristics of complexity, accuracy, and fluency in a PBL context.

Data Collection

Data collection for this study spanned 12 weeks and included six primary project-based activities: topic discussion, plan report, scaffolding activities, project development, presentation, and evaluation. The initial data collection instruments were oral pretests and posttests. The pretest was administered before implementing PBL, and the posttest was conducted afterward. A descriptive task from the second phase of the IELTS Speaking Test was employed in the study. This phase was selected because its format and content closely matched the course instruction. The pretest and posttest covered five similar topics. During the tests, participants received a task card prompting them to discuss a specific topic and were given two minutes to take notes and prepare.

The second instrument involved transcriptions of students' oral performances in both the pretest and posttest, converting their spoken language into written form (Bailey, 2008). These transcriptions enabled the researchers to analyze learners' complexity, accuracy, and fluency within the PBL context. Despite being a time-consuming process, transcribing oral language allowed for more detailed detection of specific aspects of learners' oral performance, such as syntactic complexity, syntactic accuracy, and self-repairs.

Data Analysis

In this study, complexity was assessed through syntactic and lexical measures. Syntactic complexity was determined by the average number of words per AS-unit (Norris & Ortega, 2009). Lexical complexity was evaluated using the type-token ratio (TTR) (Daller et al., 2003). Accuracy was measured by syntactic accuracy and pronunciation accuracy. Syntactic accuracy was calculated based on the proportion of error-free AS-units (Michel, 2017), while pronunciation accuracy was determined by the percentage of correctly pronounced words, facilitated by the IFlytek Voice Input app known for its high accuracy in converting spoken words into text (Liu et al., 2019). Fluency analysis focused on speech rate, measured in syllables per minute (Yousefi, 2016), and self-repairs, assessed by the rate of corrected syllables per minute (Skehan, 2003).

Following data collection and analysis, one-way ANOVA tests were employed to determine whether statistically significant improvements were observed among learners of varying proficiency levels. Post hoc comparisons using the Tukey HSD test were conducted to explore further differences between high, medium, and low-proficiency learners.

The complexity, accuracy, and fluency of oral transcripts were meticulously analyzed using specific coding protocols. Dependent clauses were enclosed in brackets [...] following Foster et al. (2000). Grammatical errors were indicated by underlining. Self-repairs, such as repetitions, self-corrections, false starts, and reconstructions, were denoted with {...}. Reconstructed or restarted words or phrases were annotated with an em dash (—) at the end. The primary researcher

conducted a manual analysis of linguistic features, with validation by the second and third authors to ensure coding accuracy. Any discrepancies were resolved by revisiting the raw data and making necessary adjustments. The findings were ultimately derived after all disagreements were addressed and resolved.

Results

Changes in Complexity, Accuracy, and Fluency among Different Proficiency Learners

Before conducting one-way ANOVA tests to analyze changes in complexity, accuracy, and fluency among different proficiency learners from pretest to posttest, a normality test was performed. The Kurtosis and Skewness values fell within the range of -2 to 2, indicating that the data exhibited a normal distribution. Subsequently, tests for homogeneity of variances were conducted. The results showed that the variances were homogeneous (p>.05), affirming that the conditions were suitable for performing one-way ANOVA tests on the data.

Changes in Complexity among Different Proficiency Learners

Figure One illustrates the variations in mean scores for syntactic and lexical complexity from the pretest to the posttest across high, medium, and low proficiency subgroups. The results reveal varied increases in mean scores for syntactic and lexical complexity in the posttest compared to the pretest among learners with different proficiency levels. These findings suggest significant enhancements in syntactic and lexical complexity among high, medium, and low-proficiency learners following their participation in PBL.

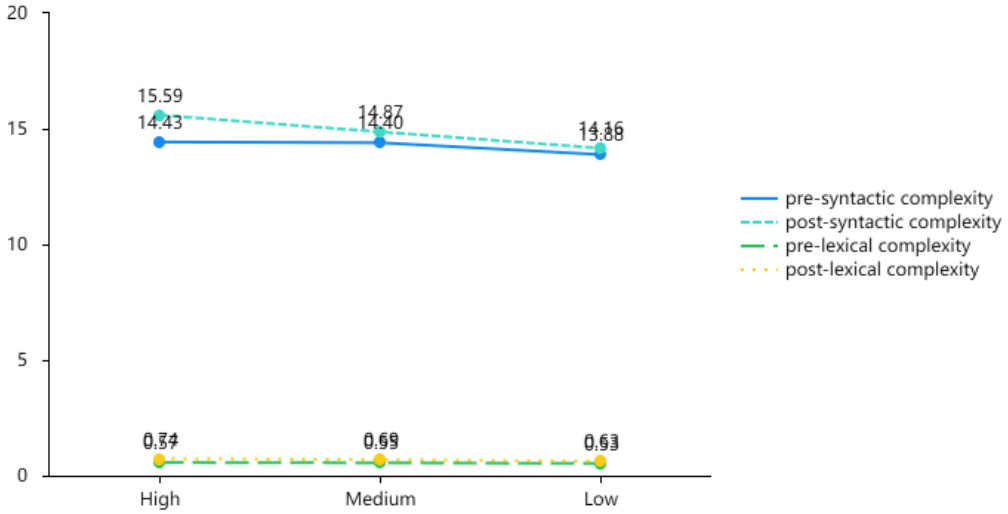

Figure 1. Changes in mean scores of complexity across the three subgroups

The findings presented in Table One show significant differences among the three proficiency subgroups in both syntactic (F=13.262, p=.000<.05, η^2=.387) and lexical complexity (F=3.817, p=.017<.05, η^2=.175) between the pretest and posttest phases. Post hoc comparisons using the Tukey HSD test reveal that high proficiency learners exhibited significantly greater syntactic complexity compared to both medium (p=.032<.05) and low proficiency learners (p=.000<.05) in the PBL context. Medium proficiency learners also demonstrated significantly higher syntactic complexity than low proficiency learners (p=.039<.05). Regarding lexical complexity, a significant difference was observed only between high and low proficiency learners

(p=.013<.05) in the PBL context. These results suggest that syntactic complexity improved significantly as learners' proficiency levels developed, whereas differences in lexical complexity were significant primarily between high and low proficiency learners in the PBL context.

Table 1. *Comparison of complexity across the three subgroups at posttest*

Complexity	Subgroups	N	Mean	SD	F	p	η^2
Syntactic	High	15	15.59	1.11	13.262	.000**	.477
	Medium	15	14.87	1.56			
	Low	15	14.16	0.45			
Lexical	High	15	0.74	0.12	4.463	.017*	.175
	Medium	15	0.69	0.10			
	Low	15	0.63	0.10			

Changes in Accuracy Across Different Proficiency Learners

Figure Two depicts the alterations in mean scores for syntactic and pronunciation accuracy from the pretest to the posttest across the high, medium, and low proficiency subgroups. The results reveal enhancements in mean scores for syntactic and pronunciation accuracy in the posttest compared to the pretest among all three subgroups. These findings underscore improvements in syntactic and pronunciation accuracy across learners of varying proficiency levels following their participation in PBL.

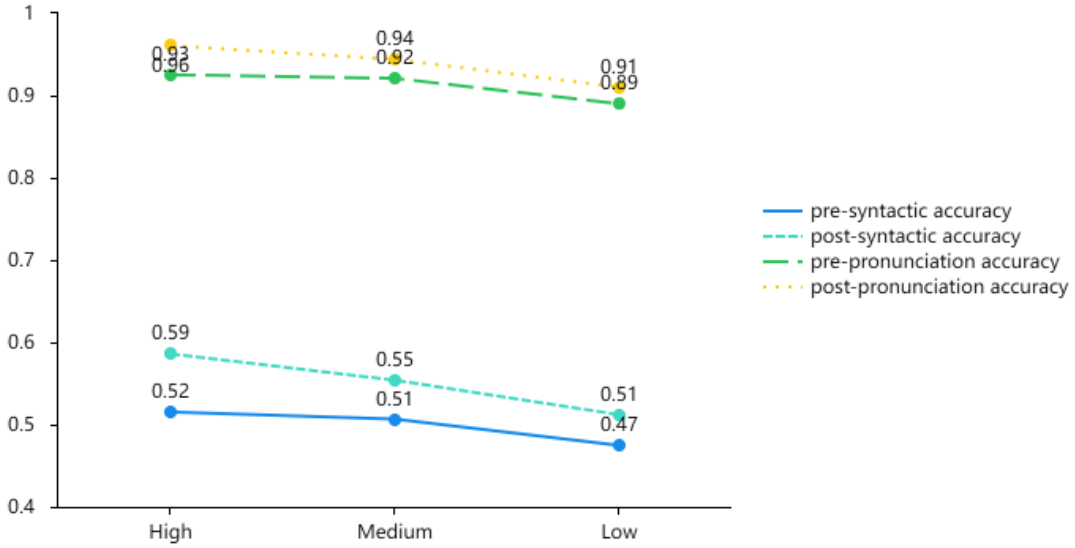

Figure 2. Changes in mean scores of accuracy across the three subgroups

Table Two shows no statistically significant difference among the three proficiency subgroups in syntactic accuracy between the pretest and posttest (F=0.429, p=.654>.05, η^2=.020). However, a significant difference was observed in pronunciation accuracy (F=11.098, p=.000<.05, η^2=.346). Post hoc comparisons using the Tukey HSD test revealed significant differences in pronunciation accuracy, specifically between high and low proficiency learners in the PBL context

(p=.012<.05). These findings indicate that while there were no significant differences in syntactic accuracy across high, medium, and low proficiency learners, notable differences in pronunciation accuracy were observed between high and low proficiency learners after PBL.

Table 2. *Comparison of accuracy across the three subgroups at posttest*

Accuracy	Subgroups	N	Mean	SD	F	p	η^2
Syntactic	High	15	0.59	0.18	0.429	.654	.020
	Medium	15	0.55	0.24			
	Low	15	0.51	0.24			
Pronunciation	High	15	0.96	0.02	11.098	.000**	.346
	Medium	15	0.94	0.02			
	Low	15	0.91	0.04			

Changes in Fluency among Different Proficiency Learners

Figure Three illustrates the variations in mean scores for speech rate and self-repairs from the pretest to the posttest across the high, medium, and low proficiency subgroups. The mean scores for speech rate and self-repairs were higher in the posttest compared to the pretest for all three subgroups. These results indicate varying increases in speech rate and self-repairs observed among learners with different proficiency levels in the PBL context.

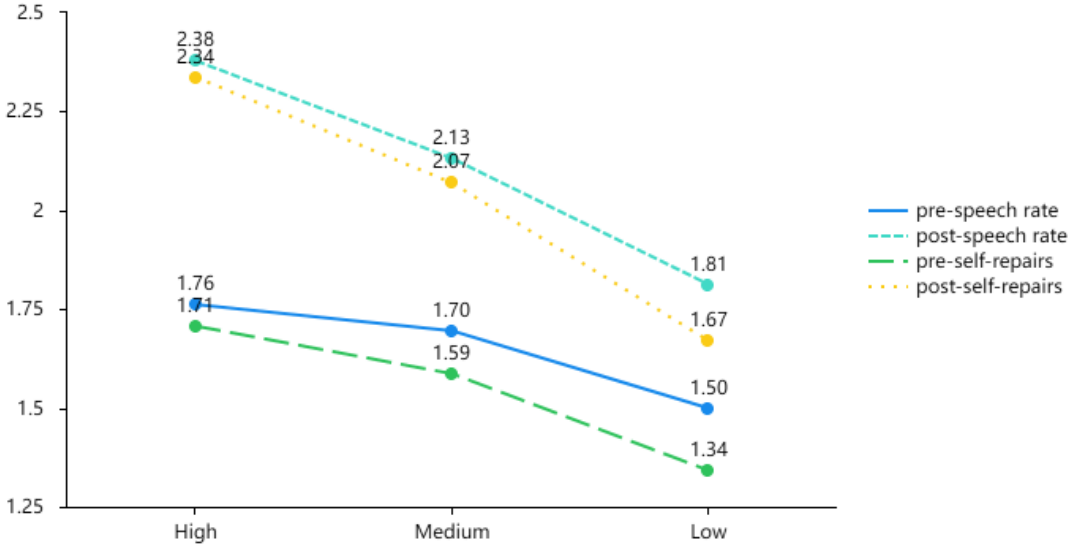

Figure 3. Changes in mean scores of fluency across the three subgroups

Table Three indicates a significant difference in self-repairs among the high, medium, and low proficiency subgroups between the pretest and posttest (F=3.817, p=0.03<.05, η^2=.154). However, no significant difference was found in speech rate across the three groups between the pretest and posttest (F=2.362, p=0.107>.05, η^2=.101). Although changes were observed in the mean scores of speech rate and self-repairs among learners of different proficiency levels following PBL, only self-repairs showed significant differences across the three subgroups. Post hoc comparisons using the Tukey HSD test revealed significant differences in self-repairs,

specifically between high and low proficiency learners (p=.003<.05). These findings indicate notable differences in self-repairs between high and low proficiency learners in the context of PBL.

Table 3. *Comparison of fluency across the three subgroups at posttest*

Complexity	Subgroups	N	Mean	SD	F	p	η^2
Speech rate	High	15	2.38	0.32	2.362	.107	.101
	Medium	15	2.13	0.50			
	Low	15	1.81	0.78			
Self-repairs	High	15	2.34	0.70	3.817	.030*	.154
	Medium	15	2.07	0.56			
	Low	15	1.67	0.72			

Features of Complexity, Accuracy, and Fluency among Different Proficiency Learners

Features of Complexity among Different Proficiency Learners

The oral transcripts were analyzed to examine syntactic complexity among learners of varying proficiency levels. Syntactic complexity was chosen for analysis due to its significant enhancement in this study, particularly evident through the use of dependent clauses.

In the posttest, high proficiency learners demonstrated an increase in dependent clauses compared to the pretest. While dependent clauses were used sparingly in the pretest, the posttest revealed more sophisticated sentence structures with various dependent clauses, including noun and adverbial clauses, attributive clauses, and even complex AS-units with multiple nested dependent clauses. Excerpts from the edited oral scripts of selected high proficiency learners are presented here, focusing solely on the use of dependent clauses while disregarding any grammatical errors.

> "[When I was at 18th birthday party], I invited my good friend to my home [where there was a lot of delicious food and drinks]. We can read some books and watch TV or play games. We can taste the dishes to get together." (S3: Adverbial clause, attributive clause, and a complex AS-unit double built-in adverbial and attributive clause)

> "[When I went to the college], firstly, I felt so nervous, [because I didn't want to leave my parents]. My hometown was far away this college. I felt so scared. [When I came to this college], I want to go home [because I don't like this college food and I want to eat my mother's food]." (S7: A complex AS-uint double built in two adverbial clauses)

There were notable changes in syntactic complexity among high proficiency learners, characterized by an increase in complex AS-units and dependent clauses.

Similarly, medium proficient learners demonstrated an increase in dependent clauses at the posttest compared to the pretest. However, the dependent clauses they utilized were limited to noun clauses as objects and adverbial clauses related to time and reason. For example,

> "I will invite my family or friends to home in holiday. We will have a dinner at home. I will invite them [because I want to connect them and improve our relationship]. I think [the dinner is to be very amazing and interesting]." (S16: Reason adverbial and object clause)

> "I have ever been to Guizhou. Guizhou has a long history. There are a lot of buildings and colorful flowers. I like the city [because it can make me full of satisfaction]." (S23: Reason adverbial clause)

In the posttest, medium proficiency learners demonstrated an increase in the use of dependent clauses, including noun and adverbial clauses, compared to the pretest.

Low proficiency learners also showed an increase in dependent clauses at the posttest compared to the pretest. However, their use of dependent clauses was limited, and they continued to produce many simple sentences alongside these clauses.

> "I think [it's badminton]. I will play it after the class with my classmates. It let me relax and happy, enhance my body. It is very very happy." (S32: Object clause)

> "I think the playground is so big. I could go to the playground once a week. [When I go to the playground], I feel comfortable." (S35: Time adverbial clause)

> "The new place is Yangjiang. I went there in September, [because I need to get there to finish my my study]. Yangjiang is a beautiful city. I went there. The weather was very bad." (S41: Reason adverbial clause)

In summary, there were also observed changes in the syntactic complexity of low proficiency learners, characterized by an increase in the use of dependent clauses, primarily noun and adverbial clauses.

Features of Accuracy among Different Proficiency Learners

The oral production transcripts were analyzed to assess changes in accuracy among participants of different proficiency levels. Accuracy was evaluated based on grammatical errors in learners' oral production. Pronunciation errors were not included in this accuracy assessment because they were not explicitly documented in the oral transcripts.

There was no significant reduction in grammatical errors observed in the oral production of high proficiency learners in the posttest. The transcripts revealed several grammatical errors, with the most notable being errors related to past tense usage. For instance,

> "I didn't have class and I went to the Baili shopping mall with my friends. We first went here and it had heavy rain. We come back with the heavy rain because we didn't know when we can come back that day. We had many beautiful memories because we ride the bicycle, with the heavy rain. Although that day it had bad rain, we are all happy." (S10)

> "An experience that I visited my girlfriend is after senior graduation. Due to study, we had a long time no see. I decide to pay a visit to her. I prepare some gifts she loves. What's more, I cook some delicious foods such as my hometown feature food and some unique gifts. When I arrived, I was so excited that we deeply hug each other, reviewing a senior high school life. We share something interesting with each other and delightedly exchange our different ideas." (S15)

Many grammatical errors observed in the oral productions of high proficiency learners were related to the past tense, and these errors did not show improvement over time.

Medium proficiency learners did not demonstrate improved syntactic accuracy in the posttest. Their oral productions continued to exhibit grammatical errors, particularly errors involving past tense, plural forms, third-person agreement, and personal pronouns. For example,

> "Last week was my friend's birthday. She sincerely invite me to her birthday. So I think I can prepare some present for her birthday party. So I buy her some love books in the beautiful box, because she like book. And when I went to her home, I buy some fruits. When I was in her birthday party, I saw her different friends and I made more different friends in her birthday party." (S19)

> "Last week I went to visit my best friend in Guangzhou. I take the bus to her house. I take lots of delicious fruits to her house. I chat with her long time and even play games with them in her home for a long time, because we haven't seen each other for 3 years. So I miss her. This time I feel very happy to visit him. I will visit her next time." (S26)

In conclusion, medium proficiency learners' oral productions still contained numerous grammatical errors, and their syntactic accuracy did not improve over time.

Furthermore, low proficiency learners did not show any improvement in accuracy at the posttest compared to the pretest. They continued to make grammatical errors persistently. Their oral productions lacked error-free AS-units, with various grammatical errors observed including issues with past tense, plural forms, third-person singular, personal pronouns, sentence structure, and others. For instance,

> "I go to the college by bus. Because it was good in the afternoon, I go to the college is very relaxed. I am learning hardly and I have many books, all on the bus. I am very tired. I understand because my parents and homes is far away. But I'm so happy because I can make many friends. We will play the game. And I'm very like my English classes, because my English is a little bad." (S33)

> "I not to become a cook because my brothers talking me do a cook is a difficult things. You need to make people the delicious. You wash some dishes. And I think it is difficult. I'm not like because I have a love job. I don't have to accept the job. And it's not feels for me. On the one hand, my subjects is comfortable for me." (S36)

Low proficiency learners frequently made numerous grammatical errors in their spoken language. Understanding their oral transcripts could be quite challenging, and comprehending them verbally was even more difficult. PBL has not shown effectiveness in improving the accuracy of speaking proficiency learners' speech.

Features of Fluency among Different Proficiency Learners

Further analysis was conducted to illustrate the changes in self-repairs observed in the oral transcripts of learners across different proficiency levels. Self-repairs were chosen because

significant improvement was noted across all three subgroups following PBL. These self-repairs included repetitions, self-corrections, false starts, and reconstructions.

There was a decrease in the frequency of self-repairs for high proficiency learners observed in the posttest. The self-repairs persisted in their oral presentations, consisted of repetitions, self-corrections, and reconstructions. Instances of self-repairs were noted in their oral presentations during the posttest, as evidenced by the provided data.

> "In that class, many English teachers and experts attended the lesson. The lesson mainly {made the lesson} {made suggestive} is the Chinese food. My English teacher gave me the opportunity to deliver a speech in the platform. It is my {face} freeze time to deliver a speech in many people. So I am very nervous at that time. But my English teacher encouraging {encourage} me. He inspired me to let it before that class the evening.{She} he gave me many suggestions about the speech draft. At that class, I made it very successfully. I feel very pleasant and I enjoy it very much." (S8: Repetition, self-correction, and reconstruction)

High proficiency learners generally showed fewer instances of self-repairs in their spoken language. Furthermore, PBL has demonstrated significant effectiveness in enhancing the oral fluency of high proficiency learners over time.

Medium proficiency learners demonstrated a reduced frequency of self-repairs in the posttest compared to the pretest. However, their oral presentations still included numerous self-repairs, mainly involving repetitions, self-corrections, and false starts.

> "I want to be an English teacher. Maybe I will {I will} work in a primary school when I {finish my career} finish my study. I very want to be an English teacher because {because} I am very interested in English. {We} I will learn more with our students and to be a English teacher is my dream. And my family is very support me. To be an English teacher, I will have many holidays. Salary is very suitable for me." (S17: Repetition and self-correction)
>
> "That a deep impression is the oral English class in the class. The content of the oral English cards is {is} when receiving guests. At that time, the teacher will encourage students {encourage students} to get up to ask the questions and answer the questions. At the same time, {teacher} the teacher will give us some advice and providing some common knowledge about how to receiving guests. And I really enjoyed the class." (S22: Repetition and false start)

Medium proficiency learners demonstrated a noticeable decrease in self-repairs during their oral communication. Notably, PBL has had a significant impact on enhancing the fluency of medium-speaking proficiency learners over time.

However, low proficiency learners continued to exhibit many self-repairs and self-corrections in their oral presentations. These self-repairs primarily involved repetitions, false starts, and self-corrections. For example,

> "I {I} want to job in the future is education industry, because {because} I want to be kids, become an English teacher. I want to {want to} teach English in my hometown. I learned

about teaching it when I was young. I {I I} for the job is very scared and can help others receive education and improve their knowledge." (S34: Repetition)

"Usually after class, I {often go to the} {I often with roommates} I often go to the playgrounds with my roommates, running the {playgrounds} playground. Gentle wind brings our face. I will very relax and happy because it can reviews the finals of the class all day. {Can let me} can I ask start a happy night life." (S42: Self-correction and false start)

Low proficiency learners noticeably engaged in more self-corrections during their oral communication. Importantly, PBL has demonstrated significant effects in enhancing the fluency of low-speaking proficiency learners.

Discussion

This study examined the changes and linguistic features of different proficiency learners' complexity, accuracy, and fluency in the PBL context. The findings of this study reveal different changes and linguistic features in complexity, accuracy, and fluency among the different proficiency learners after they participated in PBL. As for complexity, PBL significantly enhances syntactic complexity across different proficiency levels. High proficiency learners demonstrated the use of various dependent clauses, including noun and adverbial clauses, and complex AS-units with nested dependent clauses. Medium proficiency learners employed dependent clauses predominantly in noun and adverbial forms related to time and reason, while low proficiency learners also utilized these clauses, mainly focusing on noun and adverbial structures. These findings are consistent with the Torres and Rodríguez' s study (2017) in which PBL could improve students' oral production. In PBL activities, learners are asked to explore, negotiate, interpret, and create in an attempt to construct solutions (Lee, 2015). Both learners and teachers focus on the process of learning which involves developing language and content knowledge or completing the actual project work (Park & Hiver, 2017). In such a PBL context, learners with different proficiency levels increased their syntactic complexity.

Significant differences in lexical complexity were observed between high and low proficiency learners following PBL. High proficiency learners could acquire a more extensive vocabulary and construct more complex sentences, likely facilitated by their engagement in information search and project material exploration. PBL supports vocabulary development and enhances oral production (Torres & Rodríguez, 2017), offering students opportunities to analyze, evaluate, and discuss real-world problems within a classroom setting, thereby deepening their knowledge through project design and construction (Aminah & Maulida, 2021). However, low proficiency learners, constrained by limited linguistic resources, tend to express content using a narrower vocabulary. As learners progress from lower to higher levels of oral proficiency, they typically employ more precise and specific vocabulary, reflecting their development in spoken language skills (Wang & Zhou, 2023). These findings resonate with Ellis's (2005) research, suggesting that higher-proficiency learners possess a larger repertoire of linguistic chunks and use them more fluently than their lower-proficiency counterparts.

In terms of accuracy, high proficiency learners demonstrated significantly greater pronunciation accuracy compared to low proficiency learners in the PBL context. These findings are consistent with Iwashit's (2006) research, which found that higher proficiency learners

generally produce more accurate speech than those at lower proficiency levels. PBL offers a practical context for language practice and allows learners to integrate pronunciation skills into their project activities, which facilitates the retention and application of correct pronunciation in relevant contexts. High proficiency learners, who often possess strong autonomous learning skills, could self-correct their pronunciation errors, leading to significant improvements in pronunciation accuracy within the PBL framework.

However, no significant differences were observed in syntactic accuracy among high, medium, and low proficiency learners. Analysis of oral transcripts revealed ongoing grammatical errors across all proficiency levels. High proficiency learners commonly made errors related to past tense usage, while medium proficiency learners struggled with errors involving past tense, plural forms, third person singular, and personal pronouns. Additionally, low proficiency learners exhibited errors primarily in sentence structures. This lack of improvement in accuracy can be attributed to the communicative nature of PBL, which prioritizes real-world communication over explicit grammar instruction (Spring, 2020). Teachers in PBL settings typically do not focus directly on teaching grammar rules, which may explain why there was no noticeable enhancement in oral accuracy across college learners with varying proficiency levels over time.

Regarding fluency, significant differences in self-repairs were found between high and low proficiency learners. High proficiency learners showed a notable decrease in repetitions, false starts, and self-corrections following their participation in PBL, contrasting with the ongoing self-repair tendencies observed in low proficiency learners. More proficient speakers tend to engage more actively in speaking activities within the PBL environment, as noted by Akpur (2021), who highlights a direct link between proficiency levels and class participation. In PBL settings, higher proficiency learners typically demonstrate greater involvement in group discussions and willingly respond to teacher prompts, enhancing their oral fluency through increased interaction and practice. As a result, the impact of PBL on fluency is particularly evident when comparing learners with high and low proficiency levels.

However, no significant differences were found in speech rate among learners of different proficiency levels. All three subgroups showed similar increases in speech rate after engaging in PBL activities. PBL creates a supportive and interactive environment where students collaborate on various project-based tasks, such as group discussions, interviews, field trips, and role-plays, all conducted in English. As group members adjust to engaging with each other, consistent communication helps learners feel less anxious when speaking (Avsheniuk et al., 2023). This supportive PBL environment contributes to enhanced oral fluency as students feel more relaxed and motivated to communicate in English (Torres & Rodríguez, 2017; Widiyati & Pangesti, 2022). Consequently, learners across various proficiency levels experienced comparable improvements in speech rate within the PBL context, where speaking English became a natural and integral part of their collaborative project work.

Conclusions

This study aimed to examine how PBL influenced the complexity, accuracy, and fluency of learners across different proficiency levels. Significant enhancements in syntactic complexity were noted across varying proficiency levels. High and low proficiency learners differed significantly in lexical complexity, pronunciation accuracy, and self-repairs. However, no notable differences were found in syntactic accuracy and speech rate among learners of different proficiency levels. The study highlighted distinct oral linguistic features in terms of syntactic

complexity, syntactic accuracy, and self-repairs among the learners. Based on these findings, implications were drawn for tailoring PBL activities to cater to the needs of learners with different proficiency levels. High proficiency learners may benefit from activities that enrich vocabulary and deepen content knowledge, while medium proficiency learners could focus on increasing oral fluency through more frequent practice. For low proficiency learners, foundational pronunciation and grammar training were recommended.

While this study contributes to understanding oral performance in PBL contexts, it is limited by its use of a homogeneous group and a descriptive task to assess oral performance. Additionally, the lack of comparison with non-PBL contexts limits the generalisability of the findings. Future research could employ diverse oral tasks and include comparison groups to provide a more comprehensive understanding of oral linguistic features across high, medium, and low proficiency learners in PBL settings.

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