Effectiveness of PBL Using ChatGPT in Language Learning to ESL Students: An Investigational Study

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Abstract

The present study investigates how effectively PBL (Project-Based Learning) and AI (Artificial Intelligence) are integrated to enhance the language learning of ESL (English as a Second Language) students. There is no doubt about the effectiveness of AI integration in language learning. However, a blended or mixed method is expected to overcome shortcomings like emotional intelligence and individual differences in the learning process. The integration of PBL and ChatGPT enables a significant role in ELT (English Language Teaching); therefore, the study analyzes the effectiveness of L2 learning. The aim of the study is to investigate whether the combination of PBL and ChatGPT bridges the gap between traditional instruction and AI integration. The study employed a survey method using a structured questionnaire developed for the selected n=100 students through purposive sampling who had already been exposed to PBL-based language instruction in ChatGPT in the language lab. The questionnaire was developed to highlight the learners' perceptions of technological interaction and digital engagement using a Likert-scale survey in the PBL and ChatGPT contexts. The study also conducted semi-structured interviews with the participants to record the learners' perceptions apart from survey questions. The study then analyzed the data using the data tool Jamovi. The findings revealed that the proper integration of PBL and ChatGPT in language learning ensures a high frequency level of learning climate and the students are exposed to using the AI effectively and elaborately based on structure through PBL. Thus, the study concluded that it represents innovative instructional design that combines with learner-cantered methodologies.

Keywords: AI, ESL, PBL, ChatGPT, Emotional intelligence and individual differences

1. Introduction

Over the past decade, technology integration in language learning has made the process more accessible, interactive, personalised, and immersive Ravshanovna and Ixtiyorovna (2021) emphasised that technology is a vital tool for language teaching. Al-Khresheh (2024) also highlighted in his study that Education is experiencing a significant transformation in the dynamic environment of the 21st century, with technology playing a pivotal role. The integration of emerging technologies into English Language Teaching (ELT) has opened new opportunities for improving learner engagement, autonomy, and communicative competence. In addition, Son et al. (2024) asserted that the article highlights the importance of integrating technology in language instruction, which enhances teacher proficiency. Gunuc and Babacan (2018) argued that effective integration of technology into English language instruction is crucial; otherwise, inadequate integration may negatively impact students' learning outcomes.

The article indicates the necessity for a flexible approach by showing the growing ineffectiveness of conventional English teaching methods in today's world of modern technology. Beyond advocating for exclusively traditional teaching methods, blended learning (Lackey, T., 2021)

is very important to enhance students' progress by fostering more effective and productive interaction with the language (Kumar, 2023). With this framework, blended mobile language learning (BMLL), as a flexible approach, combines a range of effective methods and technological resources in a blended environment, as well as an important resource to support students at various stages of their language learning (Aslan, M., 2023). Simultaneously, through blended learning practices, teachers can engage students and improve learning outcomes, making it a necessary approach in the experiences of modern learners (Perdani, 2023). In addition, Son et al. (2024) claimed that the paper illustrates the necessity for having technology integrated into their language pedagogy, which ultimately fosters their professional development as teachers. Gunuc and Babacan (2018) argued, that while we teach English language, it is essential to integrate technology effectively, as it can provide an endless potential for engaging students in their English language learning experience; inadequate integration of technology may compromise students' learning outcomes.

According to Warschauer (2002), this method is necessary for development of students as it prepares them to use technology and English effectively and effectively so they can communicate and integrate with society. in the conclusion, blended learning needs to be connected to strong teaching strategies that promote purposeful language use to be genuinely successful. Integrating technology with the conventional teaching not only benefits but also it is an essential step to support students' substantial and long-term development (Levi, 2024).

It has been shown that project-based learning, especially when combined with technology, improves language acquisition by encouraging students' capacity for original thought (Arifatin, 2023). By fostering collaboration and active engagement among students, technology and project-based learning support the English language development (Rochimah et al., 2024). Existing literature shows that the integration improves the thinking ability and problem-solving ability among the students which highlights its efficacy in modern language instruction and offering information to those who create curricula and materials (Arabloo et al., 2020).

Project-based language learning utilizes technology to enhance collaboration, promotes meaningful language use, and fosters an improved overall student learning experience. All of which drives developments in pedagogical approaches (Thomas, 2017). As described by Slater et al. (2019) Project-Based Language Learning (PBLL) are predetermined structures that can support language, content, and skill development through the incorporation of technology to facilitates distance collaboration, enhances communication skills, and promotes language proficiency, all which improves students' professional communication skills (Casañ Pitarch et al., 2024). Project-Based learning (PBL) has received attention as a learner-centred pedagogy that supports authentic language use through experiential learning and real-world tasks. The level of engagement for learners in projects supports the simultaneous development of language skills. Educators have witnessed the pedagogical advancement of language learning parallel to the application of Artificial Intelligence (AI) in education, including the use of tools such as ChatGPT. The AI-driven ChatGPT is the only language learning resource capable of acting as a conversational partner and providing interactive assistance in real-time, offering immediate feedback, vocabulary and grammar, and encouraging task-based communication. Given its ability to adapt its response and emulate natural dialogue, ChatGPT can align perfectly with the principles of PBL.

The combined influence of Project-Based Learning (PBL) and Artificial Intelligence (AI) in language acquisition environments, particularly in the contexts of English as a Second Language and English as a Foreign Language, has received limited scholarly attention. This is despite the growing interest in both methodologies. This study aims to investigate how learners' engagement, linguistic proficiency, and viewpoints are influenced by the integration of ChatGPT inside project-based learning frameworks. This study employs a structured Likert-scale survey to solve a gap in the current research by examining technology-enhanced, task-based solutions. The subsequent phase in the research procedure involves preparation for a semi-structured interview aimed at documenting the supplementary advantages and challenges linked to the integration of PBL and ChatGPT in language acquisition. The present study investigates how effectively PBL (Project-Based Learning) and AI (Artificial Intelligence) are integrated to enhance the language learning of ESL (English as a Second Language) students. There is no doubt about the effectiveness of AI integration in language learning. However, a blended or mixed method is expected to overcome shortcomings like emotional intelligence and individual differences in the learning process. The integration of PBL and ChatGPT enables a significant role in ELT (English Language Teaching); therefore, the study analyzes the effectiveness of L2 learning. The aim of the study is to investigate whether the combination of PBL and ChatGPT bridges the gap between traditional instruction and AI integration. The study employed a survey method using a structured questionnaire developed for the selected n=100 students through purposive sampling who had already been exposed to PBL-based language instruction in ChatGPT in the language lab. The questionnaire was developed to highlight the learners' perceptions of technological interaction and digital engagement using a Likert-scale survey in the PBL and ChatGPT contexts. The study also conducted semi-structured interviews with the participants to record the learners' perceptions apart from survey questions. The study then analyzed the data using the data tool Jamovi. The findings revealed that the proper integration of PBL and ChatGPT in language learning ensures a high frequency level of learning climate and the students are exposed to using the AI effectively and elaborately based on structure through PBL. Thus, the study concluded that it represents innovative instructional design that combines with learner-cantered methodologies.

In this current decade, as technology continues to evolve, educational approaches are increasingly integrating innovative tools and methods that enhance student learning experiences. The incorporation of AI-powered language instruction presents both opportunities and challenges. Researchers have examined themes such as Technology Assisted, Technology Mediated, and Technology Enhanced language learning. The pedagogical implications are as significant as the technology itself. It is crucial to establish a robust pedagogical framework to achieve meaningful learning outcomes. Thus, technology supports learners' performance and contributes to their proficiency in the language. However, technology and pedagogy should reinforce one another to enhance language competence comprehensively. To address these

issues, empirical research is needed into the impact of integrating Project Based Learning (PBL) with ChatGPT. This integration will ensure that learner's improvement in language and in ethical considerations in AI usage. This approach will enhance student engagement and foster critical thinking of students and their collaborations. By using this method, educators can use an interactive learning environment that opens the way for satisfying the diverse needs of learners.

Aim and Objectives

The study aims to discover and evaluate the effectiveness of the integration of PBL and ChatGPT and the study covers the following objectives.

- To examine the extent of integrating Project-Based Learning with ChatGPT enhances ESL learners' motivation and engagement in English language learning.
- To analyse the integration of PBL and ChatGPT helps to overcome communication barriers and reduce speaking anxiety, and motivation to communicate in English for ESL learners.
- To study the impact of ChatGPT integrated project-based learning on learners' pragmatic language application skills and real-world communication competence.
- To understand the learner's perception of integrated PBL and ChatGPT in helping ESL learners improve their language acquisition, skill development, and language learning experience.
- To propose workable strategies for integrating AI tech with project-based pedagogy in English LanguageTeaching (ELT) classrooms.

Research Questions

Analysing the gap, this study seeks to answer the effectiveness of PBL and ChatGPT in language learning through

The following questions.

- To what extent does language learning through the integration of PBL and ChatGPT motivate learners?
- How do ESL learners perceive the integration of PBL and ChatGPT in language learning to enhance Language acquisition, engagement, and skill development?
- How do ESL learners with the integration of PBL and ChatGPT overcome their real-world communication barriers associated with language learning?

Significance of the study

The research investigates the combined effects of technology and pedagogy on English language learning in ESL and EFL environments. AI tools like ChatGPT provide accessibility, instant feedback, and interactive engagement for learners and their instructors however, technology alone will not guarantee successful acquisition of language meaningfully. Learning requires skilful pedagogical strategies to provide structure, purpose, and rationale in relation to real-world contexts. Project-Based Learning (PBL) as a pedagogy will facilitate active and purposeful

Engagement with language that is also contextual and collaborative in nature. Integrating PBL while using ChatGPT, will create an empowering and supporting learning environment that improves learner autonomy, motivation, and communicative apprehension. This research reinforces the need to incorporate technological tools educating students in learner-centred, interactive language classrooms. By examining learners' perceptions of ChatGPT-assisted PBL, the research contributes to providing relevant, effective, innovative, and scalable solutions for contemporary language education.

2. Review of Literature

La Velle et al. (2020) investigates how the COVID-19 pandemic affected English initial teacher education. The abrupt change in educational procedures presented obstacles and opportunities. The study highlights the challenges' teacher education programs have in adjusting to distant learning and virtual teaching. It also emphasizes benefits like digital skills development and flexible learning. Support systems and pedagogical changes are crucial for crisis teacher training, according to the authors. This research sheds light on teacher education's changing landscape amid unexpected hurdles.

Adedoyin and Soykan (2020) analyze how the COVID-19 epidemic affected online learning, finding difficulties and potential. The quick move to online schooling during the pandemic brought considerable challenges, including unequal access to technology and internet connectivity and the necessity to modify instructional approaches for virtual contexts. Positives include more flexibility and the potential for creative teaching techniques. The study emphasizes the need for online professors to have pedagogical training. The study illuminates the pandemic's complex effects on education by examining educators' and students' experiences. The authors emphasize a balanced approach to online learning to overcome inequities and transform education. The research sheds light on distant education's challenges and prospects in a worldwide crisis.

Bao (2020) case study explores Peking University's online teaching with COVID-19. Research on higher education illustrates the institution's response to pandemic-induced virtual learning. The study examines the university's teaching adaptation issues and strategies.

The paper examines a specific educational context's shift to online education during the epidemic.

The Aguilera-Hermida et al. (2021) study examines students' use and reception of online learning during the COVID-19 pandemic in the US, Mexico, Peru, and Turkey. The authors compare how students from different cultures used virtual schooling. According to the study, students' technological availability, internet connectivity, and online platform comfort vary by country. The study shows that socioeconomic conditions and technical readiness affect students' remote learning acceptability. Online education was convenient and flexible, but students observed digital inequity and restricted engagement. To meet each country's student demands, the writers suggest customized techniques. This cross-cultural study lights up emergency online learning's effects, revealing patterns and country-specific differences.

Bai et al. (2019) investigate Hong Kong primary school English teachers' use of ICT in English language instruction and their intention to continue their use. The authors investigate the uptake of technologies and pedagogy. The authors took a quantitative approach in their inquiry to examine how teachers' perceived usefulness, perceived ease of use and attitudes towards ICT, and professional development opportunities contributed to their intention to use ICT technologies in English language instruction. In sum, the authors found that perceived usefulness and teacher opportunities for professional development impacted teachers' intentions of ICT use in instruction. The attitude of the teachers with respect to technology and its perceived fit with their pedagogical intentions is also critical to ICT use. The authors argue for a narrowed focus on professional development that intentionally considers the teacher's concerns and attitudes regarding professional practice in teacher development of ICT integration. In summary, this research contributes to the increased use of technology to integrate literacy practices in English language instruction in Hong Kong primary schools.

Tremblay et al. (2021) discuss using qualitative research to address COVID-19 pandemic concerns. The study emphasizes the significance of qualitative methods in understanding pandemic-related complexity and rapid change. It shows how qualitative research captures complex crisis experiences and views. The authors demonstrate how qualitative methodologies may adapt to pandemic conditions, emphasizing their significance for current and future research. The article emphasizes the need for qualitative approaches in understanding unforeseen issues.

Wong et al. (2021) study investigates ESOL instructors' well-being during and after the COVID-19 epidemic. It emphasizes teachers' well-being while they face distant and hybrid teaching problems. The study helped boost ESOL educators' mental health during and after the pandemic.

Yeung and Yau (2021) used thematic analysis to examine Hong Kong higher education students' views on online learning during COVID-19. The study examines virtual learning problems, techniques, and support systems. The essay lights up pandemic-related online education strategies by sharing students' experiences.

Yau et al. (2022) conducted a co-orientation analysis of teachers' and students' perspectives on online teaching and learning in Hong Kong higher education amid the COVID-19 pandemic. The study utilizes co-orientation theory to understand the alignment and discrepancies between educators' and learners' perceptions of virtual education. This research contributes insights into the dynamics of online education during the pandemic, enhancing our understanding of the viewpoints of both teachers and students.

Lo (2023) studied in this article "Digital Learning and the ESL Online Classroom in Higher Education: Teachers' Perspectives" provides valuable insights into educators' views on integrating digital learning tools into higher education ESL instruction. The study examines teachers' attitudes, problems, and opportunities in online classrooms. The paper suggests a strong digital ESL education dynamic through teachers' views. Technology-enhanced pedagogies are important, but instructors confront challenges adapting to them. This essay contributes to the discussion on how to use digital platforms in ESL higher education, which will shape language learning paradigms.

3. Methodology

This study uses a mixed-method approach including both quantitative and qualitative data to inquire the effectiveness of integrating Project-Based Learning (PBL) with ChatGPT in English language learning. A structured questionnaire for quantitative data through the Likert scale and qualitative data through semi-structured interviews were analysed and interpreted. The study was done with a total of 100 ESL/EFL learners using purposive sampling, with Past exposure to PBL and AI-assisted language tools. Quantitative data were collected using a structured the questionnaire has 5 options to understand the learners' perceptions, engagement, and perceived improvements in Listening, speaking, reading, and writing (LSRW) skills, measured using the likert-scale. Jamovi software was used to analyse the quantitative data, including descriptive statistics, one sample T-tests, correlation analysis, and regression analyses, to identify the statistical significance of the data, including the descriptive statistics, correlation, and reliability of the tests and the data of necessary variables to ensure the reliability and validity of the test. To validate the study in a qualitative manner. Case studies with semi-structured interviews were conducted with participants to gain more insights into their pragmatic experiences, challenges, and opinions on the pedagogical use of ChatGPT with a PBL framework on English language learning. These case studies on the participants have provided the depth for this study, this research sudy focuses on the individual experiences in this method of pedagogy. This qualitative and quantitative results reveal methodological robustness in understanding the studied method of pedagogy, covering its micro and macro level applicability. The gained insights from the interviews suggested potential areas for improvement in the pedagogical approach in line with PBL and the AI tools.

4. Results and Discussions

This section shares and discusses the main findings of the Likert-scale survey and semi-structured interviews which took place with undergraduates at a private engineering college and which related to their Project-Based Learning (PBL) experience with AI. Analytical tests were performed using the Jamovi software to determine and validate the research problem statement. The principal aim of the study

was to examine how learners engaged with ChatGPT on PBL-oriented language learning tasks. The findings are discussed and shared through the display of the Tables below.

One sample T-Test was conducted for all 12 quantitative questions. The questions were labelled with the letters A toL. Each of the 12 questions utilized a 5-point Likert scale: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree, which corresponds to numerical values ranging from 5 to 1, respectively. The questions aimed to assess various aspects of student experience and satisfaction. By addressing the areas highlighted through this evaluation, improvements can be made to enhance the overall student experience and satisfaction levels.

Table 1. Learners Perception towards PBL and ChatGPT of Language Skills

A	The guidance provided by Chatbot GPT-3 during project-based language learning is effective in clarifying language usage and grammar.
B	Project-based learning with Chatbot GPT-3 encourages me to apply the language in practical, real-life scenarios.
C	The variety of project options available for language learning keeps me engaged and enthusiastic about the learning process.
D	Project-based learning with Chatbot GPT-3 fosters a sense of autonomy and responsibility in my language learning journey.
E	Project-based learning with Chatbot GPT-3 encourages me to explore and learn language nuances beyond textbook examples.
F	The feedback and suggestions provided by Chatbot GPT-3 are clear and helpful for improving my language skills.
G	Collaborating with classmates on language learning projects enriches my understanding of linguistics contexts related to the language.
H	The use of multimedia resources, facilitated by Chatbot GPT-3, enhances my comprehension and expression in the target language.
I	Chatbot GPT-3's ability to simulate real conversations aids in improving my speaking and listening skills.
J	Language learning projects with Chatbot GPT-3 motivate me to consistently practice and engage with the language.
K	The integration of Chatbot GPT-3 in language learning projects aligns well with modern learning preferences and technology use.
L	Working on projects that involve real-world language use, facilitated by Chatbot GPT-3, boosts my confidence in the language.

One Sample T-Test

One Sample T-Test

		Statistic	df	p	Mean difference
A	Student's t	17.3	99.0	<.001	2.32
B	Student's t	21.0	99.0	<.001	2.54
C	Student's t	20.5	99.0	<.001	2.36
D	Student's t	19.1	99.0	<.001	2.41
E	Student's t	17.0	99.0	<.001	1.89
F	Student's t	20.0	99.0	<.001	2.58
G	Student's t	21.8	99.0	<.001	2.88
H	Student's t	19.7	99.0	<.001	2.33
I	Student's t	18.7	99.0	<.001	2.06
J	Student's t	21.2	99.0	<.001	2.76
K	Student's t	19.7	99.0	<.001	2.51
L	Student's t	20.4	99.0	<.001	2.72

Note. $H_a \mu \neq 0$

Figure 1. One sample T-Test

The above figure shows the One Sample T-Test for all the 12 questions and the results using the Likert Scale. The results from the one-sample t-test indicate that for all twelve questions (A–L), the calculated t-values range from 17.0 to 21.8, with all associated p-values being less than 0.001, which is highly statistically significant. These findings lead to the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_a). This suggests that learners' responses were not neutral but significantly leaned towards agreement, thereby supporting the positive influence of integrating ChatGPT-3 with project-based learning for ESL learners in English language Learning. The highest mean difference (2.88 for Item G) indicates that students strongly agreed that collaborative projects enhanced their linguistics understanding. Similarly, high mean differences for Items B, F, J, and L underscore increased motivation, clearer feedback, and greater real-world confidence. Even the lowest mean the difference (1.89 for Item E) reflects a meaningful level of agreement, demonstrating that students value learning. Beyond textbook content. Overall, these findings affirm that the integration of ChatGPT-3 with project-based learning significantly enhances various dimensions of language learning, including grammar, communication, collaboration, and learner autonomy. The study tested the following hypotheses for each survey item (A–L):

The study tested the following hypotheses for each survey item (A–L):

Null Hypothesis (H_0):

There is no significant difference in using Chat GPT –based PBL for English Language learning of ESL Learners., suggesting that learners

neither agree nor disagree with the question statements.

Alternative Hypothesis (H$_a$):

There is a significant difference between the mean responses of question statements on Chat GPT - based PBL for English Language learning of ESL Learners, that learners responded more on agree or strongly with the question statements, indicating the positive impact of method in English Language learning

Descriptives					
	N	**Mean**	**Median**	**SD**	**SE**
A	100	2.32	2.00	1.34	0.134
B	100	2.54	2.00	1.21	0.121
C	100	2.36	2.00	1.15	0.115
D	100	2.41	2.00	1.26	0.126
E	100	1.89	1.50	1.11	0.111
F	100	2.58	3.00	1.29	0.129
G	100	2.88	3.00	1.32	0.132
H	100	2.33	2.00	1.18	0.118
I	100	2.06	2.00	1.10	0.110
J	100	2.76	3.00	1.30	0.130
K	100	2.51	2.00	1.28	0.128
L	100	2.72	3.00	1.33	0.133

Figure 2. Descriptives

The above figure shows the descriptive statistics calculated for each of the 12 question statements (A–L), each based on a sample of 100 participants. The analysis of all questions reveals the mean scores ranged from 1.89 to 2.88. The corresponding median values also aligns (2.00 or 3.00) with the means, suggesting relatively symmetric distributions. The standard deviations (SD) ranged from 1.10 (Question I) to 1.34 (Question A), indicating a moderate level of dispersion around the mean. The highest average scores were observed in Question G (M = 2.88, SD = 1.32) and Question J (M = 2.76, SD = 1.30), though question E had the lowest scores all through the analysis (M = 1.89, SD = 1.11).

These descriptive results aligned with the results derived in the one-sample t-tests, which confirms that all group means significantly differ from zero. The higher means for question statements such as F (The feedback and suggestions provided by Chatbot GPT-3 are clear and helpful for improving my language skills), G (Collaborating with classmates on language learning projects enriches my understanding of linguistics contexts related to the language), J (Language learning projects with Chatbot GPT-3 motivate me to consistently practice and engage with the language), and L (Working on projects that involve real-world language use, facilitated by Chatbot GPT-3, boosts my confidence in the language) suggest stronger effects on ChatGPT - supported Project based learning in English language learning as a productive method in terms of motivation, skill improvement, and language confidence.

Correlation Matrix

Correlation Matrix		**B**	**K**
B	**Pearson's r**	—	
	df	—	
	p-value	—	
K	**Pearson's r**	0.979	—
	df	98	—
	p-value	<.001	—

Figure 3. Correlation Matrix

The above figure indicates the results of Pearson correlation conducted for examining the relationship between question statement B (Project-based learning with Chatbot GPT-3 encourages me to apply the language in practical, real-life scenarios) and question statement K (The integration of Chatbot GPT-3 in language learning projects aligns well with modern learning preferences and technology use). The analysis revealed a strong and positive correlation between the two, *r (98) =0.979r (98) = 0.979*r(98) =0.979, p < .001.

The correlation coefficient of 0.979 expressed that these two question statements share approximately 95.8% of their variance (r^2 = 0.958), reflecting that project-based learning with Chatbot GPT-3 and the integration of Chatbot GPT-3 in language learning encouraged the

students to understand and apply the real-life scenarios through modern technological usage. Thus, the correlation among the usage of ChatGPT with PBL in English language learning helps the students to learn and apply their skills in a pragmatic way.

Linear Regression

Model Fit Measures

Model	R	R²
1	0.979	0.958

Note. Models estimated using sample size of N=100

Model Coefficients - B

Predictor	Estimate	SE	t	p
Intercept	0.210	0.0552	3.80	<.001
K	0.928	0.0196	47.28	<.001

Figure 4. Linear Regression

Linear Regression Analysis

A simple linear regression was conducted to examine whether the scores on Question K significantly predicted scores on Question B.

To identify and validate the correlation of question statements, K and B were checked for the regression, which expressed the results as both the variables have high tendency in analyzing the effects of Chatbot 3 and PBL in English language learning. The regression model was significant as per the result, with a correlation coefficient of $R=0.979R = 0.979$R=0.979 and an R ^{2}= 0.958. This indicates that question K accounts for nearly 95.8% of the variance in question B, resulting in strong model fit.

This result implies that question K is a highly reliable predictor of question B, i.e., the correlation analyses on integration of Chatbot GPT-3 in language learning projects aligns well with modern learning preferences and technology use, and Project-based learning with Chatbot GPT-3 leads us to the reliable and valid results.Fig. 4: Scale Reliability

Scale Reliability Statistics

	Mean	SD	Cronbach's α
scale	2.52	1.24	0.989

[3]

Item Reliability Statistics

	Mean	SD
B	2.54	1.21
K	2.51	1.28

Figure 5. Scale Reliability Statistics

To assess the internal consistency of the composite scale derived from question statements for B and K, Cronbach's alpha was computed.

Scale Reliability

The overall Cronbach's $\alpha = 0.989$, indicating excellent internal consistency between questions B and K. The results derived show that the questions are highly correlated. According to commonly accepted thresholds, an alpha above 0.90 is considered excellent, and the value observed here (0.989) suggests near-perfect reliability.

The computed results reveals that Scale Mean = 2.52 and Scale SD = 1.24 shows a high Cronbach's alpha in the result, along with strong correlation and regression results. This result has also validated that the question statements B and K can be considered redundant or suitable for combination into a composite score. This has confirmed the robustness of the of correlation analysis.

Correlation Matrix

Correlation Matrix

		E	L
E	**Pearson's r**	—	
	df	—	
	p-value	—	
L	**Pearson's r**	0.894	—
	df	98	—
	p-value	<.001	—

Figure 6. Correlation Matrix

The above figure shows the Pearson correlation, computed to assess the relationship between question statements **E** (Project-based learning with Chatbot GPT-3 encourages me to explore and learn language nuances beyond textbook examples.) and **L (**Working on projects that involve real-world language use, facilitated by Chatbot GPT-3, boosts my confidence in the language**)**. **Pearson's r = 0.894** between **E** and **L,** indicates a very strong positive correlation between the question statements E and L. The computed value suggests that as scores on question statement E increase, scores on question statement L also tend to increase significantly. This implies that Project-based learning using Chatbot GPT-3 helps increasing the confidence level of the students by exposing them to learn new language nuances other than the conventional textbook learnings. Thus, the correlation analysis of these variables has stated it clear that the

Correlation Matrix

		H	L
H	**Pearson's r**	—	
	df	—	
	p-value	—	
L	**Pearson's r**	0.931	—
	df	98	—
	p-value	<.001	—

Figure 7. Correlation Matrix

The above figure analysis, a Pearson correlation coefficient was done to examine the relationship between question statements H (The use of multimedia resources, facilitated by Chatbot GPT-3, enhances my comprehension and expression in the target language) and L (Working on projects that involve real-world language use, facilitated by Chatbot GPT-3, boosts my confidence in the language).

Pearson's r = 0.931, expresses a very strong positive linear correlation between question statements, suggesting that as values of question statement H increase, values of question statement L also increase in a highly correlated way. This level of association suggests the usage of multimedia through the Chatbot GPT-3 helps the students i understanding the real-world scenarios visually, which in turn enhances the students' skills in language along with their confidence.

Reliability Analysis

Scale Reliability Statistics

	Mean	SD	Cronbach's α
scale	2.52	1.24	0.961

[3]

Item Reliability Statistics

	Mean	SD
H	2.33	1.18
L	2.72	1.33

Figure 8. Reliability Analysis

The scale's mean is 2.52, and the standard deviation is 1.24, Cronbach's alpha = 0.961, which indicates excellent internal consistency of the scale. The high Cronbach's alpha value indicates that question statements H and L are highly correlated. The results support the valid use of the scale in assessing the use of projects-based learning and multimedia resources, facilitated by Chatbot GPT-3, enhances the respondents' comprehension and expression in the target language along with confidence boosting in the language.

Voices from the Field: An Interview-Based Exploration of ESL Learners' Perspectives

The study also conducted a qualitative analysis of the data through semi-structured interviews, focusing on specific questions aimed at understanding learners' perceptions from their viewpoints. It summarised their learning processes and overall experiences based on the explored themes.

Q1. Could you please share any positive experiences you have had while using Chatbot GPT-3 for language learning projects?

Q2. Have you encountered any challenges when using this approach? If so, could you describe them?

Q3. Do you have any additional comments or suggestions regarding the integration of Project-Based Learning (PBL) and Chatbot GPT-3 for language learning?

Table 2. Responses Based on the Themes

Themes	Participant	Responses
Confidence	P – 10, 26	Learners reported that it provided a smooth and safe space to practice without fear of judgement.
Personalized	P – 8, 16	Responses appreciated the responses and supports according to the individual needs.
Autonomy	P – 23, 31	Participants expressed that it created more independent in managing their learning process and work at their own space.
In anxiety	P – 14	Students felt less anxious and stress because they could consult the unknown vocabulary, phrase, and grammar.
Skill Transfer	P – 76	Interviewees noted that the integration helped them more prepared in practical settings.
Willingness	P – 88	Learners reported that they felt more comfortable and motivated to participate in the learning process.
Exploration	P – 52	It encouraged them to try new concepts to expand their linguistic range without any hesitations.
Outcomes	P – 60	Students stated that the assistance helped them improve the quality of the final version in attaining outcomes.
Time-Saving	P – 41, 63, 92	Several participants noted that the integration helped them in saving time and complete the task more effectively.
Overreliance	P – 15	Students felt that they had loss of personal tone and language-learning opportunity.
Interference	P - 79	Learners felt that it focused on written outputs which may not directly improve other language skills.
Distraction	P - 40	Students felt that they had a loss of focus in AI integration.
Multitasking	P - 86	Participants addressed that divided attention decrease cognitive engagement.

5. Findings of the Study

Based on the provided data, the findings highlight that blending Project-Based Learning (PBL) with ChatGPT effectively enhances language learning by promoting authentic language use and providing personalized learning support. This combined approach enables learners with practical communication skills and critical thinking abilities, ultimately preparing them for real-world language application and lifelong learning. Learners expressed a high level of satisfaction with the integrated PBL and ChatGPT approach, which highlight improvements in their language, skills and confidence. The survey revealed a positive result that the feedback and resources provided by ChatGPT. Significantly enhanced their project work and language output. Interviews suggested that students valued the freedom to choose their own topics and the timely, personalized feedback offered by ChatGPT. They also emphasized the importance of the collaborative environment provided by PBL in enhancing real-life communication and problem-solving skills in the target language. Overall, the findings Indicate that the integration of PBL with ChatGPT significantly improves the effectiveness of language learning promotes active engagement, authentic language use, and the development of critical thinking skills through collaborative, real-world projects. Survey and interview data demonstrate that learners' experience increased. Motivation, improved language skills, particularly in communication and vocabulary, and individuality in their Learning process.

The findings from using AI as a means in the ESL classroom teaching and learning in a Problem-Based Learning (PBL) framework, showed that the written and spoken language confidence levels, vocabulary retention, and fluency. All substantially increased for students. These findings correlate with the literature on AI use for English. The teaching and learning environment that have established the AI-fostered learning platforms are effective resources for Second Language Acquisition (SLA), particularly in teaching and learning of English. The value of implementing AI for English learning with a student-centred model application in the PBL framework Is having a favourable impact on language proficiency improvements. The interactive feedback by ChatGPT, context-based suggestions, and real-time interactive support all assisted in engaging the motivation of the learners. Therefore, the model application has added to the evidence of the need for a change to the pedagogical approach to language learning in our modern technological, evolving world.

6. Conclusion

To conclude, integrating ChatGPT into Project-Based Learning (PBL) can significantly enhance the educational experience for both students and educators. By effective use of ChatGPT within PBL, students gain access to a comprehensive information, diverse

perspectives, and guidance that enable them to tackle complex real-world challenges. This integration also aids in the development of essential skills for lifelong learning and success in an increasingly digital and information-rich environment. Furthermore, ChatGPT can assist students in navigating ethical considerations and understanding various perspectives in their projects. However, it is vital to maintain a balanced approach. ChatGPT should complement rather than replace the roles of educators and mentors. Students should utilize it as a tool to support their learning and project work, all the while being guided by critical thinking and the pursuit of independent research and creativity. More particularly, the study would also be helpful for beginners since it has PBL instruction. As the platform has PBL prompts, the learners will not get diverted in their learning process and it will be holistic learning. Thus, the study recommends having the integration of ChatGPT with PBL for unencumbered learning.

Thus, the research findings pointed to the need for reform of curricula around technological PBL teaching and learning, and technology-based solutions such as AI tools like ChatGPT. Students reported learning a greater language skill and self-learning. As technology advances and the world continues to change, these reflections will affect language teaching and learning, in particular in learner-centered interactive inquiry settings where students build a community, and current curriculum and instruction must adjust as educational innovations emerge.

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