

# Perceived Effectiveness of Using AI-based Applications in Project-Based Learning

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## ABSTRACT

Project-based learning is a teaching method used in classrooms that integrate authentic and real-world problems in the learning environment. In light of the Industrial Revolution 5.0 where humans are working alongside advanced technology and A.I. generated assistance, the research introduces a project-based learning approach in ESL classrooms with the assistance of AI technologies. The project aims to analyse the usefulness and ease of use of AI-based language learning applications in project-based learning among undergraduates in a public university according to the Technology Acceptance Model (TAM). The research focuses on two main theories as a theoretical framework: project-based learning (PBL) and Technology Acceptance Model (TAM). It is a 6-week proposal writing project conducted with undergraduate students from a public university in Selangor. Project-based learning was introduced, and the participants were informed that they can make full use of any AI-based technologies to support their project. Submission of the proposal was scheduled for the sixth week in which it will be presented in class. A set of questionnaires was used as the instrument to obtain their perception of using AI-based technologies in project-based learning upon task completion. 50 respondents were involved in the study. The findings indicate that students had a positive view of using AI applications in their projects, preferred group work for its enjoyment, challenge, and manageability, and found AI language applications easy to use and beneficial for their learning. Finally, the project's adaptability makes it suitable for various educational contexts, and integrating AI technology in ESL classrooms helps students complete language tasks effectively.

**Keywords:** project-based learning, Artificial Intelligence (AI), Technology Acceptance Model, ease of use, usefulness

## INTRODUCTION

The inclusivity in education includes three main dimensions; i.e. cultures, policies and practices as proposed by [4]. They have also postulated that in the teaching and learning of education practices, it is envisaged that the use of technology in complementing learning as part of diversification of teaching and learning in teaching practices. This is further supported by [15] where there is a need to conceptualise equity and inclusion regarding the digital technologies that will be used in education. These are in line with UiTM's core values; Excellence, Synergy and Integrity in which the values of Synergy highly appreciates the harmonious inclusivity and productive society. Technological inclusivity will be beneficial in the teaching and learning environment as the rapid advancement in technology cannot be stopped. Limitless digital tools can be used in promoting the inclusivity of technology in education. Some of the digital tools that can be used include e-learning, Massive Online Open Courses (MOOCs) and Artificial Intelligence (AI), according to the European Commission which have been integrated into the teaching and learning environment in UiTM.

Assenting the values of synergy, project-based learning has become one of the most prominent approaches in teaching and learning in higher education, especially in UiTM. As the teaching and learning of language is usually done separately, it is impractical to focus only on one skill [3]. Therefore, teaching of abilities such as speaking, writing, listening and reading skills in one course is indeed commendable. To ascertain a successful integration of skills in language teaching and learning, many lecturers or language instructors have opted different teaching methods that are more inventive as opposed to the traditional method rote memorization [36]. One of the most prominent approaches in teaching and learning of higher education is project-based learning (PBL) [21].

This study involved learners engaging in project-based learning, requiring them to address daily challenges and devise solutions. They were assigned project-based learning assignments that were to be finished within a six-week timeframe. The task breakdown aligns with the Project-Based Learning (PBL) components outlined [22]. The researchers recommended various factors to consider in PBL activities, including learners engaging in self-directed projects that match their interests and abilities. They should then collect, examine data, and present their findings, using a range of sources and abilities. The project should be interdisciplinary and last over a considerable period, focusing on creating a physical product, presentation, or performance. The instructional strategy should be based on comprehensive educational goals within a broader subject framework.

The spread of Covid-19 has led to the rise of numerous applications that can be utilised in ESL classrooms, serving as substitutes for traditional teaching methods during the outbreak and enabling students to continue learning through online platforms. In this study, students were encouraged to use AI-based applications in assisting students' language learning throughout the project. By definition, AI language learning applications use artificial intelligence algorithms to assist users in acquiring and enhancing their proficiency in a non-native language [36]. They indicated that the applications may consist of software for real-time text or voice translation, personalised language teaching systems, and language creation systems for creating original content in the target language. According to [16], AI is necessary for English learning due to its beneficial effect on the acquisition of English language skills. For instance, AI assists ESL learners in overcoming challenges while learning English, such as looking for unfamiliar words.

## **Problem Statement**

While Artificial Intelligence (AI) has been explored as a tool to nurture the practice of education and improve the learning experience, its integration into the classroom remains limited. The potential of this technology within the Project-Based Learning framework has not been examined empirically. Project-Based Learning, a pedagogical approach that encourages students to learn by actively engaging in real-world and meaningful projects, can benefit from AI technologies through personalised learning, automated feedback, and data-driven insights [17]. Given the efficacy of AI to enhance personalised learning, provide immediate feedback, and learn from data by the process, any AI's efficacy in influencing the level of student engagement, collaboration, and performance is merely an assumption. Understanding this relationship is crucial, as educators and institutions seek to leverage technological advancements to improve educational practices and student outcomes.

This study would determine students' perceptions of AI-based applications in project-based learning in terms of their usefulness and ease of use. The Technology Acceptance Model (TAM) served as the foundational framework for collecting data in this study. TAM is widely employed to analyse how individuals adopt and utilise new technology [30]. An extensive body of research on the Technology Acceptance Model (TAM) [14] over the past thirty years has consistently demonstrated the widespread use and popularity of TAM in the field of technology acceptance [23]. Furthermore, it is a dependable approach for assessing students' attitudes towards technology [9]. According to the model, usefulness refers to an individual's perception of how technologies enhance performance [14]. Conversely, perceived ease of use pertains to an individual's belief that utilising technologies requires minimal effort. This study focuses on analysing the use of language

learning apps upon completing the six-week report writing project considering students have ample exposure to technology in their language learning since this is not their first year in the university.

### **Research Objectives**

This research aims to analyse the effectiveness of AI-based applications in language learning from students' perspectives according to TAM [14]. The research objectives are to;

1. analyse the usefulness of AI-based language learning applications in project-based learning among undergraduates in a public university
2. analyse the ease of use of AI-based language learning applications in project-based learning among undergraduates in a public university

## **LITERATURE REVIEW**

### **Project Based Learning**

Project based learning (PBL) is a robust pedagogical approach in teaching and learning. PBL is designed to enhance creative problem-solving skills among students by engaging them in authentic, real-world problems that require collaboration across various disciplines [46]. It gives the students the opportunity to become autonomous in their own learning environment. Not only students have become the centre of knowledge and skills acquisition, PBL also revolves around collaboration and authenticity which will benefit the students greatly in increasing their content and language proficiency [51]. Hence, it is undoubtedly that project-based learning is a revamp of the traditional forms focused teaching methodology that can enhance the students' various skills especially thinking skills and speaking skills [33].

[5] the integration of PBL and AI in education. Their studies have suggested that AI-enhanced PBL approaches have the potential to enrich students' learning experiences and prepare them for careers in the respective field of studies. Although the papers address the implementation of PBL and AI within the education system, the topic of students' opinions and experiences is not strongly emphasised. Future studies could explore students' perceptions of and interactions with AI-incorporated PBL tasks, their feelings and expectations concerning AI use in learning, and the effects of such an approach on their motivation and performance outcomes.

### **Integrating AI in Language Learning**

Artificial intelligence (AI) encompasses the creation of computer systems capable of executing tasks that traditionally require human intelligence. These tasks include visual perception, speech recognition, decision-making, language translation, and problem-solving. AI systems achieve these capabilities through sophisticated algorithms and models designed to process vast amounts of data, identify patterns, and make data-driven decisions. A key component of AI is machine learning, wherein models are trained on extensive datasets to enhance their accuracy and efficiency over time, eliminating the need for explicit programming for each specific task. This adaptive learning process enables AI systems to perform increasingly complex tasks, effectively replicating human cognitive functions.

The applications of AI span numerous industries, significantly transforming approaches to problem-solving and efficiency. In healthcare, AI is utilised to analyse medical images, predict patient outcomes, and customise treatment plans. In the financial sector, AI algorithms detect fraudulent activities, optimise trading strategies, and improve customer service through chatbots. In education, AI facilitates personalised learning experiences and automates grading systems, while in transportation, it advances autonomous driving and traffic management. The integration of AI into these fields not only enhances productivity and accuracy but also offers innovative solutions to longstanding challenges, highlighting AI's transformative impact on contemporary society.

The integration of artificial intelligence is not foreign especially in language learning environments. AI has emerged as a viable aid in the field of education, including language acquisition, as technology advances [38]. This technology is revolutionising project-based learning by providing personalised educational experiences and automating routine tasks. AI-driven platforms can analyse students' progress and adapt the curriculum to meet their individual needs, ensuring that each student receives the appropriate level of challenge and support. For instance, AI tools can offer real-time feedback on progress and assessments [28], track project milestones, and suggest resources tailored to a student's learning style and pace [11]. This personalization fosters deeper engagement and understanding, as students can work on projects that genuinely interest them while receiving guidance that maximises their learning potential. Furthermore, AI can handle administrative tasks, such as grading and scheduling, freeing educators to focus more on mentoring and facilitating critical thinking and collaboration among students.

In language learning, AI plays a pivotal role by offering immersive and interactive experiences that traditional methods often lack. AI-powered applications like chatbots and virtual tutors can simulate real-life conversations, providing learners with instant feedback on their pronunciation, grammar, and vocabulary usage [32]. These tools can also adapt to the user's proficiency level, presenting progressively challenging scenarios to enhance language skills effectively. Additionally, AI can analyse language patterns and usage to identify common errors and suggest targeted exercises, making the learning process more efficient. The integration of AI in language learning thus not only accelerates proficiency but also makes the experience more engaging and tailored to individual needs, breaking down barriers to mastering new languages [2].

As these artificial intelligence applications bloom in the learning atmosphere, the use of these applications is becoming more prominent among young learners, especially university students. A study by [11] explored the experiences, perceptions, knowledge, concerns, and intentions of students on the use of generative AI in tertiary education. They claimed that Gen Z students, who have grown up with technology and the internet, are more inclined to adopt new technological advancements which is supported by their findings. The findings of this study found that students are optimistic and showing a positive attitude towards the potential benefits of the usage of AI in education such as improving productivity, efficiency, and personalised learning. Additionally, these students also expressed their intentions and plans to use AI for various educational purposes, including gathering and consolidating information, language learning, and writing support.

The advancement of technology and research in artificial intelligence has contributed to the emergence of numerous artificial intelligence applications that serve specific purposes according to fields and usage. One of the most prominent and mostly used applications is ChatGPT. It is an advanced language model developed by OpenAI that serves multiple functions across various domains. Its primary function is to generate human-like text based on the input it receives, making it versatile for numerous applications. Students are among the frequent users of these applications. Numerous studies reported the use of this application in educational settings among students and also educators [1], [7], [41], [50]. [49] explored the perceptions of non-language major college students towards Generative Artificial Intelligence (GAI) using a questionnaire developed based on the Technology Acceptance Model (TAM). It was found that the students are positive towards both the usefulness and ease of use of AI in their learning processes. The students mentioned that AI helped them to complete their tasks faster and be more productive. In terms of ease of use, students highlighted that their interaction with GAI is clear and easy to understand, showing their acceptance towards integrating AI in their learning processes.

Despite its effectiveness and contributions to enhancing learning, users must be aware of its drawbacks and risks. One challenge that could impede students' progress is overreliance on AI applications. [6] discuss in their paper how AI applications can lead to dependency, where students may come to rely heavily on these tools for tasks such as research, writing, or problem-solving. Instead of using the applications as supplementary aids, the ease of obtaining answers could bring negative consequences towards their learning development. This is consistent with the findings of [27], which suggest that the effortless generation of

answers can hinder students' critical thinking and problem-solving skills. Indirectly, this could lead to potential risk related to academic integrity. Students might depend too much on AI-generated information due to its ability to provide answers promptly. However, without properly acknowledging the sources, they may unknowingly commit plagiarism [19].

## METHODOLOGY

### Research Design

This study is an exploratory study as it seeks to investigate an area that is not yet well-defined or understood as the use of AI language apps in learning especially in tertiary language environment is fairly new considering the emergence of AI in mobile phones' digital assistance; hence, making this framework of exploratory study significant in the language learning model. Exploratory research helps clarify ambiguous problems, establish priorities, and develop hypotheses for further research. In the context of AI language apps, there is a growing interest in understanding how these tools impact language learning, but there may be limited prior research on specific applications or effects.

By focusing on a relatively small sample size using convenience sampling method, the study aims to gather initial insights, explore key variables, and identify potential challenges in the application of AI language tools. This preliminary investigation will allow researchers to adjust their methods and refine research questions for future studies. The flexibility of exploratory research is particularly beneficial when dealing with new or rapidly evolving technologies like AI, where unforeseen factors may emerge

Quantitative approach was selected as the primary design for this study and it was done at a public university in Malaysia over a six-week period as part of a project-based learning course. Quantitative approaches were utilised in the study to capture the frequencies of each sub-category. Quantitative studies focus on numerical data and measurable outcomes [34]. As this study aims to investigate the usefulness and the ease of use aspects in using AI in project-based learning, quantitative approach using survey is suitable.

### Participant

There were 50 students involved in this study. The participants were taking the same subject, EWC661 (English for Report Writing), which focuses on writing skills. These students are Bachelor's degree students from different faculties in the university. They are in their second year of studies and this course is their second English course for elective modules. They were selected as the research participants using convenience sampling as they were currently the author's students taking the subject.

### Instrument

A questionnaire was used in this study as the instrument for data collection. It was adapted from [18] for learners' perceptions of project-based learning and [14] for learners' perceived ease of use and usefulness. It was distributed to the students at the end of the project to get the general perception of use of AI technologies in project-based learning among students. The questionnaire consisted of five parts with 30 questions in total. The parts of the paper that are relevant to the study include PBL in English language classroom, usefulness, and ease of use. The six-point Likert scale is used in the questionnaire (Section B to E) for higher reliability than the five-point Likert scale could offer [12].

## FINDINGS AND DISCUSSION

### a.) Project-based Learning (PBL)

Table 1.0 shows the result for students' perceptions on project based learning. 36 percent of the respondents strongly agreed that working on a project in a group is better than working alone. As [29] stated in his work,

project-based learning revamps the traditional forms of teaching and improves students' thinking and speaking skills. Furthermore, 38 percent of them favoured project work as it is enjoyable. Apart from that, 46 percent agreed that they could play an active role during the project work. This is relevant as PBL encourages students to become autonomous, requiring them to collaborate and strive for authenticity, ultimately strengthening their language proficiency in their language learning journey. However, the majority of the respondents agreed that completing the project work is challenging for them (90%). This is in line with [46] that PBL involves students' critical thinking and problem-solving skills as they are exposed to real problems from all disciplines. Despite the difficulties they faced in their project work, the majority of them agreed that the workload is manageable (88%). This relates to the next finding where overall, 86 percent of the respondents agreed that they enjoy doing project work in English class. In general, although PBL is perceived as a challenging method to learn the English language, students found it doable, enjoyable and able to improve their role as learners.

Table I Project-Based Learning (PBL)

| ITEM   | SCALE (%)         |          |                   |                |       |                |
|--|-------------------|----------|-------------------|----------------|-------|----------------|
|  | Strongly Disagree | Disagree | Somewhat Disagree | Somewhat Agree | Agree | Strongly Agree |
| I find doing project work in a group is better than working alone. | 0                 | 2        | 10                | 28             | 24    | 36             |
| I find that project work is fun.                                   | 0                 | 0        | 12                | 30             | 38    | 20             |
| I find that project work is challenging.                           | 0                 | 2        | 8                 | 34             | 28    | 28             |
| I find that the workload of the project is manageable.             | 0                 | 0        | 12                | 42             | 30    | 16             |
| I like doing project work in English class.                        | 0                 | 0        | 14                | 30             | 32    | 24             |

b.) Usefulness

In terms of the usefulness of AI-based application in learning English, majority of the the respondents (86%) agreed that using AI-based application helps them in learning the language better. They also stated that they get better results when they integrate the use of AI-based applications during the language learning process. This is in line with the findings from [2] that claimed the integration of AI in the language learning process can help the learners to master languages more effectively. One of the prominent explanations as to why the learners are more inclined to learn the language better when using AI is the fact that it provides instant feedback and learners can acknowledge their mistakes and fix them right away. [32] offers support for this, suggesting that the AI may effectively improve language abilities by matching learners' levels of language proficiency, providing progressively challenging obstacles, and providing real-time feedback.

As for the inclination to integrate the use of AI-based applications in language learning, the majority of the students (76%) responded that they will continue to integrate AI during the learning process. This proves that AI is useful for them to learn the English language. [11] supported the findings as they discovered that students had a positive outlook and are optimistic about the possible advantages of using AI in education and will continue using AI during learning processes.

Table II Usefulness

| ITEM  | SCALE (%)         |          |                   |                |       |                |
|---|-------------------|----------|-------------------|----------------|-------|----------------|
|   | Strongly Disagree | Disagree | Somewhat Disagree | Somewhat Agree | Agree | Strongly Agree |
| Using AI-based applications helps me to learn English better.                       | 0                 | 2        | 0                 | 12             | 44    | 42             |
| Using AI-based applications helps me to get better results when learning English.   | 0                 | 0        | 4                 | 18             | 40    | 38             |
| Using AI-based applications helps me in completing the project.                     | 0                 | 0        | 6                 | 18             | 36    | 40             |
| I wish to continue using AI-based applications when studying English in the future. | 0                 | 0        | 10                | 16             | 36    | 38             |
| Using AI-based applications helps me improve my English.                            | 0                 | 2        | 0                 | 22             | 40    | 36             |

c.) Ease of Use

One of the major factors that lead learners to integrate the use of AI in learning processes is the usability. [49] mentioned that as one of the main components of AI which is generative AI is similar to searching for information using traditional search engines, it is not derivative for learners to experience the same ease of use when using AI. Based on this study, majority of the students (82%) found that AI-based applications are easy for them to use during the language learning process. They also claimed that they can use the application independently without needing any help from instructors. This is supported by [11] which posited that the current students, who mostly grew up with technology, are more inclined to adopt and adapt to the vast development of technology including AI. That explains the reason why these students are able to manoeuvre the usability of AI-based applications independently.

As these students are proficient in the usability of technology, it is safe to say that they also have the desire to learn how a new technology works especially if it benefits them. Their enthusiasm in finding out how a technology works translates into their effort to learn and understand the usability of it. That also includes their interest in learning how to use AI-based applications. The study’s findings indicate that the majority of the students (76%) found it easy to understand how AI-based applications work. They also reported that they can quickly learn how to use the applications in learning the language which supports the claim by [11].

Table III Ease of Use

| ITEM   | SCALE (%)         |          |                   |                |       |                |
|--|-------------------|----------|-------------------|----------------|-------|----------------|
|  | Strongly Disagree | Disagree | Somewhat Disagree | Somewhat Agree | Agree | Strongly Agree |
| I find that AI-based applications are easy for me to use in learning English.  | 0                 | 2        | 0                 | 16             | 38    | 44             |
| I find that I can use AI-based applications independently in learning English. | 0                 | 0        | 8                 | 18             | 40    | 34             |
| I find it easy for me to understand how AI-based applications work.            | 0                 | 0        | 6                 | 18             | 40    | 36             |

|   |   |   |   |    |    |    |
|---|---|---|---|----|----|----|
| I find that I can quickly learn how to use AI-based applications in learning English. | 0 | 0 | 4 | 24 | 38 | 34 |
| In general, I find that AI-based applications are easy to use.                        | 0 | 0 | 4 | 14 | 40 | 42 |

## RECOMMENDATION & CONCLUSION

The project is highly adaptable in nature. It can be accomplished through any means, whether online or physical. Future researchers may reproduce the study using various methods on a suitable online platform with their students. The study mode's versatility allows it to be used as a module in exchange student programmes, intensive English programmes, and language offshore programmes.

In conclusion, integrating AI technology in ESL classrooms aids students in completing their language tasks. They find AI language applications easy to use and useful in their language learning. The approach also implies that students are able to be autonomous in acquiring knowledge. They have gained independence by taking responsibility for their own learning. Thus, this method could be utilised by language educators to enhance their students' language proficiency in ESL settings.

The implication of this study is it opens the door for more students to start using AI in their learning processes as the findings suggested that using AI brings numerous positive outcomes. This study also encourage teachers and educators to introduce the use of AI and eventually use the technology in classroom settings before leaving it to the students to explore more on their own. This will uncover endless possibilities of how this technology can facilitate learning in both inside and outside of the classroom.

## ACKNOWLEDGEMENT

The heading of the Acknowledgment section and the References section must not be numbered.

## REFERENCES

1. Abdaljaleel, M., Barakat, M., Alsanafi, M., Salim, N. A., Abazid, H., Malaeb, D., ... & Sallam, M. (2023). Factors Influencing Attitudes of University Students towards ChatGPT and its Usage: A Multi-National Study Validating the TAME-ChatGPT Survey Instrument.
2. Abrenilla, E. M., Redido, C., Abendan, C. F., & Kilag, O. K. (2023). The Next Chapter of ELT: Embracing AI-Infused Pedagogies and Evolving Educational Strategies in the Post-Pandemic Landscape. *Excellencia: International Multi-disciplinary Journal of Education* (2994-9521), 1(5), 124-135.
3. Akki & Larouz (2021). The Relationship between Speaking and Writing in Descriptive Discourse in a Moroccan University EFL Context. *International Journal of Linguistics and Translation Studies*. Volume 2, Issue 1. <https://ijlts.org/index.php/ijlts/article/view/102/40>
4. Alexaki, N., Foulidi, X., & Papakitsos, E. C. (2022). The three dimensions of inclusive education in the attempt for educational change: cultures, policies and practices. *Journal of Research Initiatives*, 6(1), 5.
5. Alharbi, N. M., Athauda, R. I., & Chiong, R. (2018). Empowering collaboration in project-based learning using a scripted environment: lessons learned from analysing instructors' needs. *Technology, Pedagogy and Education*, 27(3), 381–397. <https://doi.org/10.1080/1475939X.2018.1473289>
6. Ali, O., Murray, P. A., Momin, M., Dwivedi, Y. K., & Malik, T. (2024). The effects of artificial intelligence applications in educational settings: Challenges and strategies. *Technological Forecasting and Social Change*, 199, Article 123076.
7. Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Thabit, S., El-Qirem, F. A., ... & Al-Marroof, R. S. (2022). Examining the impact of artificial intelligence and social and computer anxiety in e-learning settings: Students' perceptions at the university level. *Electronics*, 11(22), 3662.



8. Almulla, M. A., (2020). The Effectiveness of the Project-Based Learning (PBL) Approach as a Way to Engage Students in Learning. *SAGE Open*, 10(3). <https://doi.org/10.1177/2158244020938702>
9. Anthony Pragasam, J., & Ainil Sulaiman, N. (2023). Integrating Technology in ESL Reading Classroom: Accounting Pupils' Perspectives. *Arab World English Journal (AWEJ) Special Issue on Communication and Language in Virtual Spaces*.
10. Argawati, Ningtyas, & Suryani, Lilis. (2020). Project-based learning in teaching writing: The implementation and students' opinion. *English Review: Journal of English Education*, 8(2), 219-226. <https://doi.org/10.25134/erjee.v8i2.2120>
11. Chan, C. K. Y., & Lee, K. K. (2023). The AI generation gap: Are Gen Z students more interested in adopting generative AI such as ChatGPT in teaching and learning than their Gen X and millennial generation teachers?. *Smart Learning Environments*, 10(1), 60.
12. Chomeya, R. (2010) Quality of Psychology Test between Likert Scale 5 and 6 Points. *Journal of Social Sciences*, 6, 399-403. <http://dx.doi.org/10.3844/jssp.2010.399.403>
13. Dang Thi Ngoc Anh. (2019). EFL Student's Writing Skills: Challenges and Remedies. *IOSR Journal of Research & Method in Education (IOSR-JRME)*. Volume 9, Issue 6. <https://www.iosrjournals.org/iosr-jrme/papers/Vol-9%20Issue-6/Series-1/J0906017484.pdf>
14. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q Manag Inf Syst*. 1989;13(3):319.
15. Gottschalk, F., & Weise, C. (2023). Digital equity and inclusion in education: An overview of practice and policy in OECD countries.
16. Hemas Kumala Dewi, Nur Annisa Rahim, Raselly Elfa Putri, Tia Ivanka Wardani & Moses Glorino Rumambo Pandin. (2021). The Use of AI (Artificial Intelligence) in English Learning among University Student: Case Study in English Department, Universitas Airlangga. [https://www.researchgate.net/publication/357352615\\_THE\\_USE\\_OF\\_AI\\_ARTIFICIAL\\_INTELLIGENCE\\_IN\\_ENGLISH\\_LEARNING\\_AMONG\\_UNIVERSITY\\_STUDENT\\_CASE\\_STUDY\\_IN\\_ENGLISH\\_DEPARTMENT\\_UNIVERSITAS\\_AIRLANGGA](https://www.researchgate.net/publication/357352615_THE_USE_OF_AI_ARTIFICIAL_INTELLIGENCE_IN_ENGLISH_LEARNING_AMONG_UNIVERSITY_STUDENT_CASE_STUDY_IN_ENGLISH_DEPARTMENT_UNIVERSITAS_AIRLANGGA).
17. Holmes, W., Bialik, M., & Fadel, C. (2019). The potential benefits of AI technologies in enhancing personalized learning, automated feedback, and data-driven insights within educational frameworks such as Project-Based Learning (PBL).
18. Faridah, M., Norlaila, M., Rozmel, A. L., & Maryam, M. A. (2011). Project-based Learning: Promoting Meaningful Language Learning for Workplace Skills. *Procedia - Social and Behavioral Sciences*, 18(2), 187-195.
19. Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, 1–15.
20. Fragoulis, L. (2009). Project-Based Learning in the Teaching of English as a Foreign Language in Greek Primary Schools: From Theory to Practice. *English Language Teaching*, 2(3), 113-119.
21. Pengyue Guo, Nadira Saab, Lysanne S. Post & Wilfried Admiraal (2021). A Review of Project-based Learning in Higher Education: Student Outcomes and Measures. *International Journal of Educational Research* 102 (2020). [https://www.researchgate.net/publication/341480053\\_A\\_review\\_of\\_project-based\\_learning\\_in\\_higher\\_education\\_Student\\_outcomes\\_and\\_measures](https://www.researchgate.net/publication/341480053_A_review_of_project-based_learning_in_higher_education_Student_outcomes_and_measures)
22. Giao, C. L. T., & Nguyen, B. D. (2021). Project-based Learning in an EFL Setting – A Case Study at a University in Vietnam. *International Journal of Education, Psychology and Counseling*, 6 (38), 223-236. <https://doi.org/10.35631/IJEPC.6380018>
23. Granić, Andrina & Marangunić, Nikola. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*. 50. [https://www.researchgate.net/publication/334365543\\_Technology\\_acceptance\\_model\\_in\\_educational\\_context\\_A\\_systematic\\_literature\\_review](https://www.researchgate.net/publication/334365543_Technology_acceptance_model_in_educational_context_A_systematic_literature_review)
24. Hari Sugiharto Setyaedhi. (2019). Higher-order thinking learning outcomes through the problem-based learning model. *Advances in Social Science, Education and Humanities Research* 387: 318-321. <https://www.atlantis-press.com/article/125928796.pdf>

25. Hidayati & Ariani. (2017). Integrating Writing Modes into Speaking Task. *Advances in Social Science, Education and Humanities Research (ASSEHR)*, Volume 82. Ninth International Conference on Applied Linguistics (CONAPLIN 9). [https://www.researchgate.net/publication/316297604\\_Integrating\\_Writing\\_Modes\\_into\\_Speaking\\_Tasks](https://www.researchgate.net/publication/316297604_Integrating_Writing_Modes_into_Speaking_Tasks)
26. I Made S., & Sebastianus M. (2020). Empowering students' writing skill through performance assessment. *International Journal of Language Education* 4(3): 432-441. <https://files.eric.ed.gov/fulltext/EJ1286109.pdf>
27. Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, Article 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
28. Kumar, D., Haque, A., Mishra, K., Islam, F., Mishra, B. K., & Ahmad, S. (2023). Exploring the transformative role of artificial intelligence and metaverse in education: A comprehensive review. *Metaverse Basic and Applied Research*, 2, 55-55.
29. Kim, A., & Su, Y. (2024). How implementing an AI chatbot impacts Korean as a foreign language learners' willingness to communicate in Korean. *System*, 122, 103256.
30. Mulugeta Hayelom Kalayou, Berhanu Fikadie Endehabtu, Binyam Tilahun. (2020). The Applicability of the Modified Technology Acceptance Model (TAM) on the Sustainable Adoption of eHealth Systems in Resource-Limited Settings. *J Multidiscip Healthc*. Retrieved from <https://doi.org/10.2147/JMDH.S284973>
31. Levine, J. B., & Mosier, G. (2014). Literature Review on Project-based Learning. University of Indianapolis Center of Excellence in Leadership of Learning
32. Liu, M. (2023). Exploring the Application of Artificial Intelligence in Foreign Language Teaching: Challenges and Future Development. In *SHS Web of Conferences* (Vol. 168, p. 03025). EDP Sciences.
33. McCarthy, M. R. (2010). *Critical Issues in Education: Dialogues and Dialectics*. Boston: McGraw-Hill.
34. Mishra, Dr. Shanti Bhushan & Alok, Dr. Shashi. (2017). *HANDBOOK OF RESEARCH METHODOLOGY*. [https://www.researchgate.net/profile/Dr-Shanti-Bhushan-Mishra/publication/319207471\\_HANDBOOK\\_OF\\_RESEARCH\\_METHODOLOGY/links/5c3c2a5792851c22a373630a/HANDBOOK-OF-RESEARCH-METHODOLOGY.pdf?\\_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19](https://www.researchgate.net/profile/Dr-Shanti-Bhushan-Mishra/publication/319207471_HANDBOOK_OF_RESEARCH_METHODOLOGY/links/5c3c2a5792851c22a373630a/HANDBOOK-OF-RESEARCH-METHODOLOGY.pdf?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19)
35. Oxford, R. L. (2001). Integrated skills in the ESL/EFL classroom. *ESL Magazine*, 16(1). Retrieved from <https://files.eric.ed.gov/fulltext/ED456670.pdf>
36. Pardede, P. (2020). Secondary School Students' Perception of ICT Use in EFL Classroom. *Journal of English Teaching*, 6(3), 246-259.
37. Rebolledo Font de la Vall, Roxana & Gonzalez Araya, Fabian. (2023). Exploring the Benefits and Challenges of AI-Language Learning Tools. *International Journal of Social Sciences and Humanities Invention*. 10. 7569-7576. 10.18535/ijsshi/v10i01.02.
38. Rusmiyanto, R., Huriati, N., Fitriani, N., Tyas, N. K., Rofi'i, A., & Sari, M. N. (2023). The role of artificial intelligence (AI) in developing English language learner's communication skills. *Journal on Education*, 6(1), 750-757.
39. Sabahattin Ciftci. (2015). The Effects of Using Project-Based Learning in Social Studies Education to Students' Attitudes towards Social Studies Courses. *Procedia - Social and Behavioral Sciences*. Volume 186. <https://doi.org/10.1016/j.sbspro.2015.04.205>.
40. Shaari, M. S. (2022, August 21). Poor skills cause of unemployment. *The Star*. <https://www.thestar.com.my/news/education/2022/08/21/poor-skills-cause-of-unemployment>.
41. Shoufan, A. (2023). Exploring students' perceptions of ChatGPT: Thematic analysis and follow-up survey. *IEEE Access*.

42. Simbolon, D., Haryudin, A. & Efransyah. (2019). Improving students' speaking skill through Project Based Learning (PBL). *PROJECT (Professional Journal of English Education)* 2. [https://www.researchgate.net/publication/337255621\\_IMPROVING\\_STUDENTS'\\_SPEAKING\\_SKILL\\_THROUGH\\_PROJECT\\_BASED\\_LEARNING\\_PBL](https://www.researchgate.net/publication/337255621_IMPROVING_STUDENTS'_SPEAKING_SKILL_THROUGH_PROJECT_BASED_LEARNING_PBL)
43. Sutrisna, G. & Artini, L, P. (2020). Does Problem Based Learning Affect Students' Speaking Skill and Attitude toward ELL? *Retorika: Jurnal Ilmu Bahasa*, 6(2), 131-138. <https://doi.org/10.22225/jr.6.2.2315.131-138>
44. Tama, N. S., Aisyah N., Santoso B. & Kurniadi, E. (2020). Learning higher-order thinking skills using problem-based learning model. *Journal of Physics: Conference Series* 1480. <https://iopscience.iop.org/article/10.1088/1742-6596/1480/1/012008/pdf>
45. Thomas, J. W. (2000). A Review of Research on Project-Based Learning. Retrieved from [http://www.bobpearlman.org/BestPractices/PBL\\_Research.pdf](http://www.bobpearlman.org/BestPractices/PBL_Research.pdf)
46. Warr, M., & West, R. E. (2020). Bridging academic disciplines with interdisciplinary project-based learning: Challenges and opportunities. *Interdisciplinary Journal of Problem-Based Learning*, 14(1).
47. Yang, D., & Puakpong, N. (2016). Effects of Project-Based Learning on Speaking Abilities of Non-English Major Chinese Students. *Learning in and beyond the Classroom: Ubiquity in Foreign Language Education*, 11(9), 410-427.
48. Yang, H., Kim, H., Lee, J. H., & Shin, D. (2022). Implementation of an AI chatbot as an English conversation partner in EFL speaking classes. *ReCALL*, 34(3), 327–343.
49. Yang, Y., Sun, H., Chai, Z., Jiang, G., & Estigoy, E. (2024). Usefulness, Ease-of-use, and Acceptance towards Generative AI in Language Learning of Non-Language Majors: A TAM-based Study. *International Journal of Advanced Engineering Research and Science*, 11(06).
50. Yilmaz, H., Maxutov, S., Baitekoy, A., & Balta, N. (2023). Student attitudes towards chat GPT: A technology acceptance Model survey. *International Educational Review*, 1(1), 57-83.
51. Yuliansyah, A., & Ayu, M. (2021). The implementation of project-based assignment in online learning during covid-19. *Journal of English Language Teaching and Learning*, 2(1), 32-38.