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Systematic Literature Review: The Effectiveness of Technology-Assisted Project-Based English Language Learning

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The problem with learning English lies in the need for updated instructional methods. Project-based learning, a contemporary model suited for the 21st century, fosters collaboration to ignite students' enjoyment of learning. The increasing use of technology in learning is establishing a new effectiveness learning model. This research aims to determine the influence of technology-assisted and project-based learning (TPjBL) on English language acquisition, analyze factors that influence the TPjBL on English language learning, and analyze media used in implementing TPjBL in English language learning. The research methods involved a systematic literature review, analyzing 23 (twenty-three) articles selected through the PRISMA process from 2015 to 2023. The data analysis technique utilized a predetermined review protocol containing three main aspects, including bibliography, research details, as well as focus and content of the article. Based on the consequences of the analysis using protocol review, it was found that the positive influence of TPjBL on English learning was 91%, with influencing factors including student conditions, technology features, authentic projects, group communication and collaboration, teacher conditions, as well as the most widely used media of social media and web. These three parties can benefit from the results of this study. Teachers must be able to create good learning plans (project planning, technology selection), preliminary activities and appropriate assessment principles. For schools and governments, curriculum adjustments, technological facilities, such as computers, and the availability of internet access must be reviewed if determining to implement TPjBL in English learning.

Introduction

With continued integration and expansion of economic globalization, English remains essential for international communication, leading to a growing demand for individuals with strong English oral expression and communication skills in English (Pei and Pamintuan,

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2024). Economic globalization has resulted in the majority of those situation where most participants in the international/intercultural communication are non-native English speakers. However, English teaching practices often prioritize native-speaker norms, which may be insufficient in developing effective English language competence for non-native speakers (Luo, 2024). Currently, there are numerous problems found in teaching foreign languages, including inappropriate teaching of spoken foreign languages and their interaction setting, disregard for the learners' dominating position, and the use of obsolete methods for teaching spoken foreign languages, among other factors (Thrall et al., 2018). Specifically, the conventional notion of education centred around exams is firmly established, where teachers primarily concentrate on delivering curriculum materials and subject matter. To facilitate students' progress, language immersion is required.

Project-based learning (PjBL) is one of the various learning trends currently being implemented in education. This method is one of the educational approaches that establishes links between classroom instruction and practical application in real-life situations. Pedagogical techniques, such as Project-Based Language Learning (PjBLL), resemble a collective of learners embarking on a journey of exploration and inquiry (Garib, 2022). PjBLL is a language acquisition method that allows students to engage in inquiry-based activities, engaging in authentic problem-solving and learning practices. This approach encourages students to explore problems, topics, and materials independently, without a predetermined perspective (Aubrey, 2022).

The Internet and technology impact the education system, especially in 21st century education (Prasetiyo et al., 2023). Rapid technological advancements has changed the way people work and interact (Henriksen et al., 2021), positioning digital and collaborative literacy as essential skills developed through PjBLL. To help students develop their ability to communicate collaboratively online and offline, implementing PjBLL classrooms are increasingly integrating digital technologies and tools, such as Web 2.0 (Farouck, 2016),video conferencing, and online virtual environments (e.g., Dooly and Sadler, 2016). Integrating technology into PjBLL has enhanced learning by creating a "real-world digital context" (Gulbahar Beckett, 2020), enabling students to experience the physical world as a concrete, interactive educational movement.

Technology integration in PjBL has gained widespread recognition as an effective method for perfecting the whole level of education in the contemporary period. Over the last five years, there has been an increase in PjBL research. Approximately 800 Scopus articles discuss PjBL in the 2018-2023 range (Yusri et al., 2024). Recent researches showed the significance of project-based learning in improving 21st century skills for STEM students (AlAli, 2024). Other research also revealed that PjBL positively affects student engagement and task completion and is considered suitable for in-depth civil engineering learning (Paleenud et al., 2024). However, most PJBL is utilized in science, technology, engineering, and Math (STEM) students. Regarding English language learning, one of the latest studies shows that PjBL positively impacts EFL students' writing competence. This research considers that many factors still need to be researched due to the need for studies on implementing PjBL in English language learning.

According to the above data, technology-assisted project-based learning (TPjBL) is more commonly utilized in STEM disciplines. Nevertheless, utilizing TPjBL has a beneficial effect on the acquisition of English language skills. A few studies have also evaluated the factors to consider when implementing technology-assisted project-based English language learning. As

a result, this research investigates the following research problems:

(1) How does TPjBL influence English language learning?
(2) What factors influence TPjBL in English language learning?
(3) What media are used to implement TPjBL in English language learning?

Literature Review

Project Based Language Learning (PJBLL)

Embracing language acquisition in teaching English as a second language raises students' involvement and excitement in the class through educational occupation. This strategy allows students to maximize their utilization of and derive advantages from their schooling, enhancing their proficiency in acquiring a foreign language (Mirza and Gottardo, 2023). Project-Based Learning (PjBL) facilitates student engagement, cooperative learning, inquiry, critical thinking using various technological tools, as well as impromptu communication and creativity. Throughout teaching and learning, students are able to enrol in an essential position, while teachers offer advice or suggestion to assist them in achieving successful project outcomes (Liao and Chen, 2023; Crespí *et al.,* 2022). PjBL is an instructional method that cultivates enthusiasm and enhances understanding of English language because students accumulate skills and knowledge more efficiently while involved in significant and valuable projects, unlike mere recitation (Cueva and Inga, 2022). Within the PjBL framework, students assume the responsibility of devising, investigating, constructing, and delivering projects that are in line with their specific areas of interest (Caeiro-Rodríguez, 2018; Lozano *et al.,* 2022; Velasco Moreno, 2023). Thus, PjBL means a methodology that substantially contributes to the educational domain, enhancing both the pedagogical approach, and the comprehensive development of learners. The proposal offers many dynamic approaches to encourage students to engage in good reading practices, strengthening their cognitive abilities, and capacity to approach tasks and procedures. Furthermore, it also fosters motivation among aspiring professionals in their respective fields (Li *et al.,* 2021)(Inga *et al.,* 2021).

PjBL was introduced to language instruction in the 1960s as a substitute for the conventional, teacher-centred, and behaviourist method (Gulbahar Beckett, 2020). As an interdisciplinary constructivist approach, it has proven beneficial when used in language instruction (Musa *et al.,* 2011). After conducting a study of 29 (twenty-nine) university students in Malaysia, Musa *et al.* (2011) discovered that PjBL helped the participants apply their language abilities to real-life situations. According to Beckett (2020), PjBL focuses on the overall educational process and serves as the overarching title for its subcategory of PjBLL (Project-Based Language Learning). Implementing PjBLL in second-language education has created a platform for learners to actively participate in self-exploration and cultivate their self-concept while fostering their sense of responsibility (Garib, 2022). As a result, PjBLL supports teaching and learning concepts that emphasize the student's duty and involvement. Nevertheless, since teachers' perspectives can impact the learning environment, it is important to investigate how teachers perceive and implement PjBLL.

PjBLL fosters a constructivist learning environment in linguistic classrooms, prompting teachers to change their teaching methods (Thomas and Schneider, 2021). The reasoning is that PjBLL facilitates the transition of teachers' roles from producing knowledge to facilitators of learning (Lee. *et al.,* 2014). Teachers in implementing PjBLL typically function

as catalysts of learning involving individual project-based investigations. However, it is common for many teachers to tend to assume the dominating role in the classroom. Shifting from a pedagogical approach to a student-centered one can be challenging, and these difficulties could affect how teachers adopt PjBLL (Hertzog, 2007).

Technology Assisted Project Based Language Learning (TPJBL)

This limited technological understanding among teachers has constrained their technology-integrated instruction's range, diversity, and profundity (Spector *et al.,* 2014). This constraint requires teacher training to integrate technology (Tanak, 2020). Thus, teachers' proficiency in utilizing technology is more significant than simply using technology tools in language learning contexts helped by technology. Technology-assisted learning (TAL) applications are now being utilized in both the educational process and national studies, as documented in the relevant literature. TAL utilizes computers, software, and learning materials, including e-books, to teach disciplines such mathematics, science, and geography. This strategy employs technology to facilitate the learning process. The TAL process involves the incorporation of information, communication, and technology into education. This process is intricately connected to using educational technologies in educational institutions (Ghavifekr and Rosdy, 2015). Furthermore, teachers' pedagogical competence regarding technology is equally crucial in instructing their students on utilizing technology efficiently. Similarly, TAPjBLL (Teaching Assisted Project-Based Language Learning) also benefits from including technology, as evidenced by earlier research demonstrating the favourable effects of integrating technology into PjBLL (Weng and Chiu, 2023).

Several studies have explored technological tools in TAPjBLL, highlighting innovative student outcomes that traditional classes could not offer (Mohamadi, 2018) (Mali, 2017). In this context, students can incorporate technology into their education, allowing them to acquire diverse technology-related skills relevant to the 21st century (Garib, 2022). Nevertheless, Thomas and Schneider (2021) observed that the efficacy of technological tools depends on contextual obstacles, which may cause teachers to abstain from integrating technology. Contextual difficulties frequently arise in developing nations when English as a Foreign Language (EFL) teachers and learners encounter obstacles related to technology utilization (Ja'ashan, 2020), inadequate infrastructure, and restricted chances for communication in the target language (Carrero Pérez, 2016).

Methodology

This research utilized a qualitative approach with a systematic literature review method. This method was used to construct a theoretical foundation, identify research gaps, strengthen methodology, support arguments, and avoid previous duplication (Murniarti *et al.,* 2018). The implementation of this method relies on the researchers collecting information and evidence about a topic or issue before conducting new research to assess existing conditions (Linnenluecke *et al.,* 2020). As a result, rules for implementing the literature review system were needed. Some of the critical processes of SLR (systematic literature review) included identifying, assessing, synthesizing, and interpreting studies more effectively (Linnenluecke *et al.,* 2020; Page *et al.,* 2021).

This study employed three stages of review procedures developed by Staffs (2007) and refined by Xiao and Watson (2019). The three stages included planning, review process, and report preparation. The following stages are explained through the following figures:

Figure 1. Procedure Review Process

As in the figure above, the operational standards are prepared at the planning stage (Zakariya, 2022) from article search instructions as well as exclusion and inclusion criteria (Tagscherer and Carbon, 2023) to determine the review protocol used. The review stage involved three activities: identifying data sources, abstraction, and analysis, all in accordance with the established operational standards. The reporting stage focused on presenting the research findings and their analysis, which are delivered in the form of recommendations, implications, and limitations of research results.

Data Source

An important aspect of SLR is article selection. In this research, articles were selected with the help of Publish or Perish application, using the criteria of articles indexed by Scopus. Databases are crucial as they are the central storage for publication metadata and bibliometric measurements. Selecting the appropriate data storage place is crucial for evaluating the reliability of a study (Yusri *et al.,* 2024). Article selection was carried out by extracting articles with the keywords "Technology Assisted Project Language Learning,"; "Technology Assisted Language Learning," "Mobile Assisted Language Learning,"; "Computer Assisted Language Learning,"; "Project Based Language Learning,"; "English Learning"; and "Project Based Learning on English Learning" in the 2015-2023 period. In the Scopus database provided by Publish or Perish, 267 articles matched the keywords. After that, articles were then selected with consideration provided to the inclusion and exclusion criteria listed in Table 1.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Types of Research	Quantitative, Qualitative, Development, Mix Method	Review.
Language	English	Other than English
Article type	Research article	Books, chapter books, and proceedings.

Data Abstraction

This research utilized PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) as a guideline for conducting and reporting literature searches for systematic review. PRISMA aims to generate systematic reviewers who clearly and comprehensively document the justification for doing the review, the technique utilized by the authors, and the significant findings acquired. This research follows the four main phases in PRISMA, namely identification, screening, eligibility, and inclusion (Page *et al.,* 2021) to answer specific research questions related to the research question (Sohrabi *et al.,* 2021).
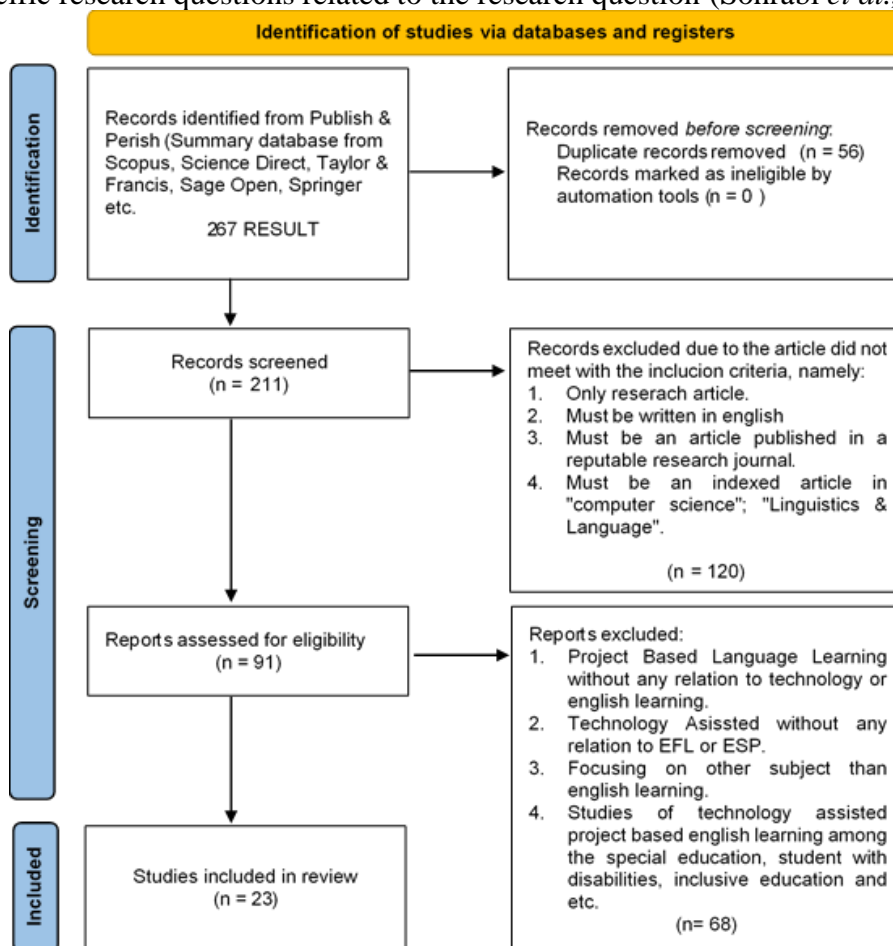

Figure 2. PRISMA Flow Diagram 2020 of Literature Research and Review Process
Source Diagram Template: Page MJ, et al. BMJ 2021;372:n71. Doi: 10.1136/bmj.n71.

Research Data Analysis

After determining the data source and abstracting the SLR data, the most important stage in this research was conducting a review analysis of the collected articles. This study utilized a review protocol, such as bibliography, research details, focus, and publication content (Qurtubi *et al.,* 2022). The bibliography focused on an overview of the author's name, year of publication, title of publication, type of publication, name of publication, and scope of publication (Sanchez et al., 2024). Research details concerned more specifically at methodology, starting from research objectives, methods, samples, populations, and models. The focus and content publication stages were focused on answering the research questions in the introduction, including a description of findings regarding the media used, the effectiveness of influence, and the factors' review.

Results

The results are described following the established review protocol. The research results were described by analyzing 23 international articles undergoing the PRISMA process.

Bibliographic Analysis

In this literature review, the articles analyzed technology-assisted project-based in English language learning. The main articles were published in the years from 2015 to 2023. This literature review could provide an overview of the most up-to-date trends, research methodologies, crucial components, necessary abilities, and frameworks researchers use before implementing PjBL. Bibliographic analysis presented the common information of the article. The following is an example of a reference table for bibliographic analysis in one of the articles.

Table 2. Essentials of Bibliographic Information

Information	Characteristic	Frequency	Percentage
Scopus Index	Q1	13	56,5
	Q2	9	39
	Q3	1	4,5
Area	Asia	16	69,5
	America	6	26
	Australia	1	4,5
Education Level	Higher Education	14	61
	Secondary	8	34,5
	Elementary	1	4,5
Total		23	

The table above contains essential basic information from the selected articles. It includes information about the Scopus index, which shows that 56.5% of articles were published in Scopus Q1, 39% in Scopus Q2, and 4.5% in Scopus Q3. The higher the Scopus index, the higher the article's impact factor.

Next is information containing the division of research areas. The 69.5% of research was conducted in Asia, 29% of research in America, and 4.5% in Australia. This percentage shows that research on English language learning is conducted particularly in areas where English is not a native speaker. Next, the information contained about the education level. Most research was conducted in universities with 61%, at the secondary level at 34.5%, and the elementary level at 4.5%. The next step was the distribution of the article year was published. The following is an image presenting the distribution of article years of publication.
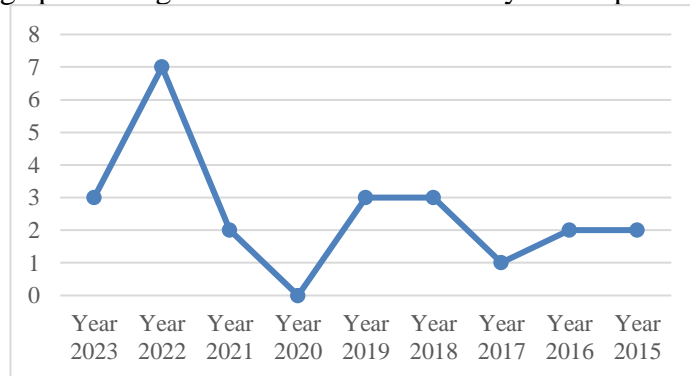

Figure 3. Distribution of article publication years

The data presented in the image above indicates that the highest number of published articles occurred in 2022, with seven articles accounting for 30% of the total publication. The second position is occupied by the years 2023, 2019, and 2018, each contributing three articles or 13%. The third position is occupied by 2021, 2016, and 2015, each with two articles or 9%. The fourth position was occupied in 2017, with only one article published or 4%. in the year 2020 had no publications, placing it in the final position. The research trends can be observed by analyzing the number of publications each year. Notably, in 2022, there was a marked increase in research on TPjBL in English language learning.

Analysis of Research Details

The analysis of the research details explains the research methods used in the article. This is under the policy implemented in this research, namely, only accepting articles in the form of research. The following is an example of an article analysis that contains detailed research information:

Table 3. Example of detailed research information

Researcher's Name	S.M. Villalba
Article Title	Blogging in Action: Teaching English within the project-Based Learning Approach
Research Detail Research Purpose	The objective of this project was to enhance the writing skills of these learners by utilizing blogging as a tool.
Research Method	Experiment
Sample and Population	28 students
Research Place	Vocational training in Spain

The above data consists of four sets, including research objectives, methods, sample and population, as well as research location. The crucial data that influences this research is regarding research methods because the SLR limits only research articles that can be included in the articles to be reviewed. Therefore, the following is an analysis of the research types percentage that fall into the SLR category:
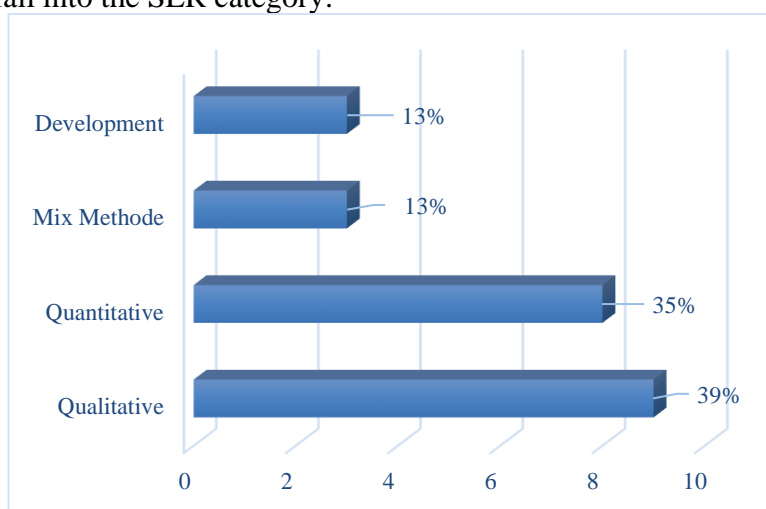

Figure 4. Percentage Analysis of the Distribution of Research Types

Analysis of Article Focus and Content

In this section, the researcher analyzes the entire content of the results and discussion in the article. In order to obtain information that will answer the research questions. The following is an example of information obtained from one of the articles:

Table 4. Example of Focus Information and Content Discussion

Researcher's Name	S.M. Villalba
Article Title	Blogging in Action: Teaching English within the project-Based Learning Approach
Focus and Discussion of Content	
English Language Competency	Writing
Media	Blogging and Google Docs
Influence Effectiveness Factor Review	No correlation was found between the findings and blogging in the project-based learning approach. This teacher must encourage his students to participate in related blog forums to practice the language and enhance collaborative learning through online interactions between students.

The information collected through this table focuses on four main things: the English language competency being tested, the technological media used, the effectiveness of the influence, and a review of factors that are felt to influence the attainment of technology-assisted project-based English language learning. This is the main research question and SLR study of this research.

How does TPJBL influence English language learning?

The magnitude of influence was discussed the established review protocol and has done through the PRISMA process. After conducting an in-depth review of 23 (twenty-three) articles, it was discovered that 21 (twenty-one) articles revealed that TPjBL had a positive influence on English language learning. However, two other results were revealed in the articles that concluded that TPjBL did not affect English language learning. Below presents a diagram illustrating the percentage influence of TPjBL on English language learning.
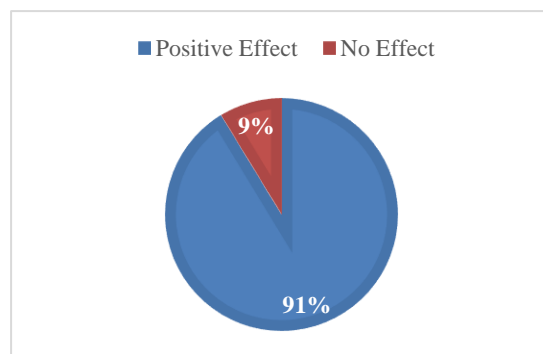

Figure 5. Percentage Analysis of the Effectiveness of the Influence of TPJBL on English Language Learning

Based on the diagram above, it is known that TPjBL has a positive influence on English language learning as much 91%. English learning is divided into four competencies: listening, writing, reading, and speaking, and this research accommodates overall English language competency. Of the 91% of research that has a positive influence, 30% are studies regarding

English language learning in general. Dooly and Sadler (2016) conducted the research in 51 (fifty-one) elementary school students in Spain regarding language learning practices using project-based of Computer-Mediated Communication (CMC). There was an increase in English learning outcomes by 40-55%. Asfihana et al. (2022) reported a qualitative study involving informants from 18 (eighteen) Islamic University students in Indonesia in which students expressed positive trends in learning experiences using virtual PjBL. Moreover, positive changes from traditional EFL learning to TPjBL were developed by Cheng-Chiang Chen (2019). Mali (2017) revealed the results of data analysis related to the main advantages of implementing PjBL activities in ICALL courses, including mutual learning, prioritizing learning autonomy, and training cooperation skills. Garib (2022) looked at it from the teacher's perspective revealed that most teachers in Lebanon, Libya, and Syria considered to use TAPjBLL. Both the pre-and post-implementation of the project involved a pragmatic teaching approach. Furthermore, a study by Pitura and Berlinska-Kopeć (2018) produces a positive trend in implementing P,BLL, making students can learn faster.

Writing competency is discussed as much as 22%. Lee (2019) utilized games media in learning writing, with most of the students finding this project fascinating (79.5%) and motivating (76.1%). Whereas, S. Wang (2019) analyzed students' perspectives on learning to write by exchanging emails, and students gave positive reviews on this learning. Mohamadi (2018) also explained the results of multivariate variance, indicating that PjBL, with a value of 25.17, and EPjBL, with a value of 21.50, had better performance than the control group, with a value of 17.23. Then, Sampurna et al. (2018) show that although student participation varies greatly, teacher participation is always the highest in learning to write using social media. Reisi and Saniei (2016) researched 90 secondary students in Tehran, Iran, showing that students in the experimental class had better writing scores than the control class, with a score of ($Z = -3.102$, $p = .002 < .05$).

Speaking competency was discussed in 22% of the studies within the 91% of research that reported positive influence. Yuan et al. (2023) conducted virtual reality research, demonstrating that project-based learning can enhance language proficiency, particularly in speaking abilities, critical thinking abilities, and foster the growth of effective learning strategies. Kato et al. (2023) examined a sample of 39 UNC Charlotte and 37 Tohoku students. The findings indicated that both groups of students demonstrated increased speaking skills in their target language, as seen by an increase in the average length of their utterances. Huang (2021), conducting research with smartphone video, showed an increase in speaking performance, with a score of 57.62 to 67.54, with a Cohens effect of d=1.46. Chimeva and Trenchs-Parera (2023) also conducted an explanatory study. The study revealed that individuals engaged in telecollaborative educational initiatives exhibited variations in their behaviour during interactions and employed different methods at different frequencies based on the person they were communicating with. Hafner et al. (2015) explained that using CMC could improve the learning environment and allows students to practice speaking competence freely. Pinphet and Wasanasomsithi (2022) examined 20 (twenty) students in Thailand using social media. The study demonstrated that English oral communication skills had improved after implementing communication strategies in a project-based blended learning approach. Teaching communication strategies alongside language acquisition can enhance language learners' English oral communication abilities.

English for Specific Purposes (ESP) discussed as much as 13% of the 91% of research that had a positive influence. Rodríguez-Peñarroja (2022) investigated 79 (seventy-nine) Jaume University students. Results confirmed a significant positive correlation between students'

grades from the questionnaire and their performance (r = 0.235, p < 0.05). Susanto (2022) conducted an ethnographic study through implementing online and traditional-based PjBL can encourage teamwork, critical thinking, and the unique needs of ESP students' English language, disciplinary knowledge, and technological literacy. Habibi et al. (2022) conducted survey research with significant correlations between all hypotheses that were reported in this study. As a result, TPjBL has a significant influence on students' ESP results.

Several positive elements of implementing TPjBL in English language learning are revealed in this article. The elements, such as authentic problems offered, are integrated with technology and language content, thereby increasing student engagement and academic achievement (Gündüzalp and Göktaş, 2024; Dooly et al., 2021; ChengChiang Chen, 2019; S. et al., 2019). Stimulating interaction between peers becomes an element of the collaboration offered by TPjBL (Chimeva and Trenchs-Parera, 2023; S. Wang, 2019; Hafner et al., 2015). Several things considered to have improved due to the implementation of TPjBL in English learning are teamwork, making collaboration and close student-student relationships can be established (Dooly et al., 2021; Mali, 2017). TPjBL can encourage students' critical thinking skills in completing authentic English projects (Asfihana et al., 2022; Susanto, 2022). Through TPjBL, that prioritizing student learning autonomy, students' active participation, English language practice, and technological literacy skills, students can increase these skills (Susanto, 2022; Pinphet, and Wasanasomsithi, 2022).

Despite its advantages, 9% of articles state that TPjBL negatively influences English language learning. The leading cause is that teachers cannot increase student involvement in technology-based projects (Villalba, 2022). The lack of teacher feedback influences student involvement. Students feel less familiar with the technology used, the lack of introduction to project learning results in confusion, and student interaction that needs to be established (Al-Rawahi and Al-Mekhlafi, 2015).

What factors influence TPJBL on English language learning?

After reviewing the factors that influence the implementation of technology-assisted project-based of English learning using focus information tables and discussing the article's contents, 82 (eighty-two) factors were collected from the 23 (twenty-three) articles that went through the review process.

Table 5. Analysis matrix and factor classification

No	Authors	N	Outcome	Factors	Factor Classification
1	H. W. Huang (2021	65	Influence with effect cohens d=1.46	Group communication and collaboration (+)	Communication and Collaboration
				Accommodates verbal and visual activities (+)	Technological Features
				Authentic and enjoyable assignments (+)	Authentic Project
				Other technology features required, such as editing and video elements (-)	Technological Features
				Long-time usage (-)	Time Limitation
2	Al-Rawahi (2015)	255	No Influence	Lack of feedback from teachers and peers (-)	Reciprocal Relationship

				Linking project collaboration to project assessment (-)	Authentic Project
				There should be an introduction and training on the use of online platforms (-)	Introduction
				Students find it challenging to implement learning (-)	Student Conditions
				Time limitations (-)	Time Limitation
				Difficult Internet access (-)	Internet Access
				No student-to-student collaboration (-)	Communication and Collaboration
3	Melinda Dooly, Randall Sadler (2016)	50	Influence	Telecollaboration helps with task completion (+)	Technological Features
				Sparks students' curiosity (+)	Authentic Project
4	Manuel Rodríguez-Peñarroja (2022)	89	Influence (r = 0,235, p < 0,05)	ICT selection is based on usability (+)	Technological Features
				The use of media helps project engagement (+)	Technological Features
				Instructors carefully analyze the use and provision of ICT media (+)	Technological Features
				Student needs, course expectations, and learning objectives (+)	Learning Plan
				Projects are integrated with the curriculum so that there is a clear assessment (+)	Project Assessment
				Time limitations, detail planning is needed (-)	Time Limitation
				Long duration can cause stress on instructors and students (-)	Time Limitation
5	Susanto (2022)	2	Positive	Teamwork (+)	Communication and Collaboration
				Critical thinking (+)	Student Conditions
				English language practice (+)	Authentic Project
				Pay attention to project assessment (-)	Project Assessment
6	Yordanka Chimeva, Mireia Trenchs-Parera (2023)	84	Positive	Project partner stability (+)	Student Conditions
				Similarity of linguistic skills between partners (+)	Student Conditions
				Student personality and learning style (+)	Student Conditions

7	J. Pitura, Monika Berlinska-Kopee (2018	30	Positive	Learning becomes faster, easier, and knowledge lasts longer (+)	
					Authentic Project
				The existence of a planned project will prevent students from getting bored, and teachers will achieve educational goals (+)	
					Authentic Project
				Projects must be planned carefully (-)	
					Authentic Project
8	R. Asfihana (2022)	18	Positive	Active participation (+)	Communication and Collaboration
				Motivation (+)	Student Conditions
				Critical thinking (+)	Student Conditions
				Building communication (+)	Communication and Collaboration
				Lack of teacher preparation (-)	Teacher Condition
				Complex e-assessment process (-)	Project Assessment
				Planning becomes an important point (-)	Learning Plan
9	J. ChengChiang Chen (2019)	20	Positive	Authentic issues, content, and language integration (+)	Authentic Project
				Peer interaction (+)	Communication and Collaboration
				Strengthening motivation (+)	Student Conditions
				Application advantages with the exact project needs (+)	Technological Features
10	Hafner (2015)	48	Positive	Formation of an excellent virtual learning environment (+)	Technological Features
				Fulfilling collaboration between students (+)	Communication and Collaboration
				Facilitating discussion (+)	Communication and Collaboration
11	Sangmin-Michelle Lee (2019)	25	Positive	Digital games facilitate project design (+)	Technological Features
				Authentic learning opportunities (+)	Authentic Project
				Developing student creativity (+)	Student Conditions
				Enjoying learning process (+)	Student Conditions
12	S.M. Villalba (2022)	28	No Influence	Lack of teacher feedback to students (-)	Reciprocal Correlation
13	M. Reisi (2016)	90	Influence	Meaningful learning (+)	Authentic Project
14	A. Habibi (2022)	350	Influence	Cognitive and epistemological understanding (+)	Student Conditions
				Teacher performance (+)	Teacher Condition

				Technology selection supports TPjBL (+)	Technological Features
				Teacher-student interaction (+)	Reciprocal Relationship
				Difficult Internet access (-)	Internet Access
				Requires compatible devices (-)	Technological Features
15	J. Yuan (2023)	20	Influence	Creates psychological conditions to solve problems and deepen assignments (+)	Student Conditions
				Time limitations require expansion of learning time (-)	Time Limitation
				Implementation is too long, making students have difficulty concentrating and being interested (-)	Time Limitation
16	Zohre Mohamadi (2018)	60	Influence	Centralization of the instructor's role (+)	Teacher Condition
				Environmental support cultural conventions are a review of technology selection (+)	Technological Features
17	Yustinus Calvin Gai Mali (2017)	30	Positive	Independence and mutual learning (+)	Authentic Project
				Prioritize learning autonomy (+)	Authentic Project
				Train cooperation (+)	Communication and Collaboration
				Lack of student-to-student relationships (-)	Communication and Collaboration
				Difficult Internet access(-)	Internet Access
				Lack of teacher guides (-)	Teacher Condition
				Time limitations (-)	Time Limitation
				Lack of reciprocity (-)	Reciprocal Relationship
				Requires expensive facilities (-)	Technological Features
18	P. Pinphet (2022)	20	Influence	Communication strategies (+)	Communication and Collaboration
19	M. Dooly (2021)	50	Influence	Authentic problems (+)	Authentic Project
				Student-centred (+)	Student Conditions
				Student independence (+)	Student Conditions
				Student to student collaboration (+)	Communication and Collaboration
				Student to teacher relationships (+)	Reciprocal Relationship
20	J. Sampurna (2018)	20	Influence	Students have their level of contribution (+)	Student Conditions
				Recommend to accommodate students' habits and preferences, as	Student Conditions

				well as educate them about the reasons for using digital collaborative tools to ensure their acceptance (+)	
				Increase students' motivation so that their participation level can be increased (+)	Student Conditions
				Measurement of participation can assess engagement (+)	Communication and Collaboration
				English proficiency (+)	Student Conditions
				Lack of student participation in docs (-)	Student Conditions
				Lack of familiarity with the application (-)	Technological Features
21	F. Kato (2020)	39	Influence	Minimal willingness of students to interact (-)	Student Conditions
				Authentic projects (+)	Authentic Project
				Selecting authentic problems (+)	Authentic Project
				Problems with the homepage application (-)	Technological Features
22	A. Garib (2022)	25	Influence	Introduction of TPjBL to students (+)	Introduction
				Curriculum commitment (+)	Curriculum
				Uncertainty of assessment in PjBL (+)	Project Assessment
				Internet connection (-)	Internet Access
				Power outages (-)	Internet Access
				Students' unfamiliarity with technology (-)	Introduction
23	S. Wang (2019)	36	Influence	Student to student relationship (+)	Student Conditions
				English proficiency (+)	Student Conditions
				Teacher role (+)	Teacher Condition
				Need better learning guides (-)	Introduction

The connotation of these factors contains the words of "positive," "negative," and "input." Several factors contained many repetitions of words and had the similar meaning as 23 (twenty-three) article authors revealed. Therefore, it is necessary to reduce data and group them to obtain twelve factors influencing the implementation of technology-assisted project-based of English language learning.
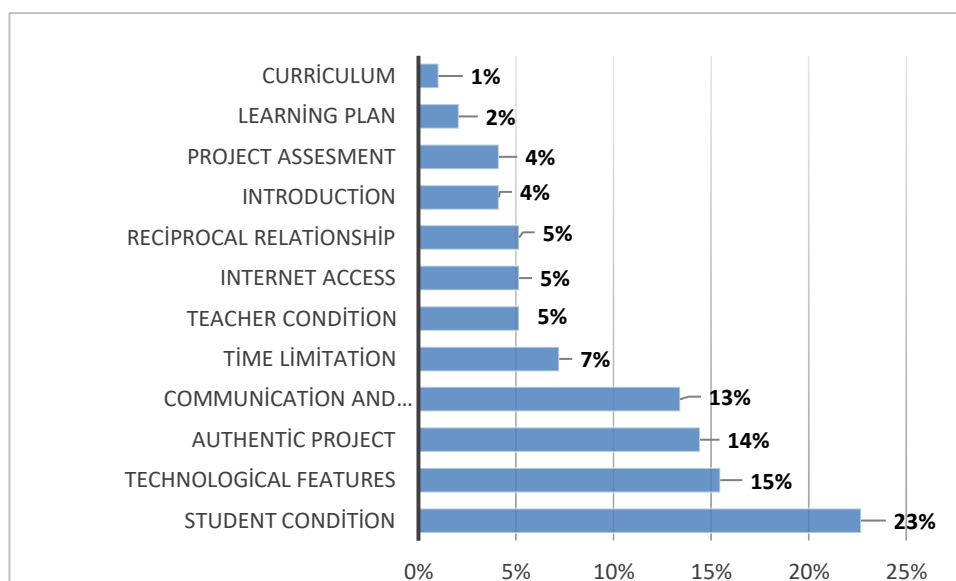
Figure 6. TPJBL Factor Analysis in English Language Learning

The students' condition obtained the highest percentage of 23%. This study can be divided into two aspects, namely, the students' internal conditions and the students' external conditions. Conditions within students include learning styles, linguistic abilities, personality, creativity, independence, motivation, and willingness to be involved in learning. In external conditions, students refer to the correlation between students and students, whether group collaboration or cooperation in completing assignments.

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Technology features got second place with a percentage of 15%. It was explained that the main element as a reference is how technology was selected for learning. The choice of technology was influenced by several things, namely whether the technology can accommodate verbal and visual activities, accommodate assignment completion, concern to the technology's superiority with the exact project needs, and whether the technology used is compatible with the device the students' belonging. The choice of technology was included in the learning plan, so teachers must use it carefully. In addition, technological features were related to internet access (6%). Many articles highlight that internet access constraints make it difficult to implement projects with technology. Apart from that, the risk of power outages becomes a concern that must be considered as it will result in the unusable technology.

The third position, with a percentage of 14%, indicates that authentic projects become an essential factor in implementing TPjBL. The selection of projects was related to learning objectives, and it must be remembered that the projects selected must be able to increase student involvement and participation. This related to other factors, such as time limitations (7%). The time required for project implementation is crucial because it will be easier for students and teachers. More time needed will ensure communication engagement and group collaboration through the chosen technology.

Group communication and collaboration positioned in fourth place, with a percentage of 13%. One thing to consider is how the project triggers students to collaborate in groups by paying attention to student accountability. Many researchers reveal low student engagement (Sampurna et al., 2018)(Al-Rawahi and Al-Mekhlafi, 2015). This can be overcome by project assessment (4%), which is continuous with the curriculum (1%), so it is clear that group collaboration is an assessed task. Therefore, students must participate in project groups.

The teacher's condition is an influencing factor with a percentage of 5%. Teachers must become instructors with a centralized role, ensuring teacher performance at a high level. This is related to the reciprocal relationship factor (5%). Moreover, teachers must ensure that they always provide feedback so that there is a collaboration between teachers and students. Continuing with the introductory factor (4%), many students have a low level of involvement due to the lack of introduction in the form of a guide on how to implement the project and the use of unfamiliar technology. As a result, an initial training was needed, and the learning plan factor (2%) is crucial for teachers to minimize errors in technology selection.

What media are used to implement TPJBL in English language learning?
The review identified seven types of technological media used across the 23 (twenty-three) reviewed articles. The following image illustrates the implementation of each technological medium.
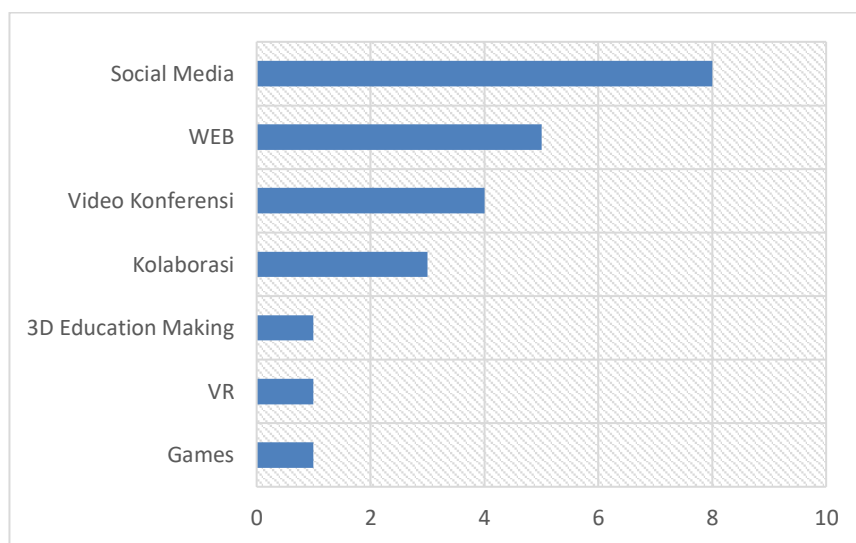

Figure 7. Analysis of the Distribution of Technology Media

Based on the picture above, social media occupies the top position with 35%. From the article analysis and with the help of a protocol review, several types of social media were used, including WhatsApp, Line, Facebook, YouTube, and Padlet. The second most commonly used technological medium included IEARN Youth Forum, WebQuest, word webbing, e-writing forum, abcya.com, and ed.ted.com with a percentage of 22%.

In the third position, video conferencing was used, with a percentage of 17%. Media used to support video conferencing including ZOOM, Skype, and Webex—furthermore, collaborative media can combine two or more technological media. The findings found several types of technological collaboration, namely the use of Skype, Video-sync, and Homepage wix.com (Kato *et al.,* 2023); Video conferencing-Machinima (Dooly and Sadler, 2016), as well as

social media, and Learning Management System (LMS) (Habibi *et al.,* 2022). In the last position, 3D education was conducted (Dooly *et al.,* 2021), and VR and games were used with a percentage of 4% (S. *et al.,* 2019).

Discussion

Based on the SLR's search of 23 (twenty-three) articles found a positive influence of TPjBL on English language learning in 91%, while the other of 9% showed no influence. That is because TPjBL can improve teamwork, critical thinking skills, and technological literacy, as well as prioritize learning autonomy, learning motivation, active student participation, and English language practice. Several previous studies examined why PjBL methods are essential for improving EFL students' learning outcomes. TPjBL builds an online teaching model for English and integrates project problems, significantly improving classroom teaching effectiveness (Zhang, 2024). PjBL helps students overcome their anxieties regarding speaking English, enhance proficiency in vocabulary, and foster a tremendous enthusiasm for acquiring knowledge about educational institutions and local communities (Vaca *et al.,* 2017). Mohamadi (2018) revealed that Project-Based Learning (PjBL) had a substantial positive impact on the vocabulary, reading, and learning capabilities of English as a Foreign Language (EFL) students.

Technology collaboration with the PjBL model provides a place for authentic student practice (Hoesny *et al.,* 2024). English learning requires significant practice in the development of its four competencies. With the integration of technology, teachers can build a climate of practice that can be done anywhere (Sabiri, 2020). Expanding the learning climate can increase the possibility of mastering higher competencies (Nhu and Minh, 2019). It is expected that English teachers will be able to expand the learning climate by integrating technology with PjBL in English learning.

Additionally, PjBL resulted in increased motivation, involvement, and academic proficiency. It also helps develop the habit of independent learning and collaboration in writing skills. In addition, PjBL effectively improves learners' language skills and mindset toward learning, coupled with a solid dedication to both material and language acquisition (Aghayani and Hajmohammadi, 2019).

This study reveals several factors that influence the success of TPjBL implementation in English language learning. Student conditions became the factors with the highest level of influence as they were related to other factors. Student conditions include students' English proficiency levels, learning preferences, cognitive conditions (Safaruddin *et al.,* 2020), psychological conditions (Bao & Liu, 2021), student participation, and involvement (Sampurna *et al.,* 2018). Learning with PjBL usually takes relatively long (Thuan, 2018), so it is important to fulfil student involvement. It is recommended that teachers must manage psychological conditions when student's complete projects by fulfilling learning preferences, selecting projects that are considered to be able to raise enthusiasm, and technology that does not bother students.

The selection of the right technology is related to how teachers maintain students' conditions during project completion. Before selecting the type of technology, teachers must pay attention to internet connections, power outages, and students' understanding of technology (Rahiem, 2020). These three things usually become obstacles in accessing technology, so the readiness of the student's learning environment to integrate with technology becomes important (Adarkwah, 2021). Teachers are expected to be able to make plans and

introductions regarding the selected technology by considering how technology features help student involvement (Ngandeu, 2020) and collaboration in project-based English learning. Teachers must also have started to analyze whether technology can support the implementation of the project and not hinder the completion of the project by students.

Teachers must be aware that achieving success in a project involves a significant amount of effort. Interesting questions need to be formulated to ensure that the project is engaging. These genuine initiatives must also apply to real-world issues and products, considering pupil preferences and selections (Latifaj and Latifaj, 2023). Utilizing PjBL has been proven to be a practical approach to developing 21st-century skills. These skills are developed through critical thinking, problem-solving, relationship building, information and media literacy, collaboration, leadership, teamwork, invention, and creativity (Almulla, 2020). Dag and Durdu (2017) indicate that successfully implementing technology integration in PjBL necessitates diligent student and teacher effort. Utilizing the internet as a source material in finding solutions to project tasks requires good communication between group members. The diffusion of ideas among members is also essential, requiring instructor guidance. The choice and optimal utilization of technological tools should align with the specific attributes of the subject matter, educational level, student proficiency, and complexity of the information. This approach enhances the efficacy of the instructional and educational process, fostering students' enthusiasm for the lesson, active engagement in learning, and overall academic achievement (Azamatova *et al.,* 2023).

Curriculum planning is frequently overlooked, contributing to the failure of TPjBL implementation in English learning (Asfihana *et al.,* 2022).. Many teachers must remember the introduction and carefully plan so that learning time is not appropriately utilized. In addition, poor curriculum planning results in assessment confusion. The uncertainty of project assessment usually reduces student participation in completing the project (Al-Rawahi and Al-Mekhlafi, 2015). Thus, it is expected that teachers will plan the curriculum by considering the time, assessment, and introduction to demonstrate the use of technology.

The most widely used media are social media and the web. According to Rahmawati *et al.* (2020), who determined that social media as the most frequently utilized technology in conjunction with PJBL is unknown. The efficacy of incorporating technology into project-based learning (PjBL) is heavily contingent upon the teacher's aptitude for facilitating the educational journey. Providing innovative functions, such as forming groups, liking, reacting, and motivating, to modernize digital schools has made social media widespread among students and teachers (Qin, 2024). Today's social media platforms have overcome 'real-world limitations' by providing a wealth of information for language learning (Y. *et al.,* 2023). Students with limitations in communicating in English or other foreign languages can be encouraged and motivated to use the Internet and social media to improve their competence and communicative skills in other languages (Guo *et al.,* 2023).

Conclusion

A few more research trends are related to technology-assisted project-based of English learning. In 2015 to 2023, there were 23 (twenty-three) detailed articles discussing these trends appropriately. Based on the findings of the study conducted utilizing a protocol review to address research inquiries, it may be inferred: 1) the positive influence of TPjBL on English language learning was 91%, while the other of 9% found no influence; 2) several factors were found that it influenced TPjBL on English language learning, namely student

conditions, technological features, authentic projects, group communication and collaboration, as well as teacher conditions; and 3) the most widely used media were social media and the web.

Research recommendations can be offered regarding several unique findings in the research. The main problems in implementing TPjBL in English language learning are student involvement and technology features. Therefore, some recommendations that can be offered to teachers are: 1) ensuring authentic projects are assignments tied to both the assessment system and the curriculum; 2) teaching introductions regarding the use of technology and introduction to learning models are crucial to avoid student confusion; 3) teachers, as , must be proactive in providing feedback and reciprocal relationships; and 4) the selection of technological media must be made carefully by considering menus and features, students are familiar with the media and compatible with all electronic devices.

This study produces several factors, levels of influence, and recommendations for easy-to-use technology in English learning. With answers to the three research questions, English teachers have a successful strategy for implementing TPjBL. In addition, accommodating student involvement and independence can develop an innovative English curriculum. Implementing TPjBL in English learning will encourage increased learning outcomes and English language competencies. Teachers must receive support from the school and government because, in several countries, the study of TPjBL has yet to be accommodated in the curriculum. Several long-term implications for schools and government include study of expanding the TPjBL-friendly curriculum and assessment system and make the school a free zone or free internet.

The implementation of research on the effectiveness of TPjBL in English language learning answers the predetermined problem questions. Careful analysis is required due to the limitations of literature review research. The information presented only reflects part of the knowledge, and publication bias may present severe risks to the accuracy of the results. The many factors analyzed, such as differences in methodology, geographical location, and education level, further complicate the generalization of the results. Other factors, such as the year of the study and journal index, indicate the need to evaluate the approach carefully in various circumstances.

Future research should address publication bias and concentrate on one specific methodology. This will allow the presentation of an innovative pedagogical approach and the inclusion of longitudinal studies to evaluate the long-term impact of TPjBL. Effective research opens up for further exploration. The study highlights the importance of student and teacher factors in implementing TPjBL in English language learning. Future researchers can enrich their research by discussing both these factors with different research forms and larger population sizes.

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