

Revolutionizing English Learning Through ICT-Integrated Design Thinking

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Abstract. This conceptual study develops an integrated framework for English language learning that combines Information and Communication Technology (ICT), design thinking, and project-based learning (PjBL). The study responds to a fragmented literature in which these approaches are frequently examined separately despite their complementary potential for technology-rich language education. A qualitative conceptual research design was used without empirical fieldwork. Academic literature was identified through Scopus, Google Scholar, and ERIC and analyzed through systematic literature review, thematic analysis, and conceptual integration. The synthesis indicates that Information and Communication Technology (ICT) can support interactive, flexible, multimodal, and personalized language learning, while design thinking contributes a human-centered iterative process of empathy, problem definition, ideation, prototyping, and testing. Project-Based Learning (PjBL) provides authentic tasks through which learners can apply language in meaningful contexts, collaborate, produce digital artifacts, and refine their work through feedback. Based on these patterns, the study proposes a framework that operationalizes the five design-thinking stages through ICT-supported project activities. The framework positions teachers as facilitators and learning designers and students as active participants in knowledge construction. Because the study is conceptual and literature-based, the proposed framework requires subsequent empirical testing across educational settings before claims about effectiveness can be established.

Keywords: ICT integration; design thinking; project-based learning; English language learning; conceptual framework

INTRODUCTION

The swift progression of digital technologies significantly influences educational methodologies, especially in language learning. Information and Communication Technology (ICT) refers to digital tools, platforms, and systems used to facilitate access to information, communication, and interactive learning processes [1]. ICT has become an essential component of contemporary educational environments, facilitating learners' access to resources, enabling communication through digital tools, and promoting engagement in interactive learning processes [1]. A study on the utilization of ICT tools in English language acquisition indicates that digital educational technologies foster personalized learning approaches, thereby enhancing students' linguistic abilities [2]. Conversely, although educational institutions widely utilize digital tools, these tools primarily enhance traditional teaching methods instead of being fully incorporated into a cohesive, innovative learning framework that could improve student engagement and learning outcomes [3]. Rather than fundamentally transforming the educational paradigm, ICT tools are presently employed merely as vehicles for distributing traditional instructional content, thereby limiting their potential to foster critical thinking—a skill vital for equipping students to navigate contemporary communication and project-based tasks in digital contexts.

The growing need for innovative teaching methods has led to expanding research on models that combine different learning approaches with emerging technologies. Design thinking, defined as a human-centered iterative process encompassing empathy, problem definition, ideation, prototyping, and testing [18], has emerged as a particularly influential model in this area. Modern educational settings require students to develop the ability to solve complex problems using innovative thinking [4]. Consequently, learning environments that incorporate both critical and design thinking are likely to help students develop skills needed to generate new solutions to complex problems. When learning environments integrate design thinking and innovative technologies, learners can actively participate in problem development processes and collaborative task completion, leading to enhanced engagement and better learning outcomes. Such environments are especially important in English language learning, where learners can develop communication skills through project-based learning activities.

Recent research has also explored various teaching methods designed to help students learn languages in technology-rich classrooms. Yusupova et al. [5] showed that using project-based learning (PjBL)—an instructional model that structures learning around complex tasks to allow learners to engage in meaningful learning experiences [19]—in English language teacher education programs significantly improves students' teamwork and teaching skills. Fikria, Setiawan, and Munir [6] conducted a systematic review focusing on the use of technology to enhance project-based language learning, identifying key theoretical frameworks and implications for practice. Additionally, Smitiene et al. [7] highlight how e-learning tools can encourage student participation and teamwork in project-based learning. Furthermore, Aviles Marino and Sarasa [8] demonstrate that using technology in project-based learning improves students' communication skills and supports hands-on experiential learning.

Therefore, the amalgamation of these methodologies into a cohesive model of English language acquisition necessitates a novel teaching strategy. This study presents a theoretical framework that integrates design thinking with ICT-facilitated English language learning through project-based activities. Conceptual research, which utilizes the existing body of knowledge to develop theoretical frameworks for pedagogy, significantly enhances theoretical modeling applicable in the development of novel educational methodologies [9]. The proposed model integrates the five stages of design thinking—empathy, problem definition, ideation, prototyping, and testing—with ICT-supported project-based English language learning. Prior studies indicate that design thinking enhances the cognitive and creative abilities of learners [4], whereas technology-assisted project-based learning promotes collaboration and experiential learning [6].

The significance of integrating digital tools with learner-centred approaches in language education has been underscored by recent developments in technology-enhanced teaching. Research on technology-enhanced project-based language learning indicates that the combination of digital technologies and project-based activities can foster deeper engagement, authentic language use, and collaborative knowledge construction among learners [6]. Li and Wang [10] suggest that integrating content-based instruction with project-based learning fosters students' creativity and self-directed learning in contemporary educational settings. Moreover, Bruno, Casas, and Saavedra [11] demonstrated that pedagogical models merging design thinking with active learning show significant potential to enhance learners' linguistic proficiency, critical thinking skills, and collaborative abilities. Despite these encouraging findings, prior research has predominantly examined ICT integration, project-based learning, and design thinking in isolation. Consequently, limited attention has been given to their systematic integration into a comprehensive pedagogical framework for English language acquisition—a gap this study directly addresses.

Literature Review

ICT Integration in English Language Learning

Information and Communication Technology (ICT) has significantly altered approaches to knowledge acquisition, information interaction, and the cultivation of communicative skills within English language instruction. Recent studies demonstrate that ICT supports flexible, personalized, and interactive learning environments; however, its effectiveness in improving learning outcomes depends on how well it is integrated with appropriate pedagogical approaches [2], [6], [10]. Specifically, Fadillah et al. [2] state that using digital devices allows the development of individualized learning experiences by engaging learners with content based on their needs and proficiency levels. Likewise, Aviles Marino and Sarasa [8] emphasize that technology-based learning environments foster communicative activities through digital channels. These findings indicate that ICT plays an important role not only in increasing access to learning materials but also in transforming the nature of language acquisition processes. Nevertheless, successful implementation still depends on several supporting factors, particularly the alignment between technology use and instructional design.

Moreover, recent research has investigated the role of ICT in facilitating authentic language application and collaborative learning in English language instruction. Fikria, Setiawan, and Munir [6] found that integrating technology into project-based language learning creates opportunities for knowledge construction and collaboration, as learners work together on meaningful projects. Similarly, Smitiene et al. [7] observe that online learning platforms facilitate active engagement and collaboration among students who interact in a project-based environment via digital tools. Li and Wang [10] propose that the use of digital technology in content-driven and project-oriented learning enhances language acquisition and analytical abilities in learners. Nonetheless, it is important to acknowledge that, despite multiple favorable findings, some researchers including Fikria, Setiawan, and Munir [6] and Li and Wang [10] suggest that ICT is often utilized primarily as an ancillary resource rather than a fully transformative element in educational practice—particularly when it is not supported by appropriate pedagogical design.

Design thinking and Project-Based Learning (PjBL) constitute two pedagogical approaches that can complement ICT integration. Design thinking, characterized as a human-centred approach through which

learners tackle real problems, generate innovative ideas, and develop solutions [18], supports the development of analytical and inventive thinking needed to address complex challenges [4]. Velu [13] further reveals that design thinking application in university settings, mediated by ICT, can strengthen learners' creativity and problem-solving capacity by involving them in contextual and meaningful tasks. However, it is important to acknowledge that despite many positive findings about ICT use, the literature consistently indicates that ICT functions mainly as a supplementary tool rather than a transformative force unless it is embedded within a theoretically grounded pedagogical framework—a gap the present study aims to address.

Design Thinking and Project-Based Learning in Language Education

Design thinking and project-based learning (PjBL) have proven to be innovative pedagogies that foster learners' creativity and problem-solving skills. The application of design thinking in education emphasizes a human-centered approach that engages learners in addressing real-world problems through the generation of innovative solutions [12], [13]. According to Patel, Puah, and Kok [4], the integration of design thinking in education helps learners acquire critical and innovative thinking skills. Furthermore, Bruno, Casas, and Saavedra [11] demonstrate that design thinking as a method for English language teaching enhances students' creativity and language competences through engagement in meaningful, contextually rich activities. These benefits indicate that design thinking is highly beneficial when employed to reach modern educational objectives in the context of active learning and learner autonomy.

Project-based learning (PjBL) is another creative pedagogical approach that has gained significant traction among educators. Yusupova et al. [5] demonstrate that incorporating PjBL in English language teacher education fosters learners' collaboration abilities and instructional skills. Furthermore, Fikria, Setiawan, and Munir [6] confirm that technology-supported PjBL promotes the development of communication skills and experiential learning, allowing learners to acquire language competences in contextually rich settings. Song et al. [28] similarly conclude through a systematic review that PjBL engagement in authentic tasks develops both critical thinking and language competency in EFL contexts. Therefore, design thinking and PjBL are approaches that can complement each other, allowing learners to develop through authentic projects and produce meaningful language outputs.

However, despite the increasing number of studies on design thinking and project-based learning, these approaches are often examined separately, resulting in a fragmented understanding of their combined potential. Moreover, there remains a limited number of studies that systematically investigate the integration of these two approaches within ICT-supported settings, particularly in the context of English language education and their impact on learners' creativity, problem-solving, and communicative competence. This lack of comprehensive evidence indicates a significant research gap that the present conceptual framework seeks to address by providing a theoretically grounded model for their integration.

METHODS

Research Design

The study does not involve empirical fieldwork; instead, it adopts a qualitative conceptual research design based on systematic analysis of existing literature. This design is appropriate for exploring complex educational concepts through interpretive and contextual understanding. Creswell [14] states that qualitative research focuses on interpreting meanings within specific social contexts using textual data, while Merriam and Tisdell [15] emphasize its role in understanding how individuals construct meaning in educational settings. Accordingly, this approach is well suited to examining pedagogical innovation. More specifically, the study applies a systematic literature review (SLR) approach to identify, evaluate, and synthesize relevant scholarly works related to ICT integration, design thinking, and project-based learning in English language education.

Rather than generating primary data, the study relies on existing literature as the main data source to uncover patterns, relationships, and theoretical gaps. The data analysis follows the principles of qualitative content analysis, conducted iteratively through data condensation, data display, and conclusion drawing. This approach is most appropriate for synthesizing theories related to ICT integration, design thinking, and English language learning. Furthermore, the literature review goes beyond descriptive summarization by incorporating systematic evaluation and synthesis, as suggested by Booth and Sutton [16], to ensure a rigorous conceptual foundation. Through this design, the study integrates existing theories into a cohesive teaching framework, contributing to a unified perspective on English language learning that incorporates ICT, design thinking, and project-based learning.

Data Sources

Digital technologies have transformed education remarkably by offering innovative methods of teaching and learning that surpass conventional classroom environments [17]. The data sources employed in this study

encompass a diverse array of academic materials, including Scopus-indexed publications, academic books, international journal articles, and other pertinent studies related to language acquisition, design thinking, and ICT. Academic books are particularly important as they provide foundational theories informing the proposed conceptual framework. In this regard, the DigCompEdu framework asserts that teachers ought to possess requisite digital competencies to effectively integrate technology in modern learning settings [1]. Design thinking is understood as a process entailing experimentation and creativity in developing ideas [18]. In an educational setting, this process focuses on learners' engagement in exploring problems, developing ideas, and improving solutions through continuous feedback. Similarly, project-based learning is defined as an instructional model that structures learning around complex tasks to allow learners to engage in meaningful learning experiences [19], with effectiveness further supported by principles of authenticity, inquiry, and student participation [20].

Data Collection Technique

The data collection technique employed is a systematic literature review through the use of academic databases including Scopus, Google Scholar, and ERIC. In the context of qualitative research, Flick [21] emphasizes that data can take various forms, including texts and documents that require interpretation, rather than being limited to numerical values. The fundamental source of information for this investigation is existing research, including journal articles, theoretical books, and previous studies related to ICT, design thinking, and language learning. Saehu [22] suggests that literature reviews can draw on various sources, including theoretical frameworks, academic journal articles, and other relevant materials. To select the literature for this study, a systematic approach was used to assess the relevance and quality of each source in building the conceptual framework. This process involves evaluation of the credibility, recency, and relevance of literature to the research focus.

Data Analysis

Thematic and conceptual analyses were employed in this study, encompassing several stages: literature identification, categorization of key components, literature integration, and development of a conceptual framework for ICT integration within the design thinking paradigm in English language learning. According to Flick [21], qualitative data analysis requires the interpretation and classification of textual materials to reveal fundamental patterns and meanings embedded within the gathered data. The initial phase involved reviewing relevant theoretical frameworks and teaching methods related to ICT, design thinking, and project-based learning. The second step involved categorization of data into significant aspects—digital learning, processes of design thinking, and dimensions of project-based learning—to reveal underlying connections between concepts. As emphasized by Saehu [22], identifying gaps and relevant aspects of the collected data forms the basis for developing the instructional model. The final step synthesized all findings into a conceptual framework integrating ICT within design thinking for English language learning, as the formation of a conceptual framework is a central outcome of qualitative data analysis [21].

RESULTS AND DISCUSSION

ICT as an Enabler of Interactive and Personalized Language Learning

The findings of this study demonstrate that ICT plays a pivotal role in reshaping English language learning into a more interactive, flexible, and personalized process that extends beyond the limitations of traditional classroom environments. ICT enables learners to access multimodal learning resources—including videos, interactive platforms, and digital texts—which support different learning styles and preferences. This accessibility contributes to a more inclusive learning environment where learners can engage with content based on their individual proficiency levels and needs. Furthermore, ICT facilitates both synchronous and asynchronous communication, allowing learners to interact with peers and instructors through digital platforms, thereby enhancing opportunities for meaningful language practice. This aligns with findings by Fadillah et al. [2] that ICT integration promotes learner autonomy, engagement, and adaptive learning experiences.

However, the findings also reveal a critical limitation: ICT is often used as a supplementary tool rather than as a transformative force in education. In many cases, digital technologies are employed merely to deliver traditional instructional content in a different format, without fundamentally changing the nature of teaching and learning. This issue is consistent with research by Ertmer and Ottenbreit-Leftwich [3], who suggest that the effectiveness of ICT depends heavily on how it is integrated into pedagogical practices. Without appropriate instructional design, ICT fails to promote higher-order thinking skills such as critical analysis, creativity, and problem-solving—skills that are essential in modern language learning. Moreover, the findings indicate that successful ICT implementation requires not only access to technology but also teacher competence, pedagogical alignment, and institutional support. Therefore, while ICT has the capacity

to create interactive and personalized learning environments, its impact is largely determined by the extent to which it is meaningfully integrated into the teaching process.

Design Thinking as a Human-Centred Approach to Language Learning

The findings highlight that design thinking serves as a powerful pedagogical approach that promotes a human-centered, creative, and problem-oriented learning process in English language education. This approach is characterized by iterative stages—empathy, problem definition, ideation, prototyping, and testing—which guide learners in addressing real-world challenges and developing innovative solutions [18]. Through the empathy stage, learners are encouraged to understand the needs and perspectives of others, which is particularly relevant in language learning as it fosters communicative awareness and contextual understanding. The problem definition stage enables learners to identify and articulate specific communication challenges, while the ideation stage encourages the generation of diverse ideas without immediate evaluation, promoting creative thinking. In the prototyping and testing stages, learners transform their ideas into tangible language products and refine them through feedback and iteration, thereby enhancing both linguistic competence and critical thinking skills.

In the context of English language learning, design thinking shifts the focus from passive knowledge acquisition to active knowledge construction, where learners engage in real-life communication scenarios and develop solutions to authentic problems. Bruno, Casas, and Saavedra [11] found that design thinking-based educational programs improve English language learning outcomes and learner creativity in primary school contexts. This not only improves language proficiency but also fosters collaboration, adaptability, and innovation. However, the findings also suggest that the implementation of design thinking requires careful facilitation by educators, as the process is non-linear and demands flexibility in instructional design [18]. Teachers must create supportive learning environments that encourage exploration, experimentation, and reflection. Without proper guidance, learners may struggle to navigate the design thinking stages effectively.

Project-Based Learning in Language Education

Project-Based Learning (PjBL) in language education focuses on authentic tasks that engage students in meaningful, context-based language use. Authentic tasks are crucial in helping students connect language learning with its application in real-life situations, enabling them to achieve both linguistic and communicative competence [8]. Students are thereby motivated to move beyond passive learning and engage actively in the construction of knowledge. Collaborative project-based activities add further value to the language learning process by encouraging students to collaborate, communicate, and negotiate meaning. Research by Fikria, Setiawan, and Munir [6] shows that the collaborative dimension of a technology-supported PjBL environment can improve students' engagement and communication skills.

Language acquisition through real-life communication is another important element of PjBL, as learners participate in authentic project-based communication tasks that develop both language skills and critical thinking abilities. Li and Wang [10] confirm that learners benefit from the incorporation of content-based and project-based learning in language acquisition. The approach of design thinking has been widely applied in education because of its human-centric approach, creativity, empathy, and iterative problem development. Micheli et al. [23] describe design thinking as an approach to innovation and creative processes grounded in designers' practices, involving the understanding of user needs and the development of innovative solutions through continuous iteration—an orientation that aligns productively with the authentic, goal-directed nature of PjBL.

The Proposed Conceptual Framework

The proposed framework integrates ICT, design thinking, and PjBL into a cohesive pedagogical model for English language learning. The framework is structured around the five stages of design thinking, each of which is operationalized through ICT-supported project-based activities. This integration addresses the key limitations identified in the literature: ICT is repositioned from a supplementary tool to the enabling infrastructure for collaborative, authentic language production; design thinking provides the structured creative process for problem identification and solution development; and PjBL anchors the learning experience in authentic, goal-directed activity that produces meaningful language outputs.

Empathy Stage

The empathy stage functions as the foundation of ICT-enabled design thinking in English language learning by helping students understand the communication needs of their peers and broader audiences. An effective design process begins with understanding users and their context [24]. In this framework, learners are guided to observe authentic language use in academic, social, and digital contexts, identify real communication challenges such as difficulty constructing coherent arguments or participating in digital discussions, and develop awareness of the communicative needs of diverse audiences. According to Kee and

Kuys [26], the empathy stage of design thinking promotes observation and analysis of authentic contexts, developing awareness of real-life language use that motivates meaningful learning.

Problem Definition Stage

The problem definition stage focuses on transforming empathic insights into clearly defined communication challenges. Learners analyze their observations and experiences to articulate concrete problems that will be addressed through subsequent project work. Micheli et al. [23] emphasize that problem definition is one of the most important elements of design thinking, as the clarity of the defined problem determines the quality of subsequent ideation and solution development. In the English language context, problem definition may involve specifying challenges related to oral fluency, persuasive writing, or digital communication. According to Lewrick [25], the clarity of problem definitions determines the success of the subsequent phases including idea generation and solution development.

Ideation Stage

At the ideation stage, emphasis is placed on generating diverse ideas for addressing the defined communication challenges through project concepts. Students explore multiple options during this phase without immediate evaluation, fostering creative and divergent thinking. Lewrick [25] describes the ideation stage as characterized by techniques aimed at promoting creative thinking, such as brainstorming, mind-mapping, and collaborative discussion. In English language learning, the ideation phase can be exemplified by activities such as brainstorming new project ideas, creating interactive digital games, or designing multimodal presentations. Collaboration is essential at this stage, as students generate and refine ideas through dialogue, simultaneously developing communicative competence and creative confidence.

Prototyping Stage

The prototyping stage involves transforming selected ideas into tangible language products that embody learners' knowledge and creativity. Learners are guided to create concrete outputs such as podcasts, digital storytelling projects, video productions, blogs, or multimedia presentations that address their defined communication challenges. Pressman [24] argues that design thinking combines creative and analytical methods to develop practical solutions to real-world problems, while Kee and Kuys [26] assert that the prototyping stage augments experiential learning by involving participants in activities that yield concrete, assessable solutions. This stage strengthens language skills while simultaneously developing learners' digital literacy and capacity to communicate effectively in diverse media environments.

Testing Stage

During the testing stage, learners assess and refine their language outputs through presentations, peer feedback, and iterative improvements. Learners deliver presentations of their work, collect structured feedback from peers and instructors, and implement iterative modifications informed by the insights gained. Kee and Kuys [26] assert that testing is a crucial phase in design thinking wherein continuous enhancement through feedback renders learning an adaptive and reflective process. Lewrick [25] further argues that a validation approach using structured feedback is essential for improving the effectiveness of developed ideas. Consequently, the testing stage promotes reflective language use, collaborative evaluation, and the iterative refinement of communicative products—competencies that are central to proficient language performance in real-world contexts.

Discussion

The integration of ICT to enhance design thinking-oriented, project-based learning (PjBL) is increasingly vital in modern language education. ICT enables the creation of interactive and active learning environments that allow learners to engage meaningfully with technology. Tristiana et al. [27] assert that the application of ICT in PjBL engages pre-service teachers in the creation of instructional materials that enhance their pedagogical and communicative competencies. Furthermore, ICT enables learners to collaborate, access pertinent information, and engage in real-time interaction—elements that are essential in modern language learning environments. Technology-mediated PjBL, encompassing AI-enabled systems, provides feedback, realistic simulations, and tailored experiences that enhance the efficacy of learning. Consequently, ICT serves as a crucial enabling element in facilitating design thinking-oriented PjBL.

Regarding pedagogical implications for English language instruction, the proposed framework presents enhancements concerning the incorporation of design thinking within PjBL. Design thinking prioritizes a human-centered and cyclical learning process predicated on empathy, ideation, and problem-solving. Integrating design thinking into language teaching and learning cultivates creativity, collaboration, and the implementation of a learner-centred methodology, thereby facilitating the resolution of authentic language challenges. Through PjBL, learners receive a holistic and experiential learning experience. Research demonstrates that the integration of design thinking and PjBL positively affects students' creative,

collaborative, and critical thinking skills through authentic projects and iterative learning processes [4], [11], [28].

The proposed framework also supports the cultivation of 21st-century learning competencies, including critical thinking, collaboration, creativity, and communication. The adoption of PjBL increases learners' critical thinking skills and language competency through participation in meaningful authentic tasks [28]. Learners are thereby involved in creating knowledge through gaining communicative competence. Moreover, proficiency in English is vital in preparing learners for global interaction. Haryadi and Aminuddin [29] emphasize that English language proficiency is instrumental in facilitating cross-cultural communication and accessing global sources of knowledge. Finally, the adoption of this framework encourages learners to engage in design thinking that is reflective, collaborative, and iterative, helping them brainstorm, create projects, and improve through peer feedback—developing not only language skills but also adaptability and digital literacy.

Pedagogical Implications

Implications for Teachers

The proposed approach holds substantial implications for teachers, particularly in redefining their role within ICT-assisted design thinking and PjBL environments. Rather than functioning as primary sources of knowledge, teachers become facilitators and learning designers who guide students in conducting cooperative inquiry and creating projects. Teachers are therefore responsible for designing meaningful learning experiences that involve the use of technology and communicative tasks. Tristiana et al. [27] note that ICT-aided learning environment design can assist teachers in creating effective, student-centred approaches that develop both pedagogical and communicative skills. Moreover, as Patel, Puah, and Kok [4] emphasize, the integration of design thinking in teaching encourages critical and innovative thinking among students through purposefully designed learning tasks. Fikria, Setiawan, and Munir [6] further confirm that teachers can efficiently organize collaborative learning activities and guide students in engaging in experiential learning processes within technology-enhanced PjBL environments.

Implications for Students

From the students' perspective, this model enables them to become active participants in knowledge construction, creative agents, and cooperative learners engaged in communicating through projects. Rather than passively memorizing material, students are expected to engage in activities requiring communication, creativity, and reflection. Song et al. [28] demonstrate that project-based learning helps students develop critical thinking and language skills through engagement in authentic tasks. Furthermore, Haryadi and Aminuddin [29] note that English language proficiency enables learners to participate in international communication and access broader knowledge networks. This model therefore not only develops language competence but also prepares students for meaningful participation in a globalized, digitally mediated world.

Implications for Curriculum Design

In the context of curriculum development, the integration of ICT and design thinking within English language programs facilitates the development of student-centred, innovative learning environments. Li and Wang [10] suggest that combining project-based and content-based teaching methods can improve both language skills and critical thinking. Bruno, Casas, and Saavedra [11] similarly found that design thinking fosters creativity and contextualized language acquisition. Therefore, curriculum designers should prioritize flexibility, authenticity, and the meaningful integration of ICT tools—moving away from technology as a content delivery mechanism toward technology as an enabler of collaborative, creative, and reflective language learning experiences.

CONCLUSION

This study has presented a conceptual framework that integrates ICT, design thinking, and project-based learning to transform English language acquisition, promoting innovation and meaningful learner participation. The primary theoretical contribution of this investigation is the demonstration that integrating ICT-facilitated design thinking into language instruction has significant potential to stimulate active knowledge construction and authentic language use. ICT facilitates collaboration, supports multimodal interaction, and enables ongoing feedback. Design thinking provides a structured, creative problem-solving process. PjBL anchors learning in authentic, goal-directed activity. Together, these three approaches shift learners from passive consumers of instruction to active agents engaged in innovative knowledge construction and real-world language use.

Based on this study, the proposed framework can provide teachers with the necessary instruments to develop a learner-oriented pedagogical approach that makes the learning process active, reflective, and centered on innovation. However, this study acknowledges important limitations: as a conceptual study, the

framework has not yet been empirically validated, and its effectiveness may vary across different educational levels, cultural contexts, and institutional settings. Future research should therefore focus on empirically testing the framework through quasi-experimental designs or action research studies in EFL classrooms, investigating its impact on learner language proficiency, creativity, and digital literacy outcomes. Longitudinal studies examining the sustained effects of the integrated model on communicative competence development would also constitute a valuable contribution to the field.

APPENDIX: SYSTEMATIC REVIEW OF KEY LITERATURE

Table 1 below presents the systematic synthesis of 15 key studies reviewed in this paper, organized by author, year, topic, method, key findings, and identified research gaps.

Table 1. Systematic Review of Literature: ICT, Design Thinking, and PjBL in English Language Learning

1	Fadillah et al. [2]	2024	EFL learners' attitudes toward ICT-based learning	Survey (quantitative)	ICT-based learning improves English language achievement; positive learner attitudes toward digital tools; personalized learning facilitated through ICT.	Limited to attitude measurement; does not address instructional design alignment or teacher competency as mediating factors.
2	Fikria, Setiawan & Munir [6]	2025	Technology-enhanced project-based language learning (systematic review)	Systematic literature review	TEPBL promotes communication skills and experiential learning in contextually rich settings; identifies key theoretical frameworks and project types.	Reviews existing studies only; limited generalizability; ICT used primarily as a supplementary rather than transformative element.
3	Yusupova et al. [5]	2025	PjBL in English language teacher education for SDGs	Mixed methods	PjBL in teacher education significantly improves teamwork, collaboration, and instructional skills among pre-service teachers.	Confined to teacher education context; does not examine integration with design thinking or broader ICT framework.
4	Patel, Puah & Kok [4]	2024	Integrating critical and design thinking in design innovation education	Mixed methods (survey + reflective journals)	Integrating design thinking supports mindset shifts; graduates develop critical and innovative thinking needed for complex problem-solving in educational settings.	Focused on design education; lacks empirical testing in EFL or language learning contexts.
5	Bruno, Casas & Saavedra [11]	2026	Design thinking methodology in primary school English learning	Quasi-experimental	Design thinking-based educational programs improve English language learning outcomes and learner creativity in primary school contexts.	Single educational level; limited generalizability across age groups; short intervention period.
6	Guaman-Quintanilla et al. [12]	2023	Impact of design thinking in higher education	Multi-actor study (quantitative + qualitative)	Design thinking improves problem-solving and creativity in higher education; positive effects across student, teacher, and institutional levels.	Synthesized from non-EFL contexts; empirical validation in language learning settings lacking.
7	Velu [13]	2023	Design thinking and ICT's mediating effect in universities	Structural equation modelling	Design thinking increases innovative action; ICT mediates the relationship between design thinking and innovation in university settings.	Focused on innovation outcomes broadly; language learning application requires further adaptation.
8	Smitiene et al. [7]	2026	Project-based learning through e-learning platforms in	Qualitative (teacher interviews)	E-learning platforms facilitate active student engagement and peer collaboration in PjBL; teachers report	Limited to teacher perspective; no direct student language outcome measurement;

			primary education		enhanced student participation through digital tools.	ICT role remains supplementary.
9	Aviles Marino & Sarasa [8]	2025	AI-enhanced PBL and experiential learning for communication readiness	Quasi-experimental (pilot)	AI-enhanced PBL improves communication skills and career readiness; experiential learning supported by technology fosters hands-on skill development.	Pilot scope; engineering-specific context; design thinking not explicitly integrated.
10	Li & Wang [10]	2026	Blending content-based instruction with PjBL for media EFL	Mixed methods	Content-based + PjBL model enhances linguistic proficiency, critical thinking, and collaborative abilities in media EFL contexts.	ICT treated as peripheral; design thinking not incorporated; limited to specific media education domain.
11	Tristiana et al. [27]	2024	ICT-based classroom design and PjBL for EFL pre-service teachers	Qualitative (perception study)	ICT-aided PjBL helps pre-service teachers develop pedagogical and communicative competence; student-centred approach promoted.	Focus limited to teacher training; learner language outcomes not directly measured.
12	Song et al. [28]	2024	Impact of PjBL on critical thinking and language skills in EFL (literature review)	Systematic literature review	PjBL engagement in authentic tasks develops both critical thinking skills and language competency in EFL learners.	No ICT integration or design thinking examined; based on existing studies without new empirical data.
13	Haryadi & Aminuddin [29]	2023	Role of English in preparing students for global challenges	Descriptive qualitative	English proficiency facilitates cross-cultural communication and access to global knowledge; essential for 21st-century readiness.	Descriptive only; no instructional intervention proposed; no connection to PjBL or design thinking.
14	Razzouk & Shute [18]	2012	What is design thinking and why is it important?	Literature review	Design thinking defined as iterative human-centred process; promotes creativity and problem-solving; applicable across educational contexts.	Theoretical foundation study; predates recent digital learning contexts; requires updating for ICT-integrated environments.
15	Micheli et al. [23]	2019	Design thinking: conceptual review, synthesis, and research agenda	Systematic conceptual review	Design thinking grounded in designers' practices; empathy, ideation, and iterative prototyping central to innovative outputs.	Focused on product innovation and business; language learning application requires deliberate pedagogical adaptation.

Interpretive Synthesis. The 15 studies synthesized in Table 1 collectively illuminate three interconnected areas of inquiry: ICT integration in language learning, design thinking as a pedagogical approach, and project-based learning as an instructional model. Studies on ICT integration (rows 1, 8, 9, 10, 11) consistently show that digital tools improve learner engagement and enable personalized learning, but a recurring limitation is that ICT remains supplementary rather than transformative without theoretically grounded pedagogical embedding. Studies on design thinking (rows 4, 5, 6, 7, 14, 15) converge on its value for creativity and critical thinking, yet most were conducted outside EFL or ICT-supported contexts, requiring deliberate adaptation. Studies on PjBL (rows 2, 3, 8, 9, 12) demonstrate that authentic collaborative tasks enhance both language competence and higher-order thinking, with technology integration amplifying these benefits. Critically, PjBL and design thinking are consistently examined in isolation, leaving their combined potential within ICT-supported language learning empirically unexplored. The synthesized evidence therefore supports the theoretical feasibility of the proposed integrated framework.

REFERENCES

- [1] C. Redecker, European Framework for the Digital Competence of Educators: DigCompEdu (No. JRC107466). Joint Research Centre, 2017.
- [2] E. N. Fadillah, S. Widiastuti, D. Sulaeman, P. Sugiartini, and D. Setiawan, "EFL Learners' Attitudes on the Use of ICT-Based Learning as Efforts in Improving English Language Achievement," *J. Lang. Lang. Teach.*, vol. 12, no. 3, p. 1573, 2024, doi: 10.33394/jollt.v12i3.11388.
- [3] P. A. Ertmer and A. T. Ottenbreit-Leftwich, "Teacher Technology Change," *J. Res. Technol. Educ.*, vol. 42, no. 3, pp. 255–284, 2010, doi: 10.1080/15391523.2010.10782551.
- [4] N. S. Patel, S. Puah, and X. F. K. Kok, "Shaping future-ready graduates with mindset shifts: studying the impact of integrating critical and design thinking in design innovation education," *Front. Educ.*, vol. 9, 2024, doi: 10.3389/educ.2024.1358431.
- [5] M. Yusupova et al., "Integrating Project-Based Learning in English Language Teacher Education for Sustainable Development Goals (SDGs)," *Int. J. Lang. Educ.*, vol. 9, no. 2, pp. 245–266, 2025, doi: 10.26858/ijole.v1i2.74938.
- [6] A. Fikria, S. Setiawan, and A. Munir, "A Systematic Review of Technology-Enhanced Project-Based Language Learning: Theoretical Frameworks, Project Types, and Implications for Future Research and Practice," *F1000Research*, vol. 14, pp. 1–25, 2025, doi: 10.12688/f1000research.165491.2.
- [7] G. Smitiene, N. Strazdiene, J. Melnikova, and A. Norviliene, "Project-based learning through e-Learning platforms in Lithuanian primary education: insights into teachers' practices," *J. Early Child. Teach. Educ.*, 2026, doi: 10.1080/10901027.2026.2634048.
- [8] E. Aviles Marino and A. Sarasa Cabezuelo, "AI-Enhanced PBL and Experiential Learning for Communication and Career Readiness: An Engineering Pilot Course," *Algorithms*, vol. 18, no. 10, 2025, doi: 10.3390/a18100634.
- [9] E. Jaakkola, "Designing conceptual articles: four approaches," *AMS Rev.*, vol. 10, no. 1–2, pp. 18–26, 2020, doi: 10.1007/s13162-020-00161-0.
- [10] Z. Li and D. Wang, "A Sustainable Pedagogical Model for Media EFL: Blending Content-Based Instruction with Project-Based Learning," *Sustainability*, vol. 18, no. 5, 2026, doi: 10.3390/su18052439.
- [11] G. A. M. Bruno, N. P. S. Casas, and L. R. Saavedra, "Impact of an Educational Program Based on the Design Thinking Methodology on English Language Learning in Primary School Students," *Int. J. Instr.*, vol. 19, no. 2, pp. 317–334, 2026, doi: 10.29333/iji.2026.19217a.
- [12] S. Guaman-Quintanilla, P. Everaert, K. Chiluiza, and M. Valcke, "Impact of design thinking in higher education: a multi-actor perspective on problem solving and creativity," *Int. J. Technol. Des. Educ.*, vol. 33, no. 1, pp. 217–240, 2023, doi: 10.1007/s10798-021-09724-z.
- [13] S. R. Velu, "Design Thinking Approach for Increasing Innovative Action in Universities: ICT's Mediating Effect," *Sustainability*, vol. 15, no. 1, 2023, doi: 10.3390/su15010024.
- [14] J. W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 4th ed. SAGE Publications, 2013.
- [15] S. B. Merriam and E. J. Tisdell, *Qualitative Research: A Guide to Design and Implementation*, 4th ed. Jossey-Bass, 2016.
- [16] A. Booth and A. Sutton, *Systematic Approaches to a Successful Literature Review*. SAGE Publications, 2012.
- [17] A. W. Bates, *Teaching in a Digital Age: Guidelines for Designing Teaching and Learning*. Tony Bates Associates Ltd., 2019.
- [18] R. Razzouk and V. Shute, "What Is Design Thinking and Why Is It Important?," *Rev. Educ. Res.*, vol. 82, no. 3, pp. 330–348, 2012, doi: 10.3102/0034654312457429.
- [19] J. W. Thomas, *A Review of Research on Project-Based Learning*. The Autodesk Foundation, 2000.
- [20] J. Larmer, J. R. Mergendoller, and S. Boss, *Setting the Standard for Project Based Learning*. ASCD, 2015.
- [21] U. Flick, *An Introduction to Qualitative Research*, 5th ed. SAGE Publications, 2014.
- [22] A. Saehu, "Designing ICT Competences-Integrated Writing Models of Teaching for English Language Study Program," *J. Basis*, pp. 15–30, 2022.
- [23] P. Micheli et al., "Doing Design Thinking: Conceptual Review, Synthesis, and Research Agenda," *J. Prod. Innov. Manag.*, vol. 36, no. 2, pp. 124–148, 2019, doi: 10.1111/jpim.12466.
- [24] A. Pressman, *Design Thinking: A Guide to Creative Problem Solving for Everyone*. Routledge, 2019.
- [25] M. Lewrick, P. Link, and L. Leifer, *The Design Thinking Toolbox*. Wiley, 2020.
- [26] J. Kee and B. Kuys, "Exploring Design Thinking Processes in Problem-Based Learning," *Interdiscip. J. Probl. Based Learn.*, vol. 18, no. 1, 2024.
- [27] N. E. Tristiana, R. Hartono, A. Faridi, and S. W. Fitriati, "ICT-based Classroom Instruction Design: Exploring EFL Pre-Service Teachers' Perception of Project-Based Learning Strategy for Developing Pedagogical Competence," *Teach. English Lang.*, vol. 18, no. 2, pp. 347–378, 2024, doi: 10.22132/tel.2024.459941.1620.
- [28] X. Song, A. B. Razali, T. Sulaiman, and J. J. Jeyaraj, "Impact of Project-Based Learning on Critical Thinking Skills and Language Skills in EFL Context: A Review of Literature," *World J. English Lang.*, vol. 14, no. 5, pp. 402–412, 2024, doi: 10.5430/wjel.v14n5p402.
- [29] R. N. Haryadi and M. Aminuddin, "The Role of English in Preparing Students to Face Global Challenges," *Jiip*, vol. 6, no. 11, pp. 9615–9621, 2023, doi: 10.54371/jiip.v6i11.3167.