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Integrating design thinking into project-based learning with TikTok-mediated activities: A model development study to improve students' speaking skills

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Abstract: Many university students feel anxious about speaking in front of others, struggle to come up with interesting ideas, and find it difficult to organize their thoughts so they can deliver them well. These obstacles highlight the necessity for an instructional methodology that fosters idea generation, organized communication, and genuine speaking practice within a nurturing environment. This study develops and evaluates a teaching model that combines Design Thinking and Project-Based Learning. Additionally, the model is supported by TikTok activities that help students improve their speaking skills. Design Thinking helps students generate creative ideas and frame problems in a structured way. TikTok provides a low-pressure digital space that encourages students to practice speaking in front of others and reduces their anxiety about doing so. Project-Based Learning offers students real-life experiences by having them work together on projects that matter. The study employs a Research and Development methodology following the ADDIE framework. It involves language education and educational technology experts, who confirmed the model. One teacher and 25 college students evaluated the model's practicality and effectiveness. Data collection was conducted using questionnaires and performance-based speaking tests. The Content Validity Ratio and the Content Validity Index were used to assess content validity. To evaluate effectiveness, the study used a one-group pretest-posttest design and a paired-samples t-test. The findings indicate that the model has high validity, strong practical utility, and significant effectiveness in enhancing speaking skills, as evidenced by a substantial effect size (0.86).

Keywords: *Design thinking, Instructional model development, Project-based learning, Speaking skills, TikTok-mediated learning.*

1. Introduction

Speaking skills are a fundamental competency in language acquisition, as the essence of language learning is the capacity to communicate effectively in diverse social and professional contexts. As the world becomes more connected, the need for communication, collaboration, and the sharing of ideas has grown, making speaking skills more important than ever [1-5]. The capacity to articulate ideas clearly, logically, and persuasively empowers individuals to engage actively in academic, professional, and social endeavors. Consequently, numerous 21st-century skills frameworks identify communication as a fundamental competency that students must acquire to navigate the evolving workplace and the emergence of a knowledge-based society [3, 6]. In the realm of education, speaking skills serve not only as a conduit for information dissemination but also as a platform for fostering comprehension, negotiating meaning, and cultivating critical thinking abilities through verbal engagement [7-9]. Additionally, advances in digital technology have underscored the importance of oral communication skills, as individuals increasingly engage with and express ideas through digital platforms that demand clear, effective communication [10, 11]. Multiple studies indicate a strong correlation between speaking

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skills and overall language proficiency, as the capacity to articulate ideas verbally facilitates the enhancement of additional language skills, including listening, reading, and writing. [12-14].

Speaking skills are very important for learning a language, but many schools still struggle with how they teach speaking, making it harder for students to improve their skills. One big problem is that students don't have enough chances to practice speaking in front of others. Not practicing speaking in front of an audience often can make it harder to improve your speaking skills, since regular practice is an important part of building confidence and competence [15, 16]. Additionally, numerous students encounter speaking anxiety (glossophobia), a considerable psychological impediment to oral communication. This anxiety frequently manifests as physiological symptoms, including nervousness, trembling, or impaired concentration, which can ultimately diminish the quality of speaking performance [17-19]. This condition is typically exacerbated by fear of negative peer evaluation and students' diminished confidence in articulating ideas verbally [20, 21]. Another issue that students frequently encounter is formulating engaging and relevant ideas for speaking activities [22, 23]. Being unable to generate interesting ideas can make the delivery of material less convincing and the audience less interested in the communication process [24, 25]. Moreover, students frequently struggle to organize their ideas coherently, resulting in unclear and confusing messages for the audience [26].

Furthermore, the process of teaching speaking in the classroom demonstrates that the pedagogical approaches currently used have not fully addressed the various challenges students face in developing their speaking skills. Most of the time, traditional activities like individual presentations and class discussions account for the majority of learning time. These activities give students a chance to talk, but in reality, these chances are few and far between, and usually only a few students are involved [27, 28]. Presentations also tend to focus on providing information without giving clear instructions on how to develop and organize ideas before speaking them. Consequently, many students find it challenging to formulate engaging ideas and articulate them coherently and comprehensibly for the audience. The communication environment in learning remains inauthentic due to the prevalence of formal, rigid, and exclusively assessment-focused speaking activities. This can make students more anxious about speaking in front of the class [29, 30]. Also, the fact that lectures are only for a limited time makes it very hard for students to practice speaking repeatedly.

Various innovative pedagogical approaches have the potential to address the challenges in teaching speaking skills, as described above, including the application of Design Thinking, Project-Based Learning (PjBL), and the use of social media as a learning tool. The Design Thinking approach offers a creative thinking framework oriented toward systematic problem-solving and idea development [31-34]. Through stages such as empathize, define, ideate, prototype, and test, students are trained to generate relevant and compelling ideas while simultaneously organizing them in a more structured manner before presenting them verbally. Thus, Design Thinking not only assists students in the idea-generation process but also in developing a logical, communicative thought process. Meanwhile, PjBL provides students with the opportunity to engage in authentic learning experiences through meaningful and contextual projects [35, 36]. This approach encourages active learning through exploration, collaboration, and the production of tangible work [37-39], thereby increasing student engagement and providing greater scope for students to develop communication skills naturally during the project completion process. Furthermore, the development of digital technology has opened new opportunities to develop speaking skills through social media platforms [40-42], including TikTok, which is popular among students. TikTok allows students to creatively record and publish video content, providing them with the opportunity to practice speaking repeatedly in a more flexible and less stressful environment [40-43]. In addition, social media use in learning can help reduce public speaking anxiety by allowing students to practice independently (autonomous practice) before appearing live in front of an audience [44, 45].

Numerous studies have shown that each method can improve learning quality, but most examine them in isolation. So far, there are only a few studies on learning models that explicitly combine Design Thinking with PjBL and use social media-based speaking activities like TikTok. However, combining

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these three methods could create a learning environment that not only helps students organize their ideas more structurally but also provides real-world learning experiences and more opportunities to practice speaking through familiar digital platforms. Consequently, the development of an innovative learning model that systematically integrates Design Thinking, PjBL, and TikTok-based speaking practices is essential to address the diverse challenges students face in enhancing their speaking skills in the digital era. This research seeks to formulate a learning model that incorporates Design Thinking into PjBL, augmented by TikTok-based speaking activities. This learning model aims to give students a more organized way to learn, so they can generate interesting ideas, put them in order, and feel more confident speaking them.

Additionally, this study seeks to assess the quality of the developed learning model by examining its validity, practicality, and efficacy in enhancing students' speaking skills. The originality of this study resides in the creation of an integrated learning model that systematically incorporates Design Thinking, PjBL, and speaking practice facilitated by the TikTok social media platform into a cohesive pedagogical framework. This study presents a learning model that integrates the development of creative ideas through Design Thinking, authentic learning experiences via PjBL, and expanded, adaptable speaking practice opportunities through familiar social media platforms. In contrast to prior studies that typically analyze these three approaches in isolation, this research seeks to synthesize them into a cohesive framework. Consequently, this study aims to enhance pedagogical approaches to speaking in the digital age, specifically in Indonesian language education, leveraging technology and social media to elevate the quality of students' oral communication skills.

2. Literature Review

2.1. Project-Based Learning (PjBL)

PjBL is an instructional approach that engages students as active participants. It involves them in exploring and resolving real-world problems through project work. In contrast to traditional teacher-centered methods, PBL prioritizes student autonomy. It enables learners to construct knowledge by investigating complex questions and generating tangible outcomes. This approach is rooted in constructivist learning theory. Here, learning is seen as an active process of meaning-making rather than passive information absorption [46, 47].

A central characteristic of PBL is its emphasis on authenticity and real-world relevance. Learning activities are organized around meaningful problems that reflect real-life situations. This setup allows students to connect academic content with practical applications. The contextualized approach deepens conceptual understanding and improves students' ability to transfer knowledge across domains. In STEM education, for example, PBL integrates science, technology, engineering, and mathematics into interdisciplinary projects. These projects demand problem-solving and innovation [48, 49]. As a result, students acquire both content knowledge and applied skills concurrently.

Collaboration and inquiry are fundamental elements of PBL. Students generally work in teams to investigate open-ended questions, develop solutions, and present their findings. This collaborative framework cultivates essential 21st-century competencies. These include communication, teamwork, and leadership. Furthermore, the inquiry-driven nature of PBL promotes critical and creative thinking. It requires students to analyze information, evaluate alternatives, and make evidence-based decisions [50, 51]. These competencies are increasingly vital for preparing learners to navigate complex professional and social contexts.

An additional key aspect of PBL is its focus on deeper learning and sustained engagement. Projects typically span an extended period. This schedule enables students to investigate topics in depth rather than superficially. Sustained involvement fosters higher-order thinking skills and enhances knowledge retention. Empirical studies indicate that students participating in PBL exhibit improved learning outcomes, increased motivation, and stronger problem-solving abilities compared to those in traditional instructional environments [52, 53]. Furthermore, PBL bridges the gap between theory and practice. This link increases the relevance and impact of learning.

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Despite its benefits, implementing PBL effectively requires careful planning and substantial support. Teachers serve as facilitators, guiding students through the inquiry process and offering appropriate scaffolding. Assessment in PBL is often complex, as it must evaluate both content knowledge and skills such as collaboration and critical thinking. Additionally, successful implementation often relies on institutional support, including curriculum flexibility and professional development opportunities for educators [47, 54]

2.2. Social Media as a Tool to Improve Speaking

Social media is increasingly acknowledged as a dynamic pedagogical tool for advancing speaking skills. Platforms such as WhatsApp, YouTube, Instagram, and Facebook enable educators to create interactive, communicative learning environments that extend beyond traditional classrooms. These platforms foster authentic communication via audio, video, and real-time interactions, which are essential for building speaking proficiency. Empirical studies demonstrate that social media–mediated communication measurably improves learners' pronunciation, vocabulary, and grammatical precision by providing frequent chances for practice in meaningful contexts [55, 56].

A primary advantage of social media for speaking development is its ability to create a low-anxiety learning space. Unlike formal classroom environments, social media allows learners to practice speaking in more comfortable, familiar settings, easing communication apprehension and boosting participation. For example, using WhatsApp audio and video chat has been shown to heighten students' confidence and motivation to speak, as learners may rehearse, re-record, and share responses at their own pace [57]. This adaptability supports steady improvement and strengthens learners' self-efficacy in oral communication.

Additionally, social media enables continuous learning and engagement outside of classroom settings. Students join discussions, exchange opinions, and collaborate with peers both asynchronously and synchronously, increasing exposure to the target language. Platforms such as Telegram and Facebook groups offer ongoing communication practice, which is crucial for developing fluency and spontaneity in speaking. Prolonged participation on these platforms has been shown to enhance learners' oral communication skills and expand opportunities for meaningful language use [56, 58].

Another significant aspect is the role of social media in increasing learners' willingness to communicate (WTC). Research shows that both structured and unstructured social media activities can enhance students' readiness to initiate and maintain conversations in a second language. When teachers assign targeted tasks such as video presentations, live discussions, or peer feedback, students become more engaged and demonstrate improved speaking skills. Moreover, social media supports the development of social-emotional skills, which further reinforce effective communication [59]

However, successful integration of social media as a teaching tool demands thoughtful instructional design. While social media offers many benefits, it also introduces risks, such as distraction and off-task behavior. Teachers must therefore establish explicit guidelines, align activities with clear learning objectives, and offer appropriate scaffolding to promote purposeful and productive use of social media [60, 61]. Furthermore, teacher training is essential for equipping educators with the skills needed to create engaging, pedagogically grounded social media activities [62].

3. Methodology

This study utilized a Research and Development (R&D) methodology to develop and evaluate a PjBL model that incorporates Design Thinking and is facilitated by TikTok-based speaking activities. The model development process followed the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework, outlining a systematic approach to creating learning products, as proposed by Branch [63].

During the analysis phase, researchers conducted a needs assessment to identify the challenges students face in acquiring speaking skills. This analysis was performed via observational learning and an evaluation of students' challenges in idea generation, organization, and verbal communication to an

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audience. During the design phase, a conceptual framework for the learning model that combines Design Thinking ideas with the PjBL syntax was created. Additionally, speaking activities based on TikTok were planned to practice speaking. This phase also created learning tools, including model syntax, learning scenarios, and speaking skills testing.

During the development phase, a prototype learning model was created and tested with experts to ensure it met pedagogical standards and the needs of students seeking to improve their speaking skills. The implementation stage includes a few tests to determine whether the developed learning model can help students improve their speaking skills. The last step, evaluation, assesses the quality of the learning model by examining its validity, usefulness, and effectiveness.

3.1. Data Collection and Analysis

The participants in this study comprised various groups engaged in developing and evaluating the learning model. During the validation phase of the research instrument, this study engaged two educational evaluation experts in developing the instrument. In the validation phase of the learning model, this study engaged two educational technology specialists and three Indonesian language education authorities, all of whom possessed expertise in instructional design, language pedagogy, and the integration of technology in education. For the trial implementation phase of the model, this study included one lecturer instructing a speaking skills course and 25 students enrolled in the course. The students who took part were already taking classes to improve their speaking skills.

The data for this study were gathered using questionnaires and testing methods. The research tools used were a questionnaire and a speaking skills test. The questionnaire was utilized to gather information regarding the validity and applicability of the learning model. Experts were given the validation questionnaire to assess whether the learning model was feasible in terms of its structure and content/material. At the same time, the practicality questionnaire was given to students and teachers to see how easy it was to use the learning model in class. Before and after the new learning model was implemented, the performance test was used to assess how well students could speak. The evaluation of speaking skills was conducted using criteria that demonstrate students' capacity to articulate ideas clearly, coherently, and effectively.

In this study, data analysis was performed to evaluate the validity, practicality, and efficacy of the developed learning model. The Content Validity Ratio (CVR) and Content Validity Index (CVI), developed by Lawshe [64], were used to assess the learning model's validity from both its construction and content perspectives. The goal of this analysis was to determine the degree of agreement among experts on whether the components of the developed learning model could work. The effectiveness of the learning model was evaluated using the average scores from questionnaires distributed to lecturers and students. The assessment of practicality was grounded in Guilford's proposed criteria for learning tools. At the same time, the learning model's effectiveness was evaluated using a pre-experimental one-group pretest–posttest design. In this design, students took a pretest to assess their speaking ability before using the learning model. After completing the learning process with the model, students took a posttest to assess the extent to which their speaking skills had improved.

Before hypothesis testing, the data were subjected to the Shapiro–Wilk test to assess normality. Next, a paired-samples t-test was used to examine differences between pretest and posttest scores to assess whether there was a significant improvement in speaking skills after using the learning model. This study also calculated the effect size to determine how much the learning model helped students improve their speaking skills. The effect size values were subsequently analyzed to identify the effect category of the developed learning model.

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4. Results and Findings

4.1. The Design Thinking–Integrated PjBL Model Assisted by TikTok

The main goal of this study was to create a teaching model that combines Design Thinking with PjBL and uses TikTok-mediated speaking activities to support it. The ADDIE framework guided the development process. It has five steps: analysis, design, development, implementation, and evaluation.

The creation of the instructional model in this research was grounded in a sound theoretical framework that links issues in speaking instruction to appropriate teaching methods. The initial needs analysis identified several significant obstacles that students encountered in enhancing their speaking abilities. Some of these problems include not having enough opportunities to practice speaking in real settings, anxiety when speaking in front of an audience, trouble coming up with interesting ideas, and trouble organizing ideas clearly when speaking. These issues suggest that speaking difficulties are associated not only with linguistic competence but also with cognitive, psychological, and experiential factors.

To tackle these challenges, the current study introduces an instructional model that amalgamates Design Thinking, PjBL, and TikTok-facilitated speaking practice. Each of these parts addresses a different aspect of the problems found. From a cognitive point of view, Design Thinking gives you a structured way to come up with new ideas and solve problems. Empathizing, defining problems, and generating new ideas are all steps that help learners think about communication topics from different angles and develop more organized, meaningful ideas before they speak. From a teaching perspective, PjBL provides students with real-world learning opportunities that enable them to complete meaningful communication tasks. Students are encouraged to actively build knowledge, work with other students, and use their speaking skills in real-life situations through project-based activities. From a technological and psychological standpoint, utilizing TikTok as an educational platform offers a versatile setting for students to repeatedly hone their speaking skills. Being able to record and change their speaking performances helps them feel less anxious about speaking and gives them more chances to practice on their own. Combining these three methods creates a complete teaching framework that generates ideas, practices real communication, and builds speaking confidence all at once. Table 1 shows how the problems found relate to the suggested teaching methods. This framework demonstrates how combining Design Thinking, PjBL, and digital media can help address the many problems that arise when teaching speaking.

Table 1.
Logical theoretical framework linking identified problems and instructional solutions.

Problem in Speaking Instruction	Theoretical Basis	Proposed Pedagogical Solution	Expected Learning Outcome
Limited opportunities for authentic speaking practice	Experiential learning theory; constructivist learning	PjBL	Students engage in authentic speaking activities through project development.
Speaking anxiety and fear of public speaking	Affective filter hypothesis; communication anxiety theory	TikTok-mediated speaking practice	Students gain confidence through repeated and flexible speaking practice
Difficulty generating interesting ideas	Creative thinking theory; design thinking framework	Design Thinking approach	Students develop creative and relevant ideas for communication
Difficulty organizing ideas coherently	Cognitive organization theory; rhetorical competence	Structured ideation and prototyping in Design Thinking	Students present ideas in a clearer and more structured manner

4.1.1. Syntax of the Proposed Learning Model

The instructional model was created by combining the ideas of Design Thinking and PjBL, with speaking activities conducted through TikTok. The model has seven steps that help students generate

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ideas, create projects, and practice speaking. Table 2 shows how the proposed model's learning syntax functions.

Table 2.
The syntax of the design thinking integrated PjBL model assisted by TikTok.

Phase	Design Thinking Stage	PBL Learning Activity	TikTok-Mediated Activity	Expected Learning Outcome
Phase 1: Introduction	Introduce	The lecturer introduces the learning objectives, project tasks, and the importance of speaking skills in digital communication contexts. Students are informed about the speaking project they will develop collaboratively.	Students explore several TikTok videos on communication and public speaking as an initial exposure.	Students understand the learning goals, project expectations, and the role of digital media in speaking practice.
Phase 2: Empathize	Empathize	Students explore real-life communication issues through discussion, observation, and initial exploration of literature, identifying audience characteristics and communication contexts.	Students watch and discuss selected TikTok videos demonstrating effective communication strategies.	Students develop awareness of audience needs, communication contexts, and real-life speaking challenges.
Phase 3: Define	Define	Students formulate the key communication problem or central message that will be addressed in their project. They determine the main purpose of their speaking task.	Students analyze TikTok speaking videos to identify elements of clear and persuasive communication.	Students define clear communication objectives and a focus for their speaking project.
Phase 4: Ideate and Project Planning	Ideate	Students brainstorm creative ideas to communicate their messages effectively. They organize project plans, distribute tasks within groups, and determine timelines.	Students design creative speaking concepts suitable for short video formats on TikTok.	Students generate innovative ideas and develop a structured project plan for their speaking task.
Phase 5: Prototype Development	Prototype	Students develop speaking scripts, presentation outlines, or argument structures. They prepare the initial version of their speaking performance.	Students produce preliminary speaking recordings or draft content using TikTok features.	Students transform conceptual ideas into structured speaking content.
Phase 6: Testing and Presentation	Test	Students present their project results and practice delivering their messages through speaking performances. Lecturers assess students' speaking skills.	Students upload or present their speaking performances on TikTok as videos or live sessions.	Students improve their speaking performance through authentic practice and feedback.
Phase 7: Reflection and Evaluation	Reflection	Students reflect on the learning process, evaluate project outcomes, and provide peer feedback. Lecturers facilitate discussions about strengths and areas for improvement.	Students review and discuss their TikTok videos and receive feedback from peers and lecturers.	Students enhance speaking competence through reflective learning and collaborative evaluation.

This instructional model combines the creative problem-solving process of Design Thinking with the hands-on learning cycle of PjBL. It also uses TikTok as a digital platform for speaking practice. The learning process is broken down into seven steps, starting with getting students ready and ending with

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their reflection on what they learned. The model begins with an introduction phase, in which the teacher discusses the learning goals, project tasks, and why speaking skills are important in today's digital communication. At this point, students also watch some TikTok videos that show how to communicate well through short-form digital media. This gives them a basic idea of how to do it.

The next step in the learning process is the empathize phase, where students talk about and watch real-life communication situations and the audience's needs. This phase prompts students to analyze authentic communication contexts and pinpoint challenges that require clear, compelling verbal messages. By watching TikTok videos that show different ways to talk to and connect with an audience, students learn how to do both. During the define phase, students identify the main communication problem or central message that will be the focus of their project. Students discuss and analyze effective speaking strategies in groups to clarify their communication goals and identify the main points they need to convey to their audience. After that, during the ideation and project-planning phase, students develop creative ways to convey their messages and work together to create a structured project plan. They come up with new ways to present their ideas, divide up group tasks, and create speaking content that works well in short videos. At this point, TikTok is a creative outlet that motivates students to create interesting, audience-focused speaking content.

The prototype development phase is all about turning abstract ideas into organized materials for speaking. Students write scripts for their speeches, outlines for their presentations, or structures for their arguments that help them perform. They also make rough recordings using TikTok features, which let them try out different ways to present their ideas through video-based speaking practice. During the testing phase, students can practice and show off their speaking skills. Students can upload or show their speaking videos on TikTok or during TikTok Live sessions. Students can improve their speaking skills by practicing and self-evaluating on TikTok. They can work on things like pronunciation, fluency, and clarity of expression before sharing their final presentations. Lastly, the reflection and evaluation phase makes it easier for people to learn together and think critically. Students show off their projects, watch their TikTok videos, and get feedback from other students and teachers. By going through this reflective process, students assess how well they communicate and identify ways to improve, making them better at speaking and sharing ideas in digital settings.

4.2. Expert Validation of the Learning Model

After the instructional model was created, the next step was to use expert judgment to check its content and construct validity. Five experts participated in the validation process: two in educational technology and three in Indonesian language education. The experts examined the instructional model from several angles, including the clarity of its syntax, the relevance of the learning activities to improving speaking skills, the extent to which Design Thinking principles were applied, and the effectiveness of TikTok as a learning tool.

We used the CVR and the CVI to check the validity of the model components. The analysis showed that all parts of the model had a CVR of 1.00, indicating that all experts agreed that each part was necessary for the instructional design. The CVI analysis also showed that the scores were very high for validity. The average scores for construct and content validity were 97 and 98.6, respectively. These results indicate that the instructional model exhibits significant conceptual congruence with recognized pedagogical principles in language acquisition and instructional design.

The experts also provided qualitative feedback on what was good about the model. They said that using Design Thinking helps students generate ideas in a more organized way, and that using PjBL activities helps students complete real communication tasks. Additionally, adding TikTok as a learning platform was considered highly relevant to how today's students learn. The validation results indicate that the proposed instructional model has a strong theoretical and pedagogical basis, making it suitable for teaching speaking.

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4.3. Practicality of the Learning Model Implementation

To see how well the developed instructional model worked, it was piloted with one lecturer and 25 university students enrolled in a speaking course. The goal of this evaluation was to determine whether the model could be used effectively in a real classroom. Questionnaires were given to both the lecturer and the students after the learning activities were over to collect data on practicality. The questionnaire assessed various dimensions of practicality, encompassing the clarity of learning instructions, the feasibility of executing learning activities, the user-friendliness of TikTok as a learning platform, and the overall learning experience.

The analysis of the questionnaire responses utilized mean score analysis in accordance with Guilford's practicality criteria. The results showed that the instructional model was very useful. The lecturer's evaluation showed average scores of 3.68, 3.76, and 3.80 at different points in the implementation process. The students' responses showed average scores of 3.51, 3.71, and 3.80. These results fall within the "very practical" range, indicating that the model can be easily used in a classroom. Several factors made the model very useful. First, the structured learning phases made it easy for both teachers and students to know what to do during the learning process. Second, the PjBL activities engaged students in creative tasks and group discussions. Third, TikTok gave students a more fun and relaxed place to practice speaking. Students also said that being able to record their speaking performances multiple times helped them feel more confident and improve their speech. This finding indicates that digital platforms that facilitate repeated practice may significantly alleviate speaking anxiety among language learners.

4.4. Effectiveness of the Learning Model in Improving Speaking Skills

A pre-experimental research design with a one-group pretest-posttest format was used to test how well the instructional model worked. The purpose of this design was to determine whether using the instructional model made a significant difference in students' ability to speak. Before implementing the learning model, students were required to complete a pretest speaking task to assess their initial speaking proficiency. Following completion of the learning activities using the developed instructional model, students engaged in a posttest speaking task to assess their progress.

Table 3.
Descriptive statistics results for students' speaking skills.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	*Pretest*	70.2400	25	6.62873	1.32575
	Posttest	89.1200	25	6.92411	1.38482

The average score on the pretest for students' speaking skills was 70.24, with a standard deviation of 6.62873, as shown in Table 3. The average posttest score increased to 89.12, with a standard deviation of 6.92411, after the treatment. It increased by 18.88. The findings of this study demonstrate an improvement in students' average speaking scores following the adoption of the PBL Model Based on Design Thinking Supported by TikTok Media. To assess the significance of the increase, a paired-samples t-test was used in inferential statistics.

Before testing the hypothesis, the data were examined using the Shapiro–Wilk normality test to ensure that the pretest and posttest scores met the assumptions for parametric statistical analysis. The pretest result was 0.104, and the posttest result was 0.105, as shown in Table 4. Also, based on the criteria above, the results of the pretest and posttest indicate a significance value greater than 0.05. Therefore, we can say that the data are normally distributed.

Table 4.
Tests of normality results.

Variable	Group	Shapiro-Wilk			Result
		Statistic	df	Sig.	
Student Speaking Skills Results	*Pretest*	0.933	25	0.104	Normal
	Posttest	0.933	25	0.105	Normal

Afterward, a paired-samples t-test was used to assess whether there was a statistically significant difference between the pretest and posttest scores. The analysis showed that students' speaking skills improved significantly after the instructional model was implemented.

Table 5.
Paired samples t-test results.

Mean	Std. Deviation	t	Sig. (2-tailed)
-18.88000	5.49485	-17.180	0.000

Table 5 shows the test results: the average difference between the pretest and posttest scores is -18.88000, with a standard deviation of 5.49485. The t-value is -17.180, and the significance value (Sig. 2-tailed) is 0.00. A significance value less than 0.05 indicates a statistically significant difference between the pretest and posttest results. This shows that the implementation of the PjBL Model Based on Design Thinking Assisted by TikTok Media significantly improves students' speaking skills. Furthermore, eta squared was used to determine the effect size.

$$\text{eta squared} = \frac{t^2}{t^2+(N1+N2-2)}$$
$$= \frac{-17.180^2}{-17.180^2+(25+25-2)}$$
$$= \frac{295.1524}{295.1524+(48)}$$
$$= \frac{295.1524}{343.1524}$$
$$= 0.86$$

The calculation results above show a value of 0.86, thus falling into the large effect category, in accordance with Cohen [65], which states that if eta squared > 0.14, it falls into the category of a very large and significant effect. This indicates a large and significant influence of implementing the PjBL Model Based on Design Thinking assisted by TikTok Media on improving students' speaking skills.

5. Discussion

The results of this study show that combining Design Thinking, PjBL, and social media speaking practice can help students improve their speaking skills. First, it seems that using Design Thinking is very important for helping students generate and organize their ideas. The empathize, define, and ideate phases help students consider communication topics from different angles and develop organized ideas before giving their speeches. This structured ideation process helps students turn vague ideas into clear messages that they can send [66-68]. Second, PjBL provides students with real-world communication experiences that help them learn in ways similar to those they would encounter in the real world [48, 69, 70]. Traditional speaking activities often focus on individual presentations, whereas PjBL tasks require students to work together, solve problems, and engage in meaningful communication [39, 71, 72]. This experiential learning process fosters enhanced engagement and facilitates the cultivation of communication proficiency.

Third, using TikTok to learn has unique benefits for practicing speaking. TikTok is a popular social media site among students. It provides a place for them to easily record and watch their speaking

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performances [69, 73]. Students can gradually build their confidence and lower their speaking anxiety by practicing and improving their speaking delivery before sharing their videos. The findings of this study corroborate prior research indicating that digital technologies can facilitate language acquisition by offering interactive and adaptable learning experiences [74-78]. Nonetheless, the current study enhances prior research by introducing a comprehensive instructional model that combines creative problem-solving, project-based learning (PjBL), and social media-mediated communication practices.

This integrated approach addresses many aspects of developing speaking skills simultaneously. These include cognitive processes related to generating ideas, social interaction through collaborative learning, and psychological factors such as anxiety and confidence. From a pedagogical standpoint, the results indicate that language educators should consider implementing novel instructional models that incorporate creative thinking methodologies and digital technologies. These kinds of strategies can make learning more interesting and give students chances to practice their communication skills in real-life situations that matter. In general, the study adds to the growing body of research on technology-enhanced language learning by showing how combining Design Thinking, PjBL, and social media can help students improve their speaking skills in the digital age.

6. Conclusion

This study aimed to develop and evaluate an instructional model that integrates Design Thinking within a PjBL (Project-Based Learning) framework supported by TikTok-mediated speaking activities to enhance students' speaking skills. The model was developed using the ADDIE framework and evaluated for its validity, practicality, and effectiveness. The findings indicate that the developed instructional model demonstrates very high levels of validity, as confirmed through expert evaluations using the CVR and CVI. These results suggest that the model is conceptually sound and pedagogically aligned with established principles of language learning and instructional design. The integration of Design Thinking supports structured idea development, while the PjBL framework provides meaningful learning experiences that promote active student engagement in communication tasks.

The results of the implementation stage also demonstrate that the instructional model is highly practical. Both the lecturer and the students perceived the model as easy to implement and engaging within the learning environment. The structured learning phases provided clear guidance throughout the learning process, while using TikTok as a learning medium enabled students to practice speaking in a flexible, familiar digital environment.

Furthermore, the results of the pretest–posttest analysis reveal a significant improvement in students' speaking skills after implementing the instructional model, with a large effect size. These findings indicate that integrating Design Thinking, PjBL, and TikTok-mediated speaking practice can effectively support the development of students' speaking competence. The combination of structured idea development, authentic project-based communication tasks, and repeated digital speaking practice provides a comprehensive learning approach that addresses both cognitive and affective aspects of speaking performance.

Despite these contributions, this study has several limitations. The research employed a pre-experimental design with a relatively small sample size, which may limit the generalizability of the findings. Besides, the study primarily focused on improving speaking performance without exploring other potential learning outcomes, such as students' motivation, creativity, or digital literacy development. Future research is therefore recommended to expand the scope of this study by employing larger sample sizes and more rigorous experimental designs, such as quasi-experimental or randomized controlled studies. Further investigations may also examine how integrating Design Thinking, PjBL, and social media platforms can contribute to broader learning outcomes, including collaborative skills, creative thinking, and digital communication competence in language education.

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Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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