Designing an Integrated English Learning Mobile Application Using a User-Centered Approach

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Abstract: This study aims to address the fragmentation of learner experiences by developing an integrated mobile application that consolidates core English language skills—such as grammar, speaking, and vocabulary—into a single, holistic learning ecosystem using a User-Centered Design (UCD) approach. Data were collected from ten participants across three rounds of testing, comprising interviews and two iterative usability evaluation cycles employing the Cognitive Walkthrough (CW) method, the System Usability Scale (SUS), and the User Experience Questionnaire (UEQ). Quantitative data from the SUS and UEQ were analyzed descriptively to examine usability improvements across iterations, while qualitative data from interviews and observational notes were thematically coded to identify usability issues and user preferences. The results indicate consistent improvements across the two evaluation rounds. Specifically, CW success rates increased from 89.23% to 96.92%, SUS scores improved from 71.8 to 78.6—placing the application within the "good" usability category—and all UEQ dimensions showed enhancement, with an average score of 1.92, classified as "high positive." These findings demonstrate that the iterative application of the UCD approach effectively enhances usability and user satisfaction. Overall, the final integrated design successfully establishes a synergistic and holistic mobile learning ecosystem for English language learning.

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Introduction

The development of digital technology in language learning has become a pressing need in the digital era (Metasari & Amalia, 2024). In alignment with this, the integration of Technological Pedagogical Content Knowledge (TPACK) is increasingly important for creating effective learning experiences (Putri, 2023). While this specialization produces sophisticated tools, it is worth noting that it has inadvertently created a fundamental gap for learners (Li, 2024). Much of the existing research tends to evaluate these applications in isolation, thereby failing to identify the larger problem, namely, the fragmentation of the learning experience (Wang et al., 2024). Fragmenting the learning process into different applications, one for grammar, one for speaking, and another for listening, makes it evident that users need to switch applications to obtain a more integrated learning experience. Not only does this inefficiency drive up the costs learners are exposed to, but it also creates a cognitive barrier that gets in the way of building a more streamlined and integrated learning process.

Fragmenting the learning process into different applications, one for grammar, one for speaking, and another for listening, makes it evident that users need to switch applications to obtain a more integrated learning experience. This constant switching imposes a significant

cognitive load, as learners must repeatedly reorient themselves to different interfaces and pedagogical structures rather than focusing on the language itself. Not only does this inefficiency drive up the costs learners are exposed to, but it also creates a cognitive barrier that gets in the way of building a more streamlined and integrated learning process. Crucially, this issue extends beyond mere inconvenience; it fundamentally degrades the effectiveness of language acquisition. Because learner progress data remains siloed within isolated systems, no single application possesses a holistic understanding of the learner's strengths and obstacles. As a consequence, the potential for truly adaptive and personalized scaffolding collapses, preventing the system from intelligently reinforcing a user's weak points across different skills.

This demonstrates how learning a language functions as an ecosystem, whereby learning one skill blossoms the others. When learning a language, vocabulary and pragmatic awareness (Kehing & Yunus, 2021) overload learning how to speak. Integration of fragmented applications, employing various approaches and tools, has proven efficacy, much like blended learning systems (Albiladi & Alshareef, 2019). The fragmentation of learner progress data across isolated systems means that no one system has a complete understanding of a learner's strengths and obstacles (Shen et al., 2024). In consequence, the possibility of truly adaptive and personalized scaffolding collapses. In this respect, the problem this study seeks to address comprises not simply the functionalities of individual components in isolation, but the lack of a cohesive, integrated ecosystem for learning that brings together all the necessary elements to allow the user to move seamlessly and intelligently, as a single, unified system.

This research addresses the issue of fragmentation by developing a fully integrated English language application that functions as a comprehensive "one-stop shop". However, consolidating such diverse functionalities, ranging from speaking drills to grammar, presents a significant design challenge: the risk of cognitive overload. To mitigate this and prevent overwhelming the learner, the study adopts a User-Centered Design (UCD) approach. UCD is essential here to orchestrate complex features into an intuitive hierarchy. For instance, the application incorporates Real-Time Conversation Practice (Li, 2024; Wang et al., 2022) and AI-driven dialogic exchanges (Huang et al., 2022; Kızıl et al., 2025) not as isolated tools, but as a seamless flow supported by instant Pronunciation AI feedback (Dennis, 2024). By using UCD principles to smooth the transition between these active tasks and supportive motivational elements like Gamification (Al-Khresheh, 2025; Shen et al., 2024), the design creates a synergistic ecosystem where high functionality reinforces, rather than complicates, the learning experience.

Every feature needs to work together in harmony to create an efficient learning cycle, and that's exactly what this research is striving for, when building a holistic learning experience. Utilising the User-Centered Design (UCD) method as suggested by Azemmour et al. (2024), the implementation of this application will be an intuitive and organic process. This research aims to resolve the fragmentation of learner experiences by employing a User-Centered Design (UCD) approach to develop an integrated English learning application that consolidates core skills into a single platform. Its novelty lies in moving beyond the evaluation of isolated tools to design a holistic ecosystem where features like AI conversation and authentic content work synergistically, effectively eliminating the cognitive barriers and data silos caused by using disjointed applications.

Research Method

The design research approach is based on a qualitative approach in line with the UCD design principles. The goal is to design an easy-to-understand English learning application that is tailored to user needs and preferences (Dananjaya et al., 2024). The focus is to ensure the product is usable by placing the user at the center of the entire process. The study was divided into four major phases following the ISO 9241-210 standard. It begins with gaining a deep understanding of the user's context and needs, and is completed with an iterative design evaluation.
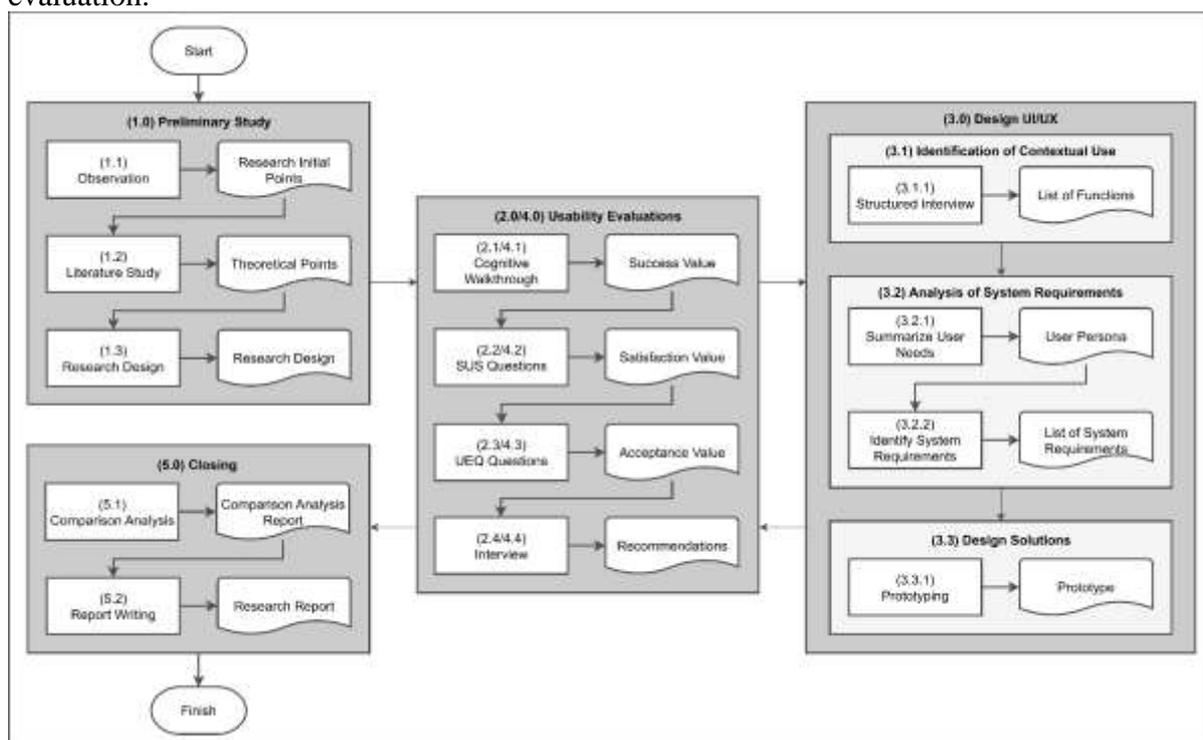

Figure 1. Research Procedure

The participants in the research were ten users representing the intended users, including the students or college students learning English and having experience with mobile language learning applications. This sample size is considered sufficient for usability studies, as recent research indicates that testing with 8 to 10 participants can identify approximately 80% of usability problems (Milosz et al., 2024). The inclusion criteria were being 18-30 years old, familiar with the use of mobile devices, and having at least one year of English learning experience. The participants were mainly college students (90%) aged 19-24, with a high level of technology literacy (80%). Most of them had experience with using more than one English learning app, such as Duolingo, Babbel, Grammarly, HelloTalk, and Tandem.

The first round of data collection was completed through semi-structured interviews and online surveys with English learners to understand their needs, challenges, and preferences. Usability evaluation was carried out in two iterative cycles. The first iteration was a low-fidelity prototype (wireframe) evaluation with a Cognitive Walkthrough (CW) using the task list that covered the main user flow from registration, switching between features, to learning exercises' completion.

Table 1. Tasklist Walkthrough

No.	Tasks
1	Register for a new account.
2	Log in to the application using the newly created account.
3	Find and start the first lesson in the "ConverseLab" feature.
4	Use the AI conversation and Real-World Roleplay features.
5	Find and start the second lesson in the "Accent Coach" feature.
6	Use the pronunciation practice feature.
7	Find and start the third lesson in the "Immerse Zone" feature.
8	Use the practice feature by watching podcasts and reading books.
9	Find and start the fourth lesson in the "LangCore Engine" feature.
10	Use the vocabulary and grammar learning features.
11	Find and start the fifth lesson in the "Growth Journey" feature.
12	Complete a challenge (selecting proficiency level & daily learning targets).
13	Log out of the application.

The second iteration was based on an improved design from CW results and utilized a high-fidelity prototype. The SUS was used for the overall satisfaction and ease of use on a 0-100 scale, a score of 68 and above is considered above average, while above 80.3 is excellent (Hyzy et al., 2022; Kortum & Sorber, 2015). UEQ provided 6 dimensions of experience: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty, with a -3 to +3 scale and positive values suggest a good evaluation (Schrepp et al., 2017). Quantitative data from SUS and UEQ were analyzed descriptively to assess improvements across iterations. Qualitative data from interviews and CW observations were coded thematically to identify common patterns of usability problems and user preferences.

Results and Discussion

The Evaluation results indicated substantial enhancement in all the usability metrics as a result of the design optimizations. The Cognitive Walkthrough (CW) Evaluation was executed on 13 Primary Task Scenarios that encompasses Registration Process, Navigation of Learning Menu, Utilization of Conversation Feature, and Completion of Daily Challenges. CW success rate in iteration 1 was 89.23% which shows that most of the users could perform the primary tasks, but there are certain pain points in a few navigation flows. The highest number of obstacles were present in Accent Coach and Real-World Roleplay learning features, where the users could not find the buttons to take the next action and were unaware of what to do next. Further findings revealed that the reason for this was that there is a lack of hierarchy in the visuals and no response/action feedback. After improvements were added, which included additional visual prompts, simplification of navigation flows, and a stronger call-to-action for buttons, the CW success rate in iteration 2 was 96.92%. The CW success rate increased by 7.69% between iteration 1 and iteration 2, indicating that the design improvements have removed the friction from the user journey.

Table 2. Results of the preliminary CW, SUS, and UEQ evaluations

Person	Task of CW													SUS Score	UEQ Score					
	1	2	3	4	5	6	7	8	9	10	11	12	13		AT	PE	EF	DE	ST	NO
1	S	S	F	S	S	S	S	S	S	S	P	S	S	73	1,83	2,00	1,75	1,00	1,75	1,00
2	S	S	P	S	S	P	S	S	S	S	S	S	S	70	2,00	2,00	2,00	1,75	2,00	1,50
3	S	S	P	S	S	P	S	S	S	S	S	F	S	70	2,00	1,75	1,75	2,00	2,00	1,75
4	S	S	S	S	S	S	P	S	S	S	S	F	S	73	2,00	1,25	2,00	1,75	2,00	1,75
5	S	S	S	S	S	S	P	S	S	S	S	F	S	73	2,00	1,50	2,00	1,75	2,00	1,75
Total	89,23%													71,8	1,966	1,7	1,9	1,65	1,95	1,55

Notes: S: Success, P: Partial Success, F: Failed

In addition, the scores from the System Usability Scale (SUS) evaluation are also congruent with the above findings. The SUS average score, which measures the application's perceived usability by the participants, has increased from 71.8 to 78.6 after the design refinement (categorized as "good" as per SUS benchmark for mobile applications and consistent with the SUS benchmark set for digital applications (Hyzy et al., 2022)). This was the case, even though it was already considered above the threshold score of 68 (indicating an average above 68), and hence, it had a potential to be improved upon. As such, after the design refinement, SUS score in iteration 2 has further increased to 78.6, with a 6.8-point change. It is then categorized as "good" with a trending towards "excellent" (>80.3), which indicated that the application had good usability and were well-received by the target users. The ConverseLab and Pronunciation AI features recorded the highest success rates as these were perceived to be the most intuitive and delivered feedback when errors were made (Sun, 2023).

Table 3. Suggestions of the participants

No.	Suggestions
1	Added a back button to the "LangCore Engine" feature.
2	Fixed typo.

Table 4. Application features

| Features	Functions
ConverseLab	Practice speaking 24/7 with AI partners and real-world scenarios.
Accent Coach	Receive instant, detailed feedback to perfect your pronunciation and accent.
Immerse Zone	Learn real-world English from engaging books and podcasts.
LangCore Engine	Strengthen your foundation with smart vocabulary drills and interactive grammar exercises.
Growth Journey	Stay motivated by completing daily quests, earning achievements, and leveling up your skills.
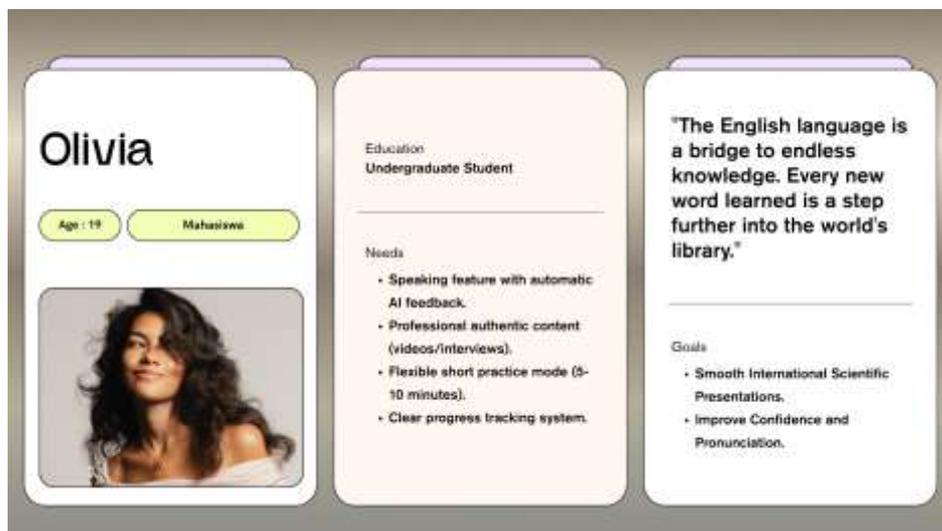
Figure 2. The proposed user persona
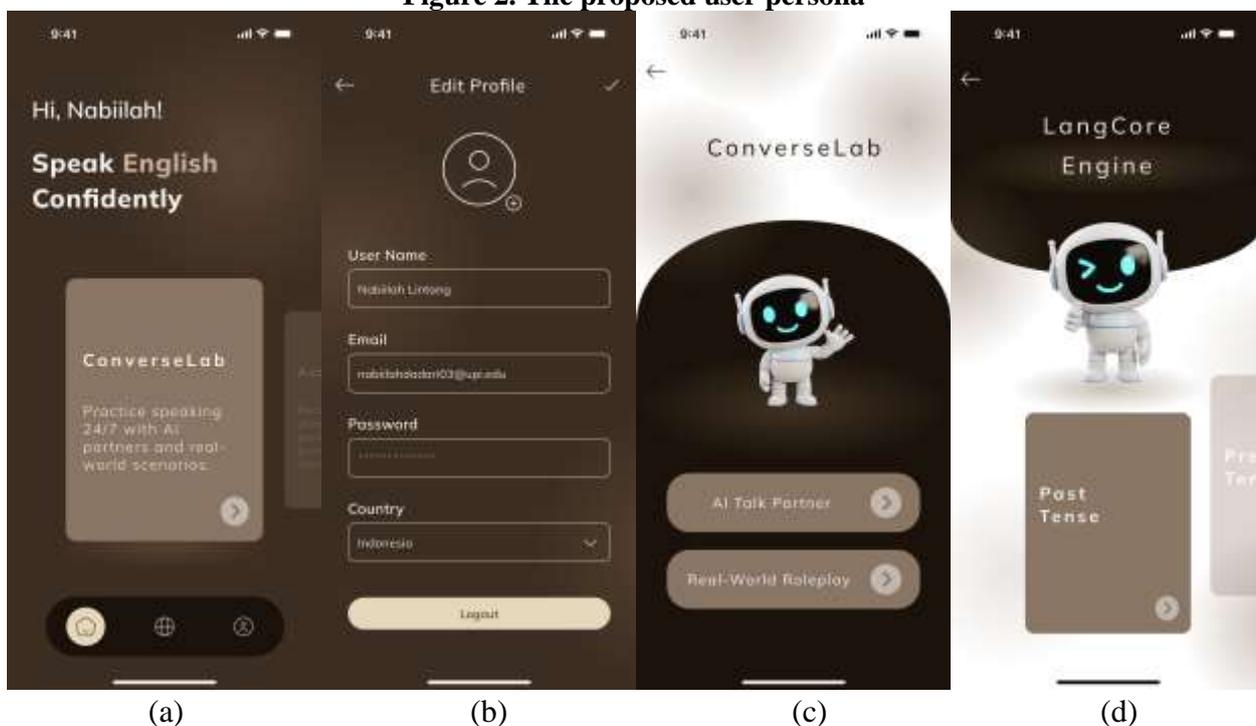

| (a) | (b) | (c) | (d) |

Figure 3. (a) Homepage; (b) Profile page; (c) ConverseLab page; (d) Langcore Engine page

The User Experience Questionnaire (UEQ) analysis reveals the six user experience dimensions in detail. The UEQ tool used for user experience measurement includes six dimensions: Attractiveness (AT), Perspicuity (PE), Efficiency (EF), Dependability (DE), Stimulation (ST), and Novelty (NO) [20]. All six UEQ dimensions have risen after the second iteration compared to the first one. Initial average UEQ scores were: AT = 1.97; PE = 1.70; EF = 1.90; DE = 1.65; ST = 1.95; and NO = 1.55. After the redesign of the product, the scores went up to: AT = 2.00; PE = 1.90; EF = 1.95; DE = 1.70; ST = 2.05; and NO = 1.90.

The increase in the Novelty (+0.35) and Stimulation (+0.10) aspects was the most substantial, showing that people considered the new design as more attractive, newer, and capable of producing a higher emotional engagement level (Bitkina et al., 2020). The total average score was 1.92 in the second iteration, which according to the UEQ benchmark, is a

"high positive" category (Schrepp et al., 2017). Such a finding confirms that the app is not only practical but also offers an engaging, innovative, and aesthetic experience (Lo, 2024; Bouchrika et al., 2019).

Table 5. Results of the post-design usability evaluation (CW, SUS, and UEQ)

Person	Task of CW													SUS Score	UEQ Score					
	1	2	3	4	5	6	7	8	9	10	11	12	13		AT	PE	EF	DE	ST	NO
1	S	S	S	S	S	S	S	S	S	S	S	S	S	75	2,00	2,00	2,00	1,75	2,25	2,00
2	S	S	S	S	S	S	S	S	S	S	S	S	S	85	2,00	1,75	1,75	1,75	2,00	1,75
3	S	S	S	S	S	S	S	S	S	P	S	S	S	75	2,00	2,00	2,00	1,50	2,00	2,00
4	S	S	S	S	S	S	S	S	S	S	S	S	S	80	2,17	1,75	2,00	1,75	2,00	1,75
5	S	S	S	S	S	S	S	S	S	S	S	P	S	78	1,83	2,00	2,00	1,75	2,00	2,00
Total	96,92%													78,6	2	1,9	1,95	1,7	2,05	1,9

Notes: S: Success, P: Partial Success, F: Failed

From a User-Centered Design perspective, the results of this study confirm the effectiveness of an iterative approach that places the user at the center of the design (Dananjaya et al., 2024). The iterative process, involving a continuous feedback loop, allows for the early identification of usability problems and the implementation of targeted solutions. This finding is in line with research (Sudirjo et al., 2024; Ferdous et al., 2019), which shows that applications designed with the UCD method have a positive correlation between user experience, user interface, and customer satisfaction. In the context of an English learning application, the application of UCD not only improves technical usability metrics but also contributes to creating a more intuitive and supportive learning environment. This is important given the complexity of the features integrated into one platform, where without UCD, the risk of cognitive overload and navigational confusion would be very high. The iterative cycle that places the user at the center of the design successfully identified the weak points of the interface, then systematically improved them to achieve optimal results (Azemmour et al., 2024).

Figure 4 illustrates the enhancements achieved across three key UI/UX dimensions: success, satisfaction, and user acceptance. The results indicate a clear upward trend, with success rates rising from approximately 89,23% (Table 2) in the pre-design phase to 96,92% (Table 5) in the post-design evaluation, while satisfaction scores improved from 71,8 to 78,6. These metrics demonstrate that the proposed design is more intuitive and satisfying for users compared to the previous version. User acceptance followed a similar positive trajectory; the comparison of UEQ scores in Figure [4] reveals growth across all six evaluated aspects during the second round of testing. Specifically, Attractiveness rose from 1.966 to 2, Perspicuity from 1.7 to 1.9, Efficiency from 1.9 to 1.95, Dependability from 1.65 to 1.7, Stimulation from 1.95 to 2.05, and Novelty from 1.55 to 1.9. In summary, the proposed UI/UX design has successfully refined the application's ease of use, satisfaction, and acceptance levels beyond those of the initial version.
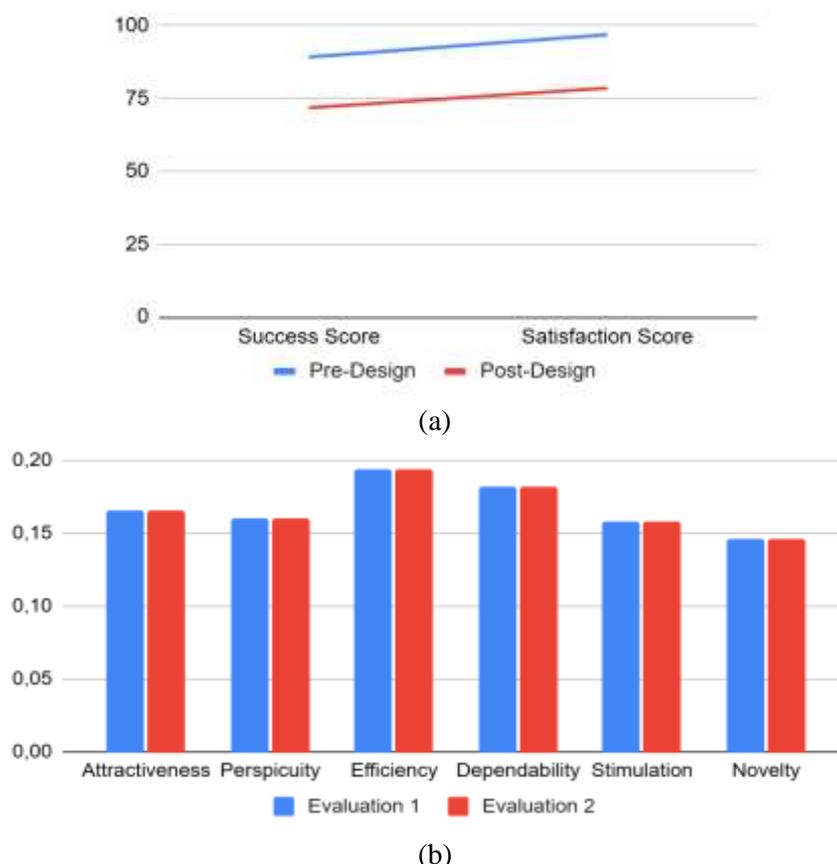
(a)

(b)

Figure 4. (a) The success and satisfaction scores; (b) The acceptance scores

The pedagogical design which merges Pronunciation AI with ConverseLab and Immerse Zone creates an interconnected learning environment that supports continuous development. While Li (2024) emphasizes the efficacy of mobile tools specifically for developing speaking skills, this study extends that perspective by demonstrating that speaking proficiency is most effectively cultivated within a synergistic ecosystem rather than through isolated practice. Unlike the specialized tools evaluated by Li, which can inadvertently create a "gap" for learners, this integrated design ensures that the ConverseLab serves as a practical application ground for the vocabulary acquired in the LangCore Engine. This structure allows users to verify their pronunciation improvements through the Accent Coach immediately after learning new words, creating a self-reinforcing learning loop.

Furthermore, the research findings align with Shen et al. (2024), who demonstrated that digital environments utilizing gamification and multiple approaches significantly enhance user performance and participation. However, where Shen et al. focused on the motivational impact of gamification, this research offers a novel perspective: that data integration itself acts as a critical scaffolding mechanism. By resolving the fragmentation of learner progress data, a limitation where no single system understands a learner's full context, as noted by Shen et al., this application enables a "Growth Journey" where gamified achievements reflect holistic competence rather than isolated task completion. Thus, the application not only connects different features to solve the problem of platform switching but also delivers a modern pedagogical approach where technological consolidation directly drives the "complete learning experience" advocated by Lo (2024).

Conclusion

The research achieved its goal to create an English language learning application which unites separate learning experiences through User-Centered Design (UCD) methodology. The evaluation results demonstrate that the UCD method produced substantial enhancements in all usability performance indicators through its iterative development process. The application development process successfully identified and fixed interface problems which resulted in a system that functions well and provides users with an easy-to-use interface. The research achieves its primary goal through designing a unified learning environment which combines Pronunciation AI with ConverseLab and Accent Coach and Immerse Zone to create an integrated learning cycle. The application enables users to enhance their skills through practice of different abilities because its connected features eliminate the drawbacks of separate specialized tools. The application provides users with a single platform that eliminates both mental obstacles and financial expenses associated with English language learning. The research recommends future studies should investigate the application's effect on language learning success through extended investigations with bigger participant groups. The research establishes a major advancement in creating complete language learning systems which focus on user needs.

Recommendation

Future research needs to perform extended studies with bigger participant groups to evaluate how the application affects real language skills development during six to twelve months. The system would achieve better personalization through advanced adaptive learning algorithms that use machine learning to create individualized learning paths based on user performance. The application needs cross-cultural validation through studies that prove its effectiveness for EFL learners from Indonesia who speak different languages at different skill levels.

Multiple factors will affect how the system will function in future deployments. The system needs to achieve optimal performance of its AI-based features (Pronunciation AI and ConverseLab) across different device specifications while developing offline capabilities to handle areas with limited internet access. The system needs to strike a balance between offering multiple features and avoiding excessive mental strain which affects beginners in their learning process. The next version of the system needs to develop advanced customization tools which will support different learning approaches while preserving the unified structure of the platform. The platform needs complete assessment systems which unite numerical performance data with qualitative feedback about learning experiences to show its complete educational effects on language skills.

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