CHAPTER I
INTRODUCTION

1.1 Background

Education serves as a crucial cornerstone for societal and national development, which is why the quality of a nation's education has always been a key indicator of its success (Rodin et al., 2024). Despite that, the education system in Indonesia has faced systemic challenges that hinder its students from achieving the academic success they deserve. Traditional teaching methods have left students without proper critical thinking and adaptive problem-solving skills, while additional issues such as inconsistent teacher quality, a rigid curriculum, and large class sizes only further exacerbate the issue (Rafsanjani & Rozaq, 2024). Therefore, educational technology applications (edtech) emerge as a solution, where they combine information and communication technology (ICT) with educational services to offer innovative learning methods (Lee & Kim, 2023).

Educational technology enhances learning by allowing anytime-anywhere access to content, offering personalized pathways through AI, providing real-time feedback via automated assessments, expanding access to limitless online resources, and deepening engagement through immersive AR and VR experiences (Bhat et al., 2024; Jiang, 2023; Rehan, 2023). It had gradually gained recognition, but the rise of Industry 4.0 prompted a shift toward more adaptive and non-traditional learning methods, causing edtech to rapidly grow in popularity (Iryanti et al., 2025). Investment in this sector exceeded $2.5 million across Southeast Asia in 2021, with Indonesia's 414 edtech startups (as per January 2023) positioning them as one of the dominant markets, reflecting its vital role in modern-day education (Millanyani et al., 2024; Victoria & Indriyanti, 2023).

In Indonesia, popular edtech platforms such as Ruangguru, Zenius, and Quipper have embodied these benefits very well by providing comprehensive e-learning solutions for conventional school subjects, earning them widespread adoption and significant attention among students in Indonesia (Hayadi & Hariguna, 2025). These platforms primarily cater to K-12 students, offering extensive video lessons, practice questions, and live tutoring sessions that

effectively complement formal education and bridge gaps in traditional classroom instruction (Djuuna et al., 2024). Beyond these, international platforms like Kahoot! and Quizizz are widely used to enhance classroom engagement, while Duolingo continues to be a popular choice for language learning, further diversifying the digital tools available to Indonesian students (Situmorang, 2023).

A distinct category of applications now focuses on preparation for the Seleksi Nasional Berdasarkan Tes (SNBT), the standardized entrance exam for Indonesian public universities. Unlike regular school subjects, where grades can improve gradually, SNBT demands targeted strategies for a one-time, high-stakes test that determines university admission (Daony et al., 2025). With only a 24% passing rate over the past three years, the exam poses both extremely limited chances of success and immense psychological pressure (Lacosta & Sarajar, 2024). Its specialized subtests, such as scholastic aptitude and critical reasoning, do not explicitly exist in regular curricula, rendering conventional classroom solutions insufficient and driving the demand for effective digital preparation platforms.

While intensive offline private tutoring institutions like Ganesha Operation, INTEN, and Sony Sugema College historically dominated this highly competitive niche, their exorbitant costs and inherent limitations in accessibility and flexibility significantly spurred the rise of digital preparatory solutions. Online platforms such as Analitica, Sainsin, Skuling, and Pahamify offer comprehensive SNBT tryouts and specialized lessons, empowering students to prepare effectively at their convenience. The success of these digital offerings has also prompted traditional private tutoring centers to invest further in online solutions, as can be seen with Ganesha Operation's GO Expert and Sony Sugema College's Online Program.

Skuling—one of the examples previously mentioned—is a platform that primarily focuses on providing practice questions and tryouts for SNBT and other standardized exams. What makes Skuling stand out compared to other SNBT-focused platforms is its strong reliance on gamification, featuring elements such as 'Battle' mode for peer competition, 'Badges' to reward achievements, 'Freestyle' for unlimited practice, 'Streaks' for daily logins, and a 'Leaderboard' to rank performance. Gamification—a way of using game design elements to engage

people, inspire action, enhance learning, and address challenges—has been widely recognized as an effective way to drive user engagement and motivation. (Shortt et al., 2023). This can be seen in applications such as Duolingo, which utilizes features like points, badges, and competitive modes to great effect; a survey, for instance, indicated that 60% of respondents strongly agreed that these gamification features in Duolingo were effective in promoting user engagement (Suryanto, 2024).

Given these strengths, Skuling should theoretically be positioned as one of the leading apps in the Indonesian edtech market. People who already use Skuling do seem to enjoy the app, as reflected in its over 330,000 users, 80% engagement rate, and consistently high ratings, with 4.4 stars on Google Play and 4.8 stars on the App Store (PT Cerdaskan Penerus Bangsa, 2025). However, despite these clear signs of user satisfaction, Skuling ranks only 14th out of 17 SNBT applications in actual usage, which is a sharp contrast to Pahamify (4th) and Cerebrum (6th), direct competitors in the same market (Setya Ayu & Auryn Santosa, 2024). This notable disparity between perceived quality and overall market presence makes Skuling an ideal case study for investigating why a seemingly well-designed, gamified platform struggles to achieve stronger market penetration.

An initial review of user feedback from Skuling's storefront reviews (see Attachment 1) indicates that, despite overall satisfaction, users still encountered issues that made the application difficult to use. For instance, users requested a Dark Mode to prevent eye strain, criticized the desktop version for not being properly optimized beyond the mobile layout, and found the interface initially confusing, which discouraged feature exploration. These issues reflect usability shortcomings, as ISO 25010 defines usability as the extent to which a system enables users to achieve specific goals effectively, efficiently, and satisfactorily (Asmara, 2022).

User-friendly design is critical in educational technology for fostering engagement and learning, meaning that Skuling's usability weaknesses could reduce long-term use and undermine its educational value (Bhat et al., 2024). Users must first be able to interact with a system effectively and efficiently before other factors, such as content quality or motivational features, can have a meaningful impact (Omonigho, 2023). Crucially, usability and gamification operate in a

hierarchical relationship where interface usability serves as the technical foundation that enables gamified elements to function. In gamified learning environments, complex interaction flows, unclear navigation, or poorly integrated feedback mechanisms may undermine the intended motivational effects of gamification. If the user experience is bad, the cognitive load needed to simply navigate the application will override any psychological engagement gamified elements aim to ignite, even when the application seems overwhelmingly rich with content (Roncal-Belzunce et al., 2025). On the other hand, a good user experience will amplify the effects of gamified features; the lack of any interaction barriers will allow the gamified features to motivate the users as intended. Therefore, focusing on usability allows this research to address the most fundamental interaction-related issues that potentially influence Skuling's adoption and sustained use.

User ratings provide valuable snapshots of real-life experience, but their selection and reporting biases often prevent them from revealing the specific usability issues behind user dissatisfaction (Hwang, 2023). To explore the causes of Skuling's limited user base better, a preliminary questionnaire was administered to 25 high school, gap, and semi-gap year students who had used the app for less than three months in preparation for the SNBT exam (see Attachment 2). The results showed mixed responses: while 52% of respondents found Skuling's appearance appealing and 68% considered it easy to use, 12% viewed the visual design as indifferent, and 4% described it as very difficult to use, suggesting that improvements are still needed.

Open-ended responses (see Attachment 3) revealed issues with consistency (e.g., small hitboxes and unclear interactive elements), unclear navigation and feature explanations, and visual problems such as small icons and poor contrast. The Battle feature was also criticized for its rigid interaction flow and lack of basic features like zooming on a photo or muting the sound effects that play during the session. Overall, 32% of respondents thought that Skuling needs to be better at explaining or presenting its features, especially its most important ones like Battle and Freestyle. This is followed by users having concerns about visual design (24%), color and font choices (20%), and inconsistent icons and buttons (16%). Despite

Daily Streak and Statistics being voted as some of the most appealing features, voters also thought those features needed improvements the most, highlighting that Skuling's strong content and engagement potential is undermined by usability shortcomings. If these issues are left unaddressed, first-time users will most likely abandon the application before they discover the rich academic potential Skuling has to offer, while existing users will grow tired of tolerating the application's shortcomings and stop using it despite the value the application has provided them.

To dive deeper into these statistics, individuals from this pool of survey respondents who provided explicit consent were subsequently invited to participate in live user interviews conducted via Zoom calls. These synchronous, semi-structured sessions strongly corroborated the survey sentiments while allowing participants to elaborate on subtle design quirks they had not initially realized they disliked. The data from these interviews explicitly reveal a dual-collapse within the application; while Skuling suffers from usability failures such as participants thinking the navigation bar's icons are confusing or the font being too thin, it also suffers from gamification failures such as the Daily Streak mode being described as uninviting and the Badges being described as as merely passive elements that lack meaningful incentive by a participant. These qualitative responses, despite their inability to be quantified, reveal a mounting cumulative impact of both small usability and gamification flaws that ultimately discourage sustained product adoption in the long run.

To systematically understand and address these issues, this study adopts the ISO 9241-11 standard. The International Organization for Standardization defines usability as a widely recognized framework consisting of three key dimensions: effectiveness—the extent to which users can achieve specific goals; efficiency—the resources expended to accomplish those goals; and satisfaction—the users' comfort and overall experience while interacting with the product (Juli et al., 2024). Because usability involves interconnected components shaped by both observable behavior and subjective perception, it is essential to use a mixed-methods evaluation that combines technical performance assessment with a deeper understanding of users' experiences.

One of the methods that will be used is Performance Measurement, a usability testing approach that provides quantitative data on the efficiency and effectiveness of an application by measuring three core parameters: task success rate, time-based efficiency, and error rate (Firdaus & Zakiah, 2021). Analysis of error rate will determine the effectiveness of the application, while the time-based efficiency metric helps determine how efficient the system truly is, providing data regarding what parts of the application cause users to find the application cumbersome in the process (Agzalia et al., 2023; Dewi, 2024). In this case, users will complete scenario-based tasks tied to Battle, Freestyle, and gamified features, as these were the primary issues that came up during the preliminary research.

While quantitative data shows what issues occur during task execution, qualitative insights are still needed to explain user satisfaction and better understand Skuling's appeal and competitive position (Almaghlouth & Almeshal, 2024). Therefore, the Retrospective Think-Aloud (RTA) method is employed, allowing participants to reflect and verbalize their thoughts about the experience (Noushad et al., 2024). As the RTA requires participants to elaborate after completing the task, their need to express themselves won't interfere with task performance, leading to more detailed elaborations since participants can articulate their thoughts after sorting them out (Hertzum, 2024). In the context of Skuling, this will help identify why users struggled with specific parts of the application, such as being unable to proceed to the next question in Battle mode.

Performance Measurement and Retrospective Think-Aloud offer insights into user-system interaction. However, given Skuling's gamified nature, these methods must be complemented by a tool that directly examines user engagement—a key outcome of effective gamification (Hajarian et al., 2023). To address this, the Gameful Experience Scale (GAMEX) will be utilized, as it is specifically designed to assess user engagement with gamified elements in non-game contexts (González-Cacho et al., 2023). GAMEX is comprised of six dimensions—enjoyment, absorption, creative thinking, activation, absence of negative affect, and dominance—that focus less on narrative or character-driven immersion often emphasized in other game experience assessments, and more on psychological

engagement and motivation relevant to task-based, gamified learning environments like Skuling (Fagundo-Rivera et al., 2024).

Since user experience and satisfaction are key components of the ISO 9241-11 standard, GAMEX offers valuable insight into how gamified features shape emotional involvement, cognitive stimulation, and perceived control, which are factors that traditional usability metrics may overlook (Llorente-Cejudo, 2024). Unlike other game evaluation frameworks that heavily focus on narrative immersion, world-building, and other game elements, GAMEX fits this research specifically as it is meant to examine how much gamified elements still psychologically impact users when applied to non-game contexts.

To transform the insights gathered from the aforementioned methods into design changes, this study will also employ the Design Thinking framework, which aims to prioritize the users' desires, needs, and challenges in developing a better and more comprehensive solution (Pratiwi & Suchahyani, 2024). It consists of five iterative steps: empathize, which involves understanding users' needs and challenges; define, where those insights are synthesized into clear problem statements; ideate, which focuses on generating a wide range of possible solutions; prototype, where selected ideas are transformed into tangible representations; and test, which evaluates whether these solutions effectively address the users' needs (Lim & Setiyawati, 2022). Design Thinking is used because of its iterativeness, where it is possible to revisit earlier steps based on testing outcomes to continuously refine the solution, allowing for a more flexible design process. It is able to bridge the gap between empirical data diagnostics and creative UI optimization, directly aligning with the other methodologies by taking user frustrations from the baseline testing phase and funneling them through a human-centered creative process.

Prior to this study, the software quality of Skuling and other applications that focus on SNBT preparations remained entirely unresearched, even though their more traditional contemporaries like Ruangguru and Skill Academy have previously been analyzed (Firmansyah, 2025; Kusuma et al., 2024). This highlights a significant gap in the literature, as beyond the specific case of Skuling, an understanding of software quality attributes across SNBT preparation applications

in Indonesia remains largely unexplored in academic discourse. Moreover, while methods such as Performance Measurement and Retrospective Think-Aloud (RTA) in the context of Design Thinking have been recognized for their validity in mixed-methods research, their integration alongside gamified experience assessment tools such as GAMEX remains rare (Ariansidi et al., 2023; Candiasa et al., 2023). Additionally, despite its established validity in international research, GAMEX has been applied in fewer than five Indonesian studies to date, highlighting both the methodological novelty and local relevance of this research (Yojana, 2024).

Therefore, this study sets out to conduct a comprehensive evaluation of Skuling by examining the usability and user experience shaped by its gamified features. Employing a mixed-methods approach that combines Performance Measurement, Retrospective Think-Aloud (RTA), and the Gameful Experience Scale (GAMEX), this research introduces a novel integration of usability and psychological engagement analysis rarely applied in the context of Indonesian educational applications. To ensure that the insights gathered lead to concrete improvements, the study also applies the Design Thinking framework as a user-centered problem-solving method. Unlike previous studies that have focused on larger, more established platforms like Ruangguru or Skill Academy, this research shifts the focus to SNBT preparation tools, a newer category that remains underexplored. By investigating how users interact with and respond to Skuling's usability and gamification mechanics, the findings will not only offer targeted recommendations for improving the app but also provide insights for the development of engaging, effective, and accessible educational technology in Indonesia.

1.2 Problem Statements

Based on the background previously outlined, several key issues have been identified as follows:

1. Users encounter usability challenges such as unclear navigation, inconsistent icons, and visual design problems, which reduce ease of use and long-term engagement.

2. Gamified features that are meant to motivate students, such as Battle and Streaks, are often perceived as confusing or lacking flexibility, limiting their effectiveness.
3. Despite strong ratings and engagement indicators, Skuling's overall market adoption remains low, suggesting that existing usability and engagement issues hinder its ability to compete with other SNBT-focused applications.

1.3 Research Questions

To address these challenges, this research aims to answer the following questions:

1. How is the current usability of the Skuling application evaluated based on ISO 9241-11?
2. How can Design Thinking principles be applied to redesign Skuling in order to address the identified usability and engagement issues?
3. To what extent does the redesigned version resolve the usability and engagement issues identified during baseline testing, evaluated using ISO 9241-11?

1.4 Research Objectives

This research, therefore, aims to bridge these critical gaps in the literature and contribute to the enhancement of educational technology in Indonesia. Specifically, this study seeks to:

1. Evaluate the current usability of the Skuling application based on ISO 9241-11 (effectiveness, efficiency, and satisfaction).
2. Apply Design Thinking principles to develop design improvements that address the identified usability and engagement issues.
3. Re-evaluate the redesigned version using ISO 9241-11 to determine whether the improvements effectively resolve the problems found in the original application.

1.5 Research Scope

With the research objectives established, it is important to clearly define the scope of this study to focus the investigation as follows:

1. The research focuses on identifying and improving usability and engagement issues, not on evaluating educational content or alignment with SNBT curriculum.
2. Participants of the usability and gamification analysis of Skuling include Grade 12 students, gap year students, and semi-gap year students who are preparing for the SNBT exam, and they will be selected through purposive sampling.
3. The study does not involve itself with Skuling's source code or backend; the results of the usability and engagement analysis of Skuling will be improved upon through a coded front-end recreation built using HTML, CSS, and JavaScript.
4. The front-end recreation is developed and validated primarily for the mobile (smartphone) viewport, as layout adjustments for tablet and laptop screen sizes were deprioritized within the scope and timeframe of this study.
5. After the front-end recreation is complete, its capabilities relative to the original version will be evaluated once, exclusively with participants from the initial usability testing who completed the baseline session on a smartphone device. As a result, the post-redesign testing phase does not involve the full set of 16 baseline participants.

1.6 Research Benefits

This research offers key benefits. both practical and theoretical, as follows:

1. For the Skuling development team, this study provides a set of tested and validated interaction patterns that can be adopted directly without departing from the application's existing feature set, helping guide the development team improve upon the current state of the application.
2. For academic institutions, this study contributes an Indonesian translation of the GAMEX questionnaire, along with a coding scheme that pairs the ISO 9241-11 domains with the GAMEX dimensions in a single thematic analysis, which can be used by future studies in similar context.
3. For students and educators, the findings will highlight common interface issues and usability barriers, helping them understand how to choose SNBT or other edtech applications that match their needs better.