Evaluating and Enhancing Usability and Gamification in Skuling Based on ISO 9241-11: A Design Thinking Approach with Usability Testing and GAMEX

By

I Ketut Veda Suputra, Student ID 2215091023

Department of Informatics Engineering

Information Systems Study Program

ABSTRACT

This study evaluates and improves the usability and gamification of Skuling, an Indonesian gamified learning application for SNBT exam preparation, using a Design Thinking approach grounded in ISO 9241-11. Baseline usability testing was conducted with 16 participants using the Retrospective Think-Aloud (RTA) protocol, Performance Measurement, and the GAMEX questionnaire across eight task scenarios, yielding an average success rate of 69.92%, with claiming daily missions (53.12%) and initiating a chat (59.38%) falling into the "ineffective" range. Thematic analysis identified six recurring usability problems, most critically the failure of 15 of 16 participants to locate the Daily Missions menu and a misleading friend-based search behaviour that produced unexplained blank results for 14 of 16 participants. These findings were synthesized through the Empathize and Define stages and addressed in Ideate using the Eisenhower Matrix and Shneiderman's Eight Golden Rules. Prioritized solutions were developed into low-fidelity wireframes, an interactive Figma prototype, and a coded front-end implementation using HTML, CSS, and JavaScript. Post-redesign testing was conducted with 6 of the previous 16 participants, where the redesigned system achieved an average success rate of 93.75% and an error rate of 1.11%, placing it in the "highly effective" category. The mean time on task was found to be 1 minute 44 seconds, with four of six GAMEX dimensions reaching the high category, and Dominance having risen from moderate to high. Thematic analysis of the post-redesign transcripts found four of the six baseline usability themes fully resolved and two partially resolved. The study additionally finds that the Absorption dimension of GAMEX scored lowest in both phases, with participants across both consistently describing Skuling as a study application rather than a game, suggesting that the dimension may be ill-suited to high-stakes examination preparation contexts.

Keywords: usability, gamification, ISO 9241-11, Design Thinking, Retrospective Think-Aloud, GAMEX, SNBT learning applications

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Oleh

I Ketut Veda Suputra, NIM 2215091023

Jurusan Teknik Informatika

Program Studi Sistem Informasi

ABSTRAK

Penelitian ini mengevaluasi dan meningkatkan usability serta gamifikasi pada Skuling, sebuah aplikasi persiapan SNBT berbahasa Indonesia dengan fitur gamifikasi, menggunakan pendekatan Design Thinking yang berlandaskan ISO 9241-11. Uji usability baseline dilakukan terhadap 16 partisipan menggunakan protokol Retrospective Think-Aloud (RTA), Performance Measurement, dan kuesioner GAMEX pada delapan skenario tugas, menghasilkan rata-rata success rate sebesar 69,92%, dengan tugas mengklaim misi harian (53,12%) dan memulai chat (59,38%) berada pada kategori "tidak efektif". Analisis tematik mengidentifikasi enam permasalahan usability yang berulang, dengan kegagalan 15 dari 16 partisipan dalam menemukan menu Daily Missions, serta perilaku pencarian berbasis teman yang menyesatkan bagi 14 dari 16 partisipan yang paling kritis. Temuan-temuan ini disintesis melalui tahap Empathize dan Define, kemudian ditindaklanjuti pada tahap Ideate menggunakan Eisenhower Matrix dan Eight Golden Rules dari Shneiderman. Solusi yang telah diprioritaskan kemudian dikembangkan menjadi wireframe low-fidelity, prototipe interaktif di Figma, dan implementasi front-end dalam bentuk kode menggunakan HTML, CSS, dan JavaScript. Uji coba post-redesign dilakukan terhadap enam partisipan, di mana sistem hasil redesain mencapai rata-rata success rate sebesar 93,75% dan error rate sebesar 1,11%, sehingga masuk ke dalam kategori "sangat efektif", dengan rata-rata waktu pengerjaan tugas selama 1 menit 44 detik; empat dari enam dimensi GAMEX mencapai kategori tinggi, dan dimensi Dominance meningkat dari kategori sedang menjadi tinggi. Analisis tematik terhadap transkrip pasca-redesain menemukan bahwa empat dari enam tema usability pada tahap baseline telah terselesaikan sepenuhnya, sementara dua tema lainnya terselesaikan sebagian. Penelitian ini juga menemukan bahwa dimensi Absorption pada GAMEX memperoleh skor terendah pada kedua tahap; partisipan pada kedua fase secara konsisten menggambarkan Skuling sebagai aplikasi belajar, yang mengindikasikan bahwa dimensi tersebut mungkin kurang sesuai untuk konteks persiapan ujian yang *high-stakes.*

Kata kunci: usability, gamifikasi, ISO 9241-11, Design Thinking, Retrospective Think-Aloud, GAMEX, aplikasi belajar SNBT