



Innovation in Digital Thesis Supervision Systems Using the Design Thinking Method

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Abstract—The thesis supervision process represents a critical academic milestone for undergraduate students; however, in many Indonesian higher education institutions, it continues to operate conventionally and inefficiently due to fragmented communication, unstructured revision management, and a lack of organized inter-session support. This study designs and evaluates the BimBOl mobile application prototype as a digital thesis supervision support system using the Design Thinking methodology through five sequential stages: empathize, define, ideate, prototype, and test. A preliminary survey of 57 respondents (45 students and 12 lecturers) identified four dominant barriers: difficulty in scheduling coordination (73.1% of students), unstructured revision management (57.8% of students), absence of proactive notifications (57.9% of students), and loss of inter-session discussion context (53.3% of students). The BimBOl prototype integrates six core features across 30 interactive screens, encompassing collaborative scheduling, digital revision markup, automated notifications, a progress dashboard, structured revision history, and a four-mode AI Consultation feature as an independent inter-session support tool not found in comparable systems. Usability evaluation using the System Usability Scale (SUS) involved 15 respondents (12 students and 3 lecturers) and yielded a combined score of 80.8, surpassing the Grade A threshold (80.3), confirming Excellent/Acceptable usability. The mean student score of 77.9 (Good/Acceptable) and the mean lecturer score of 90.0 (Excellent/Best Imaginable) confirm that the design is effective across both user groups. Unlike prior studies that addressed thesis supervision digitalization through isolated features or interface-level redesigns, this study contributes a unified, human-centered mobile supervision ecosystem that simultaneously resolves scheduling, revision tracking, notification, and AI-assisted inter-session consultation, a combination not previously documented in the Indonesian higher education context, thereby providing an empirical and design foundation for next-generation thesis supervision systems.

Keywords: Design Thinking; Digital Thesis Supervision; Mobile Application; System Usability Scale; AI Consultation

1. INTRODUCTION

The undergraduate thesis represents the culmination of a student's academic journey. It is here that the full breadth of knowledge accumulated throughout one's undergraduate education is truly tested. In reality, however, the thesis supervision process at many Indonesian universities, including Universitas Prima Indonesia, continues to rely on outdated practices. Supervision schedules are difficult to coordinate, communication between lecturers and students remains disorganized, and revision documents are scattered across multiple channels without a centralized repository. As a result, many students experience significant delays in thesis completion, while academic supervisors face an increasingly heavy administrative burden [1], [2], [3].

A preliminary survey of 57 respondents comprising 45 students and 12 lecturers revealed four primary problems that underpin this research. First, the majority of respondents (73.1% of students and 63.6% of lecturers) reported difficulty coordinating supervision schedules due to the absence of a structured coordination mechanism, with all scheduling handled reactively and without systematic organization. Second, 57.8% of students and 66.7% of lecturers expressed the need for a structured digital revision markup system to prevent revision notes from being lost after supervision sessions conclude. Third, 57.9% of students and 41.7% of lecturers cited delays in document submission due to the lack of automatic reminders indicating submission deadlines. Fourth, approximately 53.3% of students reported losing continuity in inter-session discussions due to the absence of accessible session records after meetings ended.

Traditionally, thesis supervision has relied heavily on face-to-face meetings arranged informally through text messages, phone calls, or direct visits to lecturer offices. Without a standardized documentation system, communication between students and lecturers becomes dispersed across multiple channels, including WhatsApp, email, and even social media platforms [4]. This fragmentation renders information difficult to retrieve and track [5]. Furthermore, students frequently lose productivity between sessions due to the absence of independent guidance or consultation resources. This situation underscores the urgent need for a digital platform capable of consolidating the entire supervision process into a more coherent and organized ecosystem.

The rapid advancement of mobile technology presents a genuine opportunity to modernize the supervision process without diminishing its fundamental nature as an academic relationship between students and lecturers [6], [7], [8]. Data indicate that mobile phone ownership in Indonesia reached 67.88% of the total population in 2022, suggesting that mobile-based platforms possess extensive reach as a supervision support medium [9]. The digitalization of supervision is not intended to replace face-to-face meetings, but rather to complement them with features such as collaborative scheduling, digital revision management, and AI-powered consultation that functions between in-person sessions. Recent studies have demonstrated that large language model (LLM)-based systems such as ChatGPT possess strong potential to support academic assistance, personalized feedback, and independent learning activities in higher education environments [10].

Several prior studies have addressed the need for supervision digitalization from various perspectives. Artificial intelligence applications in higher education have increasingly attracted academic attention, particularly in supporting



adaptive learning and digital academic assistance systems [11]. Prasetya et al. found that ease of navigation was the most critical factor in user satisfaction with web-based thesis management systems, although that study did not address artificial intelligence features or bidirectional communication. Marthasari et al. demonstrated the effectiveness of combining Lean UX and the System Usability Scale in designing mobile academic application interfaces, although the scope was limited to interface design without addressing revision document management. Alawdi et al. showed that direct user involvement in each stage of the Design Thinking process yields more intuitive interfaces, yet the resulting systems lacked AI-powered consultation features [12]. Septiadi and Sukmawati documented a substantial increase in System Usability Scale scores from 33 to 87 following a Design Thinking-based redesign, providing compelling evidence of this method's effectiveness in academic systems, although the focus remained solely on interface redesign without introducing new functional features [13]; this finding is further corroborated by Zamakhsyari and Fatwanto's systematic review, which affirmed that Design Thinking consistently produces more usable interfaces while simultaneously highlighting the scarcity of research integrating artificial intelligence into academic systems developed through this approach.

The preceding review reveals a clear and unaddressed gap in the existing literature. While prior studies have individually explored usability evaluation, interface redesign, and Design Thinking implementation in academic systems, none has comprehensively integrated collaborative scheduling, digital revision markup, automated notifications, structured revision history, and AI-based consultation within a single mobile platform specifically designed for the Indonesian thesis supervision context. Prasetya et al. addressed usability but omitted AI and communication features; Marthasari et al. focused on interface usability without supervision workflow integration; Alawdi et al. implemented Design Thinking without intelligent consultation support; and Septiadi and Sukmawati concentrated on redesign without introducing new supervision-oriented functionalities. This gap serves as the primary motivation for the present study, which contributes (1) a unified mobile supervision ecosystem integrating five core supervision functions into a single application, (2) the incorporation of four-mode AI Consultation as a novel feature not found in any comparable prior system, and (3) empirical usability evidence obtained through a structured Design Thinking process involving both student and lecturer stakeholders in the Indonesian higher education context.

2. RESEARCH METHODOLOGY

2.1 Research Stages

This study employs the Design Thinking approach with five sequential stages as the primary framework for developing the BimbOl application. Design Thinking is widely recognized as a user-centered and iterative approach suitable for developing mobile-based educational technology systems that require continuous adaptation based on user feedback [14]. This approach was selected because it centers directly on user needs and has been proven effective in producing interface designs that align with real-world conditions. Design Thinking also facilitates iterative improvement based on user feedback, making it well-suited for research involving two user groups with distinct characteristics [15], [16]. An overview of the overall research stage sequence is presented in Figure 1.

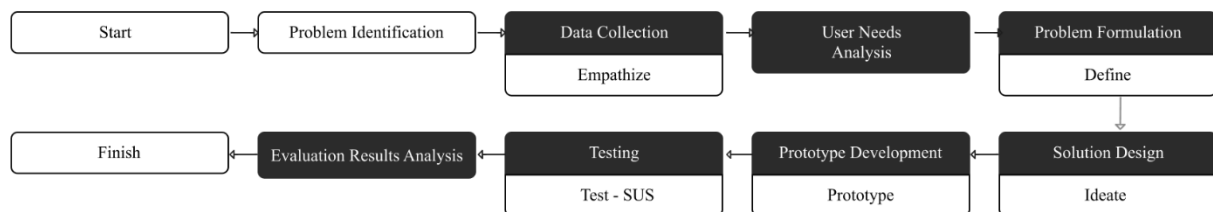


Figure 1. BimbOl Design Thinking Research Stages

The research commenced with a Problem Identification stage to recognize real barriers within the thesis supervision process. This was followed by the Empathize stage, in which questionnaires were distributed to students and lecturers to elicit firsthand accounts of their experiences. The findings were subsequently analyzed during the Needs Analysis stage to identify the most dominant problem patterns, then synthesized into a single problem statement during the Define stage, which served as the reference point for all subsequent design decisions. The Ideate stage produced a prioritized list of features along with the system architecture, which were then realized during the Prototype stage in the form of high-fidelity interfaces ready for testing. The prototype was evaluated in the Test stage using the System Usability Scale, and the results were processed during the Analysis stage to generate a comprehensive picture of the system's usability level. Each stage produced outputs that served as inputs for the subsequent stage.

2.2 Empathize Stage

Questionnaires were distributed online to 57 respondents comprising 45 final-year students and 12 active thesis supervisors, selected through purposive sampling. The questionnaire explored respondents' experiences across three primary dimensions: supervision scheduling, revision document management, and academic communication patterns. Data were analyzed descriptively using percentage distributions to identify recurring problem patterns across both user groups [17]. Respondent Composition in the Empathize Stage is presented in Table 1.

**Table 1.** Respondent Composition in the Empathize Stage

User Group	Total	Selection Criteria
Students	45	Currently undergoing or have completed supervision within the past 2 semesters
Thesis Supervisors	12	Actively supervising students
Total	57	Purposive Sampling

Table 1 shows that the study involved 57 respondents selected through purposive sampling, consisting of 45 students who were currently undergoing or had completed supervision within the past two semesters, and 12 thesis supervisors who were actively supervising students at the time of the study. The analysis identified four primary barriers that formed the basis of the system design:

- Scheduling coordination difficulties: 73.1% of students and 63.6% of lecturers reported difficulty in agreeing on supervision times.
- Unstructured revision management: 57.8% of students and 66.7% of lecturers indicated the need for a structured digital revision markup system.
- Absence automated notifications: 57.9% of students and 41.7% of lecturers reported the need for proactive reminders.
- Loss of inter-session discussion context: 53.3% of students experienced discontinuity in discussion flow between meetings.

2.3 Define Stage

All findings from the Empathize stage were organized using an affinity diagram into three clusters: supervision scheduling, document revision, and academic communication. Each cluster was analyzed to identify the underlying root causes. From these findings, a single problem statement was formulated to guide all subsequent design decisions [18]. Problem Statement: *Students and lecturers require an integrated digital platform that provides collaborative scheduling, interactive revision markup, automated notifications, and AI-based consultation to ensure that the thesis supervision process proceeds in an organized, well-documented, and productive manner between face-to-face sessions.*

2.4 Ideate Stage

Brainstorming sessions generated more than twenty feature ideas, which were subsequently filtered using a value-effort matrix. The six highest-value features were selected based on their user benefit and proportionality implementation effort.

Table 2. BimboI Priority Features and Pain Point Mapping

No.	Feature	Pain Point Addressed	Target User
1	Collaborative Scheduling	Scheduling coordination difficulties	Students & Lecturers
2	Digital Revision Markup	Undocumented revisions	Students & Lecturers
3	Automated Notifications	Absence of proactive reminders	Students & Lecturers
4	Progress Dashboard	Difficulty in aggregate monitoring	Lecturers
5	Structured Revision History	Loss of Inter-Session Context	Students & Lecturers
6	AI Consultation (4 Modes)	Absence of independent inter-session guidance	Students

Table 2 illustrates the mapping between BimboI's six priority features and the pain points identified in the empathize stage, along with their respective target users. Five of the six features target both students and lecturers, while the AI Consultation feature is specifically directed at students as an independent inter-session support tool. The AI Consultation feature with four modes: Quick, Chapter, Document, and Lecturer Settings, represents BimboI's primary differentiator not found in comparable systems. Educational chatbot systems and AI-assisted consultation technologies have shown promising potential in supporting student interaction and independent academic assistance within higher education environments [19]. At the prototype stage, this feature was simulated using large language model (LLM) APIs, specifically OpenAI GPT and Google Gemini, to demonstrate the feasibility of context-aware, natural language consultation tailored to thesis supervision needs. Each mode was conceptually structured with role-specific prompts to validate the interaction design, with full backend integration intended as a direction for future development. Two primary user flows were also designed to manage scheduling and revision documentation workflows, with an information architecture that supports intuitive navigation for both user roles.

2.5 Prototype Stage

The BimboI prototype was developed using Figma, producing 30 screens in total: 16 for the student workflow and 14 for the lecturer workflow, with a consistent orange-blue color scheme and five-tab bottom-bar navigation in accordance with Material Design 3 guidelines.

Table 3. Distribution of BimboI Prototype Screens

Group	Total Screens	Workflow Coverage
Students	16	Registration, home screen, scheduling, document submission, revision markup, history, notifications, AI Consultation (4 screens)



Group	Total Screens	Workflow Coverage
Lecturers	14	Home screen, progress dashboard, schedule management, document review, inline markup, notifications, AI configuration
Total	30	All primary workflows for both user groups

Table 3 details the distribution of the 30 prototype screens across two user groups, where 16 screens were allocated to the student workflow covering registration, scheduling, revision markup, and AI Consultation, while the remaining 14 screens supported the lecturer workflow encompassing schedule management, document review, progress dashboard, and AI configuration. The prototype is high-fidelity and interactive, enabling respondents to execute task scenarios realistically [20]. Figure 2 presents the application workflow diagrams for each user role.

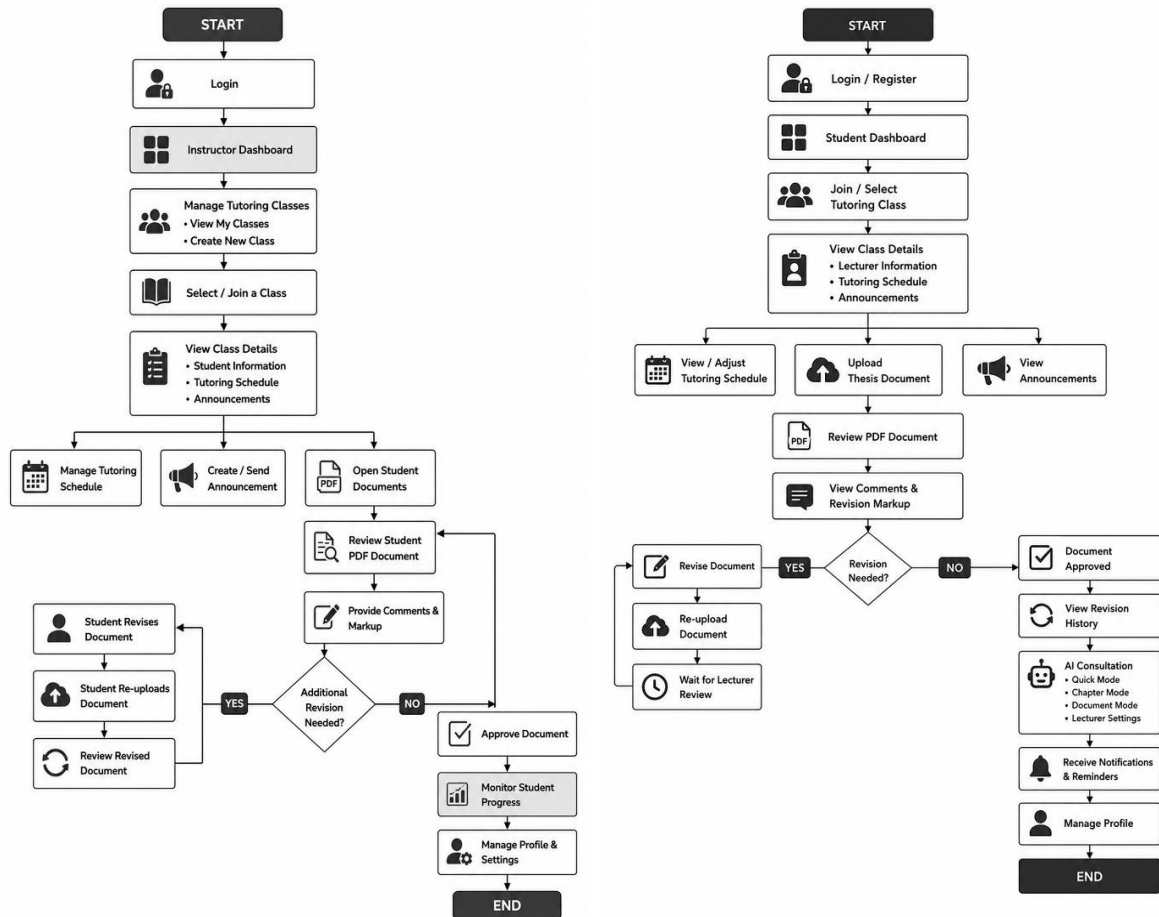


Figure 2. BimboI Application Flow: (a) For Lecturers, (b) For Students

The student workflow comprises nine stages, from login and schedule submission through document upload, feedback reception, and final approval. The lecturer workflow encompasses eleven stages centered on document review, markup provision, and schedule confirmation, with an aggregate dashboard that facilitates simultaneous monitoring of all supervised students.

2.6 Test Stage

Usability evaluation employed the System Usability Scale instrument consisting of 10 Likert-scale items rated from 1 to 5 [21]. A total of 15 respondents comprising 12 students and 3 lecturers, tested the prototype for a minimum of 15 minutes, following four task scenarios: meeting scheduling, document submission and revision reception, AI Consultation usage, and dashboard navigation. SUS scores were calculated using the standard formula. For odd-numbered items, the contribution is computed as the scale value minus 1; for even-numbered items, as 5 minus the scale value. All item contributions are summed and multiplied by 2.5, as follows:

$$SUS = \sum_{i=1}^{10} C_i \times 2.5 \tag{1}$$

$$C_{odd} = x_i - 1 \tag{2}$$

$$C_{even} = 5 - x_i \tag{3}$$

Results were interpreted using two classification systems: the Grade Scale by Brooke and the Adjective Rating by Bangor et al., with a minimum target score above 80.3 equivalent to Grade A with an Excellent rating [22], [23].

**Table 4.** SUS Score Interpretation Category Ranges

Score Range	Grade [24]	Acceptability Category[24]	Adjective Rating[25]
> 80,3	A	Acceptable	Excellent
74,1 - 80,3	B	Acceptable	Good
68,0 - 74,1	C	Marginal	Good
51,0 - 68,0	D	Marginal	OK
< 51,0	F	Not Acceptable	Poor

Table 4 presents the SUS score interpretation ranges used as the evaluative benchmark in this study. A score above 80.3 falls within Grade A and is classified as Acceptable with an Excellent adjective rating, representing the target threshold for BimbOl's usability evaluation. Scores between 74.1 and 80.3 are categorized as Grade B with a Good rating, while scores in the range of 68.0 to 74.1 and 51.0 to 68.0 are classified as Marginal under Grades C and D respectively. Any score below 51.0 is considered Not Acceptable and rated as Poor. This classification framework provides a standardized and widely recognized basis for interpreting the usability quality of the BimbOl prototype.

3. RESULT AND DISCUSSION

3.1 Empathize Stage Findings: Pain Point Identification

Survey analysis of 57 respondents identified four primary barriers most frequently encountered in conventional thesis supervision processes. Table 5 summarizes the percentage of respondents experiencing each barrier, disaggregated by user group.

Table 5. Percentage of Student and Lecturer Barriers

Pain Point	Students (n=45)	Lecturers (n=12)	Average
Scheduling Coordination Difficulties	73,1%	63,6%	70,2%
Unstructured revisions	57,8%	66,7%	60,5%
Absence of Proactive Notifications	57,9%	41,7%	52,6%
Loss of Inter-Session Context	53,3%	8,3%	38,8%

As shown in the table, scheduling coordination difficulties were the most prevalent barrier, reported by more than 70% of students and 63.6% of lecturers. These figures indicate that the absence of a structured scheduling mechanism has a tangible impact on the smoothness of the supervision process from both perspectives. The second barrier, unstructured revision management, showed a nearly proportional distribution between students (57.8%) and lecturers (66.7%), indicating that both groups equally experience the need for a jointly accessible digital markup system.

The third barrier, the absence of proactive notifications, revealed a notable difference in perception between students (57.9%) and lecturers (41.7%). Students appear to have a greater need for automatic reminders, likely because they are more prone to missing document submission deadlines. Meanwhile, the fourth barrier, the loss of inter-session context, was perceived far more strongly by students (53.3%) than by lecturers (8.3%). This discrepancy is particularly striking and carries important implications for system design.

From the student perspective, the absence of structured records frequently compels students to revisit previously covered discussions due to the lack of retrievable session logs. From the lecturer's perspective, the situation differs considerably: lecturers who supervise multiple students simultaneously have a greater need for tools that help them recall the specific supervision context of each individual student, beyond general note-taking. These findings affirm that an effective supervision system must simultaneously address the needs of both user groups, not merely one side.

Collectively, the four identified barriers are deeply interrelated. Scheduling coordination difficulties exacerbate the absence of proactive notifications, while unstructured revision management directly contributes to the loss of inter-session context. This interconnection indicates that solutions addressing only a single aspect will be insufficient to comprehensively improve supervision quality. A holistic and integrated design approach is required, and this is precisely what BimbOl seeks to address.

3.2 Mapping Pain Points to System Features

Based on the findings from the Empathize stage, six primary features were designed to proportionally address the four identified barriers. Table 6 presents the direct mapping between each feature and its targeted pain points.

Table 6. Feature and Pain Point Mapping

Feature	Primary Pain Point	Secondary Pain Point	Urgency
Collaborative Scheduling	Scheduling Coordination Difficulties	-	Critical
Digital Revision Markup	Unstructured revisions	Loss of Inter-Session Context	Critical
Automated Notifications	Absence of Proactive Notifications	Coordination difficulties	High
Progress Dashboard	Loss of Inter-Session Context	-	High
Structured Revision History	Loss of Inter-Session Context	Unstructured revisions	High



Feature	Primary Pain Point	Secondary Pain Point	Urgency
AI Consultation (4 Modes)	Loss of Inter-Session Context	Absence of notifications	Innovation

Table 6 demonstrates that the collaborative scheduling and digital revision markup features fall into the critical category, as both directly address the two most prevalent barriers experienced by more than 70% of respondents. The automated notification feature serves a dual function, simultaneously addressing the absence of reminders and improving scheduling coordination efficiency. The AI Consultation feature, meanwhile, serves as BimOI’s primary differentiator not found in comparable systems, specifically designed to help students maintain productivity outside face to face supervision sessions.

A notable characteristic of this mapping is that the majority of features were designed to address more than one barrier simultaneously. For instance, the digital revision markup feature not only resolves the problem of unstructured revisions but also indirectly preserves inter-session context continuity, as all revision notes are stored and remain accessible at any time. This design approach, which accounts for the interdependence of barriers, aligns with the holistic principle of Design Thinking that prioritizes comprehensive solutions to complex user needs.

The decision to place AI Consultation in the "Innovation" category reflects its status as a feature not yet found in comparable systems. Unlike scheduling or notification functions that are already common in various academic management platforms, AI powered consultation with four adaptive modes represents a distinctive capability that addresses the specific needs of students in maintaining academic productivity outside face to face sessions. Given the frequently non ideal lecturer to student ratios in Indonesian higher education institutions, this feature has the potential to serve as an independently accessible companion that is always available to address academic questions arising during the thesis writing process.

3.3 Prototype Development Results

The BimOI prototype was developed using Figma, producing 30 interactive screens with a high-fidelity design. Table 7 presents the distribution and functional coverage of prototype screens by user group.

Table 7. Distribution and Functional Coverage of Prototype Screens

User Type	Total Screens	Functional Description
Students	16	Registration (2), Home Screen (1), Scheduling (3), Document Submission (2), Inline Markup (2), History (2), Notifications (1), AI Consultation (4)
Lecturers	14	Home Screen (1), Progress Dashboard (2), Schedule Management (2), Document Review (2), Inline Markup (2), Notifications (1), AI Configuration (2)
Total	30	Covers all primary workflows for both user groups

The prototype encompasses complete workflows for both user groups. Students have a greater number of screens because their workflow includes the AI Consultation feature with four distinct modes: Quick mode for general questions within 2–5 minutes, Chapter mode for in-depth per-chapter analysis, Document mode for comprehensive feedback on the complete document, and Lecturer Settings mode for adjustments aligned with the supervising lecturer’s preferences. All screens employ a consistent orange-blue color palette with Material Design 3 typography to ensure optimal readability.

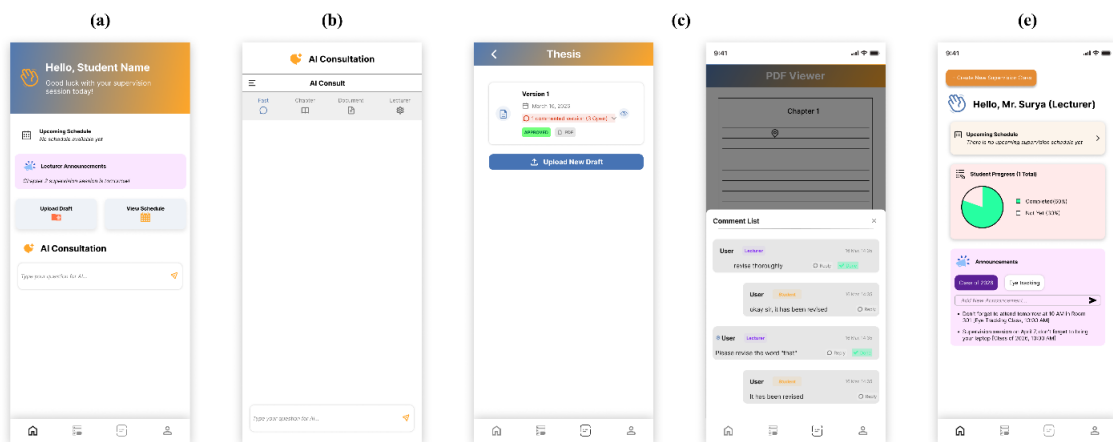


Figure 3. BimOI Prototype Interface: (a) Student Home Screen, (b) AI Consultation Quick Mode, (c) Digital Revision Markup, (d) Lecturer Progress Dashboard

Figure 3 illustrates the consistent color scheme across all prototype screens, with five-tab bottom-bar navigation that facilitates seamless transitions between primary features. High-readability principles were applied in accordance with Material Design 3 guidelines, resulting in a clean and user-friendly interface for both user groups.

The difference in screen count between students and lecturers reflects the differing complexity of their respective workflows. Students have more screens partly because the AI Consultation feature alone requires four separate interfaces



tailored to different interaction types. The lecturer screens, while fewer in number, encompass features with greater functional complexity, such as inline document markup and an aggregate dashboard that summarizes the progress of all supervised students simultaneously. This difference reflects design principles rooted in the actual usage context of each group, consistent with the findings of the Empathize stage.

The use of Figma allows for the creation of realistic interactive inter-screen links, enabling respondents to experience the application authentically during evaluation sessions without developing native code, which would require substantially greater time and resources. This high-fidelity prototyping approach is recognized in the literature as a valid method for evaluating usability prior to production implementation, particularly in Design Thinking-based research that prioritizes rapid iteration.

3.4 Usability Evaluation Results Using the System Usability Scale

The usability evaluation involved 15 respondents comprising 12 students and 3 lecturers who tested the prototype for 15–30 minutes following structured task scenarios, then completed the 10 item SUS questionnaire. The individual scores for each group are presented in Table 8 and Table 9.

Table 8. Student SUS Scores

Respondent	SUS Score	Grade	Category
Students 1	75,0	B	Acceptable
Students 2	82,5	A	Excellent
Students 3	70,0	C	Marginal
Students 4	85,0	A	Excellent
Students 5	72,5	B	Acceptable
Students 6	80,0	A	Excellent
Students 7	77,5	B	Acceptable
Students 8	85,0	A	Excellent
Students 9	72,5	B	Acceptable
Students 10	82,5	A	Excellent
Students 11	75,0	B	Acceptable
Students 12	80,0	A	Excellent
Mean ± SD	77,9 ± 5,0	B	Acceptable/Good
95% CI	[74,8–81,0]	-	-

Student scores ranged from 70.0 to 85.0 with a mean of 77.9 ± 5.0 . This value falls within the Grade B (Acceptable) category in the range of 74.1 – 80.3, indicating that students consider BimboI to be good but with room for improvement, particularly in terms of accessibility and clarity of more complex features.

Table 9. Lecturer SUS Scores

Respondent	SUS Score	Grade	Category
Lecturers 1	87,5	A	Excellent
Lecturers 2	92,5	A	Excellent
Lecturers 3	90,0	A	Excellent
Mean ± SD	90,0 ± 2,5	A	Excellent
95% CI	[83,6–96,4]	-	-

Lecturer scores were substantially higher, ranging from 87.5 to 92.5 with a mean of 90.0 ± 2.5 . This value exceeds the Grade A threshold and approaches the Best Imaginable category above 90. The 12.1-point score difference between students and lecturers warrants careful interpretation: this does not indicate that the design failed for the student group, but rather reflects the differing technological experience of the two groups. Lecturers who routinely use various academic information systems tend to adapt more rapidly to tab-based interfaces and hierarchical navigation. Conversely, students interacting for the first time with features such as digital revision markup and AI Consultation face a steeper learning curve [26].

The heterogeneity of student scores is also noteworthy, with a relatively wide range from 70.0 to 85.0 ($SD = 5.0$). This reflects genuine variation in digital literacy among students: those already familiar with mobile productivity applications tended to assign higher scores, while those less experienced rated the system in the Marginal-to-Acceptable range. These findings have important implications for subsequent development: BimboI should be equipped with more comprehensive onboarding features and contextual tooltips to assist users with lower digital literacy in understanding complex features.

3.5 Comparative Analysis of Combined SUS Scores

Table 10 presents a comparative summary of SUS scores across both user groups, including the combined score that serves as the primary benchmark for evaluating BimboI's overall usability achievement.



Table 10. Combined SUS Scores

Group	n	Mean	SD	95% CI	Grade	Category
Students	12	77,9	5,0	[74,8-81,0]	B	Good
Lecturers	3	90,0	2,5	[83,6-96,4]	A	Excellent
Combined	15	80,8	6,8	[77,1-84,5]	A	Excellent

The composite score from 15 respondents yielded a value of 80.8 ± 6.8 , surpassing the Grade A threshold of 80.3 and achieving an 'Excellent' rating. Although the lower bound of the 95% confidence interval touched 77.1, the mean value of 80.8 clearly exceeds the threshold and demonstrates that BimOI successfully achieved the minimum usability target established in this study [27].



Figure 4. SUS Score Analysis : (a) Student Respondents, (b) Lecturer Respondents

3.6 Comparison with Comparable Systems

To evaluate the usability performance of BimOI, a comparison was conducted against several comparable systems from previous studies that also employed the System Usability Scale (SUS) as their evaluation instrument. The comparison results are presented in Table 11.

Table 11. Comparison of SUS Scores with Comparable Systems

Sistem	Study	n	SUS Score	Quality
BimOI (combined)	This study	15	80,8	Grade A (Excellent)
Aplikasi SIAKAD UNY	Alawdi dkk. [12]	30	82,4	Grade A (Excellent)
Redesign Ezzi School	Septiadi & Sukmawati [13]	24	87,0	Grade A (Excellent)
Redesign Repository App	Ramadhan & Aji [28]	20	93,58	Grade A (Excellent)
Baseline Threshold	Brooke [24]	-	80,3	Grade A (minimum)

The BimOI score (80.8) is consistent with results from other Design Thinking-based academic systems [28], although slightly below systems that have undergone further iterations. This difference is understandable given that BimOI remains a high-fidelity prototype that has not yet been fully implemented, while the comparison systems are already in active use.

It is important to note that BimOI differs in functional complexity from the three comparison systems. SIAKAD UNY is a general academic information system, while the Ezzi School and Repository App redesigns focused on interface improvements without introducing significant new features. BimOI, by contrast, was built from the ground up with an exclusive focus on the thesis supervision ecosystem, supplemented by innovative features such as multi-mode AI Consultation not found in any comparable system. In this context, a score of 80.8 for a new system with greater functional complexity represents a considerable achievement and demonstrates that the Design Thinking approach successfully produced an intuitive interface despite the novelty of its features.

A notable pattern emerging from this comparison is that systems with the highest scores are generally those that simplify existing interfaces rather than those introducing new interaction paradigms. The greater the number of elements unfamiliar to users, the greater the cognitive challenge encountered during evaluation, which may ultimately suppress



scores even when the design quality is objectively high [29]. Within this framework, BimbOl's score of 80.8 can be interpreted as a genuine indicator of design strength.

3.7 Limitations and Interpretation of Results

The combined SUS score of 80.8 obtained by BimbOl is consistent with findings from prior Design Thinking-based academic system studies. Alawdi et al. [11] reported a SUS score of 82.4 for the SIAKAD UNY application developed with direct user involvement in each Design Thinking stage, demonstrating that participatory design yields usable interfaces, a finding corroborated by the present study. Septiadi and Sukmawati [13] documented an improvement from 33 to 87 following a Design Thinking-based redesign of the Ezzi School system, further affirming the method's effectiveness, although their study focused solely on interface refinement without introducing new functional features. Ramadhan and Aji [28] achieved the highest score of 93.58 in their Repository App redesign, which targeted a narrower, more familiar interface scope. In comparison, BimbOl's score of 80.8, while slightly below these redesign-focused systems, was achieved by a prototype introducing entirely new interaction paradigms, including four-mode AI Consultation, for users encountering such features for the first time. This pattern aligns with Prasetya et al.'s finding that user familiarity with interface elements is a critical determinant of satisfaction scores, and with Marthasari et al.'s observation that cognitive load during first exposure to novel features tends to moderate usability ratings. Collectively, these comparisons affirm that BimbOl's score represents strong design quality relative to its level of functional novelty and prototype maturity.

Several limitations of this study warrant acknowledgment. First, the evaluation was conducted on a Figma prototype rather than a fully operational application. User experience with a prototype may differ from that of a genuine native application in terms of responsiveness and handling of unexpected conditions. Furthermore, the AI Consultation feature was evaluated only at the prototype interaction level to assess usability and interaction feasibility, without implementing a fully operational backend system or real-time AI processing environment. Second, only three lecturers participated in the evaluation, limiting the statistical generalizability for this group, as evidenced by the wide confidence interval [83.6–96.4] resulting from the small sample size. Third, testing was conducted in a single session without follow-up, making it impossible to capture user adaptation processes or long-term effects on usage satisfaction under real-world conditions. Nevertheless, the findings of this study provide meaningful preliminary validation that the BimbOl design meets international Grade A usability standards and demonstrates strong potential for further development toward production implementation. The existing limitations must be acknowledged before making definitive claims about the system's effectiveness in an actual thesis supervision context.

4. CONCLUSION

This study successfully designed and evaluated the BimbOl mobile application prototype as an integrated digital thesis supervision support system using the Design Thinking approach through five sequential stages: empathize, define, ideate, prototype, and test. The development process was grounded in empirical findings from a preliminary survey involving both students and lecturers, which identified four primary barriers in conventional thesis supervision: scheduling coordination difficulties, unstructured revision management, the absence of automated notifications, and the loss of inter-session discussion continuity. The proposed system addresses these challenges through six core features: collaborative scheduling, digital revision markup, automated notifications, a progress dashboard, structured revision history, and four-mode AI Consultation integrated within a single mobile ecosystem. The AI Consultation feature represents BimbOl's primary differentiator from comparable systems, addressing the absence of intelligent inter-session guidance in existing academic supervision platforms. Usability evaluation using the System Usability Scale demonstrated that the prototype achieved Grade A performance with an Excellent rating, indicating strong acceptance from both user groups. The score difference between students and lecturers reflects differences in digital literacy rather than a fundamental design shortcoming. BimbOl is not intended to replace face-to-face supervision sessions, but rather to serve as a productive bridge sustaining communication and documentation between meetings. The findings confirm that Design Thinking effectively supports user-centered academic application development while highlighting the potential of AI-assisted supervision systems in improving thesis supervision productivity. This study provides an empirically validated reference model for future development of intelligent digital supervision platforms in Indonesian higher education institutions. Future research is recommended to pursue full-scale implementation, longitudinal usability testing, and integration with institutional academic systems.

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