

Optimizing UI/UX of AIMsCORE Application with Design Thinking to Enhance User Interaction and Engagement

Jannatunnisa^{1*}, Abdul Rahim², Sayekti Harits Suryawan³

^{1,2,3}Department of Informatics Engineering, Faculty of Science and Technology, Universitas Muhammadiyah Kalimantan Timur, Samarinda, East Borneo, Indonesia
E-mail: ¹*2111102441126@umkt.ac.id, ²ar622@umkt.ac.id, ³shs500@umkt.ac.id

(Received: 15 Feb 2025, revised: 20 Apr 2025, 25 Apr 2025, accepted: 29 Apr 2025)

Abstract

The AIMsCORE student assessment application at the AIK and MKDU Institute faces challenges in terms of interface and user experience, including unresponsive design, unintuitive navigation, and reliance on administrators for grade updates. This study aims to optimize AIMsCORE's UI/UX using the Design Thinking approach (empathize, define, ideate, prototype, testing) and usability measurement through the Single Ease Question (SEQ). In the empathize phase, in-depth interviews were conducted with 15 informants, including institutional leaders, lecturers, and administrative staff. Data were validated through triangulation comparing information from multiple sources and perspectives to ensure objectivity and minimize bias. This method strengthens data credibility and informs problem-based solution design. SEQ was used to assess usability, measuring user difficulty in interacting with the prototype. Results show improved usability: ease of use rose by 6.15% (from 65 to 69), visual design increased by 25% (from 56 to 70), and user expectation alignment improved by 18.03% (from 61 to 72). New features such as grade import and real-time notifications enhanced efficiency and user satisfaction. This study offers practical insights for institutions and organizations seeking to develop responsive, data-driven academic applications grounded in user-centered UI/UX principles.

Keywords: UI/UX Optimization, Design Thinking, Single Ease Question (SEQ), Academic Portal, Usability Testing

I. INTRODUCTION

Muhammadiyah University of East Kalimantan (UMKT) has an AIK and MKDU Institute responsible for implementing the university curriculum, including the management of MKDU course assessment systems. In August 2022, AIMsCORE, a web-based application for inputting MKDU grades, was launched to enhance efficiency and user interaction. AIMsCORE functions as a grading portal that supports academic data management. User Experience (UX) and User Interface (UI) are key elements in application development. UX focuses on ease and user satisfaction [1], while UI ensures an attractive and functional visual appearance [2][3]. Optimal UI/UX design allows users to achieve their goals more efficiently [4]. Therefore, the relationship between UI and UX is essential [5] in the development of AIMsCORE to ensure the application is not only visually responsive but also enhances the user experience in academic assessment systems [1].

The AIMsCORE application at UMKT's AIK and MKDU Institute, which plays a role in learning evaluation and academic administration, has revealed several issues.

Interviews with the vice-chair of the Institute and end-users highlighted the need for UI/UX optimization due to several usability barriers, particularly for new users. The main issues include difficulty understanding information, unintuitive navigation, and limited access to grade updates restricted only to administrators forcing lecturers to repeatedly contact admins. Additionally, the application lacks in-app guidance for inputting grades, resulting in admins having to manually distribute user instructions. In terms of appearance, AIMsCORE still uses a standard Bootstrap template, which is rigid and outdated in terms of modern design trends. Usability evaluation through a website checker (Figure 1) showed an overall score of 64%, with mobile compatibility scoring only 29%, indicating the app is not responsive on small-screen devices. This is a significant issue considering smartphone users in Indonesia reached 209.3 million in 2023 [6].

The purpose of this study is to optimize the UI/UX of the AIMsCORE application to address the problems faced by both users and the institution. Although the application is functionally usable and has been implemented, design and feature optimization are still necessary to enhance user satisfaction and comfort.[7]. One of the methods that can be

used for UI/UX optimization is Design Thinking. This method is chosen because it focuses on user needs, allowing the system to be designed in a way that delivers an optimal experience and enhances user satisfaction during use [7]. The Design Thinking method consists of five stages: empathize, define, ideate, prototype, and testing. This approach is capable of addressing user needs and solving problems encountered when using the AIMsCORE application. During the usability testing process, the researcher employed the Single Ease Question (SEQ) measurement method, which enables direct assessment of specific parts of the prototype that may present usability issues [8]. Through SEQ, researchers can conduct a more in-depth analysis of individual aspects of the user experience, such as obstacles, ease of use, and task effectiveness [9], thus it provides a detailed insight into how users interact with the tested prototype [10].

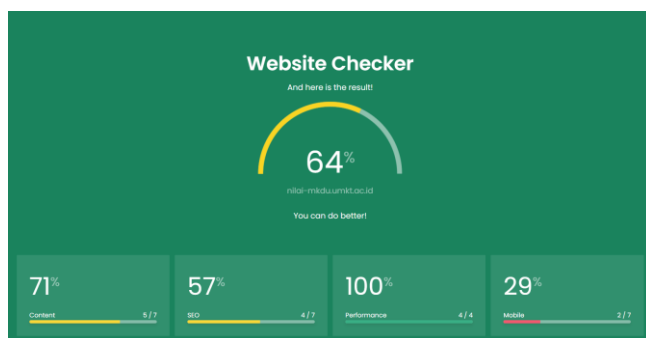


Figure 1. Testing Using Website Checker

This study is expected to optimize and enhance the quality of user interaction with the AIMsCORE application by presenting a more intuitive interface design, more structured navigation, and responsive functionality. Consequently, the user experience—both for lecturers and administrators—can be significantly improved, making the application more effective in supporting the academic assessment process.

II. RESEARCH METHODOLOGY

The five stages of Design Thinking provide a systematic framework for identifying user experience (UX) issues and designing innovative solutions as shown in Figure 2. This method includes the following phases: (1) Empathize (understanding user needs), (2) Define (defining the core problem), (3) Ideate (generating solution ideas), (4) Prototype (creating mockups), and (5) Testing (trial and evaluation) [11]. Each phase is designed to guide a structured process from problem identification and analysis to the implementation of user-centered solutions.

The empathize phase involves exploring problems through interviews with participants to understand the issues and user needs more deeply [11]. Face-to-face interviews were conducted, each lasting 15–30 minutes. The interviews comprised 40 questions divided into two sessions, focusing on user interface, user experience, and the primary issues users frequently encounter. The collected data was analyzed and validated using data triangulation—comparing and reviewing

the consistency of information from various sources, data collection techniques, and informant perspectives. This method enhances the accuracy, credibility, and validity of findings, ensuring the data is unbiased and objectively reflects actual conditions [12]. In addition to interviews, triangulation also included direct observation of user interactions with the system and analysis of previous usage documentation, offering deeper insights into the issues users faced. By comparing data, triangulation allowed researchers to identify consistent patterns and discrepancies in user experiences and ensured that the findings were accurate and representative [13]. This approach not only strengthens the reliability of the research results but also provides a solid foundation for developing more effective and user-centered UI/UX solutions [14].

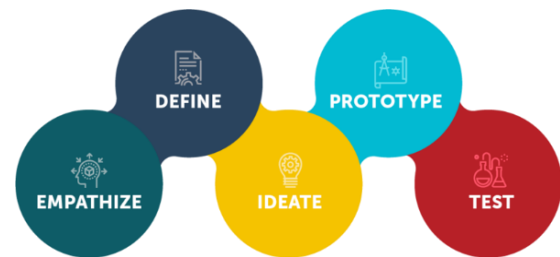


Figure 2. Design Thinking Method

In the define phase, data collected during the empathize stage is analyzed and mapped using an empathy map, then grouped to formulate the core problem statement. The results are translated into user personas, pain points, and How-Might-We statements. The user personas represent user needs, pain points highlight user challenges, and the design solutions aim to resolve these issues [11].

In the ideate stage, brainstorming sessions are conducted to generate various ideas or solutions based on the problem statements [11]. These ideas are filtered and organized using tools such as Miro to select the most suitable solution to be implemented in the subsequent interface design phase.

During the prototype stage, selected solutions are designed into application interfaces using Figma. The prototypes include both low-fidelity and high-fidelity designs, based on the selected ideas.

In the testing phase, usability testing is conducted on the developed prototype to evaluate the application's ease of use. This testing uses the Single Ease Question (SEQ) method, a Likert scale-based (1–5) evaluation tool designed to measure system usability from the user's perspective. The SEQ test consists of 10 questions covering ease of use, clarity of data input processes, interface appearance, navigation, processing speed, technical stability, feature relevance, alignment with user expectations, and user productivity in inputting data. To support testing, users were given test scenarios simulating real-life application use, allowing them to evaluate the prototype in a contextual setting. Through SEQ, researchers gathered both quantitative and qualitative feedback to assess design effectiveness and identify interaction challenges. This approach provides in-depth insight into how users respond to available features and serves as a basis for future design iterations [15].

III. RESULT AND DISCUSSION

Before entering the design thinking stages, the researcher conducted usability testing using the SEQ (Single Ease Question) questionnaire to identify critical points on the system interface that required improvement. The test results (Table 1) show the variation in user responses (R1–R15) across 10 usability parameters, serving as the basis for quantitative analysis to prioritize enhancements. These findings enabled the researcher to systematically examine the problems before designing user-centered solutions.

Table 1. SEQ Testing Before Redesign

No	Informant	Question									
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	R1	4	4	3	3	4	3	4	5	3	4
2	R2	5	4	4	4	4	3	4	4	5	4
3	R3	4	5	4	4	4	4	5	4	4	3
4	R4	5	5	4	5	4	5	5	5	5	5
5	R5	5	5	5	4	5	5	5	4	4	4
6	R6	5	5	4	4	5	4	5	4	4	4
7	R7	5	4	5	5	4	5	5	5	5	5
8	R8	2	4	3	5	2	5	5	2	2	3
9	R9	4	4	4	5	4	4	4	3	4	5
10	R10	5	5	5	5	4	4	5	4	5	4
11	R11	4	4	3	4	4	3	4	4	4	4
12	R12	5	5	5	5	5	5	5	5	5	5
13	R13	5	5	3	4	4	5	5	3	4	5
14	R14	2	3	1	4	3	4	5	5	4	5
15	R15	5	3	3	4	4	5	5	4	4	5
Total Point		65	65	56	65	60	64	71	61	62	65
Maximum Point		75									
Average		63.40									

Based on assessment data from 15 informants responding to 10 questions (P1–P10), a descriptive analysis was conducted to understand data tendencies. The total score was calculated by summing the values provided by the informants for each question, where the highest score was for P6 with a value of 71, while P3 received the lowest score of 56. The overall average was calculated using the Formula 1:

$$X = \frac{\sum P_n}{10} \quad (1)$$

With a total score of 634, the average was 63.40. This result indicates that, overall, the informants' evaluations fall in the upper-middle category. To measure how close the scores are to the maximum value (75), the percentage per question was calculated using the Formula 2:

$$\%P_n = \left(\frac{\sum P_n}{\text{Maximum Score}} \right) \times 100\% \quad (2)$$

Most of the questions showed percentages above 80%, indicating that the evaluated aspects received positive assessments. Overall, the majority of variables had high scores with an average of 63.40 out of a maximum of 75. P7, which focuses on application features, received the highest score, indicating strong user acceptance. Conversely, P3, related to interface design, received the lowest score, highlighting the need for further improvement. These findings align with user

experience (UX) evaluation principles, where both functionality and aesthetics must be optimized to enhance user satisfaction [16]. Therefore, the usability results can serve as a foundation for further research, particularly in the iterative design process before entering the design thinking stage, in accordance with user-centered system development methods.

A. Empathize

At this stage, data collection was conducted to identify problems and user needs through interviews. A total of 15 informants were involved in the interviews, consisting of 12 teaching lecturers, 2 institutional leaders, and 1 application developer. The results of the interviews were validated using data triangulation techniques to reduce bias and increase result validity [17], ensuring the data presented aligns with the problems encountered [12]. From the interviews, lecturers reported difficulties in inputting grades and monitoring the status updates of uploaded grades, often requiring them to contact the admin for confirmation of grade publication. Additionally, another identified issue was the limited interface on mobile devices, making it difficult for users to monitor and update grades. Based on these findings, UI/UX optimization of the AIMsCORE application was carried out to improve efficiency and ease in the academic grading administration process within MKDU.

From the interview data, the following user characteristics were identified:

1. Users are both male and female.
2. There are two user roles in the application: superadmin and user.
3. Grade input is predominantly done using a laptop.

Based on these identified characteristics, user personas were developed to summarize problems, needs, goals, behaviors, and demographics of potential users. The previously gathered information served as the basis for developing personas for the two user types: superadmin and user. These user personas are not representations of individual users but are fictional characters constructed based on observed user behavior patterns and motivations during the design process [18]. Figure 3 shows a sample persona for a superadmin, and figure 4 presents a sample persona for a user.

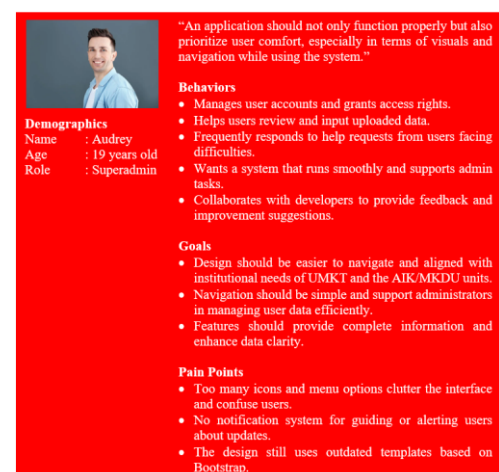


Figure 3. User Persona for Admin

The image shows the user persona of Audrey, a 19-year-old superadmin. He manages user accounts, monitors data, and handles users’ technical issues. Audrey desires an intuitive design and activity notifications. His challenges include complex navigation, lack of guidance, and the use of default Bootstrap templates, which are less than optimal.

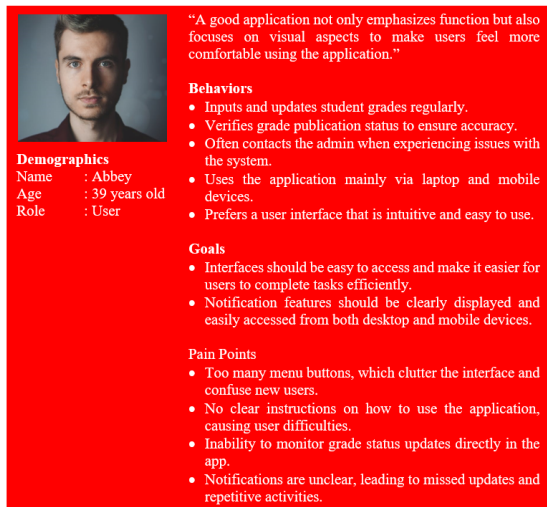


Figure 4. User Persona for User

The image above presents the user persona of a lecturer named Abbey, aged 39. He desires a simpler application interface, notification features, and data import functionality to enhance efficiency. However, he faces challenges due to complex navigation, a less intuitive interface, and the absence of data import features and clear grade update status.

B. Define

In this stage, interview results from the previous phase were analyzed and mapped using an empathy map. This mapping functions as a tool to understand problems and identify user needs in decision-making. The empathy map consists of four aspects: Says (what the user says), Thinks (what the user thinks), Does (what the user does), and Feels (what the user feels). Table 2 presents the empathy map for AIMsCORE users.

After mapping out the problems faced, the next step is to re-analyze the information to clearly and specifically identify the problem statement from the previous phase. In this context, the How Might We table can be used to help formulate the problems into open-ended questions that encourage creative solutions [19]. This structured problem formulation facilitates the development of solutions in the next phase. Table 3 below presents the How Might We statements that have been compiled.

Table 2. Empathy Map Table

No	Says	Thinks	Does	Feels
1	"Why is there no notification when there's a grade update?"	"I have to keep checking for grade changes manually."	Frequently checks the app to ensure data updates.	Tired
2	"This app is hard to access on mobile."	"It should be easy to use on all devices."	Tries to access the app from various devices.	Dissapointed
3	"Why do we have to input grades one by one? This takes too long."	"This is very inefficient, there should be a bulk input feature."	Spends a long time entering data one by one.	Tired and Bored
4	"There are no instructions on how to use this app?"	"I have to figure out how to use this app on my own."	Tries out different features or asks colleagues.	Confused
5	"The navigation is confusing, too many menus."	"It's hard to quickly find the features I need."	Tries various menus and buttons to find the desired function.	Confused

Table 3. How Might-We Table

No	Problem	How-might we	Solution
1	No notification related to grade updates and data changes.	How might we ensure users receive notifications whenever there is a grade or data update?	1) Add real-time notification features via the application. 2) Use push notifications on mobile devices. 3) Provide an activity log so users can view update history.
2	Limited accessibility on mobile devices.	How might we improve application accessibility on mobile devices?	1) Adjust the display to be responsive for various screen sizes. 2) Ensure compatibility with multiple browsers and operating systems.
3	Grade input is done one-by-one and is inefficient.	How might we speed up and simplify the grade input process?	1) Add a bulk input feature using Excel/CSV files. 2) Provide an import option to accommodate file uploads.
4	No usage guide for the application.	How might we make the application easier to use for new users?	1) Provide interactive tutorials or video guides. 2) Provide FAQs and documentation within the application.
5	Navigation is too crowded and confusing.	How might we simplify the navigation to be more intuitive?	1) Redesign the menu with a more logical structure. 2) Provide a search feature to find functions more easily. 3) Use a more minimalistic and user-friendly UI design.

C. Ideate

At this stage, solution ideas are gathered through brainstorming based on the previously defined problem statements. The solution ideas to be implemented will be

selected using a user-driven method. Table 4 presents the solution ideas proposed by AIMsCORE application users based on the interviews conducted.

Table 4. Idea Solution Application AIMsCORE

No.	Code Problem	Code Solution	Solution Idea
1	PM_D_01	S_01	Push notifications for grade updates and data changes
		S_02	Notification dashboard within the application
		S_03	Grade update indicator on the homepage
2	PM_D_02	S_01	Mobile-friendly version with responsive design
		S_02	Optimization of loading speed for low-end devices
		S_03	Compatibility testing with various browsers and OS
3	PM_D_03	S_01	Bulk grade input feature using import file (Excel/CSV)
		S_02	Automated grade input template for lecturers
4	PM_D_04	S_01	Interactive tutorial when accessing the application
		S_02	Video guides and FAQ within the application
		S_03	Downloadable user guide in PDF format
5	PM_D_05	S_01	Minimalist and user-friendly UI design
		S_02	Menu restructuring based on feature priorities
		S_03	Quick search feature to find needed functions
		S_04	Clear icons and short descriptions for each menu

D. Prototype

At this stage, a prototype of the solution is designed. There are two types of prototypes: low fidelity and high fidelity. A low-fidelity prototype is an initial design with minimal details, typically using basic colors such as black, white, or gray. Meanwhile, a high-fidelity prototype closely resembles the final system, including visual elements such as images, icons, and colors [7]. Prototypes are created for both users and super admins. Figures 5 and 6 show examples of low-fidelity implementations on desktop and mobile devices for users and super admins. Figures 7 and 8 show examples of high-fidelity implementations on desktop and mobile devices for users and super admins.



Figure 5. Low-fidelity Prototype for Mobile Version



Figure 6. Low-fidelity Prototype Desktop Version

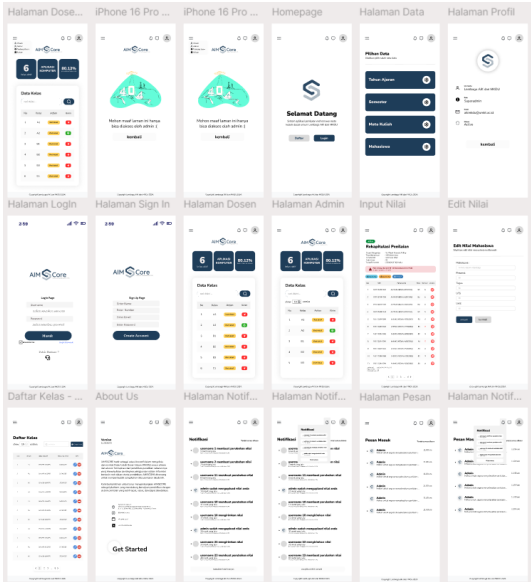


Figure 7. High-fidelity Prototype Mobile Version

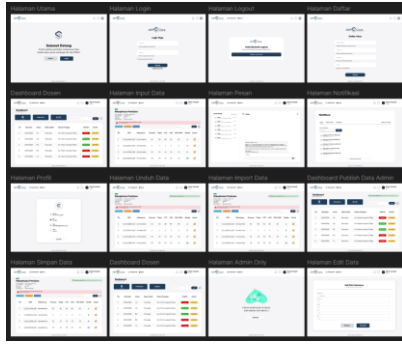


Figure 8. High-fidelity Prototype Desktop Version

E. Testing

At this stage, testing was conducted on the previously developed prototype based on the user design solutions, involving one lecturer, one institutional staff member, and one application developer from the AIK and MKDU Institute. The testing used usability testing to assess the level of ease of use for users. Participants were given the SEQ questionnaire, which is used to measure the user experience (UX) of each user. This testing was guided by a task scenario, as shown in Table 5 below.

Table 5. Task Scenario For User

No	Function	Task	Scenario
F1	Login & Registration	Participants access the homepage and perform login/registration.	Participants test the homepage prototype, complete the task, evaluate using SEQ, and provide feedback.
F2	Dashboard Access	Participants access the user dashboard page.	Participants test the dashboard prototype, complete the task, evaluate using SEQ, and provide feedback.
F3	Grade Search & Input	Participants search for information on the dashboard and input grades (manually/upload).	Participants test the search and grade input features, complete the task, evaluate using SEQ, and provide feedback.
F5	Edit Grades	Participants edit student grades.	Participants test the edit grade feature, complete the task, evaluate using SEQ, and provide feedback.
F6	Notification	Participants check grade change notifications.	Participants test the notification feature, complete the task, evaluate using SEQ, and provide feedback.
F7	Inbox	Participants check messages from the admin.	Participants test the inbox feature, complete the task, evaluate using SEQ, and provide feedback.
F8	Restricted Access	Participants attempt to access restricted pages.	Participants test access restrictions, complete the task, evaluate using SEQ, and provide feedback.

The implementation of task scenario testing was carried out with the participation of informants who provided assessments based on the provided questionnaire. The evaluation results were then analyzed to measure the extent of improvement before and after the redesign process. The results of the SEQ testing can be seen in Table 6 below.

Table 6. SEQ Score After Redesign

No	Informant	Question									
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	R1	5	4	4	4	3	4	5	5	4	4
2	R2	4	4	5	5	5	4	5	5	5	4
3	R3	4	5	5	5	5	5	4	5	4	3
4	R4	5	5	5	5	5	3	5	5	5	5
5	R5	5	5	4	5	4	3	5	4	5	4
6	R6	4	3	4	4	4	3	5	5	4	4
7	R7	5	5	5	5	5	4	5	5	4	5
8	R8	5	4	5	5	4	4	4	5	5	3
9	R9	5	5	5	5	5	5	5	5	5	5
10	R10	4	5	5	4	4	5	5	5	5	4
11	R11	5	4	5	4	3	3	4	4	5	4
12	R12	5	4	4	4	4	3	5	4	4	5
13	R13	4	5	5	5	5	4	5	5	5	5
14	R14	5	5	5	4	5	5	5	5	5	5
15	R15	4	5	4	4	5	4	5	5	5	5
Total Point		69	68	70	68	66	59	72	72	70	65
Maximum Point		75									
Average		68.22									

Before the redesign was carried out, user experience evaluation was conducted using the Single Ease Question (SEQ) questionnaire to measure the ease of completing tasks within the system. After the redesign was implemented, retesting was conducted to observe the differences in SEQ scores obtained from each participant. The graph below in Figure 9 shows a comparison of SEQ scores before and after the redesign, indicating changes in the user experience with the updated system.

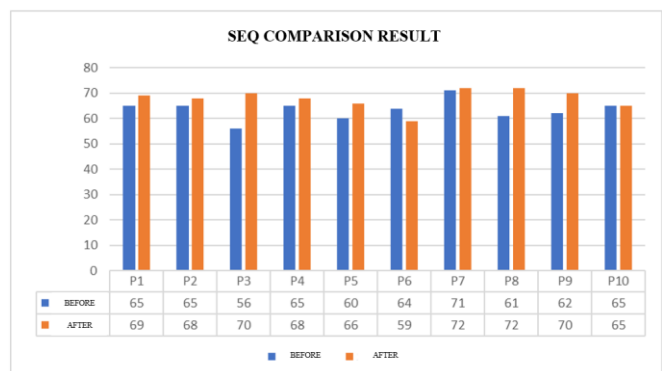


Figure 9. Comparison Result Before and After Redesign

The results of the measurement using SEQ indicate a significant improvement in the ease-of-use aspect of the

application after the redesign. Overall, SEQ scores increased across almost all questions (P1–P10). The highest increases were observed in P3 (visual design), rising from 56 to 70, and P8 (user expectations), increasing from 61 to 72. This reflects improvements in interface design, input efficiency, and overall usability perception, making the system far more effective for users. Enhancements were also seen in P1, P2, P4, P5, and P9, indicating better perceptions of navigation and productivity support within the system.

However, there are two critical notes. First, P6 (technical disruptions) decreased from 64 to 59. This decline was not due to reduced application quality but resulted from switching the testing medium from the original app to a Figma prototype, which was unfamiliar to some users and less optimal in responsiveness. Second, P10 (learning to use the app) remained stagnant at 65, highlighting the need for onboarding improvements, such as guides and documentation. These findings emphasize the importance of enhancing user education to support redesign success, especially for systems with diverse user bases.

The graph shows that the redesigned app prototype successfully improved overall usability, with higher SEQ scores in nearly all aspects. The most significant improvements occurred in visual design and user expectations. However, further refinements are needed for onboarding and technical testing, given the stagnation and decline in two indicators caused by prototype limitations and insufficient user guidance.

IV. CONCLUSION

Based on the research findings, optimizing the UI/UX of the AIMsCORE app using the Design Thinking approach positively impacted user experience. Evaluations using the SEQ method revealed significant improvements in navigation, accessibility, and system efficiency, demonstrating that a more intuitive design enhances access to core features. For future research, it is recommended to conduct longitudinal usability testing and incorporate the Think-Aloud Protocol to deeply understand users' cognitive processes. Testing should also expand to user groups with diverse digital literacy backgrounds and include additional quantitative metrics like task completion time. Beyond data security enhancements, routine evaluations using methods like SUS (System Usability Scale) and explorations of adaptive interfaces will strengthen the development of more responsive, efficient, and inclusive systems aligned with user needs.

REFERENCES

- [1] S. Khasanah and T. Sutabri, "Faktor-Faktor Tampilan UI/UX Yang Mempengaruhi Psikologis Manusia," *Jurnal Sain dan Teknik*, vol. 5, no. Februari, 2023.
- [2] M. A. Muhyidin, M. A. Sulhan, and A. Seviana, "Perancangan UI/UX Aplikasi My CIC Layanan Informasi Akademik Mahasiswa Menggunakan Aplikasi Figma," *Jurnal Digit*, vol. 10, no. 2, p. 208, Dec. 2020, doi: 10.51920/jd.v10i2.171.
- [3] A. Sintia *et al.*, "Informasi Artikel Abstrak," vol. 4, pp. 4201–4206, 2023, doi: 10.55338/jpkmn.v4i4.
- [4] N. Nurtsani and E. Sarvia, "Perancangan dan Analisis User Interface/User Experience Online Store dengan Menggunakan Pendekatan Ergonomi (Studi Kasus: Wods)," *Journal of Integrated System*, vol. 5, no. 1, pp. 27–48, Jun. 2022, doi: 10.28932/jis.v5i1.4476.
- [5] M. P. Bulu and P. A. R. L. Lede, "Rancang Bangun Sistem Informasi Pengaduan Mahasiswa Universitas Kristen Wira Wacana Sumba Berbasis Object Oriented Analysis and Design," *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, vol. 4, no. 2, pp. 538–546, Feb. 2024, doi: 10.57152/malcom.v4i2.1262.
- [6] Syafa Fadhilah Tegar Andalas, "209,3 Juta Orang di Indonesia Menggunakan Smartphone pada Tahun 2023," GoodStats.
- [7] F. R. Isadora, B. T. Hanggara, and Y. T. Mursityo, "Perancangan User Experience Pada Aplikasi Mobile Homecare Rumah Sakit Semen Gresik Menggunakan Metode Design Thinking," *Jurnal Teknologi Informasi dan Ilmu Komputer (JTIK)*, Oct. 2021, doi: 10.25126/jtiik.202184550.
- [8] F. I. Romadhanti and I. Aknuranda, "Evaluasi dan Perbaikan Desain Antarmuka Pengguna Sistem Informasi Musyawarah Masjid menggunakan Goal-Directed Design (GDD) (Studi Kasus: Masjid Ibnu Sina Jl. Veteran Malang)," 2020. [Online]. Available: <http://j-ptiik.ub.ac.id>
- [9] D. Anggraini and D. Hamdani, "Implementasi Metode Design Thinking Dalam Perancangan Prototype Sistem Pengelolaan Data Barang," *Jurnal Teknologi Dan Sistem Informasi Bisnis-JTEKSIS*, vol. 6, no. 3, p. 597, 2024, doi: 10.47233/jteksis.v6i3.1469.
- [10] T. Buana Ayu and N. Wijaya, "Penerapan Metode Design Thinking Pada Perancangan Prototype Aplikasi Payoprint Berbasis Android," *2 NDMDP STUDENT CONFERENCE (MSC) 2023*, 2023, [Online]. Available: <https://www.payoprint.id/>.
- [11] R. Yulius, M. Fajri, A. Nasrullah, D. Karmila, S. Mochamad, and A. Alban, "Design Thinking: Konsep Dan Aplikasinya Penerbit CV. Eureka Media Aksara," 2022.
- [12] DQLab, "Teknik Triangulasi dalam Pengolahan Data Kualitatif," DQ Lab AI-Powered Learning.
- [13] W. Vera Nurfajriani *et al.*, "Triangulasi Data Dalam Analisis Data Kualitatif," *Jurnal Ilmiah Wahana Pendidikan*, vol. 10, no. 17, pp. 826–833, 2024, doi: 10.5281/zenodo.13929272.
- [14] M. K. Kojongian, T. I. W J Ogi, M. Kaveeta Kojongian, W. J. F A Tumbuan, I. W. J Ogi, and J. Manajemen Fakultas Ekonomi dan Bisnis, "Kasih Kanonang Minahasa Dalam Menghadapi New Normal Marketing Mix Effectiveness and Efficiency on Bukit Kasih Kanonang Religiothe Tourism in the Face of New Nomal," vol. 10, 1966.

-
- [15] Hakia Bontong, “Usability testing dengan menggunakan pengukuran Single Ease Question (SEQ),” 2022.
- [16] R. N. Fauziyah, D. Yusup, and Siska, “Perancangan UI/UX Fitur Mentor on Demand Menggunakan Metode Design Thinking Pada Website Skilvul,” *INFOTECH journal*, vol. 9, no. 2, pp. 331–338, Jul. 2023, doi: 10.31949/infotech.v9i2.5928.
- [17] Minet Course-Net, “Triangulasi: Pengertian, Pentingnya, Jenis dan Contohnya dalam Penelitian Kualitatif,” Course-Net.
- [18] F. Febrianto and W. Andhika, “Penggunaan Metode User Persona dalam Upaya Penambahan Kebutuhan Fitur Learning Management System,” *Jurnal Syntax Admiration*, vol. 2, no. 7, pp. 1245–1256, Jul. 2021, doi: 10.46799/jsa.v2i7.274.
- [19] Z. Wang, T. Jiang, J. Huang, Y. Tai, and P. Trapani, “How might we evaluate co-design? A literature review on existing practices,” Jun. 2022. doi: 10.21606/drs.2022.774.

