Improving Website Usability with Design Thinking: A Case Study of BEM FMIPA Udayana University’s Website

.

ABSTRACT

|  |
| --- |
| **Aims:** This study aims to implement the Design Thinking methodology in the development of the BEM Faculty of MIPA, Udayana University’s company profile website. The primary objective is to enhance user experience by addressing usability issues and improving accessibility, navigation, and overall functionality.  **Study design:** This research adopts a user-centered design approach, utilizing the Design Thinking framework, which consists of five phases: Empathize, Define, Ideate, Prototype, and Test.  **Place and Duration of Study:** This study was conducted at the Faculty of Mathematics and Natural Sciences, Udayana University, over a period of five months.  **Methodology:** The research study adopts a case study design and employs mixed methods, combining both qualitative and quantitative approaches. The research began with a quantitative preliminary usability evaluation using the System Usability Scale (SUS), where the existing website received a score of 51.75 (ranked F), indicating significant usability issues. In the next phase, qualitative data was gathered through surveys, interviews, and literature studies to identify user pain points, particularly related to website navigation, design, and content accessibility. The insights from these qualitative methods informed the redesign of the website. Using the principles of Design Thinking, the website was restructured with an emphasis on an intuitive interface, improved information hierarchy, and enhanced interactivity. Finally, the redesigned website prototype was subjected to usability testing to evaluate improvements and gather both qualitative and quantitative feedback.  **Results:** The implementation of Design Thinking resulted in significant improvements in user satisfaction and website efficiency. The SUS score rose from 51.75 to 88.96, indicating a major increase in usability. Efficiency tests showed a 28.36% improvement, with users requiring fewer clicks to complete tasks. These results highlight the new website's enhanced intuitiveness, aesthetics, and alignment with user expectations.  **Conclusion:** The application of Design Thinking in website development successfully improved the usability and functionality of the BEM Faculty of MIPA company profile website. By adopting a user-centered approach, the redesigned website effectively addresses user needs, enhances accessibility, and provides a better overall experience. Future research may explore further refinements and the integration of advanced features to maintain long-term user engagement. |

*Keywords: Design Thinking; User-Centered Design;* User Experience (UX); System Usability Scale (SUS); Website Usability.

1. INTRODUCTION

The rapid advancement of information technology, particularly in the digital era, has significantly impacted various aspects of life, including the field of education (Gadzali, 2023). As a student organization at the faculty level, BEM Faculty of MIPA, Udayana University, must adapt to these technological changes to remain relevant and accessible to students, faculty members, and the public. One essential adaptation is the development of a company profile website, which serves as a platform to introduce, document, and disseminate information about the organization. A well-designed website acts as an official identity, reflecting the organization’s values, vision, and mission while ensuring efficient communication with stakeholders.

However, a preliminary usability assessment using the System Usability Scale (SUS) revealed that the existing company profile website of BEM Faculty of MIPA received a score of 51.75, placing it in the F ranking category, which indicates poor usability (Suria, 2024). Users encountered several challenges, including unintuitive navigation, difficulty in finding information, and an unappealing visual design that hindered engagement. Additionally, certain interactive features, such as news updates, were either non-functional or difficult to access, further reducing the website’s effectiveness in serving its purpose. These issues highlight the need for a comprehensive and user-focused redesign.

To address these challenges, this study applies the Design Thinking methodology, a user-centered design approach that prioritizes users' needs, pain points, and expectations in the development process. Design Thinking consists of five phases: Empathize, Define, Ideate, Prototype, and Test, which guide the systematic improvement of the website based on real user feedback (Bender-Salazar, 2023). Through interviews, and usability testing, this research aims to create a more intuitive, accessible, and aesthetically pleasing website that enhances user experience and engagement.

The primary objective of this study is to analyze and implement an improved website design that effectively addresses usability issues and optimizes the navigation structure. By leveraging the Design Thinking framework, this research seeks to increase user satisfaction, as measured through an improved SUS score and efficiency metrics. The results of this study are expected to provide valuable insights into the impact of user-centered design principles on website usability and functionality in the context of student organizations.

2. methodology

This study applies the Design Thinking method, a problem-solving approach that focuses on understanding users’ needs and perspectives while reframing problems from their point of view. This approach fosters the creation of innovative ideas that lead to effective and user-centered solutions. By emphasizing user experience, Design Thinking ensures that the resulting design helps users achieve their goals efficiently. The methodology consists of five key stages: Empathize, Define, Ideate, Prototype, and Test.

A diagram of a diagram

Description automatically generated

**Fig. 1. Design Thinking process**

**2.1 Empathize**

The Empathize phase of this study involved semi-structured interviews with 6 active students from the Faculty of MIPA at Udayana University, selected through simple random sampling (Wilson, 2013). One participant was chosen from each academic program: Chemistry, Physics, Biology, Mathematics, Pharmacy, and Informatics. Interviews were conducted either in person or virtually, lasting approximately 30 to 45 minutes. Prior to participation, all respondents were provided with informed consent forms outlining the study’s purpose, voluntary nature, and confidentiality measures. Personal data was anonymized to ensure privacy, and participants could withdraw at any time without consequence. Ethical approval was obtained from the university's institutional review board.

The interview protocol was developed based on a review of literature on website usability and user experience best practices. The questions were designed to explore participants interactions with the existing website, identify challenges with navigation, design, accessibility, and content clarity, and uncover suggestions for improvement. Open-ended questions were used to facilitate a deeper understanding of user experiences.

**Table 1. Empathize Interview Questions**

|  |  |
| --- | --- |
| **Code** | **Questions** |
| Q1 | Full Name |
| Q2 | Gender |
| Q3 | Age |
| Q4 | Study Program |
| Q5 | What type of device do you use most often? (e.g., smartphone/tablet/desktop) |
| Q6 | How often do you use digital devices to search for information? |
| Q7 | How often do you visit **bemfmipaunud.com?** |
| Q8 | How is your experience using the **BEM Faculty of Mathematics and Natural Sciences Udayana University** company profile website? Please describe what you like and dislike! |
| Q9 | What features would you like to have on the **BEM Faculty of Mathematics and Natural Sciences Udayana University** company profile website? |

To ensure accuracy, all interviews were audio-recorded with participants consent, and comprehensive notes were taken throughout the interviews. The audio recordings were then transcribed verbatim for further analysis. The qualitative data were analyzed using a thematic analysis approach, wherein key themes and recurring patterns in the responses were identified. These themes were then categorized and prioritized based on their relevance and frequency, highlighting the most critical issues related to website usability. This analysis provided a comprehensive understanding of user needs, which informed the next phases of the Design Thinking process.

**2.2 Define**

The Define phase aims to articulate the problem clearly based on the insights gathered from the Empathize phase (Garrette et al., 2018). During this stage, the primary user needs were analyzed in depth to identify the key challenges faced by users. The interviews conducted with students from various academic programs provided a wealth of information regarding the usability issues with the current website. Through careful analysis of the interview data, recurring themes and pain points were identified.

These pain points included issues such as difficulty navigating the website, unclear content structure, and accessibility challenges. The goal of this phase was to transform these findings into concrete problem statements that would guide the next steps in the Design Thinking process. By pinpointing the most critical areas for improvement, the team was able to define the core issues that needed to be addressed in the website’s redesign, ensuring that the redesign would be aligned with user expectations and needs.

**2.3 Ideate**

The Ideate phase involves an in-depth analysis of each pain point identified in the Define phase to develop the most effective solutions. This process begins with further exploration of the root causes behind each pain point to ensure that the solutions proposed truly address the underlying problems users are facing (Buphate & Esteban, 2022). The team engaged in brainstorming sessions, where diverse perspectives were brought together to generate creative ideas and potential design solutions. Techniques such as mind mapping, user story mapping, and prioritization matrices were used to ensure that the solutions aligned with user needs and expectations (Bernardo Renzi & Agner, 2023). The goal was to think beyond superficial fixes and to explore a wide range of possibilities to improve the user experience. Each solution was evaluated for its feasibility, effectiveness, and potential impact on the overall user journey. By the end of this phase, the team had a clear set of actionable ideas ready to be turned into prototypes in the next phase of the Design Thinking process.

**2.1 Prototype**

In the Prototype phase, the ideas generated during the Ideate phase were transformed into a tangible form through the creation of interface designs (Gautama et al., 2023). These designs serve as an initial visualization of the application, representing a concept that is not yet fully operational but offers a concrete view of how the final product might look. The development of the prototype focuses on providing a visual representation of the website’s structure, layout, and user interface elements. This prototype acts as a functional blueprint, offering a preliminary version of the application that allows for the testing of interactions and flow (Haque & Indah, 2022). The goal of this phase is to refine and iterate on the design, ensuring that the layout aligns with user expectations and provides an intuitive user experience. While the prototype is still conceptual, it serves as a valuable reference point for the next steps in development, offering insight into how the design can be further enhanced based on user feedback and usability testing.

**2.1 Test**

After the system implementation was completed, the next step involved conducting usability testing to evaluate the user experience of the redesigned website. The testing process focused on two main methods: the System Usability Scale (SUS) and Efficiency Testing. The SUS was used to measure the overall usability and user satisfaction of the website (Afif, 2023). This method provided a quantitative assessment of the website's ease of use and comfort from the user's perspective. The Efficiency Testing was designed to measure the number of clicks users needed to complete specific tasks on the website. This evaluation aimed to determine whether the redesign had successfully reduced the number of steps required, thus improving the speed and ease of user interaction (Wang et al., 2023).

For this step, the testing involved 30 participants, with 5 participants from each of the following academic programs: Chemistry, Physics, Biology, Mathematics, Pharmacy, and Informatics, all from the Faculty of MIPA at Udayana University. The participants were aged between 18 and 22 years and were selected based on their ability to use either desktop or smartphone devices. The selection criteria ensured that the test results were relevant to the primary user segment of the system, which included active students from the Faculty of MIPA.

**Table 2. System Usability Scale Interview Questions**

|  |  |
| --- | --- |
| **Code** | **Questions** |
| Q1 | How comfortable are you using this website? |
| Q2 | How difficult is it for you to understand how this website works? |
| Q3 | How appealing do you find the website's design? |
| Q4 | How difficult is it to find the information you need on this website? |
| Q5 | How clear are the menu and navigation on this website? |
| Q6 | How often do you feel confused while using this website? |
| Q7 | How consistent are the appearance and functionality across all pages of this website? |
| Q8 | How satisfied are you with the website's loading speed? |
| Q9 | How easy is it for you to complete tasks on this website? |
| Q10 | How likely are you to recommend this website to others? |

3. results and discussion

**3.1 Result**

The implementation of Design Thinking in developing the BEM FMIPA Universitas Udayana company profile website resulted in significant usability improvements, as shown in Table 3 and Table 4. Table 3 presents the System Usability Scale (SUS) comparison, where the score increased from 51.75 to 88.96, indicating a transition from a "poor" to an "excellent" usability rating. Additionally, Table 4 displays the results of the Click Efficiency Test, which showed a 28.36% increase in efficiency, demonstrating that users required fewer clicks to complete key tasks.

A close-up of a score

Description automatically generated

**Fig. 2. SUS Metrics**

There is a significant increase of 71.90% in the SUS Score between the old and new website versions, as shown in Fig. 2. And Table 3, The red bar represents the old website, while the green bar represents the new website, highlighting a substantial improvement in usability and user experience.

**Table 3. System Usability Scale Score Comparation**

|  |  |  |  |
| --- | --- | --- | --- |
| **SUS SCORE** | | | |
| **Num** | **Old Website** | **New Website** | **Increase (%)** | |
| 1 | 51.75 | 88.96 | 71.90% | |

**Table 4. Click Efficiency Test Result**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Task** | **Average Amount of Click** | | **Increase (%)** |
| **Old Website** | **New Website** |
| 1 | Open Latest Article | 2 | 1.1 | 45% |
| 2 | Searching for information about vision, mission, and Members | 2.1 | 1.03 | 50.95% |
| 3 | Submitting aspirations | - | 2 | - |
| 4 | Searching for specific news articles | 3.3 | 2.2 | 33.33% |
| 5 | Downloading attachments | 4.7 | 3 | 36.17% |
| 6 | Logging in | 2 | 2 | 0% |
| 7 | Updating advertisements | 4.7 | 4.03 | 14.26% |
| 8 | Updating announcements | - | 2 | - |
| 9 | Managing aspirations | - | 2 | - |
| 10 | Adding articles | 9 | 7 | 22.22% |
| 11 | Deleting articles | 4 | 3 | 25% |
| **Average Increased Efficiency** | | | | 28.36% |

**3.2 Discussions**

The significant increase in the System Usability Scale (SUS) score from 51.75 to 88.96, as shown in Table 3, indicates a substantial improvement in the usability of the redesigned website. A score above 80 is considered excellent according to industry benchmarks, suggesting that the redesign effectively addressed key user pain points. This aligns with previous studies that emphasize the importance of user-centered design in enhancing system usability and highlights the success of the iterative process employed during the redesign.

Additionally, the Click Efficiency Test results, presented in Table 4, show a 28.36% improvement, indicating that users needed fewer clicks to complete essential tasks. This enhancement suggests that improvements in website navigation, such as optimized menu structures and clearer information architecture, contributed to a more intuitive user experience. Previous research has highlighted that reducing cognitive load through thoughtful interface design can significantly impact both task completion time and user satisfaction. This finding further validates the effectiveness of the design changes implemented.

While this study primarily focuses on the website redesign for the BEM Faculty of MIPA Udayana University, its findings have broader implications. The Design Thinking methodology used to enhance usability can be adopted by BEMs from other faculties, both at Udayana University and other institutions. This methodology offers a structured approach for identifying pain points, iterating on solutions, and conducting user testing to ensure the website meets the needs of students and faculty. Faculties with distinct demographics can particularly benefit from such an approach, ensuring that their websites are intuitive, accessible, and engaging for a diverse user base.

Beyond the university context, the study’s findings are also applicable to industries prioritizing user experience and digital engagement. The principles of user-centered design used in this research can be extended to improve corporate websites, e-commerce platforms, government portals, and non-profit websites, where user satisfaction and efficiency are key priorities. The Design Thinking framework provides a valuable tool for organizations seeking to understand user needs and develop solutions that enhance functionality, accessibility, and overall user experience. As digital spaces continue to evolve, businesses and industries can leverage these insights to foster better interactions, streamline processes, and ultimately improve customer satisfaction.

However, this study does have several limitations. Firstly, the sample size of 30 participants, while adequate for initial usability testing, may not fully represent the broader student population of the Faculty of MIPA. The relatively small sample size limits the generalizability of the findings, particularly considering that users outside of the selected academic programs (Chemistry, Physics, Biology, Mathematics, Pharmacy, and Informatics) may have different experiences or needs.

Secondly, the study was conducted within the specific context of the BEM Faculty of MIPA website, which may have unique design and functionality requirements. Consequently, the findings may not be directly applicable to websites in other departments or universities, especially those with different user demographics or institutional structures.

Lastly, the study focused on participants aged between 18 to 22 years, which may not encompass the full diversity of the university’s student body. Non-traditional learners, older students, or faculty members, who may use the website differently, were not included in the study. This introduces potential biases that could influence the outcomes of the usability tests and the interpretation of user feedback.

4. Conclusion

The application of Design Thinking in developing the BEM Faculty of MIPA Udayana University company profile website has led to significant improvements in usability and user experience. The System Usability Scale (SUS) score increased from 51.75 to 88.96, reflecting a transition from a poor to an excellent usability rating. Additionally, the Click Efficiency Test demonstrated a 28.36% increase in efficiency, indicating that users could complete tasks more quickly and with fewer interactions.

These results highlight the effectiveness of a user-centered design approach in optimizing website functionality and navigation. By addressing key pain points identified during the Empathize and Define stages, the redesigned website successfully enhances accessibility, efficiency, and overall user satisfaction. Future improvements could focus on expanding website features, incorporating accessibility enhancements, and conducting long-term usability testing to ensure continuous optimization.

disclaimer (artificial intelligence)

The authors affirm that no generative AI technologies, such as Large Language Models (e.g., ChatGPT, Copilot) or text-to-image generators, were used during the writing or editing of this manuscript. All content has been independently developed and reviewed by the authors to ensure originality and academic integrity.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

References

Afif, M. H. (2023). Assessing Students’ Perceptions of Mobile Applications Usability using System Usability Scale. *Journal of Computer Science*, *19*(1). https://doi.org/10.3844/jcssp.2023.11.19

Bender-Salazar, R. (2023). Design thinking as an effective method for problem-setting and needfinding for entrepreneurial teams addressing wicked problems. *Journal of Innovation and Entrepreneurship*, *12*(1), 24. https://doi.org/10.1186/s13731-023-00291-2

Bernardo Renzi, A., & Agner, L. (2023). Prioritization Matrix to Highlight Business Opportunities. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *14030 LNCS*. https://doi.org/10.1007/978-3-031-35699-5\_4

Buphate, T., & Esteban, R. H. (2022). Using Ideation Discussion Activities in Design Thinking to Develop EFL Students’ Speaking and Critical Thinking Abilities. *LEARN Journal: Language Education and Acquisition Research Network*, *15*(1).

Gadzali, S. S. (2023). IMPACT OF TECHNOLOGY IN IMPROVING THE QUALITY OF EDUCATION AND HUMAN RESOURCE DEVELOPMENT. *Indo-MathEdu Intellectuals Journal*, *4*(2), 1337–1348.

Garrette, B., Phelps, C., & Sibony, O. (2018). Redefine the Problem: The Design Thinking Path. In *Cracked it!: How to solve big problems and sell solutions like top strategy consultants* (pp. 139–167). Springer International Publishing. https://doi.org/10.1007/978-3-319-89375-4\_8

Gautama, S. P., Fajarwati, S., & Hamdi, A. (2023). UI/UX Design on Prototype Attendance Using the Design Thinking Method. *Journal of Multimedia Trend and Technology-JMTT*, *2*(1).

Haque, M., & Indah, D. R. (2022). Design of Digital Library Prototype Using The Design Thinking Method. *Jurnal Riset Informatika*, *5*(1). https://doi.org/10.34288/jri.v5i1.442

Suria, O. (2024). A Statistical Analysis of System Usability Scale (SUS) Evaluations in Online Learning Platform. *Journal of Information Systems and Informatics*, *6*(2), 992–1007. https://doi.org/10.51519/journalisi.v6i2.750

Wang, W., Wu, S., Li, Z., & Zhao, R. (2023). Parallel evolutionary test case generation for web applications. *Information and Software Technology*, *155*. https://doi.org/10.1016/j.infsof.2022.107113

Wilson, C. (2013). *Interview Techniques for UX Practitioners: A User-Centered Design Method*. Interview Techniques for UX Practitioners: A User-Centered Design Method. https://doi.org/10.1016/C2012-0-06209-6