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Comparing the Relevance of the USE Questionnaire and Heatmap Analysis in Evaluating Usability and User Experience: A Case Study of the Unjani Information Systems Study Program Community Website

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ABSTRACT
Usability and user experience are crucial aspects in designing and evaluating digital systems, as both directly affect user satisfaction, efficiency, and engagement. However, there often exists a gap between users' perceptions of the system's usability and their actual behavior when using it. This research explores the potential of such gaps by analyzing user perceptions (measured through the USE questionnaire) and actual behavior data (collected from Microsoft Clarity heatmaps). A quantitative approach and visual observation involving 115 questionnaire respondents and 333 recorded user interaction sessions through Microsoft Clarity are employed. The study results indicate a general alignment between users' positive views and behavioral engagement, such as high usability scores correlating with active duration on the *Berita* page. However, discrepancies were also identified on the *Diskusi* pages, where high satisfaction scores did not align with user behaviors like *Quick Backs* and *Dead Clicks*, indicating barriers in usability. These findings underscore the importance of integrating subjective and objective data: the USE questionnaire captures views on ease of use, satisfaction, and benefits, while heatmaps reveal behavioral barriers that may be hidden. In conclusion, both approaches complement each other, and when used together, they produce a more comprehensive and implementable user experience evaluation.

INTRODUCTION

Usability and user experience are crucial aspects of interface design, aiming to create products that are not only easy to use but also effective and satisfying (Fachrizal et al., 2023; Raka & Setyohadi, 2021). User experience encompasses users' emotional responses to the system and focuses on enhancing human interaction with products or services to achieve maximum satisfaction (Husseniy et al., 2021; Marques et al., 2021). Design based on users' needs and preferences has been proven to enhance satisfaction and loyalty (Gada, 2024). On the other hand, visual communication through intuitive interfaces enriches the user experience and encourages higher engagement (Kholik et al., 2024). With the rapid development of the digital era, attention to usability evaluation and user experience has become increasingly important. This is driven by the rise in internet usage, which demands an optimal user experience (Zaki & Islam, 2021). In such assessments, a gap is often found between what users say and what they do, based on actual behavioral data when interacting with a system or

website. This occurs because subjective evaluation methods, such as questionnaires, have limitations in capturing the full dimensions of user experience. Most subjective measurement tools do not comprehensively cover aspects of user experience, resulting in findings that are less representative of reality (Kapusy & Lógó, 2022; Lemon et al., 2020; Mortazavi et al., 2024). Various studies on usability evaluation and user experience indicate that most research still tends to rely on a single evaluation approach (Mortazavi et al., 2024), typically in the form of subjective questionnaires such as the USE Questionnaire, UEQ, or SUS. Several studies have used the USE Questionnaire as the sole evaluation tool without accompanying observation of actual user behavior (Anggoro et al., 2022; Hidayat et al., 2021; Köhler & Usability, 2020; Nadifa et al., 2024; Nurazizah et al., 2021; Priyadi et al., 2021; Purwinarko et al., 2020; Putra & Tanamal, 2020; Sasongko et al., 2020). Other studies discussing the use of heatmaps also highlight that visual observation methods are often used separately, without being combined with user perception data (Davila et al., 2023). In addition, a study confirms that although various approaches to evaluating user experience based on inquiry, inspection, and observation have been developed, their use is still often not systematically integrated (Corrêa et al., 2024).

This indicates that there are still methodological gaps in comprehensively evaluating user experience, where user perceptions are not validated with actual behavioral data. Therefore, a combined or triangulated approach becomes important to address these deficiencies and obtain a more representative picture of user experience (Nakamura et al., 2021). The USE Questionnaire and heatmap analysis are two common methods for evaluating user experience, each offering different strengths and weaknesses. The USE Questionnaire primarily focuses on measuring subjective aspects such as satisfaction, ease of use, and the acceptance of technology systems (Hajesmaeel-Gohari & Bahaadinbeigy, 2021; Melin et al., 2020). However, this method is limited in visualization, as it does not explain how users interact with the system in depth (Firdaus et al., 2022). Meanwhile, heatmap analysis provides a clear visual depiction of user actions, highlighting the areas that are most frequently visited or used (Firdaus et al., 2022; Rezaiguia & Djeffal, 2022). Unfortunately, heatmap analysis does not include users' subjective views, such as satisfaction or ease of use, which is a significant shortcoming in providing a comprehensive assessment (Rezaiguia & Djeffal, 2022). Considering the limitations of each method, this study was designed to compare the relevance of the USE Questionnaire as a subjective approach and heatmap analysis as an objective approach in evaluating usability and user experience. This aims to make the evaluation results more valid, in-depth, and representative of the actual user experience. This forms the basis for the necessity of the study to test the extent to which the results of user perception evaluations through questionnaires align with their behavioral patterns recorded objectively.

Usability, as defined by ISO 9241-11:2018, represents a critical software quality characteristic encompassing effectiveness, efficiency, and satisfaction in user interactions. While usability focuses on functional aspects of interaction, user experience (UX) extends to broader subjective responses influenced by pre-use expectations and post-use evaluations. Key UX factors such as intuitive navigation, content clarity, and visual design significantly impact user engagement, though traditional evaluation methods like surveys remain limited by self-

reporting biases (Davila et al., 2023). The Theory of Planned Behavior (TPB) further enriches this understanding by explaining behavioral intentions through attitudes, social norms, and perceived control, highlighting why positive perceptions do not always translate to actual usage patterns.

The theoretical foundation for triangulated evaluation combines multiple frameworks to address usability dimensions comprehensively. Task-Technology Fit (TTF) theory demonstrates how system effectiveness depends on the alignment between features and user tasks, particularly in academic contexts. While Fitts's Law and Cognitive Friction theory explain interface usability through physical interaction dynamics and unexpected UI behaviors. Hick-Hyman Law complements these by quantifying cognitive load in decision-making processes, showing how menu complexity directly affects learning curves (Liu et al., 2020). Meanwhile, Self-Determination Theory (SDT) links satisfaction to psychological needs fulfillment, with studies confirming that features promoting autonomy and competence enhance LMS engagement (Sari et al., 2024). Together, these theories provide a multidimensional lens for analyzing usability gaps between perception and behavior.

For measurement, the USE Questionnaire offers a validated subjective approach, assessing usefulness, ease of use, and learning through Likert-scale items with proven reliability ($\alpha \geq 0.7$). Its quantitative results can be categorized through binomial classification or scaled scoring, though it lacks behavioral insights. Conversely, heatmap analysis objectively tracks user interactions through click patterns, scroll depth, and gaze data, visualizing engagement hotspots and friction points via color-coded metrics. When combined with eye-tracking or session recordings, heatmaps reveal discrepancies between reported satisfaction and actual behavior, addressing the limitations of purely subjective tools.

The synergy of these methods addresses critical gaps in UX research. While questionnaires capture perceived usability, heatmaps expose hidden behavioral barriers such as *dead clicks* or *quick exits*, enabling a more holistic evaluation. This dual approach aligns with TPB's behavioral prediction model and SDT's satisfaction framework, validating the need for methodological triangulation. By integrating theoretical models with mixed-method tools, researchers can bridge the divide between user expectations and real-world interactions, ultimately guiding more effective interface design improvements.

The rapid development of digital systems has heightened the importance of usability and user experience (UX) in interface design, as these factors directly influence user satisfaction, efficiency, and engagement. However, a significant gap persists between users' subjective perceptions of usability, often measured through tools like the USE Questionnaire, and their actual behavioral interactions, which can be captured via heatmap analysis. Existing research tends to rely on either subjective questionnaires or objective behavioral data in isolation, failing to integrate these methods to provide a holistic evaluation. For instance, studies employing the USE Questionnaire often overlook behavioral discrepancies, while heatmap analyses lack insights into user satisfaction and perceived ease of use. This methodological gap limits the comprehensiveness of usability evaluations, underscoring the need for a triangulated approach

that combines both subjective and objective data to bridge the divide between user perceptions and actual behavior.

The urgency of this research lies in the growing reliance on digital platforms, particularly in academic settings, where effective usability directly impacts user engagement and productivity. Despite high usability scores in subjective evaluations, users may still encounter friction during interactions, as evidenced by behavioral metrics such as *dead clicks* and *quick backs*. Such inconsistencies can lead to frustration, reduced efficiency, and ultimately, disengagement from the platform. By addressing these discrepancies, this study aims to enhance the design and functionality of digital systems, ensuring they meet both user expectations and practical usability standards. The findings will be particularly valuable for developers and designers of academic community websites, where seamless interaction is critical for fostering collaboration and information dissemination.

This study introduces novelty by systematically comparing and integrating two distinct evaluation methods—the USE Questionnaire and heatmap analysis—to assess usability and UX. While previous research has employed these tools separately, their combined use offers a more nuanced understanding of usability, revealing both alignment and divergence between user perceptions and behaviors. For example, the study identifies specific features, such as *discussion forums*, where high satisfaction scores mask underlying usability issues detectable only through heatmap data. This dual-method approach not only validates the strengths of each tool but also highlights their complementary roles in uncovering hidden usability barriers, thereby advancing methodological innovation in UX research.

The purpose of this research is to evaluate the relevance and consistency of the USE Questionnaire and heatmap analysis in assessing usability and UX, using the *Unjani Information Systems Study Program* community website as a case study. By doing so, the study seeks to provide actionable insights for improving interface design, particularly in areas where subjective and objective data diverge. The research contributes to the field by demonstrating the value of a triangulated evaluation framework, which can be replicated in other contexts to enhance usability assessments. Additionally, it offers practical recommendations for optimizing digital platforms, ensuring they align with both user expectations and behavioral realities, ultimately leading to more intuitive and effective systems.

The objectives of this study include (1) measuring user perceptions of usability through the USE Questionnaire, (2) analyzing actual user behavior via heatmap metrics, and (3) comparing the results to identify areas of alignment and discrepancy. The benefits of this research extend to multiple stakeholders: designers and developers gain evidence-based guidance for interface improvements, academic institutions receive tools to enhance student engagement, and researchers acquire a validated framework for future usability studies. By addressing the gap between perception and behavior, this study not only advances theoretical understanding but also delivers practical solutions for creating user-centric digital environments.

METHOD

Data Collection

This study involved all active *Information Systems* students at *UNJANI* from the 2021–2024 cohort, totaling 132 individuals. Using the *Slovin* formula with a 5% margin of error, a minimum sample size of 99 was calculated. A total of 115 eligible responses were collected using *purposive sampling*, targeting students who had previously used the *IS Society* website. Data was collected from May 25 to June 7, 2025, from active *Information Systems* students who had previously accessed the *IS Society* community website. The *IS Society* website (https://himasi-unjani.com/) is a dedicated digital platform designed to facilitate academic and social interaction among *Information Systems* students. It features a *discussion forum*, *news and publication* sections, and an informational page about study programs and student organizations. A mixed-methods design was applied, combining quantitative survey data with behavioral observation. Subjective data were gathered using the *USE Questionnaire*, measuring four core usability dimensions: Usefulness, Ease of Use, Ease of Learning, and Satisfaction. These data were then compared with objective behavioral data—such as clicks, scroll depth, and *rage clicks*—collected via *Microsoft Clarity* heatmap analysis.

Instruments

USE Questionnaire

This study used the *USE Questionnaire* (Lund, 2001) to measure user perceptions in four dimensions: Usefulness, Ease of Use, Ease of Learning, and Satisfaction. Each question was rated on a 1–5 *Likert* scale, where a score of 1 indicates very strong disagreement (*strongly disagree*) and a score of 5 indicates very strong agreement (*strongly agree*). Validity and reliability tests were conducted on 30 respondents, the minimum number required for reliability analysis during the pilot test stage (Bujang et al., 2024; Masri Singarimbun, 2005). Prior to the main study, the instrument, consisting of 30 items, was tested on 30 respondents and confirmed to have high validity (item-total correlation > 0.361) and reliability. Reliability was tested using *Cronbach's Alpha*, with a general threshold of 0.60 indicating reliability (Darma, n.d.). The test yielded excellent scores for all dimensions: Usability ($\alpha = 0.89$), Ease of Use ($\alpha = 0.90$), Satisfaction ($\alpha = 0.89$), and Ease of Learning ($\alpha = 0.71$). These findings validate that the questionnaire is a consistent tool for measuring user perceptions.

Heatmap Software

User behavior evaluation was conducted objectively by utilizing the *Microsoft Clarity* platform, which applies tracking scripts on the main pages of the *IS Society* site. During observation, this platform recorded various interaction indicators to generate objective data, including engagement metrics such as Sessions, Pages per Session, Average Active Time Spent, and Scroll Depth. Additionally, user frustration signals such as *Dead Clicks* and *Back Clicks* were also recorded, along with visualizations of interaction focus through *Click Maps*, all of which were compared with perception data from the questionnaires.

Analysis

USE Questionnaire

The analysis of the questionnaire data was conducted by calculating averages step by step: from the average per item, to the average per dimension, up to the final usability score, which is a combination of the four dimensions. This final result is then interpreted by classifying it into five categories of usability levels, ranging from very poor to very good, based on a predetermined range of 0.8 scale, as detailed in Table 1.

Table 1 Feasibility Standards for usability

Score	Usability categories
4,24 – 5,00	Very High
3,43 – 4,23	High
2,62 – 3,42	Moderate
1,81 – 2,61	Low
1,00 – 1,80	Very Low

Heatmap

User behavior analysis is based on several key metrics. Frustration signals are measured through Dead Clicks (clicks on non-functional elements indicating confusion) and Quick Backs (quick returns indicating unmet expectations). Meanwhile, user engagement is measured by Active Time (duration of active interaction), Pages per Session (depth of site exploration), and Scroll Depth (how much of the page content is consumed).

Framework for Comparative Analysis

The analysis was conducted by comparing each dimension of the USE Questionnaire against the behavioral metrics from Microsoft Clarity, in accordance with the conceptual mapping detailed in Table 2.

Table 2 Framework for Comparative Analysis

USE Dimension	Microsoft Clarity Metrics	Theoretical Basis	Relationship
Usefulness	Avg. Active Time Spent, Pages per Session	Task–Technology Fit, (Goodhue & Thompson, 1995)	The longer the user's active time and the more pages that are functionally visited, the more relevant the system is considered for completing tasks.
Ease of Use	Dead Clicks and Quick Backs	Fitts' Law and Cognitive Friction (Paul M. Fitts, 1954)	Dead clicks and quick backs indicate difficulty or frustration in the UI interaction.
Ease of Learning	Scroll Depth and Quick Backs	Hick–Hyman Law, (Hick (1952) and Hyman (1953))	Quick backs and scroll depth indicate cognitive load because information is hard to find, a sign that the system is difficult to learn.
Satisfaction	Sessions and Pages per Session	Self-Determination Theory, (Deci and Ryan, 1985)	Consistent click focus, number of sessions, and page exploration indicate user comfort, interest, and the fulfillment of their psychological needs.

RESULTS AND DISCUSSIONS

USE Questionnaire Results

The usefulness of the IS Society website is analyzed through the USE Questionnaire, which evaluates four components: Usability, Ease of Use, Ease of Learning, and User Satisfaction. A total of 115 participants rated 30 statements using a 5-point Likert scale. The total usability score for all items reached 4.17 out of 5, which falls into the "High" category (good). This high average score indicates that generally, users have a very positive view of the usefulness of the website. Table 3 presents a summary of the average scores for each aspect.

Table 3 Scores per variable and final score

Variables	Mean Score
Usefulness	3,99
Ease of Use	4,23
Ease of Learning	4,27
Satisfaction	4,20
Average	**4,17**

The usability evaluation of the IS Society website reveals a highly positive user perception, with all four dimensions scoring in the "High" or "Very High" categories. The website's greatest strength is its Ease of Learning (mean score of 4.27), indicating an exceptionally intuitive design that allows new users to become proficient quickly. This is complemented by strong scores in Ease of Use (4.23) and Satisfaction (4.20). However, the lowest-scoring dimension was Usefulness (3.99). This key insight suggests that while the website is remarkably easy to learn and operate, its features and content have the most potential for enhancement to better meet user needs and increase its overall value.

Heatmap Results

After analyzing users' subjective perceptions from the questionnaire, this section discusses objective behavioral data obtained through heatmap analysis. Figure 2 and 3 below presents a visual analysis of user interaction patterns through All Clicks heatmaps on key pages of the website. This analysis aims to identify the most frequently clicked elements as well as points of user confusion or friction.

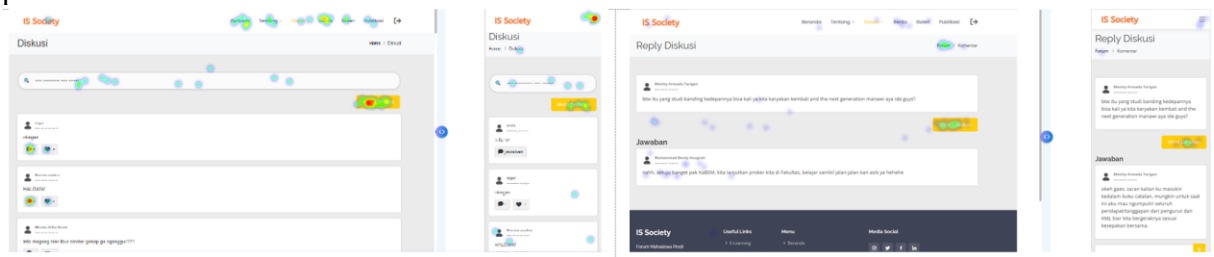

Figure 1. Heatmap Visualization of All Clicks on the Discussion Page and Reply Discussion Page

The "All Clicks" heatmap analysis, as shown in Figure 2, reveals a highly task-oriented yet complex user behavior on both the main Discussion page and the Reply Discussion page. On the main Discussion page, which recorded 134 sessions, the most dominant interaction is clicking the “Mulai Bertanya” (Start Asking) button, indicating a clear user intent. However, this page also exhibits significant usability friction, with 113 sessions ending in a Quick Back

and 57 sessions containing Dead Clicks. The pattern of focused interaction continues on the Reply Discussion page (74 sessions), where the primary hotspot is on the “Kirim Jawaban” (Send Answer) button, and engagement is deeper with an average of 14.77 pages per session and 5.8 minutes of active time. Despite this, this page also suffers from a high number of Quick Backs (66 sessions). This demonstrates that while the design of both pages effectively guides users to their primary actions, it is simultaneously hampered by usability issues that cause many users to exit prematurely.

Figure 2. Heatmap Visualization of All Clicks on the News Page and News Detail Page

The "All Clicks" heatmap analysis for the News and News Detail pages reveals a user journey focused on deep content exploration but hampered by significant usability friction. On the main News page, which recorded 51 sessions, the dominant user intent is to explore articles further, as shown by hotspots on the "Read More" buttons in both desktop and mobile views. This high interest is confirmed by strong engagement metrics, including an average of 19.43 pages per session and 9.0 minutes of active time. However, this is contradicted by 48 sessions ending in a Quick Back and 35 sessions containing Dead Clicks on non-interactive elements like image thumbnails, indicating initial navigational confusion. Once on the News Detail page, engagement deepens further (averaging 22.52 pages per session and 11.0 minutes of active time), but the heatmap shows that user clicks shift almost exclusively to navigation elements (the main menu or hamburger icon) rather than the content itself. This indicates that the detail page functions as a task endpoint where, after reading, the user's primary goal is to navigate away.

Comparison USE Questionnaire and Heatmap Results

Usefulness

The average score for the Usefulness dimension based on the USE Questionnaire is 3.99, which falls into the 'High' category. This indicates that users perceive the website's features particularly the News and Discussion pages as beneficial for completing their tasks. This perception aligns with behavioral data on the News page, where the average active time per session is around 9 minutes, and users explore approximately 19 pages per session. However, the Discussion page shows a contrasting trend, with shorter average active time (~5.2 minutes) and a high frequency of Quick Backs (113 sessions). This suggests that although the feature is perceived as useful, users may encounter difficulties during actual interaction.

Ease of Use

The Ease of Use dimension received an average score of 4.23, categorized as 'Very High'. Nevertheless, the lowest scoring item was 'It is easy to recover from mistakes', rated 3.90. Heatmap data supports this inconsistency. Dead Clicks were recorded in 57 sessions on the Discussion page and 35 sessions on the News page, while Quick Backs occurred in 113 sessions. These patterns reflect friction in the user interface, particularly on elements assumed to be clickable but unresponsive.

Ease of Learning

This dimension recorded the highest average score of 4.27. However, the item 'I could use the community site's features within the first few minutes' scored slightly lower (4.16). Heatmap analysis shows that users demonstrated limited scroll depth (53–59%) and quick navigation reversals during initial sessions, indicating hesitation in exploration.

Satisfaction

The Satisfaction dimension had an average score of 4.20. The item 'I feel I need access to this website' scored the lowest at 4.03, implying that while users are generally satisfied, the platform is not yet essential in their daily academic routine. Behavioral data reinforces this finding: 333 sessions were recorded, with high page engagement and click focus on major site features. This shows that while users are interested and engaged, the platform is not yet considered essential.

Discussion

The usefulness dimension is considered high because it has an average score of 3.99. This means that most users think that the IS Society website's features help them do their tasks. The amount of time spent and the number of pages viewed in the News section back this up, showing that the information is useful and helps students with their schoolwork. But there is a difference here compared to the Discussion page. Users didn't interact with this feature as much, as shown by the fact that they only stayed for a short time and had a high Quick Back rate. According to the Task–Technology Fit (TTF) theory, this finding shows that even if a feature is seen as important (task-relevant), it won't be used much if it isn't implemented in a way that meets users' needs or expectations. In general, people don't always act the way they think they should, especially when it comes to complicated things like discussion forums.

The average score for the Ease of Use dimension is 4.23, indicating that users find the site interface easy to use, learn, and not difficult to navigate. However, behavioral data shows a high number of Dead Clicks on the discussion and news pages, as well as consistent Quick Backs occurring on the main pages. This phenomenon can be explained by Fitts' Law, which states that the time and error of interaction will increase if UI elements are too small, too far away, or not intuitive. Furthermore, Cooper's theory of Cognitive Friction explains that users will become frustrated when the interface does not behave as they expect, such as images and text that appear to be buttons but cannot be clicked. This indicates a mismatch between the perception of ease and the reality of interaction, which can occur because users generally feel that the site is easy to use, but still experience friction when encountering certain elements. Thus, there is macro consistency, but important micro inconsistencies that need to be considered in the redesign of the interface.

This dimension received the highest score of 4.27, indicating that users feel they quickly understand how the site works, especially in the initial sessions. This perception may arise due to the relatively familiar site structure and the minimal number of complex features that need to be learned. However, behaviorally, users show a low scroll depth (around 53–59%) and often re-navigate when first accessing certain pages, such as Gallery and Publications. This indicates that although the site is not difficult to learn, the initial content structure is not immediately clear, or the order of information is less helpful. These findings are consistent with Hick–Hyman Law, which states that the more choices or information on one screen, the longer it takes to understand and decide on interactions. Thus, although the perception of quick learning is quite consistent with behavior, there are still initial cognitive barriers that should be addressed through improvements in visual hierarchy and navigation.

The Satisfaction dimension achieved a score of 4.20, indicating that users feel satisfied with their experience using the site. This is supported by the high frequency of repeat sessions (333 sessions), the number of pages explored, and clicks concentrated on key features, indicating engagement and comfort during use. However, the item with the lowest score in this dimension is "I feel the need to access this site" (4.03). This suggests that although the user experience is quite positive, the site has not yet become an essential part of the user's academic routine. The likely reason is that the functions offered are still perceived as supplementary rather than essential needs. These findings align with Self-Determination Theory (SDT), which posits that satisfaction is influenced by the fulfilment of three psychological needs: autonomy, competence, and relatedness. In this case, the IS Society site has met the engagement aspect, but has not yet fully fulfilled its central role. In this case, the IS Society site has met the aspect of engagement, but has not yet fully taken on a central role in the learning process or formal communication of students.

CONCLUSION

The main conclusion of this study shows that the *USE Questionnaire* and *Heatmap Analysis* methods complement each other and are generally consistent in assessing usability. At the macro level, positive user views (high scores on the questionnaire) are supported by behavioral data showing active participation, such as long session durations and a high number of pages explored. However, the main strength of this combination lies in its ability to uncover inconsistencies at the micro level. For example, the *Forum* feature, which users deemed *helpful*, actually had serious usability issues (high rates of *Quick Backs* and *Dead Clicks*) that could only be detected through the *heatmap*. This indicates that the questionnaire is effective in capturing overall perceptions, while the heatmap is crucial for identifying specific behavioral barriers. Based on these results, the main recommendation provided is to improve the *UI/UX*, focusing on features with the highest discrepancies between perception and behavior, such as the *Forum*, by simplifying navigation and clarifying interactive elements. Methodologically, this study strongly encourages the application of a *triangulation* approach (combining data on perception and behavior) for future system evaluations. This integrated approach has proven to provide more comprehensive insights, where subjective data from questionnaires reveal what users feel, while objective data from heatmaps explain how they behave, resulting in more precise improvement recommendations.

REFERENCES

Anggoro, E. D. W., Prasetyo, N. A., & Shintia Dwi Alika. (2022). Analisis Usability Testing Website Desa Wisata Adiluhur Kebumen Menggunakan Metode Use Questionnaire. *Prosiding Seminar Nasional Teknologi Dan Sistem Informasi*, *2*(1), 221–230. https://doi.org/10.33005/sitasi.v2i1.301

Bujang, M. A., Omar, E. D., Foo, D. H. P., & Hon, Y. K. (2024). Sample size determination for conducting a pilot study to assess reliability of a questionnaire. *Restorative Dentistry and Endodontics*, *49*(1), 1–8. https://doi.org/10.5395/rde.2024.49.e3

Corrêa, G., Pereira, R., Silveira, M. S., & Gasparini, I. (2024). Exploring Usability and User Experience Evaluation Methods: A Tertiary Study. *International Conference on Enterprise Information Systems, ICEIS - Proceedings*, *2*(Iceis), 357–368. https://doi.org/10.5220/0012606100003690

Darma, B. (n.d.). *STATISTIKA PENELITIAN MENGGUNAKAN SPSS (Uji Validitas, Uji Reliabilitas, Regresi Linier Sederhana, Regresi Linier Berganda, Uji t, Uji F, R2)*.

GUEPEDIA. https://books.google.co.id/books?id=acpLEAAAQBAJ

Davila, F., Paz, F., & Moquillaza, A. (2023). Usage and Application of Heatmap Visualizations on Usability User Testing: A Systematic Literature Review. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *14032 LNCS*(July), 3–17. https://doi.org/10.1007/978-3-031-35702-2_1

Fachrizal, M. R., Paramitha Fadillah, A., & Budiarto, A. (2023). UI/UX Prototype Usability Analysis of E-Commerce Websites. *2023 International Conference on Informatics Engineering, Science & Technology (INCITEST)*, 1–6. https://doi.org/10.1109/INCITEST59455.2023.10396947

Firdaus, F., Ariandi, Firman, & Rasydianah. (2022). Pengukuran Usability eLearning UNSULBAR selama masa Pandemi COVID-19 (Studi Kasus: Prodi Pendidikan Biologi). *BIOMA: Jurnal Biologi Dan Pembelajarannya*, *4*(1), 23–30. https://doi.org/10.31605/bioma.v4i1.1607

Gada, T. (2024). Enhancing User Engagement and Retention in Fintech: A Study on Effective UX Strategies and Design Principles. *International Journal of Science and Research (IJSR)*, *13*(5), 1260–1263. https://doi.org/10.21275/sr24520104932

Goodhue, D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *MIS Quarterly*, *19*(2), 213. https://doi.org/10.2307/249689

Hajesmaeel-Gohari, S., & Bahaadinbeigy, K. (2021). The most used questionnaires for evaluating telemedicine services. *BMC Medical Informatics and Decision Making*, *21*(1), 1–11. https://doi.org/10.1186/s12911-021-01407-y

Hidayat, R., Asnawi, M. F., & Rohman, S. (2021). Analisis Usability Dengan Metode Use Questionnaire Pada Aplikasi Myindihome. *Journal of Economic, Business and Engineering (JEBE)*, *3*(1), 168–173. https://doi.org/10.32500/jebe.v3i1.2155

Husseniy, N., Abdellatif, T., & Nakhil, R. (2021). Improving the Websites User Experience (UX) Through the Human-Centered Design Approach (An Analytical Study Targeting Universities Websites in Egypt). *Journal of Design Sciences and Applied Arts*, *2*(2), 24–31. https://doi.org/10.21608/jdsaa.2021.29802.1029

Kapusy, K., & Lógó, E. (2022). User Experience Evaluation Methodology in the Onboarding Process: Snapchat Case Study. *Ergonomics in Design: The Quarterly of Human Factors Applications*, *30*(3), 4–10. https://doi.org/10.1177/1064804620962270

Kholik, A., Soegiarto, A., Sari, W. P., & Negeri, U. (2024). *Strategi Komunikasi Visual dalam User Interface (UI) dan User Experience (UX) Untuk Membangun Kepuasan Pengguna*. *4*.

Köhler, T., & Usability, T. (2020). Usability evaluation of personalized adaptive e-learning system using USE questionnaire Didik Hariyanto Recommended citation : Usability evaluation of personalized adaptive e-learning system using USE questionnaire Didik Hariyanto. *Knoledge Management & E-Learning: An International Journal (KM&EL)*, *12*(1), 85–105.

Lemon, C., Huckvale, K., Carswell, K., & Torous, J. (2020). A Narrative Review of Methods for Applying User Experience in the Design and Assessment of Mental Health Smartphone Interventions. *International Journal of Technology Assessment in Health Care*, *36*(1), 64–70. https://doi.org/10.1017/S0266462319003507

Liu, W., Gori, J., Rioul, O., Beaudouin-Lafon, M., & Guiard, Y. (2020). How Relevant is Hick's Law for HCI? *Conference on Human Factors in Computing Systems - Proceedings*, 1–11. https://doi.org/10.1145/3313831.3376878

Lund, A. M. (2001). Measuring usability with the USE questionnaire. *Usability and User Experience*, *8*(2).

Marques, L., Matsubara, P. G., Nakamura, W. T., Ferreira, B. M., Wiese, I. S., Gadelha, B. F., Zaina, L. M., Redmiles, D., & Conte, T. U. (2021). Understanding ux better: A new technique to go beyond emotion assessment. *Sensors*, *21*(21), 1–26. https://doi.org/10.3390/s21217183

Masri Singarimbun. (2005). *Metode Penelitian Survei:Masri Singarimbun & Sofian Effendi*. LP3ES.

Melin, J., Bonn, S. E., Pendrill, L., & Lagerros, Y. T. (2020). A questionnaire for assessing user satisfaction with mobile health apps: Development using rasch measurement theory. *JMIR MHealth and UHealth*, *8*(5). https://doi.org/10.2196/15909

Mortazavi, E., Doyon-Poulin, P., Imbeau, D., Taraghi, M., & Robert, J.-M. (2024). Exploring the Landscape of UX Subjective Evaluation Tools and UX Dimensions: A Systematic Literature Review (2010–2021). *Interacting with Computers*, *36*(4), 255–278. https://doi.org/10.1093/iwc/iwae017

Nadifa, R. M., Pradana, F., & Bachtiar, F. A. (2024). Evaluation of Usability in LetsCode Digital Learning Media Using the Usability Testing Method and Use Questionnaire. *Journal of Information Technology and Computer Science*, *9*(2), 152–163. https://doi.org/10.25126/jitecs.92599

Nakamura, W. T., Ahmed, I., Redmiles, D., Oliveira, E., Fernandes, D., de Oliveira, E. H. T., & Conte, T. (2021). Are ux evaluation methods providing the same big picture? *Sensors*, *21*(10). https://doi.org/10.3390/s21103480

Nurazizah, E. O., Ermatita, & Astriratma, R. (2021). Analisis pengukuran usability menggunakan metode Use Questionnaire pada aplikasi Shopee Indonesia. *Seminar Nasional Mahasiswa Ilmu Komputer Dan Aplikasinya (SENAMIKA)*, *2*(2), 688–697. https://conference.upnvj.ac.id/index.php/senamika/article/view/1629%0Ahttps://conference.upnvj.ac.id/index.php/senamika/article/download/1629/1391

Paul M. Fitts. (1954). The Information Capacity of the Human Motor System in Controlling the Amplitude of Movement. *Journal of Experimental Psychology*, *47*(6), 381–391. http://www2.psychology.uiowa.edu/faculty/mordkoff/InfoProc/pdfs/Fitts 1954.pdf

Priyadi, A., Sediyono, E., & Purnomo, H. D. (2021). Evaluasi Kebergunaan (Usability) dan Rekomendasi Penggunaan Google Classroom untuk Blended Learning di Perguruan Tinggi. *J. Sistem Info. Bisnis*, *11*(2), 105–116. https://doi.org/10.21456/vol11iss2pp105-116

Purwinarko, A., Subagja, M., & Yanuarto, A. (2020). The Evaluation of Final Assignment System Using the USE Questionnaire Approach. *Scientific Journal of Informatics*, *7*(2), 2407–7658. http://journal.unnes.ac.id/nju/index.php/sji

Putra, Y. S. M., & Tanamal, R. (2020). Analisis Usability Menggunakan Metode USE Questionnaire Pada Website Ciputra Enterprise System. *Teknika*, *9*(1), 58–65. https://doi.org/10.34148/teknika.v9i1.267

Raka, S. J., & Setyohadi, D. B. (2021). Measuring User Satisfaction in Website Usability by Considering Stress Level. *JOIV : International Journal on Informatics Visualization*, *5*(3), 333. https://doi.org/10.30630/joiv.5.3.512

Rezaiguia, H., & Djeffal, A. (2022). Usability evaluation from client-side traces using heatmap and system usability scale. *2022 International Symposium on INnovative Informatics of Biskra (ISNIB)*, 1–6. https://doi.org/10.1109/ISNIB57382.2022.10075994

Sari, D. F., Efendi, A., & Sumaryati, S. (2024). Examining Student Satisfaction with Learning

Management System-Based E-Learning: A Self-Determination Theory Perspective. *Voices of English Language Education Society*, *8*(1), 52–63. https://doi.org/10.29408/veles.v8i1.25297

Sasongko, A., Jayanti, W. E., & Risdiansyah, D. (2020). USE Questionnaire Untuk Mengukur Daya Guna Sistem Informasi e-Tadkzirah. *Jurnal Khatulistiwa Informatika*, *8*(2). https://doi.org/10.31294/jki.v8i2.9135

Zaki, T., & Islam, M. N. (2021). Neurological and physiological measures to evaluate the usability and user-experience (UX) of information systems: A systematic literature review. *Computer Science Review*, *40*, 100375. https://doi.org/10.1016/j.cosrev.2021.100375