User Experience Evaluation Using Heuristic Evaluation (Case Study: PT. Kuncie Pintar Nusantara)

Meikel Zekben S[1], Astri Ghina[2]

[1]Telkom University, Master of Management, Gegerkalong Hilir Street No. 47 Bandung 40152 West Java, Indonesia
Corresponding Author Email: meikelzekben8[at]gmail.com

[2]Telkom University, Master of Management, Gegerkalong Hilir Street No. 47 Bandung 40152 West Java, Indonesia, Korea

Abstract: *Non-formal learning serves as an alternative education that plays a role in assisting schools and communities in addressing issues in the field of education. Kuncie's website, which focuses on non-formal education, specializes in online business learning and mentoring. Several factors that can influence user experience include internet connection quality, user interface, technical support availability, interaction and engagement, and learning personalization. This study aims to assess the user experience of the Kuncie website before and after design improvements, with the goal of enhancing the overall user experience. The research employs a qualitative method, specifically a case study, with in-depth qualitative data collection using heuristic methods by experts. The evaluation of user experience identified 101 issues with 29 priority improvements grouped into 10 heuristic principles. The priority for improvements is based on severity levels 4 and 3. A new prototype mockup design was created based on the expert recommendations, summarized into 29 solutions. Subsequently, a validation stage (iterative prototyping) was conducted with experts and active users of Kuncie. The validation results showed 23 solutions with an "agree" status and 6 solutions with an "agree with notes" status. Through user interview testing, all Kuncie users expressed that the new design has a more elegant appearance and a login flow that is easier to understand.*

Keywords: User Experience (UX), Non-Formal Education, Heuristic Evaluation Method, Edtech Website

1. Introduction

Web-based non-formal learning in Indonesia faces several challenges that need to be overcome to achieve maximum success and effectiveness. The challenges include: (1) Difficult accessibility in remote areas (outermost, lagging, and frontier), uneven internet access, and telecommunication infrastructure, which pose obstacles when accessing web-based non-formal learning (Andersson & Grönlund, 2009). (2) Technological infrastructure, inadequate hardware such as smartphones and low computer specifications, can hinder the online non-formal learning process. (3) Low digital literacy, with many learners unfamiliar with technology or not accustomed to internet use. (4) Relevant content to ensure that online non-formal learning materials meet the learners' needs. Developing engaging, interactive, and contextually relevant content presents its own challenges. (5) Interaction and engagement in creating adequate interaction between learners and educators. Online learning may feel less interactive and less conducive to discussions and collaboration among learners. (6) Evaluation and certification by measuring and evaluating web-based non-formal learning outcomes. Policymakers and educational institutions need to formulate effective evaluation methods to measure learners' progress in online learning.

The challenges outlined above significantly affect the user experience. Factors influencing user experience include internet connection speed and quality, complex User Interface (UI), technical support availability, interaction and engagement, and personalized learning. In web-based non-formal learning, User Experience (UE) is closely related, and a complex or difficult-to-use UI may hinder learners in navigating and utilizing it optimally. UE, according to the ISO 9241-210, is what users perceive and respond to in interactions and predictions with products, systems, or services. Additionally, according to Norman, UE encompasses all interactions users have not only with a company but also with its products and services. UE issues are a priority to address promptly because their impact affects the sustainability of a website or product. According to Robert Gagne and his Instructional Design Theory, emphasizing the importance of designing effective and efficient learning experiences, focusing on a good user experience can enhance the effectiveness of knowledge transfer (Robert Gagne, 1965).

Kuncie is an online learning platform designed to help professionals acquire new knowledge and skills through high-quality online courses accessible anytime, anywhere. Users can choose courses based on their interests and needs and learn through interactive video lessons, assignments, and exercises. The platform also provides support from experienced instructors and experts in their respective fields. Kuncie has 1.7 million users, with 61.3% male and 38.7% female users. By age, Kuncie users aged 18-24 account for 22%, 25-34 account for 21%, and 35-44 account for 16%. Kuncie's customer base in spread across Indonesia, with the top five cities such as Jakarta (15.14%), Surabaya (12.73%), Makassar (10.05%), Bandung (8.16%), and Palembang (7.06%). There are 3,000 premium subscribers, predominantly male (53.4%), and the largest customer base is in Jakarta, Surabaya, and Bandung.

Observations of the Kuncie website revealed various issues, such as the absence of a search button on the homepage,

ambiguous language, and layout in the toolbar menu (mentor & jadi mentor), no pricing information or product ratings in the product catalog view, and the lack of a "sort by" feature. Interviews with the Team Lead Product and Research at Kuncie revealed that the UX team had not conducted User Experience evaluations involving external UI/UX experts. To enhance the user experience during interactions with the website, a UE evaluation is being conducted. The Heuristic Evaluation (HE) method can be used for this evaluation, aiming to identify design problems or errors that may affect the user experience, involving the use of pre-established HE principles or guidelines.

2. Methods

The type of research used is qualitative research. Qualitative research focuses on in-depth understanding and description of phenomena, while quantitative research focuses on measurement and statistical analysis to generalize findings. The qualitative research method to be used is a case study, where in-depth analysis of a specific case will be conducted. The goal of a case study is to deeply understand the context, dynamics, and complexity of the researched case. This research begins with the collection of more in-depth qualitative data using a heuristic method by selected experts. The experts will evaluate with reference to Nielsen's 10 principles. The Heuristic method can provide deeper insights into design and functional aspects that need improvement. This method can offer valuable information in enhancing the user experience on the Kuncie edtech website.

The research stages are the steps that the researcher will take to complete the research. The following are the stages that will be undertaken in the evaluation of the UE of the Kuncie website based on the HE method presented in Figure 1 below:
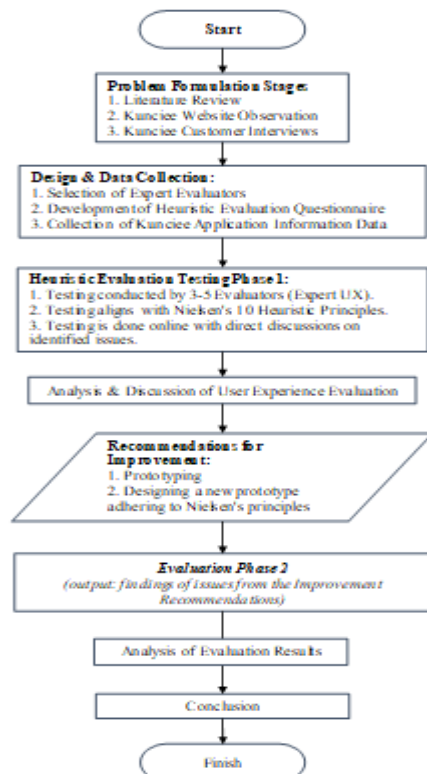
Picture 1: *Research Phases*

Problem Formulation Stage
In this process, the stage involves defining the scope of the issues that occur and subsequently formulating the problem based on user experience with the Kuncie website, which is gathered through pre-research observations.

1) Literature Review Stage
The literature review stage involves exploring theories related to the analysis and evaluation activities using HE. This literature review is then used as reference material, supporting this research activity in the form of journals, books, and previous research.

2) Observation of the Kuncie Website
The observation stage includes direct observation of the appearance, interactions, and user responses when using the Kuncie website. The observation stage consists of selecting participants (active customers of the Kuncie website and new customers), focusing on user actions, responses, and reactions.

3) Interviews with Kuncie Customers
The stage of interviewing Kuncie customers involves conducting brief initial interviews with customers who have used the Kuncie website as a support for non-formal education. Interview questions revolve around the user experience, strengths, and weaknesses of the Kuncie website.

Design and Data Collection Stage
This stage consists of four crucial elements: the selection of evaluators, the preparation of test documents, the collection of Kuncie application information, and the briefing of evaluators.

1) Selection of Evaluators
Heuristic Evaluation (HE) is an evaluation method aimed at identifying issues in a system and typically involves 3 to 5 experts. This evaluation, utilizing experts, is often employed initially to enhance existing designs in preparation for user testing on the system (Rahmadina et al., 2019). In this research, the chosen experts are external UI/UX specialists associated with the Kuncie application. The first expert is from UX Telkomsel, the second from UX Ex-Tokopedia, and the third from UX Telkom Indonesia. These three experts will contribute to the research process in the heuristic method.

2) Preparation of Heuristic Evaluation (HE) Test Documents
HE is a method that employs a set of heuristics to assess usability. During the initial design stage, the specification phase allows for the implementation of HE. However, HE can also be used to evaluate mockup designs or existing websites (Repository et al., 2021). Nielsen & Molich, 1990 proposed 10 heuristic rules for usability, which are utilized in the evaluation and can be seen in the following table.

Table 1: Heuristic Principles

Heuristic Principles	Definitions
H1-*Visibility of System Status*	The system should provide real-time information to users about what is happening through timely and appropriate feedback that is logically

	acceptable (as soon as possible).
H2-*Match Between System and The Real Word*	The system should communicate in the user's language, using words, phrases, and concepts that are familiar to the user rather than system-oriented terms.
H3-*User Control and Freedom*	Users often select system functions accidentally, so there should be a "clear emergency exit" that allows them to escape from undesired situations without lengthy dialogs.
H4-*Consistency and Standards*	Users should not have to wonder whether different words, situations, or actions mean the same thing.
H5-*ErrorPrevention*	A well-thought-out design to avoid problems from the beginning is better than well-designed error messages.
H6-*Recognition Rather than Recall*	Minimize the user's memory load by making objects, actions, and options visible. Users should not have to remember information from one part of the dialog to another. Instructions for system use should be straightforward.
H7-*Flexibility and Efficiency of Use*	Allow users to customize, adjust, and use system instructions for actions they frequently perform.
H8-*Aesthetic and Minimalist Design*	Existing dialogs should not contain irrelevant or rarely needed information.
H9-*Help User Recognize, Diagnose and Recovers User*	Error messages should be expressed in clear and simple language (without programming code), indicating the problem precisely, and suggesting constructive solutions.
H10-*Help and Documentation*	Documentation needs to be provided. Information provided through such means should be easy to find, focused on user tasks, contain concrete steps to follow, and not be excessively large.

HE can identify usability issues in the software. The identified problems are then assessed according to their level of difficulty (severity rating). Severity rating can determine the number of resources needed to fix the identified problems and provide an initial estimate of the usability principles that need to be added (Sulistioyono, 2017).

Table 2: Severity Rating

Severity rating	Explanation
0	No usability issues
1	Cosmetic problem category, existing issues do not need to be fixed unless there is extra time in the project
2	Minor usability problem category, fixing existing issues is given low priority.
3	Major usability problem category, fixing existing issues is given high priority.
4	Usability catastrophe category, existing issues are given higher priority and must be fixed immediately before the project is launched.

3) Data Collection for Kuncie Application Information
In conducting the information gathering as the basis for this evaluation research, the researcher collected information through interviews with several users of the Kuncie website application. Additionally, the researcher conducted interviews with the product and research team of the Kuncie application, conducted online through Zoom meetings. During these interviews, discussions were also held regarding the improvements previously implemented by the UX team at Kuncie.

4) Evaluator Briefing
In this stage, the evaluators are briefed on the scope of the system examination and the characteristics of users utilizing the system. The evaluators review a list of principles and examples of heuristics to ensure their understanding of these principles. The briefing is conducted through an online Zoom meeting, with all experts scheduled to attend and listen to explanations related to the research.

Heuristic Evaluation Testing Stage
In the research using the HE method, opinions from UI/UX experts who play a role in providing evaluations are required (Nielsen & Molich, 1990). Three experts are utilized in testing the Kuncie website. When experts evaluate the Kuncie website, they are also required to fill out testing documents based on the 10 HE principles to identify issues systematically and meticulously on the Kuncie website.

The following is a list of procedures and flow in conducting the evaluation on the Kuncie website using the Heuristic Evaluation method using video conference tools (Zoom application). The flowchart can be seen in the research stage diagram below:
a) As an introduction, the researcher provides a detailed explanation to the evaluators regarding the evaluation that will be conducted using the Heuristic Evaluation method. The researcher also explains the 10 principles of the Heuristic method and severity ratings to determine the severity level of identified issues. The researcher provides a set of documents for the evaluation to be conducted by the evaluators.
b) The researcher gives time to the evaluators to explore the related website. The time given is based on the evaluators' needs. In this session, discussions can take place between the researcher and the evaluators.
c) After understanding the content of the website, the evaluators are given approximately 180 minutes for the evaluation (Yulis Ambarwati, 2017). Then, the evaluators are expected to present the identified issues along with their severity ratings.
d) After the evaluators finish evaluating, the findings and the given severity ratings are documented in the test document provided by the researcher.
e) The data obtained is then processed by the researcher for summarization and analysis.

Analysis & UX Discussion Stage
In this stage, the evaluation results from the three experts are recapitulated, considering severity rating values. Subsequently, an analysis is conducted to obtain a basis for the design improvements in the form of a mockup design interface for the Kuncie website based on the severity ratings analyzed earlier.

Website Improvement Design Stage
In this stage, a discussion is conducted via Zoom meeting with the three experts regarding the analysis of identified issues, severity values for each issue, and discussing priority recommendations for solutions. Following this, the website design is improved and visualized using Figma software in

the form of a mockup.

New Validation Stage
In this stage, validation of the new design, created in the form of a prototype, is conducted. Validation (iterative prototyping) of the new design is done with the evaluators who provide recommendations for improvement. Validation of the new design is also done with active Kuncie customers. The method used is user interview testing, where the prototype is explained to active Kuncie customers and evaluators.

Discussion
This section explains the results of the evaluation and discusses the findings of the identified issues, validation of the new design, and outlines the heuristic principles violated based on the evaluation results of user experience.

Conclusion
The final stage involves drawing conclusions based on the results from the previous stages, addressing all the problem formulations outlined. Additionally, in this stage, ideas for further research are provided, grounded in the findings of this research process.

3. Results and discussion

In the evaluation procedure, when evaluators identify issues, they document their findings in the provided testing document.

Evaluator Evaluation Results (Expert)
Based on the issue findings in Table 3, calculations were performed to determine the Heuristic principle most frequently encountered in the evaluation of the Kuncie website. The code H4, which corresponds to the principle of "consistency and standards," was found to be the most frequently identified principle, accounting for 24.75% of the 101 identified issues. All Heuristic principles were violated in the evaluation of the user experience on the Kuncie website.

Table 3: Nielsen's Heuristic Principles and Number of Issues

| Nielsen's Heuristic Principal	Number of Issues
H1-*Visibility of Sistem Status*	12
H2-*Match Between System and The Real Word*	9
H3-*User Control and Freedom*	14
H4 -*Consistency and Standars*	25
H5-*Error Prevention*	7
H6-*Recognition Rather than Recall*	3
H7-*Flexibility and Efficiency of Use*	5
H8-*Aesthetic and Minimalist Design*	20
H9-*Help User Recognize, Diagnose and Recovers User*	5
H10-*Help and Documentation*	1
Total Number of Issues Found	**101**

In the web interface design of the Kuncie website, according to the evaluation results of the three experts, code H10-Help & Documentation is the principle with the least identified issues. In the percentage distribution chart of issue findings, codes H4, H8, H3, and H1 are the heuristics with the highest number of issues (percentage above 10%).
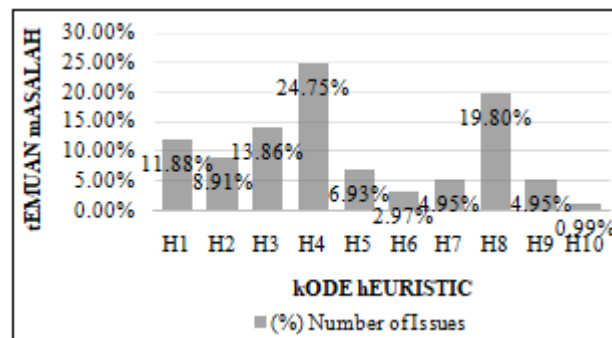
Picture 2: Percentage Distribution Chart of Issue Findings

Severity levels can be used to allocate the most resources to fix the most serious issues and can also provide a rough estimate of additional needs for usability efforts (Nielsen J, 1994). Severity levels generally consist of values 0: no issues, value 1: cosmetic issues, value 2: minor issues, value 3: major issues, and value 4: issues that should not exist before product release.

Based on the number of issue findings, there are 42 issues with severity level 1, meaning these 42 issues are cosmetic issues that do not significantly impact users. Fixes may not be needed if time is limited. In the category of minor usability, there are 30 issues with severity level 2. This category has the potential for issues affecting users when interacting with the Kuncie website. Fixes are needed with low priority. Then there are 22 issues with severity level 3, classified as major usability issues that need to be fixed with high priority. Finally, there are 7 issues with severity level 4, indicating issues that should be fixed, as these are problems that should not exist or be found when the system or website is launched or used.
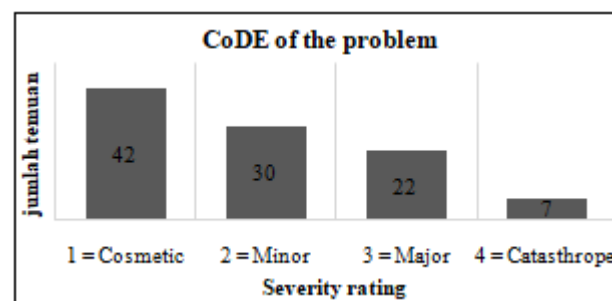

Picture 3: Severity Rating Graphic

Priority of Fixes
After determining the issues and their severity ratings, the next step is to provide recommended fixes for each problem with a severity rating above 0. This stage is carried out through discussion among experts so that the best solution can be provided based on various expert perspectives. Based on Jacob Nielsen's severity rating table concept, severity 1 indicates cosmetic issues that do not significantly impact users, so fixes are not urgently needed if time is limited. Severity 2 indicates minor usability issues with potential difficulties for users, requiring fixes with a low priority level. The expert input suggests focusing on fixing issues with severity ratings of 3 and 4, where there are a considerable number of problems, specifically 7 severity 4 issues and 22 severity 3 issues.

Website Sitemap Design

A website sitemap is a diagram or hierarchical list of pages on a website. This site map serves as a visual guide showing the structure of the website, helping users understand how pages are organized, and providing direct links to various sections of the website (Newman & Landay, 2000). In recommending the prototype for improvement, the initial step in planning the improvement is to create a website sitemap. The sitemap for the improvement prototype is slightly different from the original website. This is because it serves as a solution to the identified problems and groups each menu, with content related to relatively similar themes. The new sitemap has six main menus on the website: Home (Landing Page), Mini MBA, Learning, Mentor, Job Openings, and Become a Mentor. Each specific menu contains sub-menus that include various informational content related to the themes presented in each menu title.
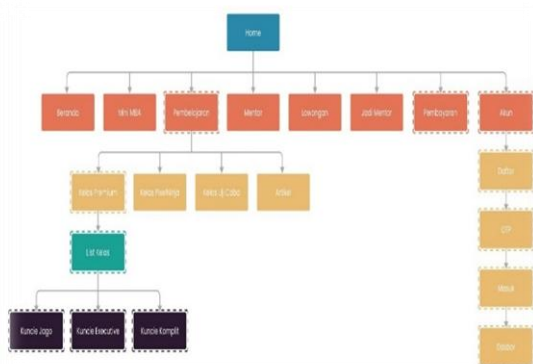
Picture 4: Site Map New Design

4. Discussion

Heuristic evaluation does not require a representative number of people. According to Nielsen (1994), three usability specialists are sufficient to identify most user interface usability issues. The challenge encountered in this study was the difficulty of recruiting experienced professionals in this field. In user experience research, usability specialists are defined as individuals with postgraduate degrees and several years of work experience in user experience. The assessment was conducted by three evaluators who work as UI/UX experts in large companies, namely PT Telkom Indonesia, PT Telkomsel, and the startup Tokopedia.

User Experience (UX) evaluation done in one iteration may be feasible in certain situations, especially when the project has time, budget, or resource constraints (Dumas & Redish, 1999). In this UX evaluation of the Kuncie website, only one iteration was conducted, including evaluation, creating a mockup design prototype, and validation. This was due to time, budget, and resource constraints, and on the other hand, there is no theory that mandates more than one iteration; everything depends on the research goals. The results of the first heuristic evaluation iteration found 101 user experience issues on the Kuncie website. These cases were grouped based on heuristic principles. Based on the problem findings sorted by the severity rating of each issue, the expert's advice focuses on fixing severity 3 and 4 issues,

considering the number of problems and the severity level that must be addressed as soon as possible (Nielsen J, 1994). Severity 3 has 22 issues, categorized as major usability issues that need to be fixed with high priority. There are also 7 severity 4 issues, which need to be fixed, and these issues are considered problems that should not exist or be found when the system or website is launched or used. This agreement is reinforced by Jacob Nielsen's (1994) severity ratings table.

The priority of creating a mockup design prototype was carried out to address 29 issues spread across 9 heuristic principles. The dominant heuristic principles violated in the interface design of the Kuncie website are H4 - Consistency and Standards, H1-Visibility of System Status, and H3-User Control and Freedom. Twenty-nine issues were found on the Kuncie website's payment menu, registration & login, navbar, Kuncie Jago, Kuncie Kilat, and dashboard menu. Issues were predominantly found in the payment menu, registration & login, and navbar. The following are the 9 violated Heuristic Principles along with the solutions implemented:

a) Visibility of System Status

In the evaluation results of the Kuncie website's interface design, six issues were found with evaluation codes M24, M80, M84, M85, M96 & M99. The location of these issues was in the navbar menu (Navigation Bar) with three issues, the payment menu with two issues, and the registration and login menu with one issue. The recommended solutions are to create a banner that does not cover the main menu (M84), improve navigation (M85), differentiate the background color of Mini-MBA menu items with a different text color on the menu bar hover state (M24), improve the button and form input styles to clearly distinguish between the two (M80), provide page titles and contextually appropriate empty state messages (M99), and display a cancel button (M96).

b) Match Between System and the Real World

In the evaluation results of the Kuncie website's interface design, two issues were found with evaluation codes M76 & M100. The location of these issues was in the payment menu. The recommended solutions are to make the display more transparent, such as adding a promo page with coupon codes or similar (M76), and not displaying confirmation when the cart is empty (M100).

c) User Control and Freedom

In the evaluation results of the Kuncie website's interface design, five issues were found with evaluation codes M3, M18, M23, M35, M88. The location of these issues was in the navbar menu (Navigation Bar) with one issue, the registration & login menu with one issue, the dashboard menu with one issue, and the Kuncie Jago menu with one issue. The recommended solutions are to add the option to set the password during registration at the beginning (M18), add a menu bar on this page (M23), add a submit button and remove the automatic loading feature after entering OTP (M3), add a close/cancel button (M35), and provide clear information that the filter is active (M88).

d) Consistency and Standards

In the evaluation results of the Kuncie website's interface design, six issues were found with evaluation codes M4, M19, M20, M21, M51, M86. The location of these issues was in the navbar menu (Navigation Bar) with one issue, the registration & login menu with one issue, the dashboard menu with three issues, and the payment menu with one issue. The recommended solutions are to move the option to read Terms & Conditions and Privacy Policy to the initial registration page (M4), apply the same design standard for all pages on the Kuncie website (M19), standardize and agree to use only one dashboard page (M20), determine a standard copywriting/language for all pages on the Kuncie website (M21), move the Cancel button below Pay Now but with a more noticeable cancellation color like red/orange (M51), and use only one type of navigation (M86).

e) Error Prevention
In the evaluation results of the Kuncie website's interface design, two issues were found with evaluation codes M97, M98. The location of these issues was in the payment menu. The recommended solutions are to disable the button when not filled out or create a list of available voucher codes (M98) and provide deletion confirmation (M97).

f) Recognition Rather Than Recall
In the evaluation results of the Kuncie website's interface design, one issue was found with evaluation code M2. The location of this issue was in the registration and login menu. The recommended solution is to move the close button to the top right, change the close button to a breadcrumb, and provide an error message near its context (M2).

g) Flexibility and Efficiency of Use
In the evaluation results of the Kuncie website's interface design, three issues were found with evaluation codes M1, M55, M89. The location of these issues was in the registration & login menu with two issues and the Kuncie Jago menu with one issue. The recommended solutions are to add the option to set the password during registration at the beginning (M1), make it clear which password to input because there is no password entered during registration (M55), and add additional explanations for the product catalog (M89).

h) Aesthetic and Minimalist Design
In the evaluation results of the Kuncie website's interface design, one issue was found with evaluation code M95. The location of this issue was in the payment menu. The recommended solution is to relayout information and design components (M95).

i) Help User Recognize, Diagnose and Recovers User
In the evaluation results of the Kuncie website's interface design, three issues were found with evaluation codes M68, M81, M101. The location of these issues was in the Kuncie Kilat menu with one issue, the registration & login menu with one issue, and the payment menu with one issue. The recommended solutions are that such bugs should be fixed immediately (M68), provide an error message near its context (M81 & M101).

The validation stage involved experts (evaluators) and active Kuncie users. Expert validation was conducted by attaching the prototype in Figma form and validation documents (iterative prototyping). The results obtained were 23 solutions (79.31% of the total solutions), where all experts gave an "agree" opinion with the created solutions, and there were only 6 "agree with notes" solutions (agreed with notes). No solutions were disagreed with by the experts, but one solution, where 2 experts in the validation results gave the status "agree with notes." This solution was providing an error message near its context (M81), where the violated principle was H9-Help User Recognize, Diagnose and Recovers User, and it was found in the registration and login menu. Since this research was conducted only in iteration 1, the validation results become input for the next research.

From the perspective of active Kuncie users, the validation stage was conducted using the user interview testing method with 3 respondents who were previously shown the new prototype design (Rubin & Chisnell, 2008). The goal of validation for Kuncie users is to obtain feedback and initial insights into the new prototype design. The validation results from Kuncie users are that all respondents conveyed that the new display is more elegant, better than the previous display, and easy to use. All respondents mentioned that the login flow is easier to understand and more comfortable because information is displayed clearly, and if there is an error in data entry, the component to be corrected is immediately visible.

5. Conclusion

The evaluation results of the Kuncie website experience identified a total of 101 issues from the experts, grouped based on 10 heuristic principles. Heuristic principles H4 - Consistency and Standards, H8 - Aesthetic and Minimalist Design, and H3 - User Control and Freedom are the most frequently violated principles in the interface design of the Kuncie website.

In terms of priority for improvement, considering the severity level, the issues with severity values of 3 and severity 4, where the number of issues is quite substantial, specifically 7 severity 4 issues and 22 severity 3 issues, totaling 29 issues. The dominant issues were found in the payment menu, navbar, registration and login, Kuncie Jago, dashboard, and Kunci Kilat. These severity 3 and 4 issues became the main pain points in the user experience issues of the Kuncie website. The prototype design was created based on the 29 priority issues and adhered to the recommended improvement suggestions from the experts.

Testing of the new prototype design was conducted by validating (iterative prototyping) with three evaluators beforehand and directly performing user interview testing with three respondents (active users) of the Kuncie website. There were 23 solutions (79.31% of the total solutions), where all experts gave an "agree" opinion with the created solutions, and there were only 6 "agree with notes" solutions (agreed with notes). There was one solution where 2 experts provided validation results with the status "agree with notes." Meanwhile, the results obtained from direct interviews with three respondents (Kuncie users) conveyed that the new display is more elegant, better than the previous display, easy to use, and has a more organized design with a

search feature for several menus. The average rating given for an attractive display was 4.30 points on a scale of 1 to 5 points. All respondents (Kuncie users) also mentioned that the new login flow design is easier to understand and more comfortable because information is displayed clearly, and if there is an error in data entry, the component to be corrected is immediately visible.

References

[1] Allen, M., Currie, L. M., Bakken, S., Patel, V. L., & Cimmo, J. J, "Heuristic Evaluation of Paper-based Web Pages: A Simplified Inspection Usability Methodology", Journal of Biomedical Informatics, 39, pp. 412–423, 2006.

[2] Almeida, F., & Gonçalves, R, "Towards Mobile UX Evaluation and Improvement in Startups: A Case Study on the Adoption of User Experience Questionnaire and Hierarchical Task Analysis", Journal of Startup and UX Research, 7(2), pp. 45-63, 2020.

[3] Alomari, H. W., Ramasamy, V., Kiper, J. D., & Potvin, G. (2020). A User Interface (UI) and User Experience (UX) evaluation framework for cyberlearning environments in computer science and software engineering education. Heliyon, 6, e03917. https://doi.org/10.1016/j.heliyon.2020.e03917.

[4] Arhippainen, L. (2021). A Tutorial of Ten User Experience Heuristics. Center for Internet Excellence, P.O. Box 1001, FI-90014 University of Oulu.

[5] Bernhaupt, R., Pirker, M., & Gatellier, B. (2013). "Identification of User Experience and Usability Dimensions for Second Screen Applications: Results from an Expert Evaluation Using Generic Task Models." In Proceedings of Interact '13, Springer.

[6] Dewi, P. W. S., Dantes, G. R., & Indrawan, G, "User Experience evaluation of e-report application using Cognitive walkthrough (cw), Heuristic Evaluation (he), and User Experience questionnaire (ueq)", Journal of Physics: Conference Series, pp. 1516, 2020.

[7] Fadhilah, E. W., Herdiani, A., & Martha, A. S. D, "Analisis Usability User Experience Pada Aplikasi Peduli Lindungi dengan Metode Heuristic Evaluation". Jurnal Tugas Akhir Fakultas Informatika, 2022.

[8] Holland, S., & Baker, R. (2001). "Exploring the Space of User Experience." In Proceedings of the 2001 Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques (DIS '01), pp. 225-236. https://doi.org/10.1145/378995.379020.

[9] Imana, A. G., & Nugroho, Y. S, "UX (User Experience) Evaluation of The Open Learning Universitas Muhammadiyah Surakarta Using Heuristic and Usability Testing", Jurnal Teknik Informatika (JUTIF), Vol. 4, No. 4, pp. 681-691. DOI: https://doi.org/10.52436/1.jutif.2023.4.4.824, 2023.

[10] Indrawati, E, "Developing a theoretical framework in research", Journal of Educational and Developmental Psychology, 5(1), pp. 133-139, 2015.

[11] Kalaichelven, J., Rahim, R. E. A., & Ibrahim, R. "Measuring User Experience of Blended Learning Application: A Case Study of Higher Education". In 2022 13th International Conference on E-Education, E-Business, E-Management, and E-Learning (IC4E 2022), pp. 6, 2022.

[12] Kamil,M, Pendidikan Nonformal: Pengembangan melalui Pusat Kegiatan Belajar Masyarakat (PKBM) di Indonesia (Sebuah Pembelajaran dari Kominkan Jepang), Alfabeta, Bandung, 2009.

[13] Newman, M., & Landay, J. A. (2000). "Sitemaps, Storyboards, and Specifications: A Sketch of Web Site Design Practice." In Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques

[14] Nielsen, J., & Molich, R, "Heuristic Evaluation of user interfaces", Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 249-256, 1990.

[15] Nielsen, J. (1995). "Heuristic Evaluation." In J. Nielsen & R. L. Mack (Eds.), Usability Inspection Methods, pp. 25-62.

[16] Paramitha, A. I. I., Indrawan, G., & Dantes, G. R. (2018). "The Evaluation of Web-Based Academic Progress Information System Using Heuristic Evaluation and User Experience Questionnaire (UEQ)." Conference Proceedings

[17] Ramadhanti, N. T., Budiyanto, C. W., & Yuana, R. A, "The use of Heuristic Evaluation on UI/UX design: A review to anticipate web app's usability". AIP Conference Proceedings, pp. 2540, 2023.

[18] Randi Eka, "Tren Platform Edtech di Indonesia". [online]. Available: DailySocial.id. Tren Platform Edtech di Indonesia. [Accessed: April 21, 2023]

[19] Rubin, J., & Chisnell, D. (2008). Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Wiley.

[20] Schlecht, M, "User experience evaluation: Testing with at least three users". In Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems, pp. 589-596,2017.

[21] Pierre, S. D. Q., "Study on Heuristics Evaluation: Evaluation of Shopping+ Application." In Proceedings of the 6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences, 2015.

[22] Tang, Z., Johnson, T. R., Tindall, R. D., & Zhang, "Applying Heuristic Evaluation to Improve the Usability of a Telemedicine System." Telemedicine and e-Health, 2006

[23] Tondel, I. A, "Iterative User Interface Design. Interacting with Computers, 14(5)", pp. 831-846, 2002.

[24] Utami, Y. T., Pramudani, A., Irawawati, A. R., & Kurnia, D, "Implementasi Heuristic Evaluation Untuk Analisis User Experience (UX)Pada Virtual Class Universitas Lampung", Jurnal Ilmiah Sistem Informasi Akuntansi (JIMASIA), Vol 3, No.1, Juni 2023, pp. 33 – 42, 2023.

[25] Yeratziotis, A., & Zaphiris, P, "A Heuristic Evaluation for Deaf Web User Experience (HE4DWUX)". International Journal of Human-Computer Interaction, 34(3), pp. 195-217, 2018.

[26] Zhu, J., & Hou, H, "Research on User Experience Evaluation of mobile applications in government services" IEEE Access, 9, pp. 51111-51120, 2021.

Author Profile

Meikel Zekben S received the S.T degrees in Industrial Engineering from Diponegoro University in 2017, respectively. During 2013-2017. He now with PT Telekomunikasi Selular (Telkomsel).

Astri Ghina holds a Doctorate in Science and Management. Her daily occupation involves being a lecturer for the Master's program in Management at Telkom University in Bandung, Indonesia. Astri Ghina has 17 publications, 249 citations, and specializes in strategy in the field of entrepreneurship.