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User Interface Optimization Using Human Centered Design Method to Improve Website Usability (Case Study: Entrance Cilacap)

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A B S T R A C T

A good user interface design on a website will make users feel at home using the website. On the contrary, a bad user interface will make users quickly leave the site or bounce rate. User involvement in the system development process will have a positive and significant impact on satisfaction with a system. The objective of this study is to obtain a new user interface that can overcome the usability problems in the web design of the Cilacap Entrance. To meet user needs, this study uses the human centered design (HCD) method for web redesign. User identification and interviews were conducted to obtain user context data. While user personas are used to determine user needs. In addition, A/B testing was used by applying the results of heatmap analysis and data from Google Analytics and Google Web Console to compare the results before and after the interface redesign. The results showed an increase in the number of users, longer visits, more content exploration, and high activity on the site. This means that the redesigned interface was successful in improving user experience, increasing user activity, and maintaining user interest in the Cilacap Entrance website.

1. Introduction

LKP Entrance is one of the tutoring and learning institutions in Cilacap that utilizes a website to provide information to its users. The current issue with the Entrance website is its poor user interface design, particularly in the navigation section, and the abundance of empty content, which falls under the category of poor usability. Therefore, optimization of the user interface of the Entrance website in Cilacap is necessary. Optimization is the process of striving for optimal or ideal results.

Based on the analysis of data from Google Analytics and Google Console for the Entrance website during the period from May 25 to June 21, 2023, it is evident that out of the total 51 visitors, only a few stayed on the site for a short duration of about 90 seconds. The data shows that 34.30% of visitors leave the site without interacting with any other pages, while the bounce rate reaches 52.54%. Based on the heatmap analysis using the Mouseflow plugin from June 15-22, 2023, involving 20 users with an average visit duration of 61 seconds, as well as 226 total clicks and 50% scroll activity on various elements on the site. Based on the data, it can be concluded that the website has not provided satisfaction to its users due to the high bounce rate and exit rate, as well as low visitor activity on each page. Additionally, the website has not yet provided a good user experience.

To create a positive user experience and increase website usability, a well-designed user interface is essential.[1] Involving users in the development process can also significantly improve their satisfaction with the system.[2] A system with a user-friendly interface that provides a high level of user satisfaction can make

users feel comfortable and at ease when operating the system.[3]

In this research, the human-centered design (HCD) method is used to meet user needs. According to ISO 9241-210, HCD is a system development method that prioritizes human factors in interactive system development. Its goal is to produce more effective and efficient systems by involving users.[4-7] The human-centered design method is proven to provide a very good approach to producing a system or website that suits the needs of users.[8-10] The HCD method consists of four stages: context of use analysis, user needs analysis, solution design creation, and solution design evaluation.[11] The evaluation stage is crucial in determining the level of system usability.

This usability study will focus on the user experience when using a system.[12] Usability is a technique for analyzing quality that determines the level of user satisfaction with a system or product.[13] The human-centered design method is employed to address human-centered problems and gain insights into usage needs.[14] The A/B testing method is used to evaluate the comparison results before and after the user interface redesign. It is a commonly used approach for testing changes in the appearance of a website.[5] The objectives of this research are to obtain a web design that can improve user experience, increase user activity, and maintain user interest in the Entrance Cilacap website.

2. Methods

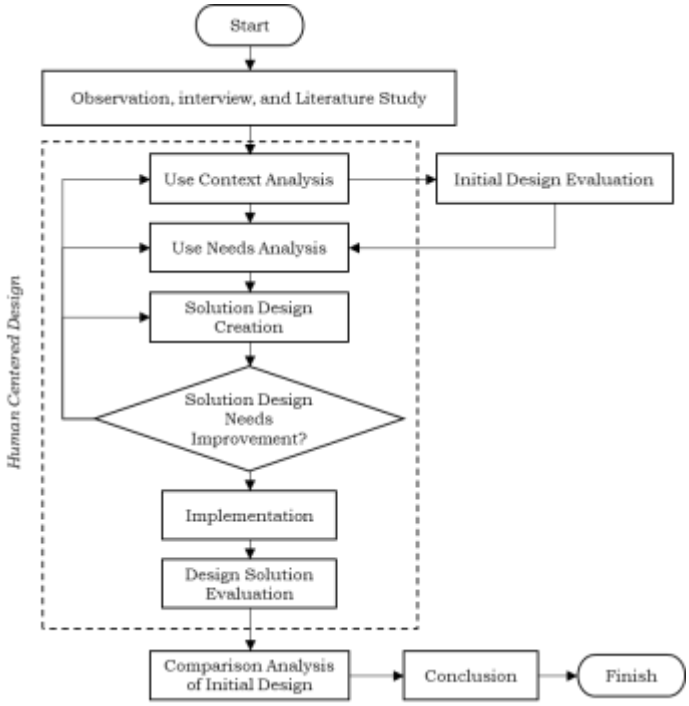

Figure 1. Research stages.

User context analysis

This stage aims to obtain data related to the list of stakeholders and system users, user characteristics, user goals, user tasks, and the environment where the system is used.[15] In this study, context analysis was conducted by identifying users or stakeholders and interviewing web users. The interview data to be obtained focuses on a) user goals and tasks and b) system environment.

Initial design evaluation

The initial design evaluation assesses the usability level of the website. The data was obtained from Google Analytics and Google Console for the Entrance Cilacap

website. The heatmap technique is used to analyze certain design elements that attract user attention and user interaction patterns identification with elements on the display or user interface.[16]

Human-centered design: user needs analysis

At the user needs analysis stage, the needs of the Cilacap Entrance website users are explained. The obstacles faced by users during the initial design evaluation will be analyzed to determine user needs in the solution design. Researchers will conduct interviews with stakeholders and system users. The interview results will be used to create user personas. After conducting interviews, the obtained data is processed into personas that represent the website's real users. Personas contain combined data from five interview participants, including information on their needs, biographies, photos, user goals, and system environment.[17]

Human-centered design: solution design creation

Solution design begins with sitemap design, then identifying the user flow for each feature, creating a mood board, creating a style guide, and creating a prototype. User flow design is applied to the following features: 1. Viewing program details, 2. Viewing blogs or information, 3. Register for the class program, 4. View the gallery.

The solution design is customized to meet user needs and adheres to the principles of the human-centered design (HCD) method. HCD principles, based on ISO 9241-219, offer crucial guidelines for designing products, systems, or services with a focus on user needs and experiences.[18]

Human-centered design: implementation

The final outcome is a fully operational Cilacap Entrance website that can be accessed on a desktop, tablet, or smartphone with an improved design. The steps required in the implementation phase are 1) Color selection, 2) Theme selection, and 3) Plugin installation. The plugins used in the Cilacap Entrance web are Elementor, Wp Super Cache, Site Kit by Google, Join Chat, and Yoast SEO.

Human-centered design: solution design evaluation

The evaluation was conducted to measure the usability level of the solution design in terms of user satisfaction and comfort. This measurement uses data from the Heatmaps technique and data analysis from Google Analytics and Google Console of the Entrance Cilacap website.

Comparison analysis of initial design evaluation result with solution design

The data obtained from the evaluation results of the initial and solution designs are then analyzed and compared. Finally, an A/B testing method is used to determine which design is better.[19]

3. Results and Discussion

User context analysis

The list of users and stakeholders was obtained through discussions with the Cilacap Entrance team.

Table 1. List of stakeholders and users.

Users	Description
Head of LKP Entrance Cilacap	The Head of the Institution as a party that provides instructors, opinions and directions to the admin in carrying out website management tasks.
Student guardian	Student guardians as users of the Cilacap Entrance website will get information related to the institution and interact with the website user interface.
Tutor	Tutors as users who can share information and materials through the blog page.
Student	Students as users who will get information about materials and information from the institution.
General user	General users can view information related to the institution's Entrance.

The evaluation will involve recruiting 5 participants, based on Nielsen's statement that usability evaluation can be done with just 5 users.[3] The participants will access the system environment using a mobile phone device, Google Chrome, and either Wi-Fi or data packages as data connection sources.

Initial design evaluation

Based on the data analysis of the Google Analytics website entrance in Cilacap from May 25 to June 21, 2023, there were 51 visitors. The total number of views during this period was 172, with an average visit time of approximately 1 minute and 30 seconds (90 seconds). The exit ratio was 34.30%, and the bounce ratio was 52.54%. The data shows that the number of visits to the site is low and most visitors leave without interacting with other pages. Additionally, the activity on the page is also low.[20] According to the Google Console analysis, there were 43 total clicks, 556 ad serving pages, and an average click-through rate (CTR) of 7.7%. These results are unfavorable because the high number of views is not proportional to the small number of clicks. Based on the evaluation results using heatmaps generated by the Mouseflow plugin during the time period of June 15-22, 2023, with a sample size of 20 users and 34 recordings, the average visit duration was 1 minute and 15 seconds, and the exit rate was 46.15%. Based on the heatmaps data above, it appears that the Entrance Cilacap website does not provide a satisfactory user experience. This is indicated by the high bounce rate, short user visit time, and low user activity on the page.

User need analysis

Based on the results of interviews and information obtained about the obstacles experienced, stakeholders and website users expect a website that is informative, with an attractive and easy-to-understand design. Additionally, they expect a good layout and grouping of functions to provide user comfort. The following Figure 2 is one example of the results of the user persona created.

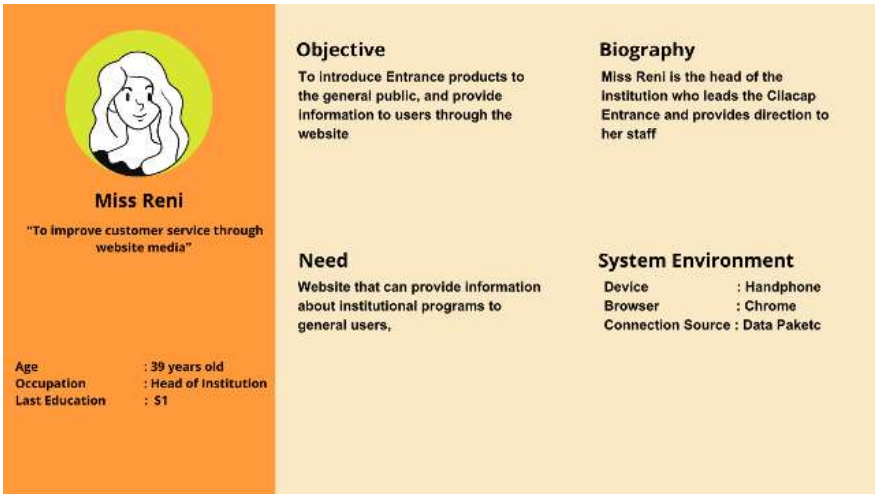

Figure 2. User Persona from Miss Reni (user) perspective.

Solution design creation and implementation

The following image displays one of the solution designs that was created. The chosen colors should align with the brand's Entrance colors, which are orange and yellow, conveying enthusiasm and excitement for learning. Secondly, for theme selection, the Tutor Starter theme was chosen due to its responsive display, allowing it to be accessed on multiple devices. Thirdly, in regards to the plugin installation process, the aim was to provide additional functionality and improve website performance.

Figure 3. Solution design view.

Evaluates the solution design

During November 9 and December 6, 2023, the Data from Google Analytics data captured on the Entrance Cilacap website are shown in Table 2 below.

Table 2. Google Analytics data.

Parameters	Google Analytics	
	Before (A)	After (B)
Users	51 visitors	91 visitors
Page view	172 pages	961 pages
Average duration	1 min 30 sec	5 min 16 sec
Bounce rate	52.54%	39.59%

The number of users increased by 78%, indicating a positive growth in the audience. Page views increased significantly, reflecting increased user interaction. The average visit duration also increased, indicating more user engagement. The bounce rate decreased by 25%, indicating an improvement in retaining users on the page.

During the same period, Google Console analysis showed that the increase in the number of users, longer visit duration, wider content exploration, and increased activity indicates that the solution design has successfully improved the overall user experience.

Table 3. Google Console data.

Parameters	Google Analytics	
	Before (A)	**After (B)**
Clicks	43	211
Live pages	556	286
Average click-through rate	7.7%	73.8%

Click through rate (CTR) shows the click activity on an ad. The data above shows a very high increase in CTR. This means that the interaction on the ad to go to the Cilacap web Entrance is high. A comparison of the evaluation results between the initial design and the solution design through heatmap analysis showed significant positive progress. The number of users increased by 100%, reflecting strong audience growth. Table 4 shows the heatmap analysis data.

Table 4. Heatmap analysis data.

Parameters	**Google Analytics**	
	Before (A)	**After (B)**
User	20	40
Recording	42	69
Page view	72	521
Clicks	226	658
Average page visit duration	1 min 1 sec	9 min 37 sec

Recordings increased indicating an improved understanding of user behaviour. Page views jumped by 712.5%, signalling a more immersive user experience. The highest duration of visits increased by 669.33%, signalling longer user engagement. This suggests that users are more comfortable exploring the website and have a better understanding of the content. The solution design has successfully improved the user experience and increased user activity with the content, resulting in longer website visits.

4. Conclusion

Optimization of user interface design is made based on consideration of the initial design of the Cilacap Entrance website using the human centered design method which includes the stages of context of use analysis, initial design evaluation, user needs analysis, solution design creation, and solution design evaluation. The research on user interface optimization using the human-centered design method on the Cilacap Entrance website concluded that the redesigning process successfully improved the user experience, increased user activity, and maintained user interest in the content, resulting in longer website searches.

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