

User-Centered UI/UX Design and Development of a Vocational School Website: A Design Thinking Approach with HEART-Based Evaluation

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Abstract

This study presents the UI/UX development of the SMK Surakarta website, aimed at creating an effective, user-centered information medium. The design process adopts the Design Thinking methodology to ensure that the interface is both accessible and engaging for diverse user groups, including students, teachers, parents, and the broader public. Emphasis was placed on delivering an aesthetically appealing and functionally intuitive platform that enhances user experience. Usability evaluation was conducted in the final phase through structured questionnaires involving participants comprising SMK Surakarta teachers, students, and individuals aged 20–30. The assessment employed the HEART framework, which encompasses five key user experience metrics: Happiness, Engagement, Adoption, Retention, and Task Success. The results indicate a high level of usability, with the highest score in Retention (84%), followed by Happiness (83%), Task Success (80%), Engagement (79%), and Adoption (78%). These findings demonstrate that the developed UI/UX design meets user expectations and provides a satisfactory experience. Continuous feedback collection and iterative improvements remain a core part of the website's development strategy to ensure long-term user satisfaction and system effectiveness.

Keywords: ui ux, design thinking, heart framework, heart metrics, website

1. Introduction

The development of digital technology in the modern era has expanded into various sectors, including education. One of the essential elements in the digitalization of education is the presence of school websites. A website serves as an important medium for providing information, and its existence has become crucial in today's digital world. As a result, educational institutions, including schools, have developed websites to disseminate information [1]. Currently, most schools have websites as a means of communication and information delivery. However, not all school websites have an attractive appearance. A school website should not only function as an information platform but also serve as a reflection of the school's identity and image.

User Interface (UI) design and User Experience (UX) play a crucial role in the development of school websites, including the website of SMK Surakarta. The primary issue with this website located in its less appealing visual appearance and certain layout inconsistencies in prioritizing information placement. So, user accessibility is not optimized, making it difficult to access information efficiently.

Designing a user interface (UI) and user experience (UX) that are not optimal can be an obstacle for users, especially in terms of accessibility, communication and display aesthetics. A well-designed UI/UX should meet users' functional and aesthetic needs while providing a comfortable, easy, and engaging experience. The user interface focuses on the visual appeal of a display and proper color selection, facilitating interaction between users and the system, whether it is a website, mobile application, or software [2]. Meanwhile, User Experience (UX) emphasizes the overall user interaction, determining whether the application is easy or difficult to use [3].

The UI/UX enhancement of SMK Surakarta's website will be carried out using the design thinking method. The UI/UX design development will incorporate more creative ideas and designs to achieve results that align with the principles of design thinking. Website evaluation will focus on UI/UX improvements to ensure effective information delivery and school services. Additionally, the UI design will be enhanced, particularly in terms of the website's color palette, to create a distinctive visual identity that aligns with SMK Surakarta. Design thinking is a creative problem-solving approach that involves users in the thought process and considers their perspectives as the primary factor in decision-making [4]. A user-centered UI/UX design can transform a school website from merely an information portal into a platform that facilitates interaction, communication, and school community development in a user-friendly and engaging manner.

2. Method

This study uses the design thinking method to develop UI/UX design on the SMK Surakarta website. The design thinking method is an innovative approach that focuses on in-depth understanding of users, identifying relevant problems, and developing creative and user-oriented solutions [5]. In Figure 1, we highlight the key stages of the design thinking methodology.

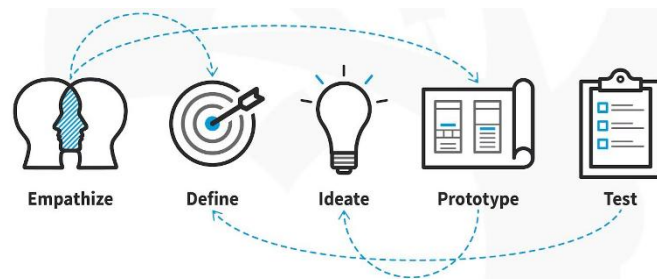


Figure 1. Design Thinking

The design thinking method consists of five main stages: empathize, define, ideate, prototype, and test. Each stage at Figure 1 is explained as follows:

- 1) Empathize. The design thinking approach emphasizes the user-centered design aspect, where the thinking process focuses on the value of people as users and the people themselves [6].
- 2) Define. Define is used to collect all information from empathize. The process of analyzing a problem helps generate ideas that will be used to solve the problem effectively.
- 3) Ideate. In this phase, previous information will be used to generate ideas. During the brainstorming phase, ideas are generated to find solutions to the problems that users solve.
- 4) Prototype. The prototype step is useful for implementing the ideas obtained in this step into an application/product to test and improve and re-evaluate new ideas.
- 5) Test. The prototype created in the previous step will be tested to assess how well it addresses and manages the challenges identified in steps one and two.

2.1. Activities in the method

2.1.1. Empathize

The purpose of this stage is to gain an empathetic understanding of the user. Furthermore, the purpose of this stage is to eliminate the opinions held and provide insight into the motivations and needs of users [7]. At this stage, interviews were conducted with parties from SMK Surakarta, specifically teachers, students, and staff through direct discussions. This stage aims to find problems and deficiencies on the SMK Surakarta website and to obtain additional information that will be used when continuing to the next stage. According to the data in Table 1, there is an explanation of various activities at the empathize stage.

Table 1. Empathize Stage Activities

Activities Carried Out	Tools used	Results
Note down important points of the objectives before the interview.	Book and Pen	Some lists of questions used for interviews.
Looking for references from several other school websites to be used as a comparison and to find deficiencies and features that are not yet available on the SMK Surakarta website.	Browser, Word	Several websites from other schools that have complete features and are used as examples or comparisons.
Interviews with school officials (students, teachers, staff)	Browser to view the website that is used as the object of development. Books and pens to write and record interview results.	Notes on issues with the website: colors, layout, completeness of information
Independent observation on the old website	Browser and editor to analyze the website and note the shortcomings and solutions.	Notes on deficiencies on the website that need to be fixed and added: header, buttons/navigation to open pages, layout simplification, etc.

2.1.2. Define

At the define stage we must define what the user needs are by synthesizing the information collected at the empathize stage, to determine the extent of the problems faced by the user [8]. The data obtained from the interview results are then analyzed to be combined into one. This stage is carried out to ensure that the solution to be designed is truly in accordance with user needs. The points defined are in the form of adding features and concepts to the development of the UI/UX website. Several important points will be used as a reference in the development of the UI/UX website of SMK Surakarta. The following is a table of the results of the problems and solutions carried out at the define stage. Table 2 lists the detailed various problem-solving activities that contain problems and solutions at the define stage.

Table 2. Results at Define Stage

Problem	Solution
The menu header does not use the sticky header type. So when the website is scrolled, the menu will disappear, and you have to go back to the top of the page if you want to choose another menu.	Change the menu header type with the sticky header feature.
There is no button to open the full story or older stories.	Create buttons and pages to collect older news so users can choose other news.
There is no place for agendas or announcements.	Addition of agenda or announcement column.
The design on the website looks plain, only white.	Adding some colors to the design to show the characteristics and identity of the school
There is no information regarding the operational schedule.	Add operational schedule, shortcuts for social media, and website page translations to the top header for additional information.
The side of the article looks empty without any shortcuts to other content.	This section can be filled by entering several related articles or other menu options.
There is no sharing feature on the article page. So users may have difficulty if they want to share articles to social media.	Created several shortcuts for sharing to social media such as copy link, send to facebook, X, and whatsapp
There is no place to give reviews or criticism and suggestions	Column or page for sending criticism and suggestions.

2.1.3. Ideate

Ideate is the stage of developing ideas or commonly called brainstorming [9]. The steps taken in this stage besides brainstorming are looking for references, so that creative ideas will emerge and the development process will be more optimal and in accordance with the focus of several problems.



Figure 2. Website Sitemap

The following is a table of the results of implementing the ideate stage. As shown in Figure 2, the process results of the ideate stage in the form of a web sitemap. And the details of the activities of the idea are written full in table 3.

Table 3. Activities at the Ideate Stage

Activities carried out	Tools used	Result
Individual brainstorming	Laptop to record ideas.	Creative ideas that will be used as a reference in development
<i>Brainstorming with resource persons</i>	Laptop to open references and record the results of suggestions.	Some suggested references on other websites
Searching for references individually	Laptop to open several portfolio browsers such as Pinterest, Behance, and Dribbble.	An interesting website reference in terms of color, layout, features, and application of animation.

2.1.4. Prototype

After the mockup design is complete, the next stage is prototyping, which is the creation of a dummy or simulation of the features that have been designed. This stage is the result of a simulation to ensure how the features that have been added to the website design work. This stage is an experimental phase, and its purpose is to identify the best solution for each problem identified during the first three stages [10]. As shown in Figure 3, the prototype is completely built and can be run using browser tools and Figma.

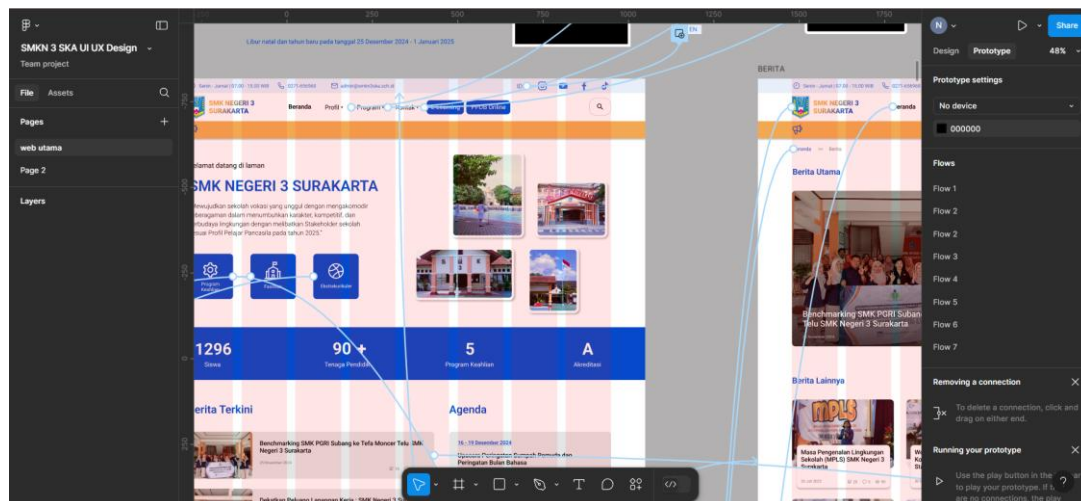


Figure 3. Prototype

2.1.5. Test

The fifth or final stage of design thinking is to conduct user testing. In the final stage of the design thinking process, designers will conduct trials to get feedback and improve existing solutions and make the product even better. User feedback is useful for identifying the strengths and weaknesses of the product so that improvements can be made [11]. At this stage, the HEART method (Happiness, Engagement, Adoption, Retention, and Task Success) is used to test the results of the website UI/UX design. The

HEART framework itself was developed by Google based on the theory of user-centered metrics [12]. The HEART framework was developed in 2010 by Kerry Rodden, Hilary Hutchinson, and Xin Fu from Google to measure UI/UX. The HEART framework can be used to find the right metrics to measure the overall UX of a product or to measure the UX for a specific feature. This framework provides a structure for determining the right metrics for a product.

3. Result and Discussion

3.1. Sketch

Before entering the mockup design, it is necessary to make a UI (User Interface) sketch in the form of a digital wireframe and then continue to implement the results of the wireframe sketch into the form of a mockup design [13]. The design sketch in this design was made on the medibang paint digital drawing application using a drawing tool, namely a pen tablet. This rough sketch is used to create a layout image on the UI/UX design of the SMK Surakarta website, which will then be realized in the wireframe and mockup. An example of the results of the UI/UX sketch activity can be seen in Figure 4.

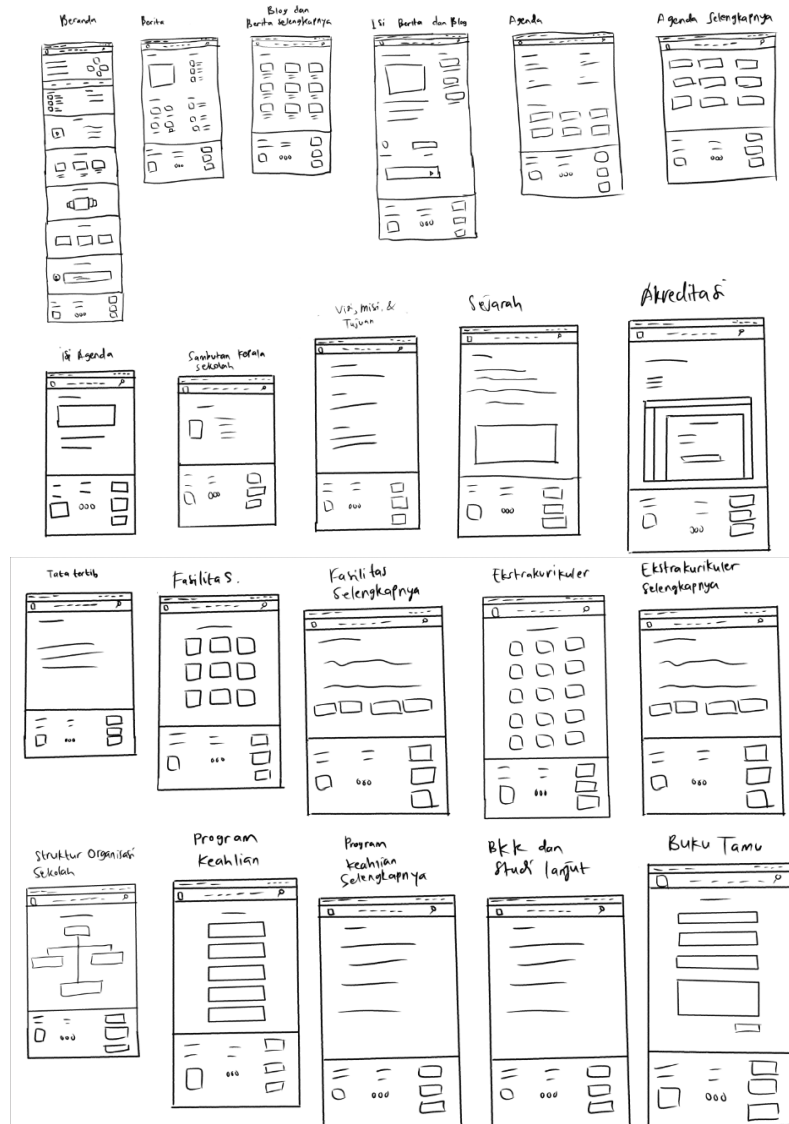


Figure 4. Website Sketch

3.2. Wireframe

The wireframe stage is an important process in designing the UI/UX of a website. Wireframes consist of lines and boxes that lay out the layout of the elements that will be in the application [14]. At this stage, a basic framework is created to determine the structure, layout, and main functionality of each page. Wireframes serve as an initial visual guide that helps with development, as well as understanding how elements such as headers, navigation, content, action buttons, and footers will be arranged on the website page. The wireframe stage helps minimize errors in developing the UI/UX of a website, saves time, and ensures that the result will meet user needs. Meanwhile, the wireframe creation stage is carried out when the sketch results have been approved, such as the various wireframes in Figure 5.



Figure 5. Website Wireframe

3.3. Mockup

The mockup stage in UI/UX design development plays an important role in visualizing the final appearance of the website before entering the development stage. The purpose of using this mockup is to test and visualize the previously created concept [15]. At this stage, the design not only displays the layout structure as in the wireframe, but is also equipped with visual elements such as color, typography, icons, images, and other graphic elements. This stage is carried out using the Figma application. At the mockup stage, the design is created using examples of existing wireframes. The wireframe design that is still empty adds several details of color elements, typography, icons, and images. The purpose of the mockup is to see the results of the UI/UX design that has been developed to be better. Figure 6 shows the results of various UI/UX mockup views.

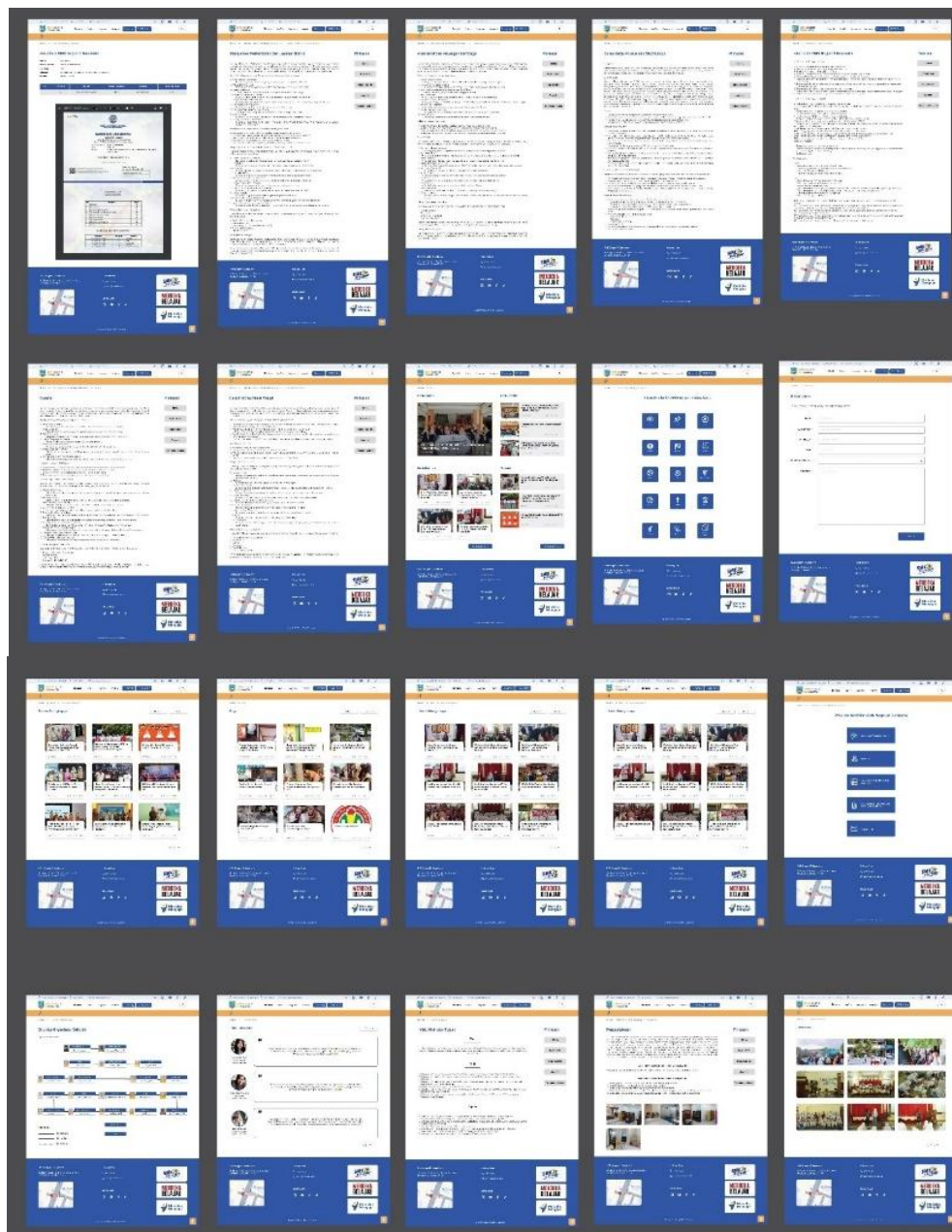


Figure 6. Website Mockup

3.4. Prototype

After the mockup design is complete, the next stage is prototyping, which is the creation of a dummy or simulation of the features that have been designed. This stage is the result of a simulation to ensure how the features that have been added to the website design work. An example of the prototype display is in Figure 3.

3.5. Testing

This test uses a quantitative research method that takes data from a questionnaire and is filled out by 16 people, namely 5 students and 3 teachers of SMK Surakarta, then 8 others from people with an age range of 20 to 30 years. Before calculating the questionnaire results, there is a set of goal signal metrics as in the following table 4.

Table 4. Goal Signal metrics

Variabel	Goal	Signal	Metrics
Happiness	Each user can provide positive feedback.	Data collection was carried out by distributing questionnaires that included questions related to user satisfaction.	Responses to the questionnaire were expressed on a Likert scale of 1 to 5.
Engagement	Every user is expected to be interested in using the SMK Surakarta website.	Data collection was carried out by distributing questionnaires that included questions related to user satisfaction.	Responses to the questionnaire were expressed on a Likert scale of 1 to 5.
Adoption	Each user is expected to use the SMK Surakarta website at least once a month 1 week.	Data collection was carried out by distributing questionnaires that included questions related to user satisfaction.	Responses to the questionnaire were expressed on a Likert scale of 1 to 5.
Retention	Every user understands the features on the SMK Surakarta website.	Data collection was carried out by distributing questionnaires that included questions related to user satisfaction.	Responses to the questionnaire were expressed on a Likert scale of 1 to 5.
Task Succes	Every user can take advantage of the available features.	Data collection was carried out by distributing questionnaires that included questions related to user satisfaction.	Responses to the questionnaire were expressed on a Likert scale of 1 to 5.

In this study, a Likert scale was used with the number 1 as the lowest score range and 5 as the highest score. The instrument used in this test uses the HEART Metrics variable which can be seen in the table 5 below:

Table 5. HEART Metrics Variable Questions

Code	Question
H1	I like the appearance of the SMK Surakarta website interface.
H2	I can easily use the SMK Surakarta website to search for information.
H3	The information presented on the SMK Surakarta website is very clear.

Continued Table 6. HEART Metrics Variable Questions

Code	Question
H4	The SMK Surakarta website really meets my expectations as a complete school information provider platform.
H5	I will recommend the SMK Surakarta website to others (students, parents, or colleagues).
E1	I can use the SMK Surakarta website at any time.
E2	I can easily find information that is relevant to my needs.
E3	The features on the SMK Surakarta website help me get the information I need.
E4	I am encouraged to explore more pages on the SMK Surakarta website.
E5	I routinely use the SMK Surakarta website to search for the information I need.
A1	I easily understand how to use the SMK Surakarta website on the first visit.
A2	The navigation of the SMK Surakarta website is easy to understand.
A3	I understand the instructions or directions provided on the SMK Surakarta website.
A4	It took me a little time to understand how to use the SMK Surakarta website.
A5	The design of the SMK Surakarta website helped me understand its functionality quickly.
R1	I will often visit the SMK Surakarta website to get the latest information.
R2	I often use the features on the SMK Surakarta website.
R3	The quality of the SMK Surakarta website is good.
R4	I feel that the SMK Surakarta website is very useful.
R5	The SMK Surakarta website is very effective in fulfilling all academic information.
T1	It is quite easy to find information on the SMK Surakarta website.
T2	I understand the instructions given on the SMK Surakarta website clearly enough to complete assignments.
T3	The features on the SMK Surakarta website make completing assignments more efficient.
T4	I feel that there are no problems with the features on the SMK Surakarta website.
T5	The SMK Surakarta website is very helpful in accessing academic information.

3.6. Test Result

Next, the data obtained from the questionnaire will be calculated on the level of usability aspect. The calculation of the value of each variable has several stages, namely:

1) The process of calculating values based on table 6 which contains Likert values:

Table 6. Scores on a Likert scale

Scale	Code	Value
Strongly Agree	SA	50
Agree	A	40
Neutral	N	30
Disagree	D	20
Strongly Disagree	SD	10

2) To calculate the maximum value per variable, the following calculation is performed:

$$N_{\max} = \frac{\text{Expected/maximum value (50)} \times \text{Number of questions per variable (5)}}{\text{Number of respondents (16)}} \quad (1)$$

3) To calculate the total value per variable, it can be calculated by adding up all the values per variable. To determine the criteria value, the following calculation can be done:

$$\text{Category} = \text{Total value} : \text{Maximum value} \quad (2)$$

The results obtained are then matched according to the category. If the results are above 0.81 which corresponds to the coefficient ($0.81 < r < 1.00$), then the results obtained are included in the very high coefficient. As seen in the results in table 7.

Table 7. Coefficient value

Coefficient	Description Coefficient
$0,81 < r < 1,00$	Very High
$0,61 < r < 0,80$	High
$0,41 < r < 0,60$	Medium
$0,21 < r < 0,40$	Low

Information: r = Reliability, is the consistency or reliability of measurement results or measuring instruments. After getting the results from the respondents, the next step is to calculate the total value per variable by looking at the score or value in table 8.

Table 8. Calculation of Total Value per Variable

No	Code	Value	Total
1	H1	SA (7), A (7), N (2)	690
2	H2	SA (6), A (9), N (1)	690
3	H3	SA (4), A (9), N (3)	650
4	H4	SA (4), A (8), N (4)	640
5	H5	SA (4), A (9), N (3)	650
6	E1	SA (1), A (6), N (9)	560
7	E2	SA (2), A (10), N (4)	620
8	E3	SA (1), A (11), N (4)	610
9	E4	SA (4), A (9), N (3)	650
10	E5	SA (9), A (5), N (2)	710
11	A1	SA (2), A (12), N (2)	640
12	A2	SA (0), A (11), N (5)	590
13	A3	SA (2), A (11), N (3)	630
14	A4	SA (2), A (11), N (3)	630
15	A5	SA (1), A (11), N (4)	610
16	R1	SA (1), A (10), N (5)	600
17	R2	SA (1), A (12), N (3)	620
18	R3	SA (5), A (8), N (3)	660
19	R4	SA (9), A (6), N (1)	720
20	R5	SA (12), A (3), N (1)	750
21	T1	SA (2), A (11), N (3)	630
22	T2	SA (2), A (11), N (3)	630
23	T3	SA (0), A (12), N (4)	600
24	T4	SA (3), A (8), N (5)	620
25	T5	SA (10), A (5), N (1)	730

Based on the number of calculation values per variable obtained, the overall results can be seen in table 9.

Table 9. Calculation Results

Variabel	Questions	Max Value	Total Value	Criteria Value	Category
Happiness	5	4	3.320	0,83	Very High
Engagement	5	4	3.150	0,79	High
Adoption	5	4	3.100	0,78	High
Retention	5	4	3.350	0,84	Very High
Task Succes	5	4	3.210	0,80	High

4. Conclusion

This study adopted the Design Thinking methodology as a systematic approach to address existing challenges and to generate structured, user-centric outcomes in the development of the SMK Surakarta UI/UX website. The methodology encompasses five iterative stages Empathize, Define, Ideate, Prototype, and Test each contributing a distinct role in the creative problem-solving process. The process commenced with the Empathize stage, which focused on observing and understanding user needs to identify core issues. These insights informed the subsequent Define stage, where key problems were synthesized and clearly articulated. This stage is pivotal in shaping the direction of the solution. Next, in the Ideate stage, a range of creative solutions were generated to address the identified problems. The Prototype stage followed, involving the creation of tangible interface mockups that embodied the proposed solutions. Lastly, the Test stage was conducted to gather user feedback and validate the effectiveness of the developed UI/UX features.

The testing phase involved 16 participants, including teachers and students from SMK Surakarta, as well as several respondents aged between 20 and 30 years. Usability evaluation was performed using a structured questionnaire based on the HEART framework, which measures five key dimensions of user experience: Happiness, Engagement, Adoption, Retention, and Task Success. Each variable was assessed through five items, totaling 25 questions.

The findings revealed a high level of user satisfaction across all metrics. Retention achieved the highest score with 84%, followed closely by Happiness (83%), Task Success (80%), Engagement (79%), and Adoption (78%). These results demonstrate that the UI/UX design effectively met user expectations and provided a satisfactory experience. To ensure ongoing improvement and long-term system sustainability, the SMK Surakarta website development team continues to collect user feedback for iterative refinement.

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