Mobile Information Academic-Based UI/UX Design System Application Using the Design Thinking Method (Case Study: University of Singaperbangsa Karawang)

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Abstract. Unsika Academic Information System is a service owned by Singaperbangsa Karawang University which has a function for the management and administration of student academic activities. However, this service is currently only available based on a website, then it has a confusing flow when you want to use it in terms of display design, it is less attractive and not neatly arranged as in the positioning layout that seems too dense which is not easy when using it. Therefore, it is necessary to design a UI/UX on a mobile-based Unsika Academic Information System Application to overcome problems and make improvements so that it can be used by students who are current users comfortably. In this study, a UI/UX design was carried out which produced a prototype using design thinking as an approach or method. Then to get the measurement and assessment of user experience, this study used the System Usability Scale (SUS) by obtaining an average score of 89 which goes into a high acceptance rate, a B value scale, and an adjective rating classified as excellent. Furthermore, measurements using the User Experience Questionnaire (UEQ) method each obtained an average value of six aspects, namely attractiveness 2,533, achievement 2, 650, efficiency 2,600, Accuracy 2,350, stimulation 2,300, and novelty 1,450. Based on SUS and UEQ testing, the UI/UX prototype design was rated in the very good category. The results of this study can be used as a reference for recommendations for further development.

Keywords: UI/UX Design. Design Thinking Method, Mobile Information Application

1 Introduction

UNSIKA has an academic information system service called eCampus based on a website and mobile application using web view technology. The display design is still an old template model that is not up to date with the latest designs, causing concern because the appearance is unattractive and confusing. Then it also affects the layout or layout with positions that are too dense and untidy, causing confusion and requiring users to process applications for a long time. With the emergence of anxiety among students as users about the appearance of the eCampus application, the effort that can be done to overcome this is to design a mobile application user interface for the

M. Setiyo et al. (eds.), *Proceedings of the 4th Borobudur International Symposium on Science and Technology 2022 (BIS-STE 2022)*, Advances in Engineering Research 225,
https://doi.org/10.2991/978-94-6463-284-2_73

UNSIKA academic information system service with attention to a user experience that focuses on user needs and comfort. Therefore, this research will design a UI/UX design with the hope that it will be a solution to the problems experienced by UNSIKA students.

User interface or UI design is an interface display for a product or digital product, such as mobile applications and websites. Meanwhile, user experience or UX is to develop user experience so that they have a sense of convenience and comfort for a product that you want to design or develop [1]. One approach to designing user interfaces and user experience is a design thinking approach that is user-centric or focuses on users [2]. Design thinking is an approach or method in solving and solving problems that are user-centered and involve users from the initial process to the final process. With the aim of solving these problems, it can be useful for users [3].

Based on previous research [4] with the research title "User Interface/User Experience Analysis and Design with Design Thinking Methods in Academic Information Systems, Jenderal Soedirman University" the background is because its appearance confuses users and the display design is not neat and inconsistent. The conclusions obtained are that by using the design thinking approach and having passed usability testing, the results can produce application prototypes that suit the needs of users, namely students. Furthermore, research by Zahra et al in 2021 uses a design thinking approach to solve problems encountered in the Gravote application, namely the features for voting through applications still have deficiencies and do not meet the needs of users [5]. Then a re-design of the UI/UX design was carried out which obtained testing results in terms of effectiveness, efficiency, and user satisfaction that were good and could be developed further in the form of applications.

Referring to this background, this research will use a design thinking approach in designing the UI/UX of the UNSIKA academic information system service mobile application. The results of testing the satisfaction aspect with an average value of 85 which is included in the high acceptability criteria and gets a grade of B [6]. The results of this assessment show that the design thinking method can be successful in designing designs for the Lelenesia Mobile application UI/UX. Furthermore, it was also proven in research conducted using a design thinking approach, in the aspects of effectiveness and aspects of efficiency, the results obtained were 84 which entered the high range [7]. In this study, it is hoped that the use of the design thinking approach can be used to solve problems in designing user experiences in UNSIKA academic information system service applications and can meet usability values according to user expectations, namely UNSIKA students in accessing them with mobile devices (Fig. 1).

Fig. 1. E-Campus Application UNSIKA

1.1 User Interface/User Experience (UI/UX)

User Interface is part of a program that connects the interaction between humans and computers [8]. The user interface has function as a translator or communication medium to convey information into the system with a display that is attractive and easy to understand. Because if an application that has a display makes users feel confused, and difficult to use so that the function of the application does not work properly, then the application can fail [9].

User experience includes all aspects of user interaction starting from perceptions and responses before when using and after using a product or application. To be able to achieve a good user experience, a product or application must have a match between the features offered and the needs of the user. To find out whether it is easy or not whether the product needs to be tested. The method commonly used to test a product or system is the usability testing technique. For designing interface display designs and in Fig. 2 shows an overview of system designs that include some of these components. The following are some of the influential components: 1) Consistency; 2) Hierarchy; 3) Personality; 3) Layout; 4) Typography; 5) Colour; 6) Imagery; 7) Control and Affordances. This control and affordability component is a component part of the user interface which becomes a bridge used by the user to carry out commands with the system through the screen of his device [10].

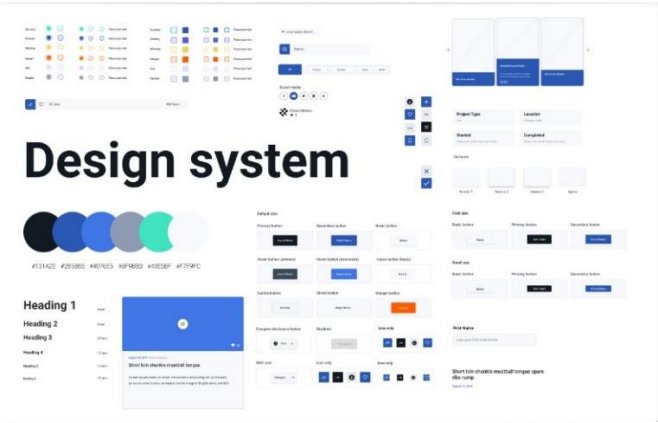


Fig. 2. System Design Components

1.2 Usability Testing

Usability is included in the field of human-computer interaction as an aspect of the quality of a product or system by assessing the level of ease and efficiency of use by users [11]. According to The International Organization for Standardization ISO 9241-11:2018, usability is the extent to which a system, service, or product can be used by users to achieve certain goals with results that pay attention to three things, namely, efficiency, effectiveness, and user satisfaction. As described in [12] the following are three aspects of usability in ISO 9241-11 (2018):

1. Efficiency (Efficiency)
   Efficiency is the level of use of resources by users in achieving the accuracy and completeness of objectives.
2. Effectiveness
   Effectiveness shows the level of perfection and accuracy achieved by the user when carrying out certain tasks. How well the user is doing the task he wants to complete when using the system.
3. Satisfaction (User Satisfaction)
   Satisfaction is the extent to which the user responds after using the system, service, or product to meet the needs and expectations of the user.

1.3 System Usability Scale (SUS)

The System Usability Scale (SUS) is a simple measurement questionnaire that will be given to respondents, namely users after trying a series of product or system testing instructions [13]. SUS has ten question components and five answer choices which are originally in English but have been translated into Indonesian as shown in Table 1.

Table 1. SUS Question Component

Code	Component	STS	TS	RG	ST	SS
R1	I think I will use this system again	1	2	3	4	5
R2	I find this system complicated to use	1	2	3	4	5
R3	I find this system easy to use	1	2	3	4	5
R4	I need help from other people or technicians in using this system	1	2	3	4	5
R5	I feel that the features on this system work as they should	1	2	3	4	5
R6	I feel there are many things that are inconsistent in this system	1	2	3	4	5
R7	I feel like others will figure out how to use this system quickly	1	2	3	4	5
R8	I find this system confusing	1	2	3	4	5
R9	I feel there are no obstacles to using this system	1	2	3	4	5
R10	I need to get used to it first before using this system	1	2	3	4	5

The next step is when the values are obtained, the results are entered into the SUS score which consists of 3 parts, namely, Acceptability Ranges, as an assessment to see the level of user acceptance of products that have three levels, namely, not acceptable, marginal, and acceptable. Then in the second part is the Grade Scale, to see the level value of the product which has 5 level groups starting from A, B, C, D, and F. Next is the Adjective Ratings as the ratings or ratings of the product which have several levels starting from best imaginable, excellent, good, ok, poor and worst imaginable. From the explanation of the three parts in the SUS score, it is visualized as shown in Fig. 3[14].

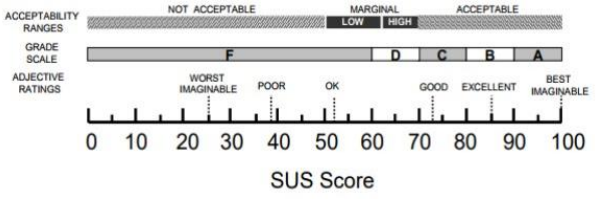


Fig. 3. SUS Score Basis

1.4 User Experience Questionnaire (UEQ)

As shown in Fig. 4, there are 26 questions that cover 6 aspects. In each scale of the UEQ, there are a pair of answers whose meanings are opposite to each other, such as troublesome to pleasant whose answers range from 1 to 7. From the range of answers, the scale also has a standard mean or average of 0.8. If the value is less than 0.8, it will mean a negative value, while to be considered positive, the result must be above the value of 0.8. Following are each of the 6 aspects contained in the 26 questions in the User experience questionnaire (UEQ) namely: 1) Attractiveness; 2) Clarity (perspicuity); 3) Efficiency; 4) Dependability; 5) Stimulation; and 4) Novelty [13].

	1	...	7		
annoying	○	...	○	enjoyable	1
not understandable	○	...	○	understandable	2
creative	○	...	○	dull	3
easy to learn	○	...	○	difficult to learn	4
valuable	○	...	○	inferior	5
boring	○	...	○	exciting	6
not interesting	○	...	○	interesting	7
unpredictable	○	...	○	predictable	8
fast	○	...	○	slow	9
inventive	○	...	○	conventional	10
obstructive	○	...	○	supportive	11
good	○	...	○	bad	12
complicated	○	...	○	easy	13
unlikable	○	...	○	pleasing	14
usual	○	...	○	leading edge	15
unpleasant	○	...	○	pleasant	16
secure	○	...	○	not secure	17
motivating	○	...	○	demotivating	18
meets expectations	○	...	○	does not meet expectations	19
inefficient	○	...	○	efficient	20
clear	○	...	○	confusing	21
impractical	○	...	○	practical	22
organized	○	...	○	cluttered	23
attractive	○	...	○	unattractive	24
friendly	○	...	○	unfriendly	25
conservative	○	...	○	innovative	26

Fig. 4. UEQ Questionnaire

2 Method

2.1 Design Thinking

The design thinking approach or method consists of several stages, namely, starting from research by gathering information about users. From this information, it is then poured into a solution that will be offered and after that, a test is carried out on the solution that has been built [15]. Fig. 5 shows the design thinking process, then according to Plattner (2009) which was explained in the journal there are five stages in the design thinking approach including the following [16].

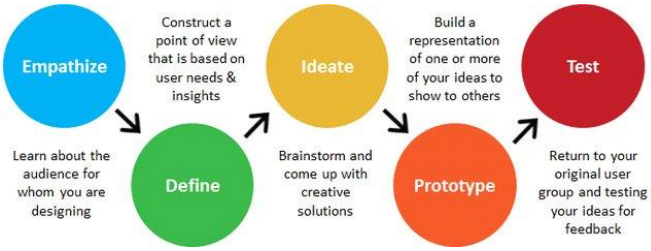


Fig. 5. Process Design Thinking Approach

2.2 Knowledge Representation

In the knowledge representation section, this is the result of data collection by making questionnaire questions which have been divided into four variables using the Google Forms tool. The data was collected from 35 Unsika students who displayed the results of questions such as name, gender, faculty origin, class, education level, study program, and validation for predetermined respondent criteria. And the following respondents do not represent all Unsika student users.

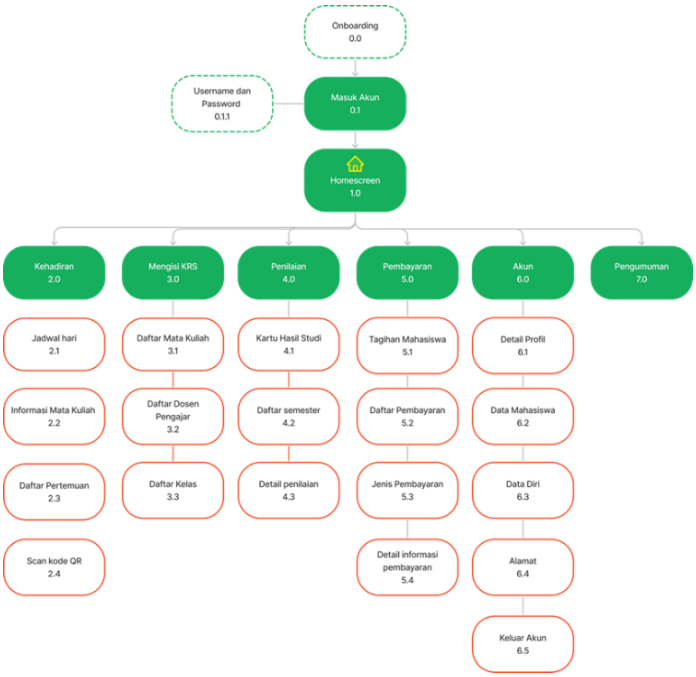


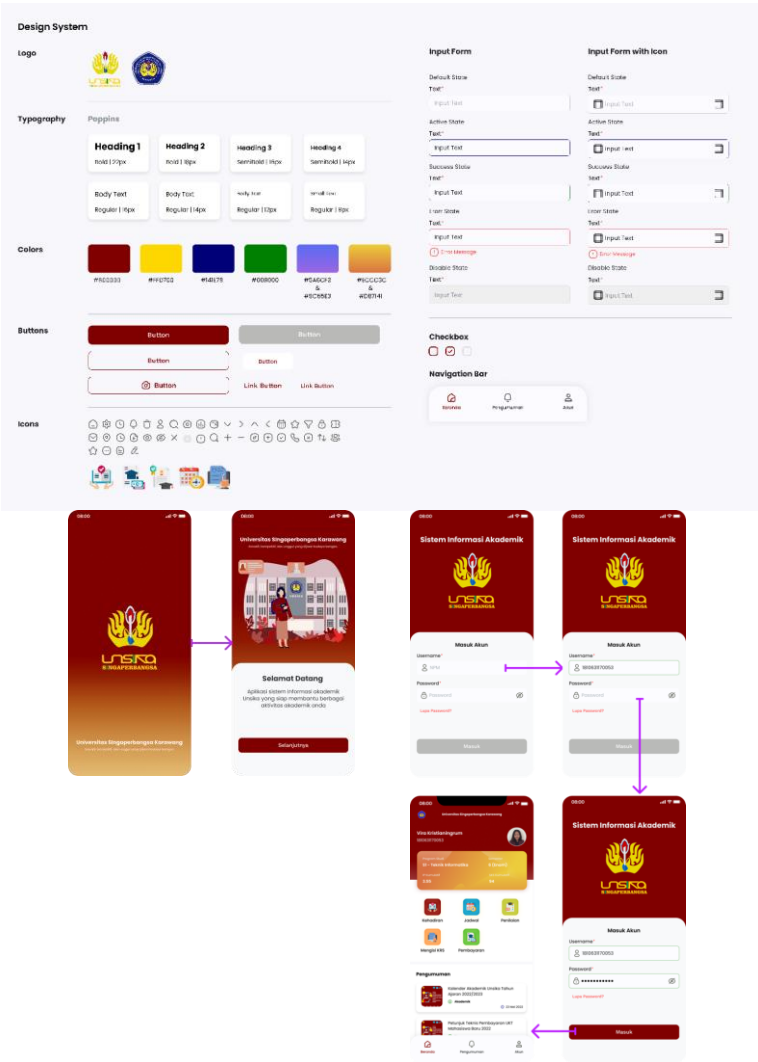
Fig. 6. Information Architecture chart in Indonesian

2.3 Information Architecture

Fig. 6 displays the results of the information architecture mapping into a chart design form. There are five main menus that can be used by users, namely the attendance menu, filling in KRS, assessment, payment information, and the user profile account menu.

2.4 Design System

The design system for the design of the Unsika academic information system application is shown in Fig. 7 which has various sets of elements used in the design, such as logo images, fonts, colors, buttons, icons, and text boxes.



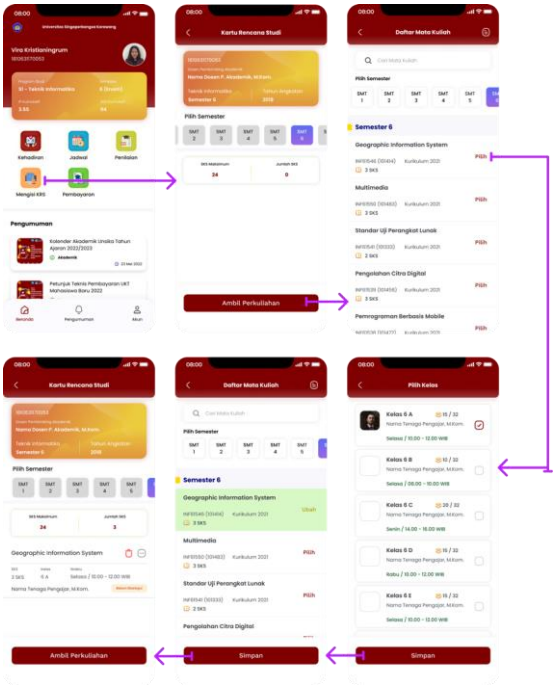


Fig. 7. Design System

3 Conclusion

The results of the measurement using the system usability scale method questionnaire that was given to five respondents resulted in an average score of 89. Based on the results of this score, sulking in Fig. 3 that the results fall into high acceptability criteria, grade scale) namely B and adjective ratings fall into the Excellent category. So in the prototype of the Unsika academic information system application, it can be stated that the level of satisfaction is stated to be good and acceptable. Respondents who took part in prototype trials were five according to Nielsen's theory. The five respondents are currently active students studying at Singaperbangsa University, Karawang.

Table 2. System Usability Scale Results

Respondents	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	SUS Score
Respondents 1	5	1	5	1	5	1	5	1	5	1	100
Respondents 2	5	1	5	1	5	1	5	1	5	1	100
Respondents 3	4	2	5	4	5	3	5	2	4	4	70
Respondents 4	5	2	5	1	4	2	5	1	5	2	90
Respondents 5	5	1	5	2	5	2	5	2	4	3	85
Average SUS Score											**89**

In the user experience questionnaire or UEQ method, referring to Fig. 3, five respondents were given a questionnaire containing twenty-six questions with seven answer scale options. After obtaining an assessment from respondents who have filled out the UEQ questionnaire, it is entered into the Data Analysis Tools to obtain the output of the questionnaire. The output data obtained undergoes a data change process because for each UEQ answer scale, there is a pair of answers whose range of answers is from a scale of one to seven and then transformed into a value range of -3 to +3.

Fig. 8 which shows the average value of all questions using the user experience questionnaire method. On the attractiveness scale, the results of the Unsika academic information system prototype achieved an average value of 2.533. The clarity scale gets the highest score by reaching 2.650. Then the efficiency scale gets a value of 2.600, the accuracy scale with a value of 2.350, the stimulation scale with a value of 2.300, and the novelty scale gets an average value of 1.450. Based on the numbers from these average values, it can be seen that the prototype of the Unsika academic information system that has been tested by respondents gets very good scores from all aspects of the UEQ.

UEQ Scales (Mean and Variance)			
Attractiveness	↑	2.533	0.32
Clarity	↑	2.650	0.3
Efficiency	↑	2.600	0.27
Accuracy	↑	2.350	0.86
Stimulation	↑	2.300	0.67
Novelty	↑	1.450	1.08

Fig. 8. Average Results of UEQ Testing Scale in Indonesian

Fig. 9 is a graphical visualization of the list of average scale values in Fig. 4 before. The graph shows that the six scales obtain a mean or average value of more than 0.8 so that the results are positive. If the scale is below or less than 0.8 then the result will be negative.

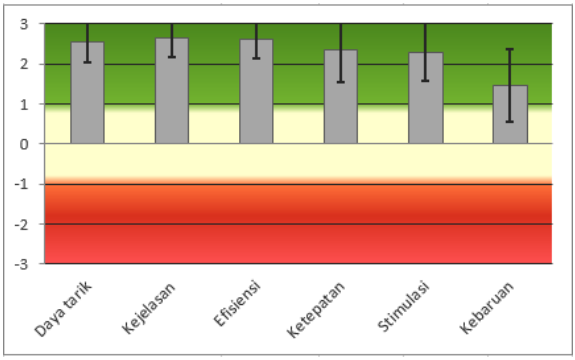


Fig. 9. Graphical Visualization Average Results of UEQ in Indonesian

Acknowledgments. This research was funded by Universitas Singaperbangsa Karawang through a 2019 Research Grant for Higher Education which is managed by the Center for Research, Development and Community Service at Universitas Singaperbangsa Karawang (LPPM Unsika).

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