



## **Improved User Interface Design on Mobile Apps “X” Using the Goal Directed Design Method**

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**Abstract**-Mobile Apps “X” is one of the supporting applications for the Telkom University community that has been downloaded more than 10,000 times and received a rating of 3.9 on the Google Play Store. There are several user reviews that expect an improvement in the Mobile Apps “X” user interface. The problem found is the complexity of seeing the class schedule because they have to go through several menus first. The aim of the research is to improve the application to be even better so as to eliminate the complexity when used. This is a matter of ease of use. After evaluating the application, the SUS score is 61, the Completion Rate for the task of viewing class schedules is 50%, the task of viewing attendance information is 43%, and the Overall Relative Efficiency is 54%. The solution in this research is to improve the user interface using the Goal Directed Design method which will focus on meeting the goals of the user. The results of the improvements are an increase in the SUS score to 82, the Completion Rate for the task of viewing class schedules to 100%, the task of viewing attendance information to 100%, and the Overall Relative Efficiency to 100%. When interviewed at the end of the evaluation, users said that this design had met their goals. Thus, this improvement has become a solution to application problems.

**Keywords:** Mobile Apps; User Interface; Ease of Use; Goal Directed Design; Goals

### **1. INTRODUCTION**

Information technology that is growing at this time can make the process of getting information easier. One technology that can facilitate humans in the process of obtaining information is a mobile application. Its high level of mobility allows users to get the information they need anywhere. This is what makes mobile applications very important in the world of information [1]. Mobile Apps “X” is one of the applications that support academic activities for the campus community. Broadly speaking, this application will display information on the campus website in the form of a mobile application. This application has been downloaded more than 10,000 times and has a rating of 3.9 on the Google Play Store. In the review column on the Google Play Store, there are users who expect an increase in the user interface. After conducting in-depth interviews and excavations with users who have used Mobile Apps “X” for about 1 year, there were problems found in almost all users who were respondents in this study. The most frequently used features on Mobile Apps “X” by users are to make attendance, view grades, and view class schedules. However, when accessing, there are difficulties because the user has to go through several menus in order to see the class schedule. The existence of user difficulties when using an application can have an impact on not achieving usability [2]. This problem that occurs can be categorized as an Ease of use problem [3]. Ease of use means that a system must be designed to be efficient and easy to use. This problem that occurs can affect product performance, so improvements to the user interface design of the “X” Mobile Apps application need to be made. There are several matrices that can be used to measure the ease of use of a product. The more important matrices to measure in increasing the Ease of use of a product are Effectiveness, and Efficiency [4] [5]. Thus, an evaluation of Effectiveness and Efficiency will also be carried out in this study by calculating the Completion Rate and Overall Relative Efficiency.

The user interface is a form of display that relates to the user and is the most important element of a system [6][7]. Users will be more comfortable using an application if they do not need to spend more effort to use the application [8]. User goals will be focused on this research. Therefore, the method chosen is Goal Directed Design which will place the user's goals in the middle of the design process [9][10]. Understanding each goal to be achieved by the user is important so that the design results will be in accordance with the needs and objectives of the user itself [11]. This research will result in improved user interface design in the form of a prototype that will be made using Figma. The improvements made not only improve the user interface for a better appearance, but also pay attention to user comfort when they want to use Mobile Apps “X”. Therefore, usability testing will be carried out to evaluate the design results that have been designed. The tool that will be used in usability testing is the System Usability Scale (SUS). The reason for choosing to use SUS is because it is a reliable and most widely used evaluation tool to assess the perceived usefulness of a system [12][13]. In addition, SUS is valid and reliable to be used as a measuring tool [14][15]. Improvements to the user interface design are expected to solve the problem of Ease of Use that cannot meet usability in the Mobile Apps “X” application and can provide results that are in accordance with user goals. The problem of access complexity experienced by users when they want to see class schedules for other days causes the Ease of use component of this application to not be achieved. Therefore, it is necessary to make improvements to the user interface design of the Mobile Apps “X” application to increase the Ease of use component.

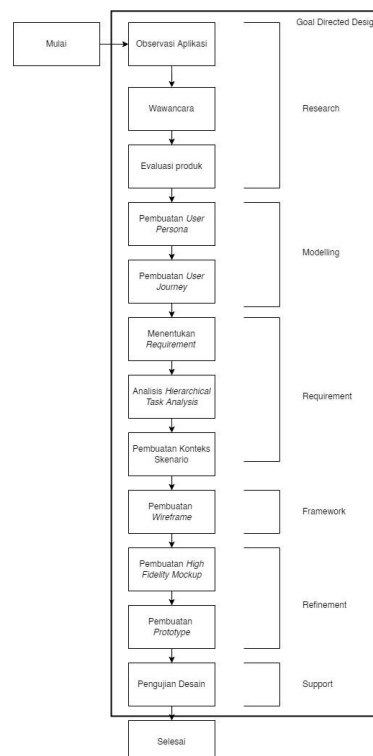


There are several studies related to user interface design such as that conducted by A. Achmadi, D. Junaedi, E. Darwiyanto [6], who made user interface recommendations for the Higher Education website using the Goal Directed Design method and the QUIM method for usability testing. In addition, there are also improvements to the user interface for the East Java Province BNN website in the research of W. Parwaningsuci, H. M. Az-zahra, and M. C. Saputra [16], using the Human-Centered Design method which measures the effectiveness and efficiency of the website. In the research of S.W. Ningrum, I. Akrunanda, A.R. Perdanakusuma [17], improved the user interface with the usability testing method and calculated the evaluation results with the USE Questionnaire. Ningrum calculates the Success Rate and also Overall Relative Efficiency in her research. Based on several studies that have been described, the authors chose Goal Directed Design as the method used in this study. The reason for choosing Goal Directed Design is because this method can record how users use the product and can translate research results into a design solution based on what is found in direct testing [9]. In addition, the research that has been described becomes a reference for the author to test the aspects of Effectiveness and Efficiency. The difference between this research and the existing one is that in this research, the user will be the main focus in meeting any required goals.

Based on the background and identification of the problems that have been described, the formulation of the problem in this study is about the Mobile Apps "X" user interface model that can meet usability, especially the Ease of use component and to find out whether the proposed user interface model for Mobile Apps "X" can meet user goals. The limitation of this research is that the user interface improvements made will refer to Mobile Apps "X", the user interface improvements made will focus on improving Mobile Apps "X" and improving the user interface on the display contained in the student role. The research objective is to fulfill usability in terms of Ease of use for Mobile Apps "X" and to produce a user interface that is in accordance with the user's goals according to the Goal Directed Design method.

## 2. RESEARCH METHODOLOGY

In this study the method used is the Goal Directed Design (GDD) method. Figure 1 is a research methodology design



**Figure 1.** Research methodology

In Figure 1 can be seen the methodology of this research. At the research stage, ethnographic field study techniques were used, namely observation and interviews to obtain qualitative data about the users of the product. At the Modeling stage, the behavior and workflow found will be made persona. At the Requirements stage, user requirements are defined. This stage uses a scenario-based design method with innovations that focus on meeting user needs, not abstract user tasks. At the Framework stage, a sketch is designed for the design to be made. The designer conceptualizes the product as a whole and defines the basic framework of product behavior, visuals, and physical form where applicable. The Refinement stage is similar to the Framework stage but with an increased



focus on details and implementation. At the Support stage, an evaluation of the design that has been made is carried out. The purpose of the evaluation is because a well-crafted and validated design solution is unlikely to address every developer challenge and technical question

## 2.1. Research

The research was conducted by determining the sample of respondents in this study as many as 40 students from all faculties on campus as users of Mobile Apps "X". The selection of the number of respondents was based on the recommendation of Jakob Nielsen for quantitative research with a population of more than 500 people, namely 40 respondents. The results have a 95% confidence level and a 15% margin of error which means it has a low risk with good precision [18]. The next step is to evaluate the product with SUS. Perform calculation of Completion Rate and Overall Relative Efficiency to evaluate the value of Effectiveness and Efficiency. The author gives some of the main tasks contained in the Mobile Apps "X". Furthermore, data collection and analysis of problems related to Mobile Apps "X" is carried out. Interviews with the developer of Mobile Apps "X" and users were conducted as an evaluation material for Mobile Apps "X". Furthermore, in-depth observation of the application is carried out.

## 2.2. Modeling

In the Modeling stage, the results of the analysis that have been obtained from the Research stage will be made to create a user persona. The created persona consists of Identity, Description, Frustration, Behavior, Goals, Task. In addition to Personas, a User Journey is made to describe user interactions from the beginning of a task scenario until the user completes the task.

## 2.3. Requirement

At the Requirements stage, user requirements are determined based on the User Persona that has been created at the Modeling stage. After the requirements are collected, the author performs an analysis using Hierarchical Task Analysis and creates a scenario context. The purpose of creating a scenario context is to describe user interactions and as a basis for designing improvements to the design.

## 2.4. Framework

At the Framework stage, a wireframe is designed as an initial sketch before making a High Fidelity design. Making wireframes will pay attention to problems that occur in users, needs and goals that have not been achieved in the previous design.

## 2.5. Refinement

At the Refinement stage, a High Fidelity design is made which will end with the creation of a prototype of the wireframe that has been formed at the Framework stage. Making this prototype aims to provide a clearer visualization or description of the latest interface design to users. The fonts and colors used are the same as those used in the existing design on Mobile Apps "X".

## 2.6. Support

The Support stage is the last stage in Goal Directed Design. At this stage, an evaluation is carried out using SUS, Completion Rate, and Overall Relative Efficiency of the prototype that has been made. The purpose of the evaluation is to ensure that the prototype that has been made can meet user goals and solve problems that occur.

# 3. RESULTS AND DISCUSSIONS

## 3.1. Evaluation

At this stage, the author tests the designs that have been made. The author conducts usability testing and conducts questionnaires to ascertain whether the design has been able to meet the goals and needs of users or not.

### 3.1.1. Design Evaluation

At this stage the author evaluates Mobile Apps "X" to 40 respondents who have been determined to get a value before repair which will be compared with the value after repair.

## 1. SUS

The results of the SUS from the design improvements that have been made can be seen in Table 1.

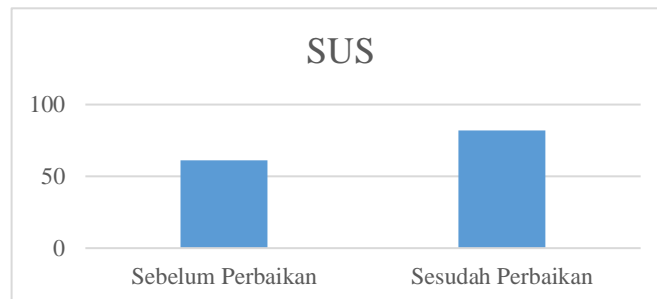
**Table 1.** SUS Improvement Result

Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
1	5	2	5	1	5	1	5	2	5	1	95
2	4	2	5	2	4	2	5	2	4	3	77.5
3	4	1	4	2	3	2	5	1	4	2	80
...	...	...	...	...	...	...	...	...	...	...	...



Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
38	4	2	4	2	3	2	4	1	4	1	77.5
39	4	1	5	2	3	2	4	1	4	2	80
40	4	2	5	2	3	2	4	1	5	2	80
Average											82

The results from SUS show that there is an increase after the user interface improvement on Mobile Apps "X". The average value after improvement is 82 from the previous value of 61. Based on the SUS assessment in Figure 2 this value has an Adjective Ratings of "EXCELLENT", Grade Scale of "C", and Acceptability Ranges of "ACCEPTABLE". This means that the design made is acceptable to the user. In addition, this value is already above the average SUS value recommended by Brooke, which is 68 [19]. The comparison of SUS values from before and after repairs can be seen in Figure 2.



**Figure 2.** Comparison of SUS

## 2. Completion Rate

The results of the completion rate from the design improvements that have been made can be seen in Table 2.

Table 1. Tested Task Results

Respondent	T1	T2	T3	T4	T5	T6	T7	T8
1	B	B	B	B	B	B	B	B
2	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B	B
...	...	...	...	...	...	...	...	...
38	B	B	B	B	B	B	B	B
39	B	B	B	B	B	B	B	B
40	B	B	B	B	B	B	B	B

In Table 2 it can be seen the results of the task testing to respondents after repairs were made. B is a task that was carried out successfully, HG is a task that was carried out successfully but the respondent almost gave up because he had difficulties when doing the task, G is a task that the respondent failed to do because the respondent gave up on doing the task.

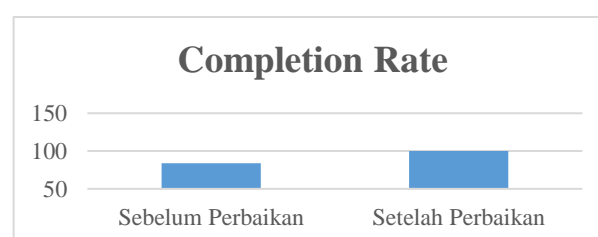
$$\text{Completion rate} = 320/320 \times 100\% = 100\%$$

Based on the calculations in equation 1, there is an increase in the Completion Rate on the improvement design of Mobile Apps "X" to 100% of the recommended average standard of Completion Rate of 78% [20]. In task 2 and task 8, which were previously below the recommended average completion rate, they are now above this value. The following is the calculation of the Completion Rate on task 2 and task 8:

$$\text{Completion rate (task 2)} = 40/40 \times 100\% = 100\%$$

$$\text{Completion rate (task 8)} = 40/40 \times 100\% = 100\%$$

Comparison of the Completion Rate values from before and after repairs can be seen in Figure 3 and Figure 4.

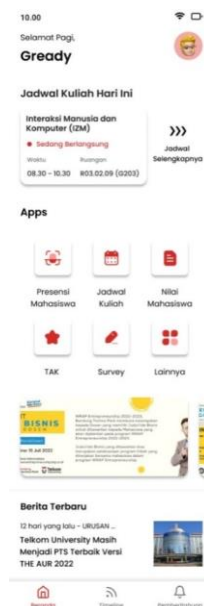


**Figure 3.** Comparison Completion Rate Mobile Apps "X".



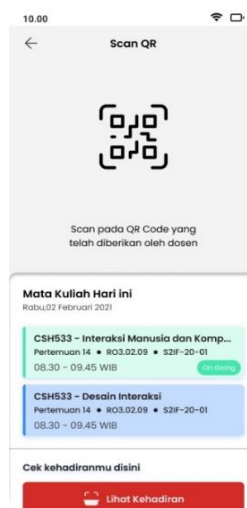
**Figure 4.** Comparison Completion Rate task 2 dan task 8.

Before the repairs were made, the Completion Rate value in task 2 was 50% and the Completion Rate value in task 8 was 43%. After repairs, task 2 and task 8 experienced an increase in the Completion Rate to 100%. This happens because the problem that occurred in the previous design has been given a solution. In task 2, a special menu has been created to display the class schedule which is placed on the homepage as shown in Figure 5. In the new design, users do not need to enter the “Presensi Mahasiswa” menu to view the schedule lecture as in the previous design.



**Figure 5.** Task 2 solution

In task 8 users can see an icon that illustrates attendance as well as the size and location of the menu to view attendance information which has been made easier for users to find as shown in Figure 6. The menu to view attendance information is entitled "Lihat Kehadiran"



**Figure 6.** Task 8 solution



### 3. Overall Relative Efficiency

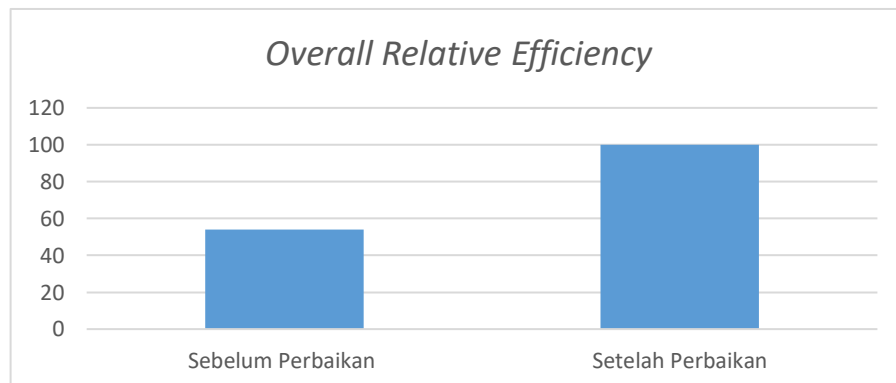
**Table 2.** Evaluation of Task Time on Design Improvements (Per Second)

Respondent	T1	T2	T3	T4	T5	T6	T7	T8
1	2	2	3	2	1	3	3	7
2	3	4	7	1	2	2	3	9
3	5	4	6	4	3	2	2	10
...	...	...	...	...	...	...	...	...
38	5	3	5	4	1	5	3	11
39	3	3	2	7	1	4	3	7
40	3	5	2	4	3	3	2	9

Based on equation 2, the efficiency results from the improvement design are obtained as follows:

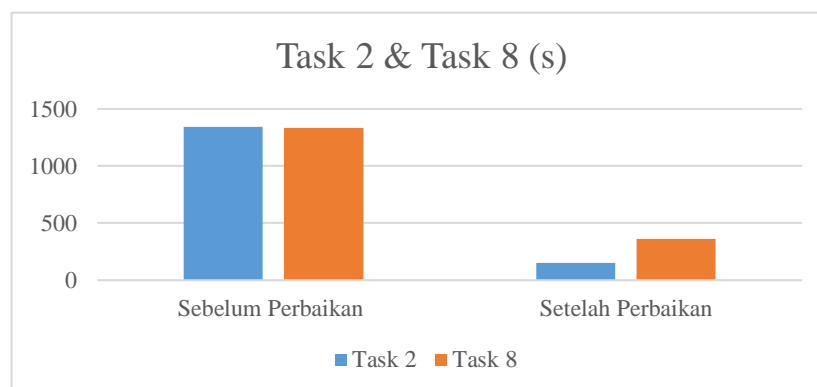
Overall Relative Efficiency =  $13081308 \times 100\% = 100\%$

Based on equation 2, the results of Efficiency are obtained. In Table 3, it can be seen the results of the calculation of the time when the respondent worked on a task on a design that had been repaired. The time started from when the respondent worked on the task until the respondent succeeded or gave up in carrying out the task. The results of the Efficiency calculation show that the Efficiency value of the Mobile Apps "X" before the repair was 54%. After the repair, there was an increase in Efficiency to 100%. In Figure 7 it can be seen the comparison of the Overall Relative Efficiency value before and after the improvement.



**Figure 7.** Comparison of Overall Relative Efficiency before and after improvement

There is a decrease in the total time needed to do task 2 and task 8. The total time for task 2 is 153 seconds, and for task 8 is 364 seconds. This happens because respondents are faster in accessing class schedules and attendance information because they do not need to go through several menus as in the previous design. Respondents also get the information they need faster because the placement of the information is in accordance with the respondent's expectations. In Figure 8, it can be seen the comparison of the total time required by respondents to do task 2 and task 8 before and after repairs.



**Figure 8.** Comparison of the time required on task 2 and task 8 before and after repair

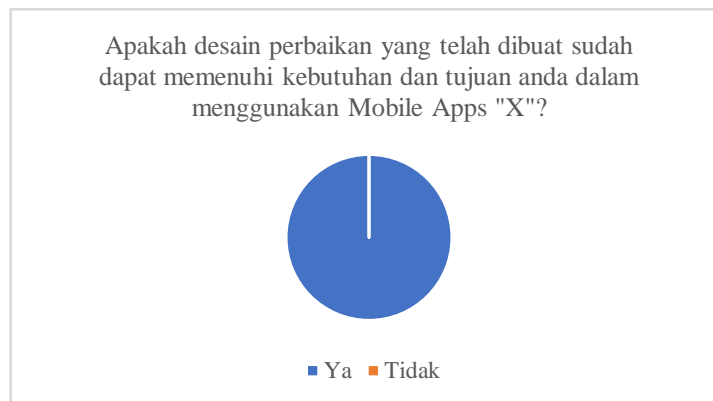
#### 3.1.2 User goal interview

When evaluating the design, the authors also conducted interviews to find out whether the designs made were able to meet the needs and objectives of the users. After that, the authors asked respondents to fill out a questionnaire





to answer the questions the authors asked. have been able to meet their goals and needs in using Mobile Apps "X". Figure 9 is the result of the questionnaire that has been carried out.



**Figure 9.** User Goal Questionnaire Results

## 4. CONCLUSION

The problem of Mobile Apps "X" is in Ease of use with the finding of complexity when you want to see the class schedule because you have to go through several menus first. After this research was conducted, a solution was produced to answer the problem of the Ease of use Mobile Apps "X" component that was not met. The resulting solution is to create a special menu to display certain information, improve the flow of viewing information, select icons that can describe the contents of the menu, give a title to each existing menu, as well as the size and location of the existing menu. The application of this solution can make the Mobile Apps "X" user interface model to fulfill the Ease of use component. Problems that occur in Mobile Apps "X" can result in user goals not being met. Based on user difficulties and user goals that have not been achieved, the improvement of the "X" Mobile Apps user interface is focused on meeting user goals in accordance with Goal Directed Design. After improvements were made to the Mobile Apps "X" there was an increase in the SUS value from 61 to 82, the Completion Rate for the task of viewing the previous class schedule from 50% to 100%, the task of viewing attendance information from 43% to 100%, and Overall Relative Efficiency which was originally 54% to 100%. From the increased results, it can be said that the improvement of the user interface has succeeded in meeting the user's goals.

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