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Evaluation UX Design on GGWP Tourney Application Using HCD and Heuristic Evaluation Methods

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Abstract−The rapid developments in technology make the information spread faster, especially in the electronic sports industry (eSports). Game tournament information is essential to gamers since they strive to obtain accurate and easy-to-understand information about esports. The GGWP Tourney application is a mobile application that provides information and means to purchase e-sports competitions online. However, the GGWP Tourney application is still in the development stage so there are still many user experience problems, especially in the usability and journey of the application. Therefore, analysis and evaluation of the usability of the GGWP Tourney application are carried out so that it is in accordance with what users expect. In this study, usability evaluation was carried out using Heuristic Evaluation as a method of evaluating usability values and designing solutions using the Human Centered Design (HCD) method according to user perceptions based on the results of the evaluation carried out. The evaluation has been carried out in two stages, namely the initial stage and the stage after designing the solution design. The results of the initial evaluation found 12 problems and the severity rating value had an average greater than 2 so improvements were made to the application user interface. While the second evaluation stage in the solution design shows the number of problems found only 3 and the severity rating value is less than 2 so that no further repairs are carried out. Based on these results, the heuristic evaluation method can reduce the number of problems in the GGWP Tourney application from 13 problems to 3 remaining problems. This methods be used to determine the usability value of an application that can be used to improve the user experience of the application.

Keywords: Heuristic Evaluation; User Experience; Tournament; Human Centered Design; Usability

1. INTRODUCTION

Rapid technological advancements make information flow faster, especially in the electronic sports industry (esports). Based on data from the Global Games Market Report 2021, Indonesia occupies the 17th position as the largest game market with very fast growth with a total of 62.1 million active gamers [1]. Therefore, the electronic sports industry in Indonesia is growing very rapidly. This makes information related to esports more needed by gamers.

Game tournament information is essential to gamers since they strive to obtain accurate and easy-to-understand information about esports. GGWP Tourney is an application that provides information about game tournaments. The GGWP Tourney application is a mobile-based application that provides information and facilities for procuring online electronic sports competitions under the supervision of PT Inspirasi Dunia Media[2]. The GGWP Tourney application can also be used by competition organizers to create their own tournaments. However, the GGWP Tourney application is still in the development stage so there are still many problems in terms of user experience, especially in the usability and journey of the application. Based on the results of interviews with IT staff from GGWP Tourney, there are shortcomings in terms of usability and journey based on the amount of feedback from users who have difficulty using the application according to the workflow provided. The data shows that the user experience of the GGWP Tourney application has not met the needs and satisfaction of users. Usability can affect the quality of applications in maximizing features, appearance, security, and performance in terms of interaction with humans[3]. User Experience (UX) is an exploration of how someone perceives and interacts with a product, including every aspect of user interaction with the company dan its service[3]. Evaluation of the user experience is important since a bad user experience can negatively affect the quality and performance of the application, affecting the user's comfort in using the app. In this study, an evaluation will be carried out using the Heuristic Evaluation method. Heuristic Evaluation is a usability evaluation method that can be used to evaluate usability deficiencies and errors in a mobile application.

There are several literature studies that discuss the problems in this research. According to ISO 9241-210, UX is defined as a person's perception and response resulting from the use and/or anticipated use of a product, system, or service[4]. It states that UX includes all user emotions, beliefs, perceptions, physical and psychological responses and behaviors, and achievements that occur before, during, and after use. UX focuses on the convenience of a product in the eyes of the user in order to create a comfortable relationship between human and computer interactions. In another study, Nielsen J stated that Heuristic Evaluation is an evaluation method that measures the usability level of a system to find functionality problems in the interface design of a system[5].

In its implementation, Heuristic Evaluation usually involves more than one evaluator, because it is not enough for one individual to have all the ability to find many errors in a system. Thus, it takes approximately three to five individuals with different experiences when using the system to be able to find many user experience problems from different and comprehensive perspectives in a system[6],[7]. In a study conducted by Paramitha et al, the results of the heuristic evaluation obtained were then calculated with severity ratings as recommendations for improvement in the design[8]. In this study, Heuristic Evaluation was used to maximize

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the user experience of the application related to how to find errors from various user points of view by heuristic principles. There are ten heuristic principles used as parameters in measuring the usability of a system, namely Visibility of System Status, Match between System and The Real World, User Control and Freedom, Consistency and Standards, Error Prevention, Recognition rather than Recall, Flexibility and Efficiency of Use, Aesthetic and Minimalist Design Help Users Recognize, Diagnose and Recover from Errors, and Help and Documentation[9]. Using usability as a criterion for distinguishing usability from heuristics requires an understanding that usability refers to the ability of a product to be used by a minimally skilled user and that it can be projected during the creation of a product and evaluated by specialists and potential users through inspections and tests [10].

In another study, Nielsen J suggested that Severity Ratings are a parameter representation of usability problems that are found based on their severity to be corrected first before being used and followed up[11]. The usability of software has been a major concern for decades. However, many software products and systems have poor usability despite that[12]. The severity rating is used in determining the assessment of the results of the heuristic evaluation by allocating a system that must be repaired first based on its severity. The main factors of Severity ratings in measuring the severity and assessment are the frequency of occurrence of problems, the impact of problems if they occur, and the persistence of problems[11].

According to ISO 9241-210 (2010), Human Centered Design (HCD) is an approach to system design and development that focuses on humans[4]. Basically, Human Centered Design (HCD) and User-Centered Design (UCD) are similar methods, however, HCD does not only focus on users but also on user backgrounds, and takes into account the impact on stakeholders, while UCD is only limited to ordinary users [4],[13],[14],[15]. According to Don Norman 2018, HCD has 4 main principles, namely, Focus on Humans, Focus on the Right Problems, Everything is Connected to The System, and Keep the End Result in Mind. An HCD cycle consists of Understanding and Specifying the Context of Use, Specifying the User Requirements, Creating Designs to meet User Requirements, and Evaluating Designs against User Requirements[16],[12].

This study focuses on evaluating usability using Heuristic Evaluation as an evaluation method and designing a solution design using the Human Centered Design (HCD) method according to user perceptions based on the results of the evaluation carried out. The evaluation and design were carried out on the GGWP Tourney application to determine the effect of the heuristic evaluation method on the usability value in improving the user experience of the GGWP Tourney application and to design a solution design based on the results of the evaluation carried out as recommendations and comparisons with the initial design of the GGWP Tourney application.

2. RESEARCH METHODOLOGY

2.1 Research Stages

The stages in this study were carried out based on the stages in Figure 1.

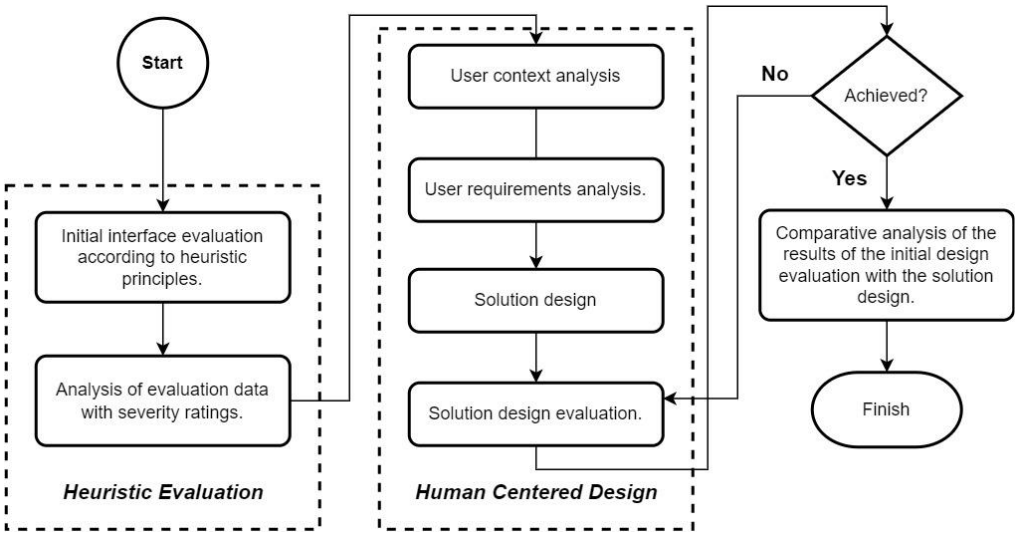

Figure 1. Research Stages

In this study, there is a research stage that contains the stages of the plan that will be carried out based on the method used which is shown in Figure 1. Data collection for the GGWP Tourney application is carried out by several evaluators who have been chosen based on qualification. Data will be grouped using Heuristic Principles to determine variables and indicators that indicate usability errors in the related application. Then from the results of the usability error data for the GGWP Tourney application, an evaluation will be carried out

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using Severity Ratings as a tool to measure the severity, Next will be a Solution Design Design using the Human Centered Design method according to the evaluation results obtained. So this research will focus on improving the quality of the user experience of the GGWP Tourney application in accordance with the wishes of the user.

2.2 Initial Interface Evaluation According to Heuristic Principles

Data collection using the heuristic evaluation method is usually carried out by several evaluators who are competent in the field of interface development [9]. In this study, the data collection process will be carried out by evaluators who are experts in the UI/UX field. According to Nielsen J, it takes at least 3 or 5 evaluators who are usability experts enough to identify most user interface usability problems[17]. Thus, in this study, data collection using the heuristic evaluation (HE) method will be assisted by 3 expert evaluators with the following qualifications:

a. Experience or have worked professionally as a UI/UX Designer.
b. Have registered and/or attended training both online and offline on UI/UX.

After the evaluator is determined, the selected evaluator will then gather with the researcher to carry out the following steps, namely:

a. Briefing Session
   In this process, evaluators and researchers will discuss the introduction of the application, the purpose of the application, who is the target market for the application, and what objects will be evaluated in the GGWP Tourney application.
b. Evaluation Period
   In this process, evaluators and researchers will conduct a thorough evaluation of the GGWP Tourney application in accordance with the 10 heuristic principles as reference variables and indicators. In Table 1 are several variables and indicators that are used as a reference as material for evaluating the usability of the GGWP Tourney application.

Table 1. Variables and Indicators based on Heuristic Principles[16].

Code	Variable	Indicators
H1	Visibility of System Status	1. Can users find out what they are doing when using GGWP Tourney? 2. Does each GGWP Tourney page have a title that describes the content of the page? 3. Do users get feedback from the application every time they run a command?
H2	Match between System and The Real World	1. Is every icon in the GGWP Tourney application easy to understand, and has familiar functions? 2. Can users understand the commands contained in the GGWP Tourney application? 3. Is the use of language in the application easy enough for users to understand?
H3	User Control and Freedom	1. Can users easily fix and find the mistakes they have made before? 2. Do users know what to do if they notice the system is issuing warning messages? 3. Can users copy (copy & paste) information on the application as well as change (edit) user data themselves?
H4	Consistency and Standards	1. Does the GGWP Tourney app use the same and consistent terms for commands or menus? 2. Does the GGWP Tourney app display an appropriate description for each selected button? 3. Does the GGWP Tourney app display on every page using consistent assets?
H5	Error Prevention	1. Is there a message that warns and prevents the user from making a mistake? 2. Do users understand the warning messages generated by the system? 3. Will the system automatically suggest typos/terms in the search box?
H6	Recognition rather than Recall	1. Can users easily use the application when used for the second time? 2. Is the menu layout easy for users to remember? 3. Do messages and warnings appear in the user's eye position when looking at the screen frequently?
H7	Flexibility and Efficiency of Use	1. Does the displayed menu allow users to work more quickly and efficiently? 2. Can users combine several keys simultaneously to run a command or shortcut? 3. Is there a helpful navigation menu on each page?
H8	Aesthetic and Minimalist Design	1. Are only important information displayed on the screen? 2. Does the GGWP Tourney app have a design that annoys users?

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Code	Variable	Indicators
		3. Is the GGWP Tourney application designed with a minimalist look?
H9	Help users Recognize, Diagnose, and Recover from Errors	1. Does the error message contain sentences that the user doesn't understand? 2. Does the error message contain the required solution options? 3. Is there a clear error message so that the user can understand and understand the error made?
H10	Help and Documentation	1. Is there a “help” or “assistance” menu to guide users when they have trouble? [13] 2. Is the “help” menu easily accessible to users? 3. Is the language in the "help" menu easy to understand by users?

c. Debriefing Session
This stage is the final stage in the evaluation, namely by providing solutions for suggestions for improvements to the shortcomings in the GGWP Tourney application interface.

The results of the evaluation carried out by the evaluator will later be collected and will be entered into a form that has been prepared by the researcher, which then the data on the form will be used for the next stage, namely analyzing data using the Severity Rating technique.

2.3 Data Analysis using Severity Ratings

In this study, after the evaluation data using 10 heuristic principles were obtained, further data analysis was carried out using the Severity Rating technique to measure the severity. The Severity Rating technique is also used to determine the priority of improvements to the system design[11].

In its implementation, the Severity Ratings assessment is carried out by dividing the parameter values into 0-4 scales [11] as listed in Table 2 below:

Table 2. Aspects of Assessment using Severity Ratings[11]

Severity Ratings	Explanation
0	No Problem : I don't agree that this is a usability problem at all.
1	Cosmetic : Need not be fixed unless extra time is available on project.
2	Minor : Fixing this should be given low priority.
3	Major : Important to fix, so should be given high priority
4	Usability Catastrophe : Imperative to fix this before product can be released

In table 2, it is explained that the lower the value obtained in the heuristic question points, the more respondents agree with the existing features and there is no need for improvements or additions to the system. And conversely, the higher the value, the more needed additions or improvements to the application. In this study, only severity ratings 2 to 4 will be repaired, because at that value there are problems that can interfere with users, while severity rating values 0 and 1 will not be repaired because there are no problems or if there are, the problem is not disturbing users[11].

2.4 User Context Analysis

Based on the results of the evaluation carried out in the previous method, it is necessary to determine the user context analysis in the GGWP Tourney application. The user context analysis can be done by making observations such as interviews with application users who have used the application or viewing user data if the application has been used by the general public.

The analysis data will be used as the basis for making user personas. User Persona is created by separating user characteristics according to the goals and objectives of the user[4]. In this study, user characteristics can be searched by conducting interviews with the owner of the GGWP Tourney application to find out the characteristics of users through existing user data.

The result of this stage is the User Persona which will be used as a reference for designing the solution design so that the design results are by the desired user characteristics.

2.5 User Requirements Analysis

User requirement analysis is needed to determine user needs and what constraints need to be fixed in the application[4]. User needs in question can be in the form of a list of tasks and scenarios performed by users when using the GGWP Tourney application.

In this study, user needs are the result of a system evaluation analysis that has been carried out previously and priority improvements are made based on severity ratings that have been determined by the evaluator[11].

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The results in this section are in the form of a table containing functions in the application that need to be repaired or added.

2.6 Solution Design

At this stage, a solution design will be designed to make recommendations for improvement based on severity ratings and user personas that have been obtained from the previous stage. Designing begins by describing the architecture of the GGWP Tourney application, and after that making a wireframe as a form of low-fidelity design. The wireframe is a low-fidelity design to describe the initial form of the GGWP Tourney application before being made into an interactive high-fidelity prototype[4].

Then after the wireframe is created, the design, improvement, and additional interface design will be carried out according to the findings of problems that get severity ratings or a fairly high level of severity. Next, a high-fidelity design will be made, namely a prototype as a final description of the solution design.

2.7 Evaluasi Desain Solusi

After the solution design is made, an evaluation is needed to find out whether the design is in accordance with the context of use and user needs or not. If not, the design phase of the resolution design will be carried out, and if it is quite appropriate and has a lower severity rating than the previous evaluation stage, then the design is good enough.

Severity ratings which are considered quite good have a scale of 0 to 1. However, if the problem in the application is difficult to get a value of 0 to 1, then at least the value of the severity ratings has decreased compared to the initial design evaluation[17].

The results of this stage are the score and severity rating analysis calculations on the GGWP Tourney application which has been designed to design a solution.

2.8 Analysis of Results Comparative Evaluation of Initial Design and Solution Design

In this last stage, the evaluation results that have been carried out in the first stage will be compared with the evaluation results in the second stage to determine the change in severity ratings from the initial design and solution design. The results of this stage are a comparison chart of the two evaluation stages and a table identifying which parts have undergone design changes and the improvement scores.

3. RESULT AND DISCUSSION

3.1 Initial Design Heuristic Evaluation Results

Heuristic evaluation was carried out on the initial design of the application by involving three evaluators to find problems in the application design. The results of the heuristic evaluation can be seen in table 3.

Table 3. The results of the initial heuristic evaluation

Problem Code	Problem	Location
H1-1	A little confusing when first using the app.	Menu Page
H3-2	Users don't know the error message when they make a mistake.	Message Page, Ranking Page
H5-1	There are no error messages or feedback when entering the wrong command text.	Message Page
H5-2	The user doesn't get an error message so doesn't know he's made a mistake.	Message Page, Ranking Page
H5-3	The system does not provide suggestions when inputting a chat command incorrectly.	Message Page
H6-1	Still a little confused if you are use the application for the second time.	Menu Page
H6-3	Messages and warnings do not appear to users	Aplikasi GGWP Tourney
H7-1	Menus are very inefficient when using a chatbot compared to displaying menus on one page.	Message Page
H7-2	Cannot combine commands or create shortcuts.	Message Page
H8-2	The design of the app is a little confusing the first time you use the app.	Message Page, Tournament Page
H8-3	The application design is minimalist but there are still designs that are less efficient.	Message Page, Tournament Page
H10-1	There is a help menu but does not provide recommendations for problems that often occur.	Help Page

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3.2 Severity Ratings Results

Severity ratings are obtained from the evaluation of the evaluators based on the results of the initial heuristic evaluation. Severity ratings are used as an analysis of user needs in determining priority improvements to the problems found. The results of the severity ratings of each evaluator can be seen in table 4.

Table 4. The results of severity ratings for each problem.

Problem Code	Problems			Total
	Evaluator 1	Evaluator 2	Evaluator 3	
H1-1	2	3	2	2,3
H3-2	3	2	3	2,7
H5-1	4	3	3	3,3
H5-2	3	4	3	3,3
H5-3	4	4	4	4
H6-1	3	3	4	3,3
H6-3	4	4	3	3,7
H7-1	4	4	4	4
H7-2	4	4	4	4
H8-2	3	3	2	2,7
H8-3	4	3	4	3,7
H10-1	2	3	3	2,7

Based on the results of severity ratings in table 4, the priority of repairs on the problem is determined from the total average value of the problem. The value of the evaluators for each problem starts from 0 to 4 based on table 3 in the previous section. If the total average value of the problem is greater than 2, then the problem is included in the priority of repairs that must be carried out. If the total average value of the problem is getting closer to 4 or is worth 4, the higher the priority for repair. Besides that, no repairs were done.

3.3 User Persona

In this study, the user persona is used as a reference in designing the solution so that the results of the solution design are by the desired user characteristics. User personas are created based on existing user data taken from interviews with the owner of the GGWP Tourney application. The description of the user persona obtained based on the characteristic data of the GGWP Tourney application user can be seen in Figure 2.

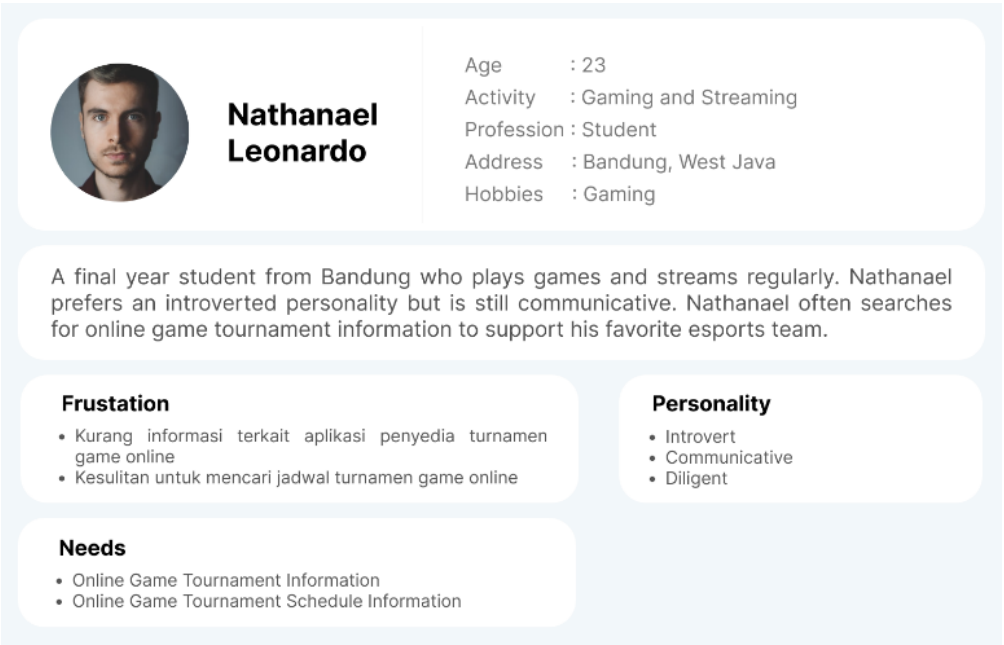

Figure 2. User Persona

3.4 User Requirements Analysis

User needs are obtained from the results of the system evaluation analysis that has been carried out and priority improvements are made based on the severity ratings that have been determined by the evaluator. Based on these results, several functions or application features that need to be improved are shown in table 5.

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Table 5. Application functions that need improvement.

App Function
Menu
Esport Rankings
Tournaments
Help
Message

3.5 Solution Design

3.5.1 Information Architecture Design

The design of information architecture improvements is made based on the results of the analysis of the application functions that need to be improved. An overview of the design of information architecture improvements made hierarchically is shown in Figure 3.

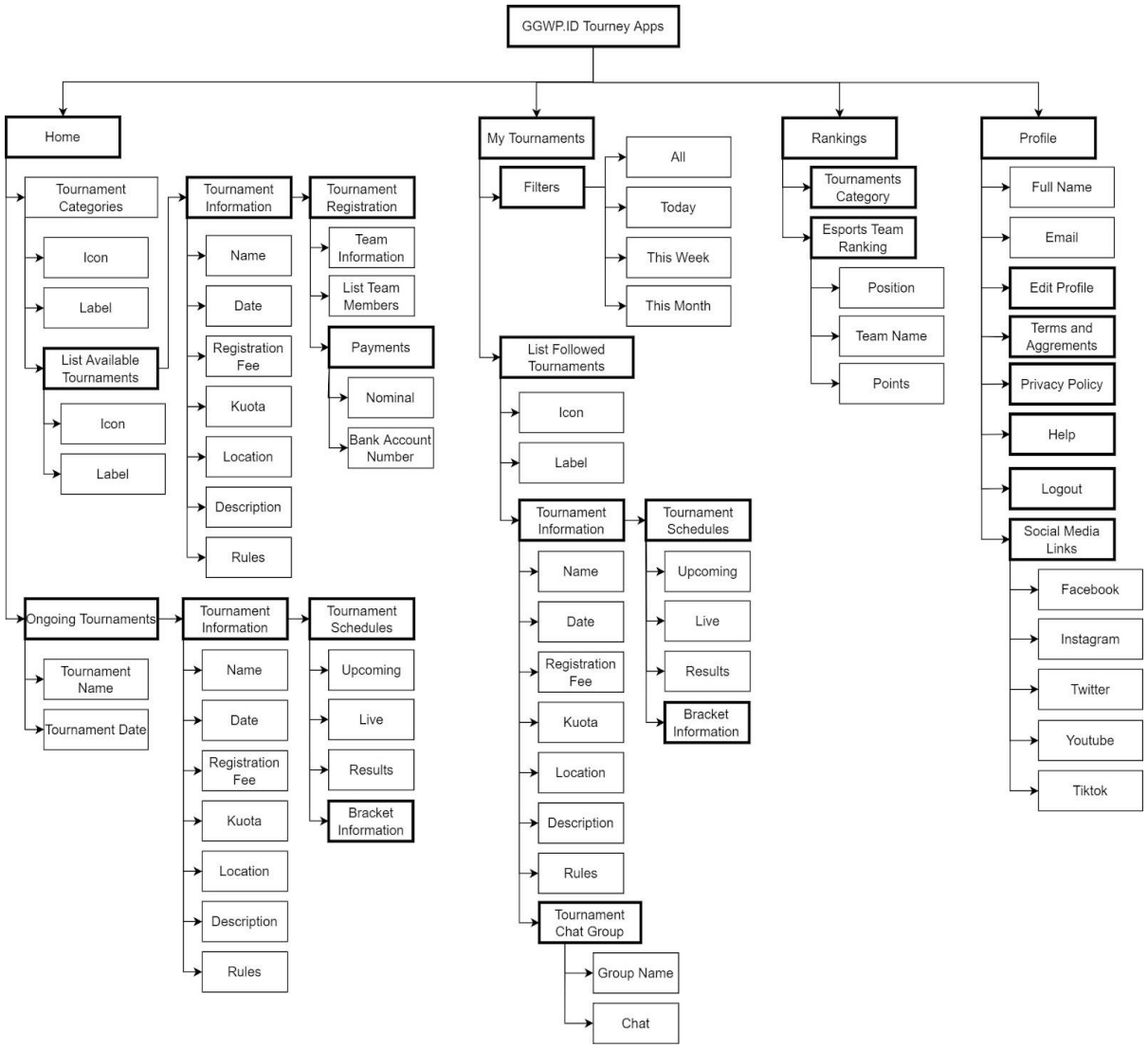

Figure 3. Design of application information architecture improvements.

Based on Figure 3, the information architecture improvement design covers the main functions and sub-functions of the application. From the top level shows the main function or menu of the application, while the bottom level shows the sub-functions of the main function.

3.5.2 Wireframe

The design of the application wireframe is carried out using the concept of low-fidelity prototyping. The wireframe design is made to quickly describe the application framework and the application flow. An overview of the wireframe design for the solution design is shown in Figure 4.

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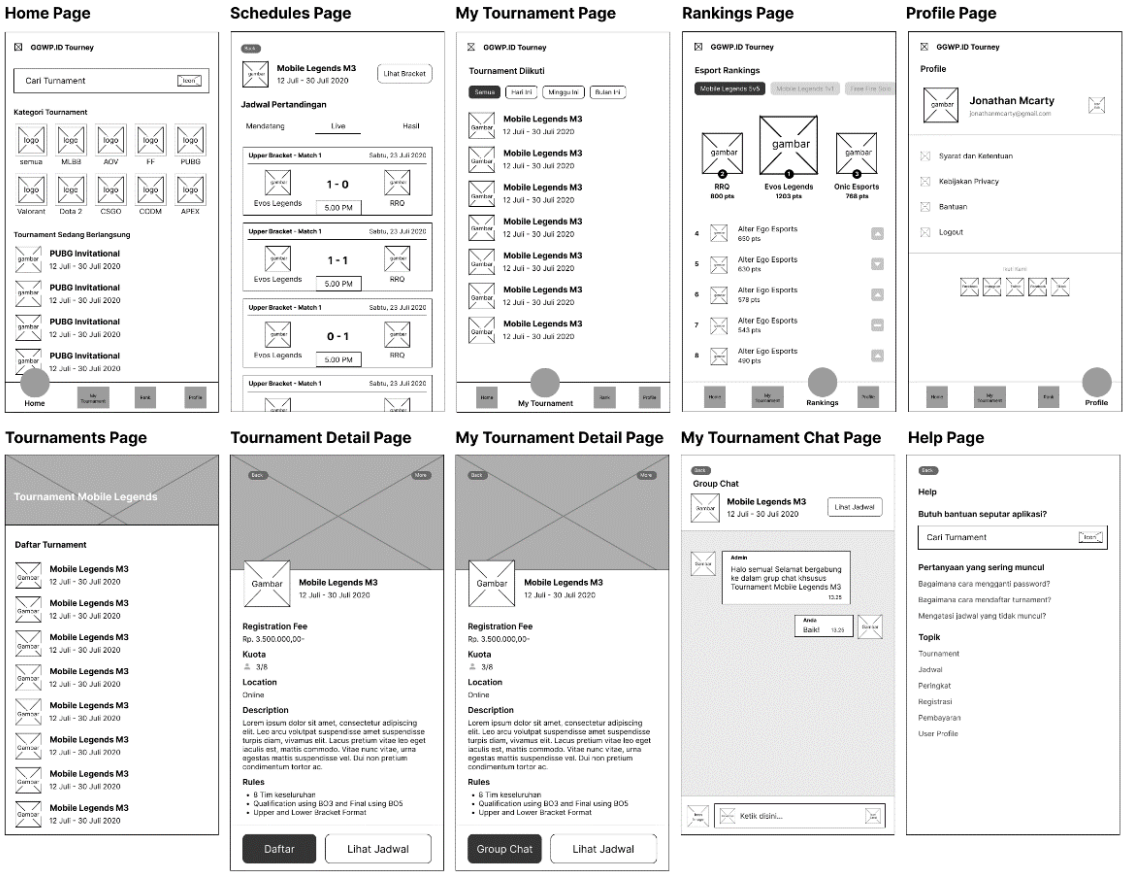

Figure 4. Wireframe design of the solution design.

3.5.3 User Interface

The user interface design of the solution design is based on the framework contained in the wireframe. The user interface is made as the final design before prototyping which will then be tested on the user. An overview of the user interface design of the designed solution is shown in Figure 5.

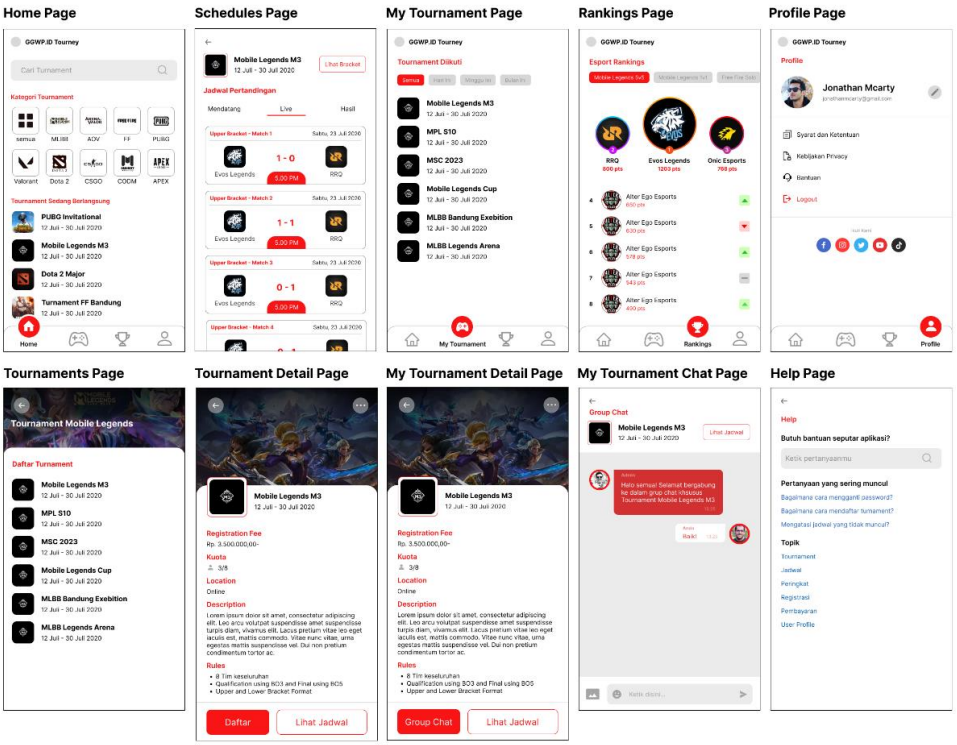

Figure 5. User Interface Design of the solution design.

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3.6 Heuristic Evaluation Results on Solution Design

The second stage of heuristic evaluation is carried out after the solution design is carried out. The results of the second stage heuristic evaluation can be seen in table 6.

Table 6. The results of the second stage heuristic evaluation.

Problem Code	Problems	Location
H1-3	There is no feedback when pressing the login button.	Login Page
H7-3	Navigation feedback between pages is sometimes delayed.	GGWP Tourney App
H3-2	The user still doesn't know what to do when the system issues a warning message.	GGWP Tourney App

Based on the results of the second stage heuristic evaluation in table 6, there are only 3 problems left in the application design. The results are then calculated as severity ratings for each problem. The results of the calculation of the second stage of severity ratings can be seen in table 7.

Table 7. The results of severity ratings for each problem.

Problem Code	Problems			Total
	Evaluator 1	Evaluator 2	Evaluator 3	
H1-3	1	2	2	1,7
H7-3	1	1	3	1,7
H3-2	2	1	1	1,3

Based on the results of the calculation of the severity ratings of the second stage, the total average value of the problem is below 2 so the problem does not need to be repaired. The results of the evaluation and calculation of the severity ratings of the second stage will then be compared with the results of the initial evaluation.

3.7 Comparative Results of Initial Design Heuristic Evaluation and Solution Design

The results of the initial and second stage heuristic evaluations are then compared to see whether the problems in the early stages have been resolved or not. The comparison of the results of the initial and second stage heuristic evaluations can be seen in Figure 6.

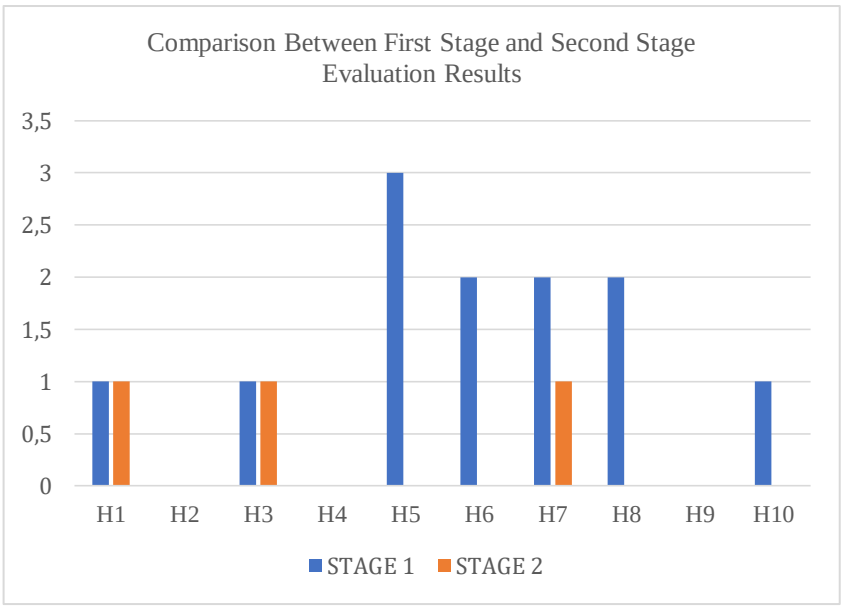

Figure 6. Comparison of the results of the first and second stage heuristic evaluations.

Based on Figure 7, the results of the initial evaluation found 18 problems with details of 3 problems in the H1 category, 1 problem in the H3 category, 3 problems in the H5 category, 2 problems in the H6 category, 3 problems in the H7 category, 2 problems in the H8 category, 3 problems in the H9 category, and 1 problem in the H10 category. While the results of the second stage of evaluation only found 3 problems with details of 2 problems on H1 and 1 problem on H3. Based on this comparison, the results of the second stage of evaluation prove that the solution design based on the results of the initial evaluation can reduce design problems in the GGWP Tourney application in terms of user experience.

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4. CONCLUSION

In this study, a heuristic evaluation of the user experience of the GGWP Tourney application has been carried out. The results of the initial heuristic evaluation or the first stage and the results of the second stage heuristic evaluation were obtained. The results of the first stage of the evaluation obtained 18 problems with details of 3 problems in the H1 category, 1 problem in the H3 category, 3 problems in the H5 category, 2 problems in the H6 category, 3 problems in the H7 category, 2 problems in the H8 category, 3 problems in the H9 category, and 1 problem in category H10. These results are then used to design solutions and prototypes using the Human Centered Design method. Meanwhile, the results of the second stage of evaluation were obtained after re-evaluating the solution design. In the results of the second stage of evaluation, 3 problems were found with details of 2 problems in H1 and 1 problem in H3. Based on the comparison between the results of the first and second stage evaluations, the design of the solution provided can reduce design problems in the GGWP Tourney application from the user experience side. The heuristic evaluation method can reduce the number of problems in the GGWP Tourney application from 13 problems to 3 remaining problems. Based on these results, the heuristic evaluation method can be used to determine the usability value of an application that can be used to improve the user experience of the application. For further research, it is expected to use other methods or compare usability values between heuristic evaluation methods and other methods.

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