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User Interface and User Experience Disaster Education Game Application Using Heuristic Evaluation

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Abstract

Natural disaster educational game application to introduce Raudhatul Athfal (RA) level students to learning and knowledge. A game application was created to make it easier to recognize and complete a stage in the form of a game operated via computer, making it additional learning how to use a computer and knowing how to responsive and alert when a disaster strikes, what should be done through this application game? In order to better measure students' abilities when using this application, it is necessary to assess several respondents, one of whom is the teachers at the school, to assess whether this application will be of interest or not in understanding how to use it and other components. The assessment process is through distributing questionnaires and filling in the results through respondents using a Likert scale with heuristic evaluation indicators filled in with the statement that this application is interesting at the class size level for RA (Raudatul Athfal) students with a Visibility of system status score of 74, Match between system and real world tea 71, User control and freedom 58, Consistency and standards 72, Error prevention 64, Recognition rather than recall 73, Flexibility and efficiency of use 78, Helps users recognize diagnose 66, Recovers user 75, Help and documentation 79 with a total score of 710 using the Likert scale formula.

I. INTRODUCTION

Changes in innovation from technology affect any sector, one of which is education in learning, which can be known to be used digitally. Learning media is currently combined between software and hardware that can be accessed through supporting devices such as computers, smartphones and others, in this research learning development innovations are used using computers through natural disaster games. [1]

Games are activities that are done for fun when there is free time. With this game can be combined through game applications on a computer with learning media, games that focus on education are called educational games. Educational games are entertainment learning applications that contain material and adjust the learning theme to the content of the content, such as what for example natural disaster games focus on natural disaster learning materials [2].

Natural disasters are events that threaten humans from several natural and non-natural factors from community mistakes, resulting in losses such as property, and casualties [3].

Games are used as a place to fill free time and relieve stress. In an education game can be used as an education to students to eliminate boredom in learning in the classroom and can be an additional learning through application-based games through computers, in addition to using game applications there is an introduction and knowledge of how to operate applications on several computers [4].

Computer games are computer programs between users can interact through control in fulfilling goals, computer games can be enjoyed by children to adults, in addition to providing fun but as a container of knowledge in solving problems, abilities according to the content of the game content like what [5].

This game uses multimedia that produces sound and images to get interesting attention to users and focuses on the content story in completing the game stage.

User experience is the benchmark for acceptance of game applications. If the game application is not comfortable, it can potentially fail. In anticipating this, it is necessary to approach through usability to see the

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user experience of the game application. Usability as a user experience interacts with game applications, such as educational game design and even the storyline of the game content. Where there are still users who do not know how to use the application. For this reason, it is necessary to design an evaluation to see what shortcomings occur in the game application system [6]

Testing techniques in evaluating application usability are very important to determine system quality, evaluation procedures can find application defects and problems in usability using a heuristic evaluation approach. The heuristic evaluation method facilitates the design of objects to be examined. Heuristic evaluation is generally a test involving several standard indicators in the application, evaluation here is used in measuring the usability, efficiency and effectiveness of the user interface.[7]

II. Related Works/Literature Review

A. User interface

User interface is part of the application so that users with game applications can communicate, user interfaces play a role in associating human interaction with information in the application game itself.[8]

B. User experience

Includes all related components of human interaction with computers and applications, as well as related institutions. The discipline in user experience development is about application convenience to create compatibility between game content and learning in knowledge [8]

C. Natural Disasters

According to that the event of submergence of areas by land with increased water volume, flooding is a high frequency of water from normal with increased overflow until puddles occur at low points. The causes of this flood are several environmental damages such as land use diversion, and illegal tree felling [9]

D. Thinking Framework

According to [9], this research is certainly with the thought and analysis of the process of using disaster education game applications such as knowledge of preparedness when a disaster occurs, then the younger siblings and students will prepare what things must be prepared when a disaster comes, the process of developing this educational game into an information media is not only playing fun by playing the content of the learning storyline but will be a learning story when it occurs in the real world during a disaster Occurs and in this educational game also proposes the quality of software regarding functional suitability testing, compatibility testing, and usability testing by testing the device quality system in the user interface of application use needs, design, and testing. After testing the device has been completed, there is a revision process that fixes what must be changed to adjust the application according to user goals. [10]

E. Supporting Journal

This research uses several references from several other sources so that this research can be formed and has several differences with previous studies, the following is the first research which raises the theme of Analysis of the Usability of Mobile Ordering Applications for Prima Taxi Services Using the Webuse Method and Heuristic Evaluation, Prime Group in the service sector taxi This sector creates online taxi ordering applications to make it easier for passengers to compete in transportation competition. This application still requires user interface assessment measurements using the Webuse method and needs to explore the error rate using the heuristic evaluation method, which in its application provides GOOD information in the use process. Then the usability evaluation results on the driver's side are lower compared to taxi application users. From a heuristic perspective, this is not found in the Webuse method [11], Continuing previous research, Usability Evaluation of the Prokal.Co Online News Website Using Heuristic and Webuse Evaluation Methods, which contains the PROKAL.co Website, a Kalimantan news portal that needs to improve the appearance of the website using the heuristic evaluation method, there are 5 main stages and 2 evaluation indicators that need improvement and 7 indicators need high level improvement and 1 indicator needs low level improvement [12] and In this study overall the results of the application of heuristic and webuse evaluations are almost all valid and there are still minimal errors in assessment. assessment process The level of problems is in a heuristic severity ranking, which means the level of difficulty is appropriate to the user and this research recommends improvements to the appearance in the form of a prototype which needs to be evaluated and approved by the professional. -cal[13], Analysis of the User Interface and User Experience in Commando War Games Using the Heuristic Evaluation Method which contains Commando war game which is a turn based strategy game genre. However, this game needs to focus on its user interface. The interface focus requires heuristic evaluation methods to find deficiencies In the single convenience question the total score was 6.6, going well. Heuristically, the evaluation obtained a score of 0.34 – 0.66 with neutral and sufficient results. User

experience in usability post tasks got a score of 6.6, all the games run well Based on the user interface, the commando war game is close to appropriate which means it is interesting [14], Analysis of the User Interface (UI) and User Experience (UX) at AIS UIN Jakarta Using the Heuristic Evaluation and Webuse Method with the ISO 13407 Standard which contains 35 respondents who assessed the AIS academic application using the heuristic evaluation method and ISO 13407 as very interesting. information of 96%. There are 10 principle indicators calculated using a Likert scale with a result of 96%, which means it is very interesting. The results of the questionnaire on the ISO 13407 section of 96% are very interesting [15], Design between users in educational games to recognize letters and numbers for children with mild intellectual disabilities using the User Centered Design (UCD) method. Understanding in using mentally retarded applications through the User Centered Design process by distributing several questionnaires containing heuristic evaluation method assessments. Assessment through heuristic evaluation using the Likert scale formula. of 79.13% which means an attractive scale. The usability value of effectiveness and efficiency is 79.13% on an attractive scale and the minimalist design is 98.66% and has a good and comfortable layout[16] .

III. METHODS

A. Heuristic Evaluation

User interface design for evaluation in finding different and comprehensive usability problems for improvement [16], or heuristic evaluation a process of evaluating interface experience over several skilled experts. This evaluation measures the function of the application, to make it more effective and efficient against ten heuristic evaluations. The aim of this heuristic evaluation method is to improve the appearance of the user interface more effectively. Evaluation is a series of performance to be more in line with the criteria for each level of the task. [17]

B. 10 principles of heuristic evaluation

The heuristic evaluation method uses 10 basic principles as a reference, including visibility of system status, match between system and real world, user control and freedom, consistency and standards, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design, helps users recognize diagnose and recovers users, help and documentation [18].

C. Likert Skala

The Likert scale is a research scale used to measure user interface experience problems in natural disaster educational game applications when found in heuristic evaluations. The results of the answers from several respondents measure the extent to which the user interface and experience are accepted or interesting in the content of the game which makes education can be used as learning through the game application along with the assessment weight table.[19]

TABLE 1
ASSESSMENT WEIGHT

Value weight	Range	Scale
1	0% - 19,99%	Very Uninteresting
2	20% - 39,99%	Not attractive
3	40% - 59,99%	Neutral
4	60% - 79,99%	Interesting
5	80% - 100%	Very interesting

In the table 1 above, respondents will assess the number range from 1 to 5, where the contents of the number provide information from value 1 is very unattractive, value 2 is not attractive, value 3 is neutral, value 4 is attractive, and value 5 is very attractive.

Based on the weighted value above, respondents will assess the user interface from the 10 principles of heuristic evaluation in the questionnaire and will process the questionnaire data using the following Likert scale formula:

Calculation formula using a Likert scale:

T = Total number of respondents who voted
Pn = Choice of Likert score numbers
Y = Highest Likert score x number of respondents
X = Lowest Likert score x number of respondents

$$Percentage = \frac{Indicator\ Value\ Results}{Maximum\ Value\ Results}\ x\ 100\% \quad \textbf{(1)}$$

D. Framework

This research uses a thinking framework to make it easier for researchers to compile a series of user interface experiences in their assessment along with an image of the thinking framework.

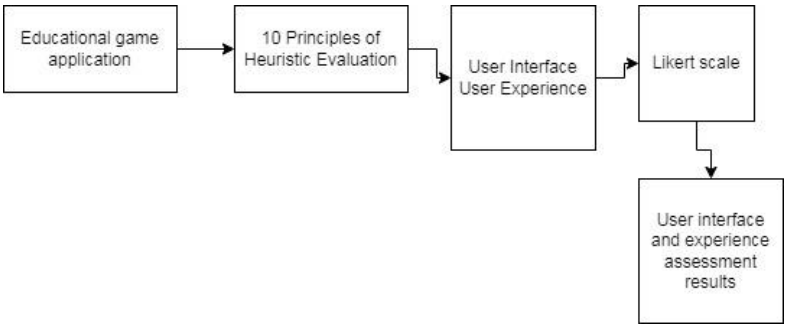

Fig. 1 Thinking framework User interface assessment undergoes heuristic evaluation

In the picture 1, the framework for thinking about the user interface experience is formed in order to see the results of the value of several respondents' input on the application that has been created for students later, which will be used in additional learning about natural disasters through educational game applications that are embedded in the computer.

IV. RESULTS

A. Data Assessment

In starting data processing here we used primary data with a total of 20 respondents who filled out several questionnaires

TABLE 2
EVALUATION HEURISTIC ASSESSMENT INDICATORS

Number	Indicator	Evaluation				
		1	**2**	**3**	**4**	**5**
1	Visibility of system status			8	10	2
2	Match between system and teh real world			10	9	1
3	User control and freedom			5	12	3
4	Consistency and standards			13	2	5
5	Error prevention			17	2	1
6	Recognition rather than recall			9	9	2
7	Flexibility and efficiency of use			6	10	4
8	Helps users recognize diagnose			15	4	1
9	Recovers user			10	5	5
#	Help and documentation			6	9	5
	Amount			99	72	29

In the data table 2, respondents assessed the user interface experience side of educational game applications with a total number of respondents who rated weight 3 as 99, weight 4 as 72, and weight 5 as 29, totaling 20 respondents with a total of 200

B. Data processing

After the heuristic evaluation indicators for the game application have been assessed, the next process is adding up the data that has selected a value of 1-5 with the Likert scale formula with the results as follows.

The value of visibility of system status is 74%, Match between system and the real world is 71%, user control and freedom is 58%, consistency and standards is 72%, Error prevention is 64%, recognition rather than recall is 73%, flexibility and efficiency of use is 78%, Helping users recognize the diagnosis by 66%, recovering users by 75% and assistance and documentation by 79%.

C. Final score

In the table below, the combination of values from the indicators per representative is entered into the Likert scale formula to see the overall results and produce information such as the total value.

TABLE 3
FINAL VALUE

Number	Indicator	Value results
1	Visibility of system status	74
2	Match between system and teh real world	71
3	User control and freedom	58
4	Consistency and standards	72
5	Error prevention	64
6	Recognition rather than recall	73
7	Flexibility and efficiency of use	78
8	Helps users recognize diagnose	66
9	Recovers user	75
10	Help and documentation	79
Results of heuristic evaluation indicator values		710

$$Percentage \frac{74 + 71 + 58 + 72 + 64 + 73 + 78 + 66 + 75 + 79}{1000} \; x \; 100 \; \%$$

$$Percentage \frac{710}{1000} \; x \; 100\% =$$

$$Percentage = 71\%$$

From the calculation of the interface value in the table above, a value of 71% is obtained, which indicates that it is in the attractive category based on the value weighting table and it can be concluded that the overall user interface experience is in the attractive category positive category.

TABLE 4
THE HIGHEST SCORE OF THE 10 PRINCIPLES OF HEURISTIC EVALUATION INDICATORS

Number	Indicator	Value results
1	Visibility of system status	74%
2	Match between system and teh real world	71%
3	User control and freedom	58%
4	Consistency and standards	72%
5	Error prevention	64%
6	Recognition rather than recall	73%

7	Flexibility and efficiency of use	78%
8	Helps users recognize diagnose	66%
9	Recovers user	75%
10	Help and documentation	79%

The highest value for the 10 user interface experience indicators here is the highest value for the help and documentation indicator at 79% and the smallest value for the user control and freedom indicator at 58%.

V. DISCUSSION

This educational game application focuses on the user interface experience through several 10 heuristic evaluation indicators where assessments that are considered to be at an intermediate level can be reviewed so that the features of this application can further increase the level of user interface comfort and experience. when using the application. The score results achieved currently require expansion through external parties so that this application develops along with students' knowledge, where children's abilities not only know how to use games but also gain more experience in how to operate computer games. Maybe in the future this application can survive and develop among students in computer learning with game content in the application so that students are interested in game content and like computer tools. and this application will be used more on the Android side which must be continued if the computer device is inadequate then another solution in the future could be to use a smartphone and record each account's learning and learn at what level of play. The highest score of 10 indicators on the help and documentation side which explains a direction on how to use the game can be done step by step so that the game can run smoothly, because each game is given several descriptions and dialogues. then the lowest value in terms of user control freedom needs to be made an evaluation in improving the game mode which must be selected first so that users can choose the easy or difficult level of a game and understand the storyline in learning-based games.

VI. CONCLUSIONS

In this research, applications are assessed for user interface and experience through 10 heuristic evaluation principles by processing data using a Likert scale formula consisting of Visibility of system status at 74, Match between system and real world at 71, User control and freedom at 58, Consistency and standards 72, Error prevention as much as 64, Recognition rather than recall as much as 73, Flexibility and efficiency of use as much as 78, Helps users recognize diagnose as much as 66, Recovers users as much as 75, Help and documentation as much as 79. with interesting information and 20 respondents chose the assessment from 1-5, where the value 3 is 297, the value 4 is 268 and the value 5 is 145 from 10 indicators

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