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UI/UX Designing of an Indonesian Language Writing Educational Game for Elementary School Students Using a Human-Centred Design Method

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Abstract

Based on previous research conducted on elementary school students, it was found that there are still many errors in the use of EYD or KBBI rules, such as errors in the use of capital letters and the use of words. The lack of learning media outside of school triggers students' lack of understanding. Using technology-based learning media in games is exciting and can help improve students' understanding outside school. Using educational games as out-of-school learning media has several advantages, namely ease of access and higher student interest in playing. In developing games, an attractive appearance is needed and is the need of elementary school students. This is adequate and can increase students' interest in using the game as an out-of-school learning media. Therefore, an appropriate design method is needed to design the appearance to be attractive and by the needs of students, one of which is Human-Centered Design (HCD). This method involves users directly during the design process. By applying the HCD method, this research aims to design the interface of the "CerdasEYD" educational game that suits the needs and answers the problems that students have. Testing is carried out using the System Usability Scale to measure the success of the interface that has been designed. Through this test, the results obtained in the form of an average score of 95 indicate that the design has met the needs and answered the problems that students' problems.

Keywords: *EYD, KBBI,* Human Centered Design, User Interface

Abstrak

Berdasarkan penelitian yang pernah dilakukan sebelumnya terhadap siswa usia sekolah dasar, didapatkan hasil bahwa masih banyak terdapat kesalahan dalam penggunaan kaidah EYD ataupun KBBI seperti, kesalahan penggunaan huruf kapital dan penggunaan kata. Kurangnya media pembelajaran di luar sekolah menjadi pemicu dari kurangnya pemahaman yang dimiliki siswa. Penggunaan media pembelajaran berbasis teknologi berupa gim dinilai menarik dan dapat membantu meningkatkan pemahaman siswa usia di luar sekolah. Penggunaan gim edukasi sebagai media pembelajaran di luar sekolah memiliki beberapa keunggulan dalam penggunaannya, yaitu kemudahan mengakses dan ketertarikan siswa dalam bermain tentu lebih tinggi. Dalam mengembangkan gim, dibutuhkan tampilan yang menarik dan sesuai dengan kebutuhan siswa usia sekolah dasar. Hal ini di nilai efektif dan dapat meningkatkan minat siswa dalam menggunakan gim sebagai media pembelajaran di luar sekolah. Oleh karena itu, untuk merancang tampilan agar menarik dan sesuai dengan kebutuhan siswa, dibutuhkan metode perancangan yang sesuai, yaitu salah satunya Human-Centered Design (HCD). Metode ini melibatkan langsung pengguna pada saat proses perancangan. Dengan menerapkan metode HCD, penelitian ini bertujuan untuk merancang tampilan antarmuka dari gim edukasi "CerdasEYD" yang sesuai dengan kebutuhan dan menjawab permasalahan yang dimiliki siswa. Untuk mengukur keberhasilan antarmuka yang telah di desain, dilakukan pengujian dengan menggunakan System Usability Scale. Melalui pengujian tersebut, diperoleh hasil berupa nilai rata-rata sebesar 95 yang menandakan bahwa desain yang dirancang telah sesuai dengan kebutuhan dan menjawab permasalahan yang dimiliki siswa.

Kata kunci: EYD, KBBI, Human Centered Design, User Interface

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INTRODUCTION

As a citizen of Indonesia, Indonesian is the primary language used for communication. The appropriate language will facilitate oral and written communication(Purwandari, 2015). Several essential factors in communication and writing include using the Enhanced Spelling of the Indonesian Language (D, Ejaan Bahasa Indonesia yang Disempurnakan) (Qhadafi, 2018). In education, the Indonesian language is a subject that must be learned from elementary school to university. At the elementary school level, writing instruction plays a significant role in Indonesian language learning (Khair, 2018). Therefore, it is essential to guide elementary school students to have the ability to communicate and write using proper language, according to the rules of EYD and the Kamus Besar Bahasa Indonesia (KBBI) (Suparlan, 2020).

However, Indonesian language learning at the elementary school level is still not optimal (Muflihah & Sutrisna, 2021). According to a study conducted by Rahmaningsih (2016) at Muhammadiyah Mulyodadi elementary school, the most common spelling mistakes found were incorrect capitalization with 515 errors (46.69%) and errors in word usage with 126 errors (11.42%) (Rahmaningsih, 2016). Furthermore, according to Sembiring (2022), at 044843 Elementary schools, most students have a poor understanding of EYD rules. This is due to a lack of interest in reading and ineffective learning methods, making it difficult for students to understand EYD better (Sembiring, 2022). According to the research findings presented above, improvement in word spelling, according to EYD and KBBI, is crucial for primary students (Rahmaningsih, 2016). Therefore, learning media is needed to assist primary students in understanding word spelling, according to EYD and KBBI. Various media can be used to support learning, one of which is using technology.

Numerous technologies can be utilized as learning media, including educational games. According to Novita and Sundari (2020), through research conducted at Pengadilan 2 Bogor Elementary School, using games as a learning medium is considered adequate (Novita & Sundari, 2020). This can be seen through the increase in the average scores at that elementary school, which was only 74.42, and increased to 84.02 after using technology in learning (Novita & Sundari, 2020). A suitable and engaging interface for children supports the success of games in improving average scores. The interface includes user interface and user experience. The user interface is the main display in an application, and user experience is the user's experience in using an application (Tasril et al., 2023).

Understanding user demands is required in developing educational games for teaching Indonesian language writing according to EYD and KBBI for elementary school students to produce a learning game that can adapt to user needs. Therefore, researchers use the Human Centered Design (HCD) approach, which focuses on user needs in its solution. This research expects the researcher to design an interface that meets user needs so that the developed game can be implemented effectively to assist elementary school students in their learning process.

RESEARCH METHODS

The method used in designing this application's user interface and user experience is human-centered Design (HCD). HCD is a method that directly involves users in developing a system by applying ergonomic factors (Wijaya et al., 2019). The goal is to ensure that the created system aligns with the desires and needs of the users (Setiadi & Setiaji, 2020). Additionally, the HCD method aims to enhance efficiency, effectiveness, user comfort, user satisfaction, and user experience (Firantoko et al., 2019). This method, as shown in Figure 1, consists of three stages: inspiration, ideation, and implementation.

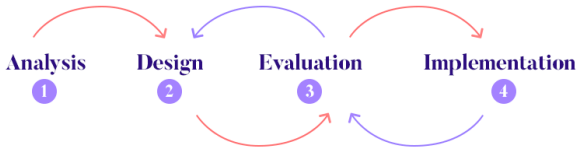

Figure 1. Human-centered Design

A. Inspiration

Inspiration is the first stage of the Human-Centered Design method. It involves gathering information about the users' goals, challenges, and needs. This stage is crucial because the information obtained from users will be applied to develop the best solutions (Setiadi & Setiaji, 2020). During this stage, observations are conducted to identify the problems users face. Researchers need to put themselves in the users' shoes to understand the various challenges they encounter and their expectations for the product to be developed. Subsequently, these problems are analyzed to find solutions that align with the users' needs. Various methods can be employed to gather the necessary information, such as distributing questionnaires,

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conducting interviews, direct observations, and more.

B. Ideation

After identifying the user problems in the Inspiration stage, the Ideation stage gathers user information through observations and interviews. Ideation is the second stage in the HCD method. Once user information is gathered through observations and interviews, it is processed into various innovative and beneficial alternative ideas (Rendiansah et al., 2017). These alternative ideas can then be developed into a good solution that aligns with the users' needs. In the ideation stage, ideas are collected, various alternative solutions are analyzed, and a suitable solution is selected to address the existing problems and meet the users' needs.

C. Evaluation

After the design process is complete, the design that has been made will be tested first. This aims to explore feedback from potential users, and the feedback will be used as reference material at the Implementation stage.

D. Implementation

Implementation is the final stage of the HCD method. After finding a good and relevant solution to address the problems identified in the ideation stage, the solution will be implemented in the implementation stage. In essence, implementation is the stage that transforms the solution into a product, such as a system, website, game, and so on (Prayogi et al., 2013). Typically, the implementation stage involves prototyping, application development, UI/UX design, and others.

RESULTS AND DISCUSSION

The followings are the results and discussions obtained after going through the stages of the method used in designing the Indonesian language writing learning game according to EYD and KBBI.

A. Inspiration

In the Inspiration stage, the first step is identifying issues by conducting direct observations and interviews involving potential users. The purpose of the observation is to observe and directly find research samples. After that, interviews are conducted to gather information about the needs and issues faced by potential users.

The observation and interviews were conducted on March 21, 2023, at Sardonoharjo 1 Elementary School with research samples of fourth-grade students. This study involved ten students from grade 4, consisting of 5 male students and five female students. The student data involved in the study are listed in Table 1. Figure 2 and Figure 3 shows photos of the observations and interviews in action.

Table 1. Student List

Respondents	Gender	Age
Respondent 1	Male	10
Respondent 2	Male	9
Respondent 3	Male	10
Respondent 4	Female	10
Respondent 5	Female	9
Respondent 6	Female	9
Respondent 7	Female	9
Respondent 8	Female	10
Respondent 9	Male	9
Respondent 10	Male	10

Figure 2. Interview Process

Figure 3. All of the students answered some question

The reason for selecting fourth-grade students as the research sample is that learning about EYD begins to be introduced and deepened in the fourth grade. This is based on the previous observations involving several homeroom teachers at Sardonoharjo 1 Elementary School. After conducting the observation and interviews, the results are presented in Table 2.

Table 2. Interview Result

No.	Question	Answer
1.	When playing games, what devices do you use?	All of the students prefer playing games using smartphones. This is because of the ease of smartphone access, which makes users comfortable using them daily, including playing games.
2.	When playing games, how do you hold a smartphone comfortably?	All of the students play games with a landscape layout.
3.	Have you ever heard about educational games?	6 of 10 students are already familiar with what educational games are.
4.	Is it necessary to add character animations in the game?	All of the students want character animations in the game. Using character animations in the game can enhance students' interest, making the game more engaging and preventing it from being plain and boring.
5.	How interested are you in educational games? Provide your reasons.	9 out of 10 students enjoy and are interested in playing challenging educational games that train their thinking speed.
6.	Can educational games help you in learning a subject?	All students feel that educational games can help improve their understanding of a subject.
7.	What genre of educational games do you like?	All the students enjoy playing educational games with the quiz genre compared to other genres.
8.	Do you prefer to receive stars or points when completing a game?	7 out of 10 students prefer receiving stars over points when completing a game. This is because students often feel uncomfortable when they see their scores directly.
9.	What colors do you want to be used in this game?	8 of 10 students like rainbow colors. They find that diverse colors look more vibrant and appealing to the eyes.

B. Ideation

In this stage, the process of gathering ideas and feedback from users in the previous stages is carried out. The collection of ideas and feedback will be compiled to form an overview of the interface design for the CerdasEYD game, which will later be implemented into a CerdasEYD game prototype. The interface design prototype for the CerdasEYD game is created using a design tool called Figma. Before designing the prototype, the designer needs to set the color used in the design into one color palette. The color palette is shown in Figure 4.

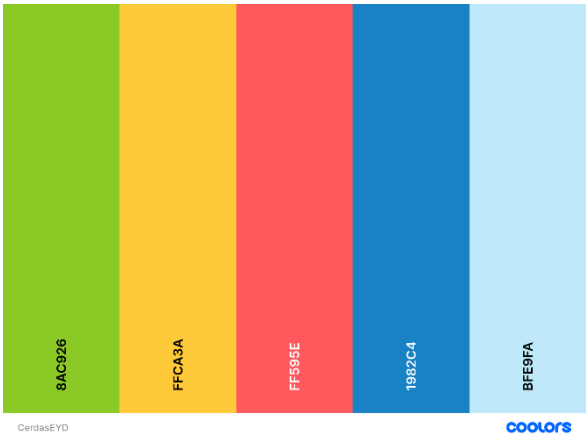

Figure 4. Color Pallete

Once the prototype is designed, it will gather interaction feedback, serving as a reference for creating solutions in the next phase. Figures 4–

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8 are the design results of the CerdasEYD game prototype:

1. Main Menu

Figure 5. Main Menu

Figure 5 shows the homepage, and there are five buttons that players can select to navigate to their desired pages. These buttons include "Main" (Play), "Nilai" (Scores), and "Tentang" (About). The "Main" button is used to start the game. The "Nilai" button allows players to view the score history from previous games. The "Tentang" button explains the CerdasEYD game. In the top right corner of the homepage, there are two buttons for settings and logout. The colors used in this game take inspiration from the Rainbow theme, which consists of vibrant primary colors such as red, yellow, green, blue, etc. The choice of school background on this page is aligned with the initial theme of the game, which is an educational game for elementary school-age children. The colors of each button are matched with the primary color of the logo that has been created, which is yellow with the color code #FFCA3A.

2. Play Page ("Main" Button)

Figure 6. Choose Level Page

Figure 6 represents the main page. Before starting the game, players can select the difficulty level based on their abilities, as shown in Figure 5. There are three difficulty options: Easy ("Mudah"), Medium ("Menengah"), and Hard ("Sulit"). The difference between the three difficulty levels lies in the game's duration. In the Easy level, the game lasts for 60 seconds. On the Medium level, it lasts 45 seconds; on the Hard level, it lasts 30 seconds. The background on this page is still the same as the one used on the main menu page. On this page, there is a change in the logo's position, which is placed in the top right corner. As for the colors of each button, the "Easy" button has a green color with the color code #8AC926, the "Medium" button has a yellow color with the color code #FFCA3A, and the "Difficult" button has a red color with the color code #FF595E.

Figure 7. Play Page

Figure 6 represents the gameplay page. Players can answer questions by selecting the options on the four buttons below the question box. The questions in the game will continue until the game time is up. The buttons' colors on this page are similar to the menu page, with four answer buttons in yellow with the color code #FFCA3A and the exit button in red with the color code #FF2B2B. The background used is an animated image of a classroom. This is aligned with the situation of students in the classroom when they are working on a task or taking an exam.

3. Game History Page ("Nilai" Button)

Figure 8. Game History Page

On the Score History page shown in Figure 7, players can view the History of their previous games. This page will also display the number of stars earned in each game that has been played. The History of each game will be accumulated on this page. The exit button on this page is the same color as the buttons used on the menu page, which is red with the color code #FF595E. Then, the buttons on each History are light blue with the code #BFE9FA.

4. About Page ("Tentang" Button)

Figure 9. About Page

On the About page, players can access information about CerdasEYD. This page provides details about the game creators, the date of creation, and other relevant information. On this page, there is only one button, the exit button. The color of the button is red with the color code #FF595E.

C. Evaluation

In this stage, testing activities are carried out to receive feedback from potential users regarding the initial design that has been made. Users can do some tasks regarding the flow of using the game prototype. After completing the trial phase, respondents will be asked several questions through interviews. The results of the interview are shown in Table 3.

Table 3. Evaluation Interview Results

No.	Question	Answer
1.	In your opinion, does the overall appearance of this prototype meet the needs of the students?	All students felt that the overall display was sufficient for their needs.
2.	Is the overall appearance of the prototype easy to understand?	All students understood the user flow.
3.	Do you find the placement of buttons on each action page distracting while playing?	All of the students were not bothered by the placement of buttons on each page.
4.	How do you feel after trying this prototype?	8 of 10 students found it easy to use this prototype.
5.	Is the use of character animation on the prototype sufficient?	9 of 10 students found the use of character animation insufficient. Students want the character to be added to some pages.
6.	Does the colour chosen for each button match the initial requirement?	7 of 10 students were satisfied with the colours used. However, there is a request to change the menu buttons to use more varied colours so as not to be monotonous.

D. Implementation and Final Testing

In this stage, the user interface based on the ideas and feedback provided by players in the previous step will be designed, as well as the design created during the ideation stage. The outcome of the research is a final prototype of the CerdasEYD game. So, the following are the final prototype results of the CerdasEYD game according to user needs:

1. Final Design of Main Menu

Figure 10. Final Design of Main Menu Page

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The changes that occur on the Main Menu page are related to the color of the "Main," "Nilai," and "Tentang" buttons. Before the changes were made, the color used for the three buttons on the main menu was yellow with the color code #FFCA3A. According to user needs, the color of the buttons on the main menu was changed. The "Main" button was changed to green, the "Nilai" button was changed to yellow, and the "Tentang" button was changed to red. So that the main menu page looks more colorful and can avoid a monotonous interface design (Figure 10).

2. Final Design of Exit from The Game

Figure 11. Final Design of Exit Page

Figure 11 represents the final design of the Exit page. This page will appear when players select the exit button. It also features a 2D character as a guide for players. This character will be used consistently throughout the CerdasEYD game.

3. Final Design of Play Page ("Main" Button)

Figure 12. Final Design of Choose Level Page

Figure 12 represents the final design of the Choose Level page. The changes made on this page include the addition of a 2D character as a guide for players, along with accompanying dialogue.

Figure 13. Final Design of Play Page

The changes made on the Play page include adding a 2D character as a guide for players in the bottom left corner of the Play page (Figure 13). The 2D character was added to avoid a monotonous interface design and was also requested by all the students interviewed.

Figure 14. Final Design of Back to Main Menu Page

Figure 14 represents the final Design of the Back to Main Menu page. A 2D character has been added to this page, along with accompanying conversation, to serve as the player's guide.

Figure 15. Final Design of Final Score Page

The Final Score page has been updated with a 2D character as a guide for players and supporting dialogue (Figure 15). Furthermore, a new final score page will display the number of stars earned and the number of questions successfully answered by the user. These results will be saved on the Game History page.

Final Testing

This stage is the testing stage of the final design that has been made. This test uses the system usability scale by giving several tasks to prospective users. Ten students who became respondents beforehand had to carry out the task until it was completed. The tasks given to students are shown in Table 4.

Table 4. Testing Task

No.	Task
1.	Start the game
2.	Open the History page.
3.	Open the About page
4.	Open Settings
5.	Exit the game

After the students have completed the tasks given in Table 4, they will be given a questionnaire to assess and evaluate the final design of this prototype. The system Usability Scale has five questions dan 5 answers (Damayanti et al., 2022). The questions on the questionnaire are shown in Table 5.

Table 5. System Usability Scale Questions

No.	Question
1.	I want to use this system frequently.
2.	I found the system unnecessarily complex.
3.	I thought the system was easy to use.
4.	I think that I would need the support of a technical person to be able to use this system.
5.	I found that the various functions in this system were well integrated.
6.	I thought there was too much inconsistency in this system.
7.	I imagine most people would learn to use this system very quickly.
8.	I found the system very cumbersome to use
9.	I felt very confident using the system.
10.	I needed to learn many things before I could get going with this system.

Then, based on the questions that have been made, an analysis will be carried out using the Likert formula, and the calculations will be adjusted to the Likert scale interval below:

1. 0% - 99% = Strongly disagree
2. 20%-39.99% = Disagree
3. 40%-59.99% = Neither agree nor disagree
4. 60%-79.99% = Agree
5. 80%-100% = Strongly agree

The results of the questionnaire are shown in Table 5.

Table 6. Questioner Results

Respondents	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
R1	5	1	5	1	5	2	5	1	5	2
R2	5	1	5	1	5	1	5	1	5	2
R3	5	1	4	1	5	2	5	1	5	2
R4	4	1	5	1	4	1	5	1	5	1
R5	5	1	5	1	5	1	5	1	4	1
R6	5	1	5	1	5	1	5	1	4	1
R7	5	2	4	1	5	2	5	2	5	2
R8	5	1	4	1	5	1	5	1	5	2
R9	5	1	5	1	5	1	5	1	5	1
R10	5	1	4	1	4	1	5	1	5	1

Based on the calculations from the table above, the overall average is 95. When viewed from the average level of the system usability scale from many studies is 68, it can be concluded that the interface design of the CerdasEYD game has a value above average (Miftah & Sari, 2020).

CONCLUSIONS AND SUGGESTIONS

Conclusion

This research aims to design the user interface and user experience of the CerdasEYD game using the Human Centered Design (HCD) method. The HCD method provides several advantages in developing the CerdasEYD game. With the calculations in the final test, researchers' HCD results have proven to provide comfort for users. This is adjusted to the student's feedback during this research to improve the interface design.

Suggestion

During this research, many shortcomings still make the resulting design imperfect. The author's suggestion for future research is that there is a need to add new features, such as additional material and discussion of questions, that can further assist students when learning outside of school. CerdasEYD is expected to help elementary school students to gain a better understanding and knowledge of Indonesian writing based on the current EYD and KBBI rules and guidelines. Therefore, this research is expected to be further developed into an educational game that students can implement daily.

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