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Empowering Early Education: Developing a Hijaiyah Game for Preschoolers

Ade Rizki Yulianto[1*], Ainayah Syifa Hendri[1], Aninditawidagda Pandam Sudaryanto[1], Muhammad Iqbal Hanif[2]

[1]Faculty of Communication and Informatics
Universitas Muhammadiyah Surakarta
Surakarta, Indonesia
[2]Faculty of Information Technology
Monash University
Melbourne, Australia
*l280220003@student.ums.ac.id

Abstract-In the early education phase, traditional teaching methods often fail to fully engage preschool learners, highlighting the need for innovative and interactive learning tools. This research presents an interactive Hijaiyah letter game designed to overcome this gap for preschool children. This game integrates educational content with fascinating gameplay to increase the effectiveness and learning outcomes of the Arabic alphabet, stimulate critical thinking, and increase children's concentration. Developed with a focus on preschoolers' developmental needs and unique learning characteristics, the game uses a user-centered design that makes learning fun and effective. The effectiveness and usability of the game are evaluated through Black Box testing for operational functionality and the System Usability Scale (SUS) for user satisfaction. Preliminary findings show that the game is intuitive and suitable for its target audience, showing significant potential as an educational tool in early childhood education. This research provides valuable contributions and insights into the design and effectiveness of learning aids for preschool children and positively impacts educational strategies to engage young learners.

Keywords: Preschool Children, Educational Games, Black Box, System Usability Scale

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1. Introduction

Early childhood education is crucial in creating the foundation for learning and holistic development in preschool-age children, where their development should be guided by quality interactions tailored to their growth and developmental stages [1]. This period is critical because children's brains develop rapidly, and they absorb information quickly [2]. Therefore, it is essential for early childhood education systems to utilize engaging and interactive approaches to maximize children's learning potential.

In the advancing digital era, technology and media play a significant role as potential tools to achieve these goals, particularly in facilitating the learning process [3]. The development of technology-based educational games focuses on helping students learn rather than just entertaining them. The aim of creating educational games is for students to achieve learning objectives, designed to enhance critical thinking skills and increase their concentration while playing [4]-[6].

This article delves into creating a hijaiyah game that's perfectly tailored for preschoolers, marrying educational goals with the allure of entertainment. Inspired by the proven effectiveness of educational strategies that blend learning with fun, this research harnesses the power of engaging gameplay to make learning about hijaiyah letters interactive and enjoyable for children [7], [8]. The game aims to ignite curiosity and foster a deep, meaningful learning experience without straying from its educational mission by leveraging play elements.

This article will outline the steps involved in developing the hijaiyah game for preschoolers, including design planning, technological implementation, and

psychological approaches, explicitly focusing on adapting these elements for a desktop platform [9].

This choice of platform is driven by its accessibility and the potential for interactive features that cater to the learning styles of preschool-age children[10]. Considering these factors, the game aims to achieve optimal learning outcomes, making the educational experience engaging and effective. Furthermore, we will discuss the potential benefits that children, teachers, and parents can gain from utilizing this game as a learning support tool, highlighting how it can serve as a valuable resource in early childhood education settings. Through the continuous advancement and enrichment of early childhood education with innovative technologies, this article seeks to provide meaningful insights for educators, game developers, and stakeholders interested in enhancing the educational journey of preschoolers with educational and enjoyable hijaiyah games on desktop platforms.

2. Methods

The author used the System Development Life Cycle (SDLC) method with the Waterfall model. The Waterfall model is the oldest and most popular SDLC model, widely used in large companies and government projects. Its characteristic sequential steps make it unique [11]. This educational game for learning hijaiyah letters was developed using the Waterfall model due to its advantages, such as simplicity and clear, structured definition of each stage, along with complete documentation that eases the maintenance process [12]. Therefore, based on these advantages of the Waterfall model, it was deemed suitable for implementing in the development of this educational game for learning hijaiyah letters [13]. The waterfall method in this research is presented in Figure 1.

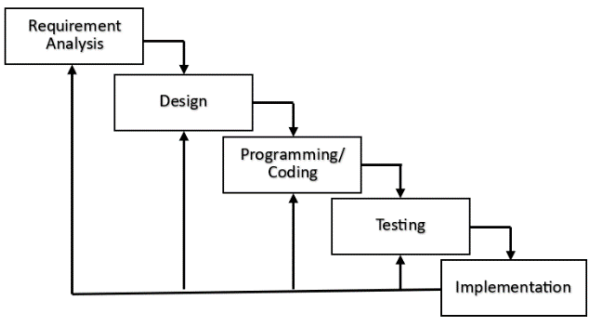


Figure 1. Model Waterfall SDLC

Here are the stages in the creation of this educational game for learning the Arabic alphabet:

a. Requirement Analysis

The tools and materials used in the making of this educational game for learning the Arabic alphabet are explained in Table 1.

Table 1. Tools and materials

Hardware	Software
Computer / Laptop	CorelDRAW
Flashdisk	Adobe Photoshop
	Construct 2
	Windows Operation System
	Google Chrome

b. Design

A use case diagram illustrates the interaction between external systems and users [14]. This diagram models the behavior of the system to be developed. The use case diagram for the educational game of learning the Arabic alphabet (huruf hijaiyah) can be seen in Figure 2.

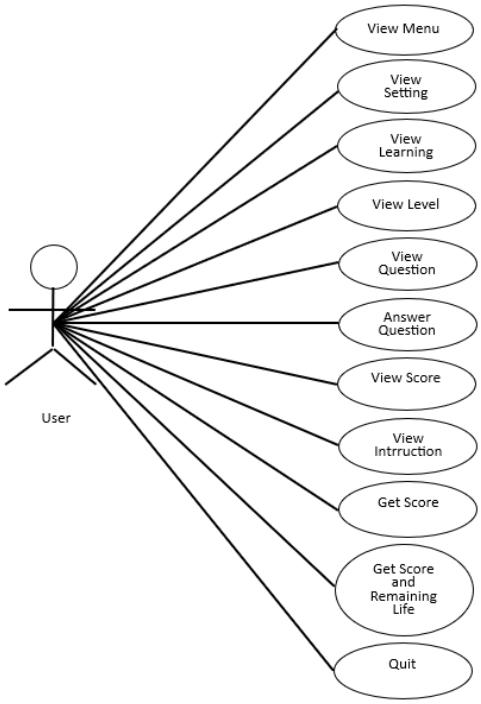


Figure 2. Use Case Diagram

c. Activity Diagram

Workflow or activities involved in a process or system are depicted in an activity diagram [15], [16]. The activity diagram for the educational game of learning the Arabic alphabet (huruf hijaiyah) can be seen in Figure 3.

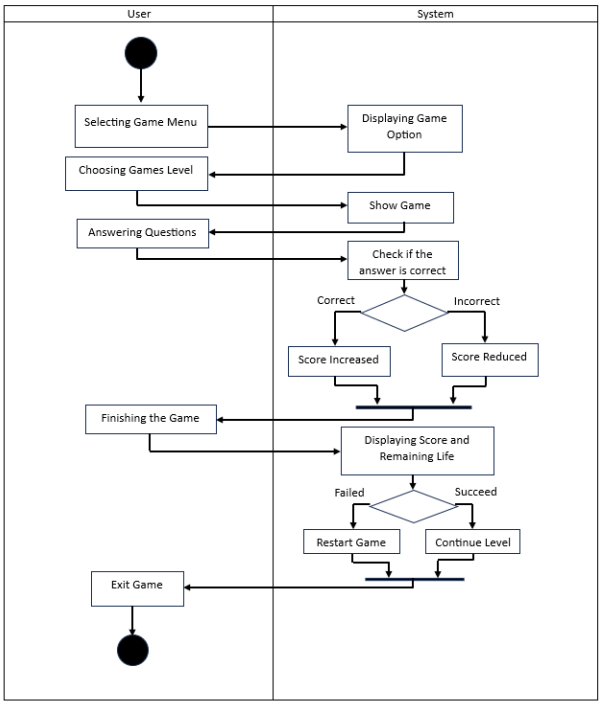
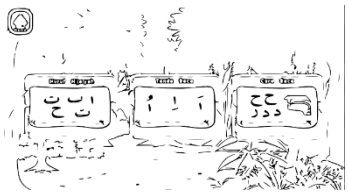
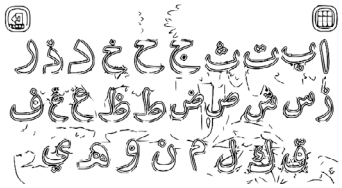
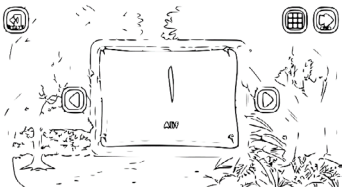
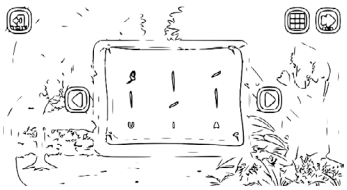
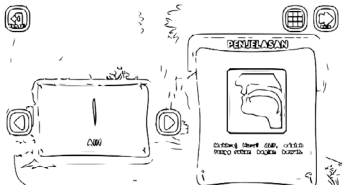
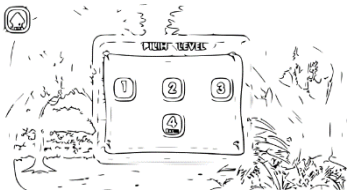
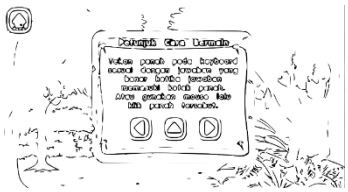


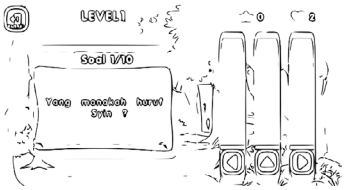
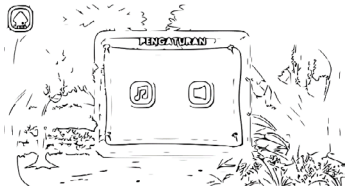
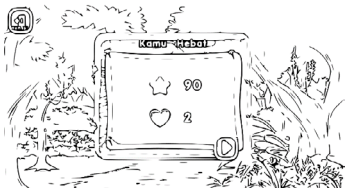
Figure 3. Activity Diagram

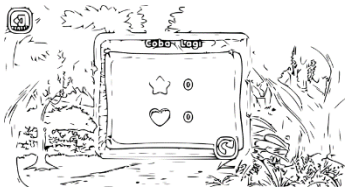
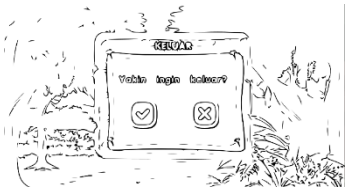
d. Storyboard

Storyboard is a representation of scenarios or activities performed by a system [17]. Table 2 shows the storyboard of the educational game for learning the Arabic alphabet.

Table 2. Game Storyboard

No.	Picture	Information
1.		The display of the game's main menu page when starting the educational game which consists of 5 buttons, namely buttons with settings, learning, game, instruction, and exit icons.
2.		The learning menu page displays if the player presses the learning button. The learning menu consists of 3 lessons, namely *hijaiyah* letters, punctuation marks, and how to read good and correct *hijaiyah* letters.
3.		Displays a different mode from the hijaiyah material page, where all letters are displayed directly on 1 page.
4.		The display of the *hijaiyah* letter learning page that can be directed to the right and left to replace the previous or next letter.
5.		The display of the punctuation learning page that can be directed to the right and left to replace the previous or next letter.
6.		The display of the learning page on how to read *hijaiyah* letters along with an explanation of where the letters come out. Letters can be changed by hovering right and left to change to the previous or next letter. There is sound related to the letter being studied.
7.		The page display selects the game level, which consists of 5 buttons to go to level 1, level 2, level 3, and level 4 (bonus level).
8.		Display of the instructions pages on how to play the game, which contains an explanation of how to play the game and the buttons used to answer questions.

No.	Picture	Information
9.		Each level page in the game will display questions and answers randomly. Questions can be answered by clicking on the keyboard arrow when the answer enters the arrow box. There is also the duration of the child playing the game, diamond as the score, and life for the user's life remaining in the game.
10.		The settings page display consists of 3 buttons, namely the button with the music icon to turn music on or off, the button with the sound icon to turn the sound on or off, and the "back" button to return to the main menu.
11.		The display of the page after the player has completed the mission at each level consists of the number of diamonds or scores that the player gets and the duration of the problem. There is also a button with a "continue" icon to go to the next level.

No.	Picture	Information
12.		The page displays if the player fails to complete the mission at each level, consisting of the number of diamonds or the score the player gets and the duration of the problem. There is also a button with a "back" icon to retry the game at that level.
13.		The page displays when the player presses the "exit" button on the main menu page. There are questions and yes and no buttons. If the player presses the yes button, the player will exit the game, but if the player presses the no button, the player will return to the main menu page.

e. Programming/Coding

Several codes are created to organize assets and scenes. In this stage, design ideas are transformed into program algorithms. In the process of creating this game, the Construct 2 application is used to convert the design into a sequence of code blocks to implement the programmed logic.

f. Testing

After the game is completed, the next stage is called testing. The purpose of this testing is to ensure that the application can be used effectively and that users will not encounter difficulties while playing the game. The testing methods used in this research are black box testing and the SUS (System Usability Scale) method. Black box testing is conducted to evaluate whether the created game operates as expected [18], [19]. Meanwhile, SUS is used

for subjective testing of software product with a Likert scale method[20].

g. Implementation

Implementation is the final step of the SDLC, where this step is carried out to ensure that the results are good and in accordance with the initial goals. This stage implements the entire system after the testing phase before it is handed over to the users [20]. Additionally, the application's usage is observed while participants play it.

3. Results

This study shows that the Arabic alphabet learning media can be implemented for kindergarten students at An Nur Jatikuwung Islamic Education Foundation. This educational game was created using Construct 2 and can be used on laptops or computers. Some main displays of the research and development of the Arabic alphabet game are as follows:

a. Main Menu

When the application starts, the main menu will appear. The main menu has five other sub-menus: settings menu, learning menu, game menu, information menu, and exit menu. The main menu of the Arabic alphabet game is shown in Figure 4.

Figure 4. Main Menu

b. Learning Menu

There are three materials in the learning menu display: 'Huruf Hijaiyah' material, 'Tanda Baca' material, and 'Cara Baca' material. Users can select the material they want to study by clicking on the desired material. To return to the main menu, click the 'Home' button. Figure 5 shows the learning menu of the Arabic alphabet game.

Figure 5. Learning Menu

In the 'Huruf Hijaiyah' material, the user will see the Arabic alphabet without punctuation marks. In the 'Tanda Baca' material, the user will see the Arabic alphabet with its punctuation marks. Meanwhile, in the 'Cara Baca' material, the user will see the Arabic alphabet along with how to pronounce it and an image showing where the letter should be pronounced. The user can press the right arrow to display the next Arabic alphabet, and the left arrow to display the previous one. Figure 6 shows the display of one of the materials in the learning menu.

Figure 6. Learning Menu Material

c. Game Menu

In the game menu, there are 4 levels with different levels of difficulty. The first one is the hijaiyah letters without punctuation marks, the second is the hijaiyah letters with punctuation marks, the third is the connected hijaiyah letters, and the fourth, as a bonus game, is the hijaiyah letters memory game. To choose a level, click on the desired level. Figure 7 shows the game menu display.

Figure 7. Game Menu

Each level displays gameplay where the player must press the left, right, or up arrow button to answer the provided questions. If the player answers correctly, the score increases by 20, but if they answer incorrectly, one life is deducted. Figure 8 shows the game page while being played.

Figure 8. Game Page When Played

After completing the current level, in the game page, if the player succeeds in winning the game or answering the game well, the words "You Are Great" will appear along with the score and remaining lives. To proceed to the next level, click the right arrow button, and click the "back" button to return to the main menu. Figure 9 displays the page when the player succeeds.

Figure 9. Win Game Page

If the user fails to complete the current level being played, the game over page will appear with the words "Try Again". Click the button with the "repeat" icon to go back to the previous level and the "back" button to return to the main menu. Figure 10 shows the page when the player loses.

Figure 10. Game Over Game Page

4. Discussion

a. Black Box Testing

Functional requirements of an application can be tested using black box testing[18]. The testing was conducted on a laptop device with the Windows operating system. The Educational Game application for learning hijaiyah letters was tested by inspecting each menu. The test results showed that the application can run well on the target device. The results of black box testing can be seen in Table 3.

Table 3. Black Box Testing Result

No	Item	Input	Output	Hasil
1	Main Menu	Click the settings button	Enter the settings menu	Succeed
		Click the learning button	Enter the learning menu	Succeed
		Click the game button	Enter the game menu	Succeed
		Click the instruction button	Enter the instruction menu	Succeed
		Click the exit button	Enter the exit menu	Succeed
2	Settings Menu	Click the turn on Music	Music On	Succeed
		Click the turn off Music	Music Off	Succeed
		Click the turn on Audio	Audio On	Succeed
		Click the turn off Audio	Audio Off	Succeed
		Click the 'Back' button	Back to the main menu	Succeed

No	Item	Input	Output	Hasil
3	Learning Menu	Click the hijaiyah letter learning menu	Display hijaiyah letter learning	Succeed
		Click the punctuation learning menu	Display hijaiyah letter learning Successfully with punctuation	Succeed
		Click the reading method learning menu	Display hijaiyah letter learning along with how to read it	Succeed
		Click the 'Back' button	Back to the main menu	Succeed
4	Game Menu	Click the level you want to play	Display game instructions or how to play	Succeed
		Click the 'Back' button	Back to the main menu	Succeed
5	Exit Menu	Click the 'Yes' button	Exit the game	Succeed
		Click the 'No' button	Back to the main menu	Succeed
6	Instructions Menu	Click 'Enter'	Enter the game	Succeed
		Click the 'Back' button	Back to the level selection page	Succeed
7	Play Game	Answer the question correctly	Appear the statement 'Perfect' then the score increases by 10 points	Succeed
		Answer questions incorrectly	The statement 'False' appears, then the life score decreases by 1	Succeed
8	Game Over Menu	Click Enter	Play the same level again	Succeed
		Click the 'Back' button	Return to the level selection page	Succeed
9	Success Game Menu	Click Enter	Proceed to the next level	Succeed
		Click the 'Back' button	Return to the level selection page	Succeed
10	Hijaiyah Letter Learning Menu	Click the Right Arrow	Display the next hijaiyah letter	Succeed
		Click the Left Arrow	Display the previous hijaiyah letter	Succeed
		Click the Up Arrow	Automatically display the next hijaiyah letter until the last letter	Succeed
		Click the 'Back' button	Return to the learning menu	Succeed
11	Hijaiyah Letter Learning with Punctuation Menu	Click the Right Arrow	Display the next hijaiyah letter with a diacritic mark	Succeed
		Click the Left Arrow	Display the previous hijaiyah letter with a diacritic mark	Succeed
		Click the Up Arrow	Automatically display the next hijaiyah letter with a diacritic mark until the last letter	Succeed
		"Click the "Back" button	Return to the learning menu	Succeed
12	Hijaiyah Letter Learning Along with How to Read Menu	Click the Right Arrow	Display the next hijaiyah letter along with how to read it	Succeed
		Click the Left Arrow	Display the previous hijaiyah letter along with how to read it	Succeed
		Click the Up Arrow	Automatically display the next hijaiyah letter along with how to read it until the last letter	Succeed
		Click the "Back" button"	Return to the learning menu	Succeed

b. System Usability Scale (SUS)

Game edukasi tentang huruf hijaiyah was demonstrated and tested on students from TK Yayasan Pendidikan Islam An Nuur Jatikuwung for research purposes on May 16, 2023. The assessment method used

was through a questionnaire calculated using the SUS formula. The questionnaire consists of ten questions, each with five answer options. The system was shown and tested on 15 TK students accompanied by 2 supervising teachers. The supervising teachers were involved to maximize the children's ability in using and testing this educational game. Table 4 shows the results of the SUS calculation.

Table 4. SUS Test Result

No Respondent	Questions										Total	SUS Score Total*2.5
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
1	4	3	4	2	4	0	4	4	2	3	30	75
2	3	1	2	1	3	1	2	2	3	3	21	52.5
3	3	1	2	3	3	1	2	2	2	1	20	50
4	3	3	2	1	3	1	3	1	1	0	18	45
5	4	3	3	4	4	4	4	3	2	4	35	87.5
6	2	4	4	4	4	4	4	3	3	2	34	85
7	4	4	4	4	4	4	4	3	3	4	38	95
8	1	1	1	1	3	3	2	2	2	1	17	42,5
9	4	3	3	4	2	2	4	4	3	1	30	75
10	4	4	4	4	4	4	4	3	3	4	38	95
11	4	3	3	1	3	3	2	3	3	3	28	70
12	3	3	3	2	3	3	3	3	3	1	27	67.5
13	4	3	4	3	3	1	2	3	3	3	29	72.5
14	3	3	3	3	3	3	2	3	3	1	27	67.5
15	4	4	4	1	3	3	3	3	3	1	29	72.5
Total												1052.5

The results of the usability test using the SUS shown in Table 4 produced a total SUS score of 1052.5. Next, the average value for the total SUS score is calculated, as shown in equation 1.

Average Value:

$$\sum_{t}^{n} = 1\frac{xi}{N} \quad (1)$$

Where:
xi: Total SUS score
N: Number of respondents
Therefore, average value = 1052.5/15 = 70.164

Figure 10 displays the SUS testing benchmark rating scores used to determine whether the program runs well or not.

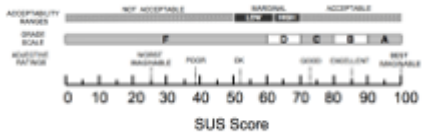


Figure 11. SUS score ranking

The result shows that the score of 70.164 meets the Good criteria, which means that the educational game for learning hijaiyah letters runs well and can help students in better understanding hijaiyah letters.

5. Conclusion

Based on the research and development conducted, this study highlights the significant role of entertainment in educational game design for Hijaiyah letter learning among preschoolers. The combination of engaging gameplay with educational objectives enriches the learning experience, as evidenced by smooth operational performance in Black Box testing and a favorable SUS score of 70.164, categorizing the game as "Good." These findings underscore the importance of integrating entertainment elements to enhance educational engagement and effectiveness, suggesting that such entertaining, educational tools have the potential to transform traditional learning methods into more enjoyable and impactful experiences for young learners. Future research should explore the long-term effects of these tools on educational outcomes and consider their application across various subjects to enhance the educational landscape for preschoolers further.

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