

Hijaiyah Matching Games Using Html5

Jauharoh Pratami
Informatics Department
Islamic State University (UIN) of Sunan Kalijaga
Yogyakarta, Indonesia

Ahmad Subhan Yazid
Informatics Department
Islamic State University (UIN) of Sunan Kalijaga
Yogyakarta, Indonesia
yazid.anfalah@gmail.com

Agung Fatwanto
Informatics Department
Islamic State University (UIN) of Sunan Kalijaga
Yogyakarta, Indonesia
agung.fatwanto@uin-suka.ac.id

Abstract—Hijaiyah letters are letters used in the writing of the Holy Qur'an. In learning hijaiyah letters, many children still have difficulties so alternative learning methods are needed to make children more interested in recognizing hijaiyah letters. Interactive hijaiyah learning using electronic media is also still rare. Of the several hijaiyah letter recognition applications which are available, it is also limited in the use of certain operating systems. This research uses the waterfall method. The technology used to build web-based games in this study is HTML5 because HTML5 has the advantage of the flexibility to run on various platforms through a browser. In addition, this application does not require an installation process like other applications, but simply by accessing the web page, the application can be used. The results of this study are Hijaiyah Match games that can be run on various operating systems through a browser. The test results show that this application can help children learn hijaiyah letters.

Keywords-Game; Hijaiyah; HTML5; Letters.

I. INTRODUCTION

Hijaiyah letters are letters used in the writing of the Holy Qur'an. In learning hijaiyah letters, children still find some difficulties to learn, so it needs an alternative method to make children more interested in recognizing hijaiyah letters. Interactive learning using electronic media today such as educational games [1] are still rarely found, especially hijaiyah letter recognition games.

The development of technology in Indonesia has accelerated very quickly in recent years, this has been proven to have many facilities and infrastructure available and also the increasingly cheap prices of electronic devices, including laptops and personal computers (PCs). Development of the operating system to date include Windows, Linux, and Macintosh.

The development of the operating system must also be supported by application compatibility in each operating system. The existence of various operating systems creates limitations on the application itself, each application can only run on certain operating systems that support it. As a result, some of the available applications are limited by current operating system.

To overcome the limitations of the application of the computer operating system, an alternative step is needed. The solution offered through this study is the development of web-based hijaiyah letter recognition application using HTML5 language. HTML5 is a technology that makes it possible to build web-based applications that can be opened on any device through a browser [2]. The advantages of web-based applications with HTML5 are that it can run on a variety of operating systems and fewer development costs because there is no need to buy certain software. In addition, the use of this application does not require an installation process [3], simply by accessing it on a web page, the application can already be run. One codebase for making cross-platform games is HTML5.

The game that will be developed in this study is called the Hijaiyah Match Game, which is a matching game for hijaiyah letters and reading in Latin letters. This game is drag and drop and web-based. This game application presents hijaiyah letters in Arabic script as objects that must be dragged and dropzone in the form of Latin letters which is a reading of the hijaiyah letters. With this hijaiyah game, it is expected to make it easier for children to play this educational introduction to hijaiyah letters on various operating systems.

II. METHOD

The data in this study were collected through a literature study or literature. This method is a technique of collecting data and information through reading and studying references in the form of papers, theses, or books. Internet facilities are also used as a medium for searching data or information published in cyberspace relating to research objects, concepts, and theories that are used as the basis for writing this study report.

The collected data is then analyzed using the waterfall software paradigm, Figure 1 is a stage image of the Waterfall

system development method according to Sommerville model [4]:

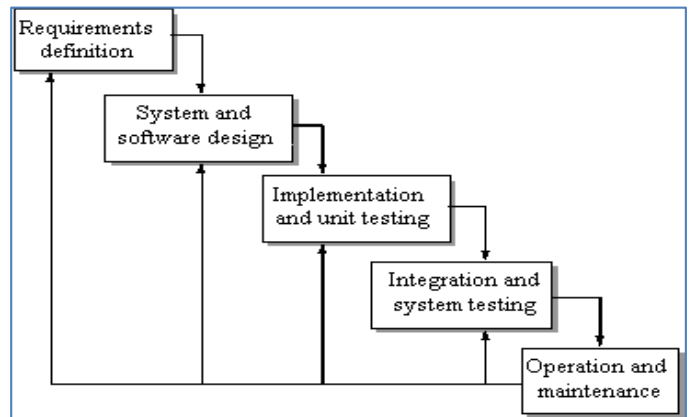


Figure 1. Waterfall System Development Methodology

Figure 1 shows the steps taken in the waterfall paradigm with the following explanation:

A. Requirements Definition

Collecting what is needed to build a complete application and then analyzed in order to define the needs that must be met by the program to be built.

B. System and Software Design

After what is needed is collected then the design is made for the game application to be made.

C. Implementation and unit testing

At this stage, the design of the program is translated into codes using a predetermined programming language. The program built is tested directly by the unit, whether it is working well.

D. Integration and System Testing

Testing is done to find out how far the system is running, the application must be in accordance with the educational game criteria and software user requirements. Furthermore, the application is tested on several respondents to assess whether the system is running well and according to plan.

E. Operation and Maintenance

Operate the program and carry out maintenance and repairs as needed.

III. SYSTEM DESIGN ANALYSIS

Analysis and design need to be done systematically so that the application is made according to the purpose and purpose. The first stage of analysis is to do system analysis, starting from problem analysis, functional analysis, and non-functional analysis. As for the design phase, it starts with designing the system and designing the interface that will be used to apply to the application.



A. System Analysis

The analysis is carried out to obtain the exact definition of the problem and the description of what will be done by the application, which aims to determine the ins and outs of the application to be examined. The results of the analysis of several similar games (Arabic alphabet, Arabic match, and the introduction of hijaiyah letters) indicate that the application to be made needs to meet several criteria: The game must have a game hint menu; The game needs to have several levels; The game must be able to run not only on 1 platform. The devices needed by the user to run the Hijaiyah Match Game application are as follows: browser, internet connection, mouse, and speaker.

The development of this application also requires assets in the form of images and sounds to make the game more interesting and interactive. The list of needs is mentioned in Table I.

TABLE I. PICTURE AND SOUND NEEDS

File Type	The needed file	Use	File Extension
image	Background	Image as the background of the game	.png
	Hijaiyah letters	Hijaiyah font size (30x30) px that functions as an object being dragged (drawn) to the dropzone area	.png
	Hijaiyah letters Dropzone	Where the hijaiyah letters are dragged	.png
voice	Pronounce of Hijaiyah	The sound of the hijaiyah pronunciation	.mp3 .ogg
	Backsound	The sound that becomes the background sound of the game.	.mp3 .ogg
	Level Up	Sound when playing on one level can be completed.	.mp3 .ogg
	False-Sound	Sound when hijaiyah letters are placed (dropped) in the wrong place (dropzone area).	.mp3 .ogg
	dragStartSound	Sounds when hijaiyah letters are dragged	.mp3 .ogg
	LoseSound	Sound when game over.	.mp3 .ogg

B. Functional Requirements Analysis

Functional requirements analysis describes the process of activities that will be applied in a system and explains the needs of the system so that the system can run well and in accordance with needs. The analysis conducted is modeled using UML (Unified Modeling Language) with Use case Diagrams [5].

Use case Diagram is a construction to describe the relationships that occur between actors with activities contained in the system. The purpose of modeling use cases is to define the functional and operational needs of the system by defining the scenarios for the system to be built. From the results of existing application analysis, the use case diagram for the Hijaiyah Match game application can be seen in Figure 2.

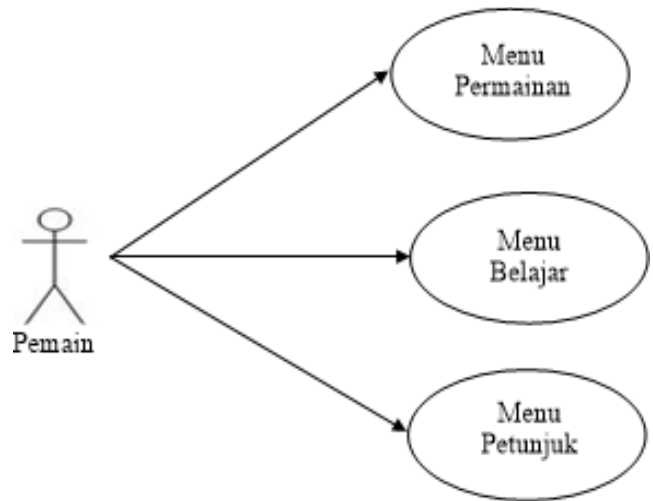


Figure 2. Use Case Game Hijaiyah Match

The definition of use case is as follows: The player is the actor who runs the application. Game menu: displays the game page from the application. The learning menu displays pages that contain explanations including hijaiyah letters and pronunciations of hijaiyah letters written in Latin letters. Hint menu: displays a page that explains the game's game rules.

C. Game Design

This game is designed to have 5 game levels formed by the number of letters used in each level. The following level design in the game Hijaiyah Match as in Table II.

TABLE II. DESIGN LEVELS IN GAMES

Game Level	Number of Hijaiyah letters	Letters used
Level 1	6 letter	ب ت ث ج ح
Level 2	10 letter	ح خ ذ ذ ر ز س ش ص ض
Level 3	15 letter	ض ط ظ ع غ ف ق ك ل م ن و ه ي
Level 4	20 letter	ب ت ث ج ح خ ذ ر ز س ش ص ض ط ظ ع غ ف
Level 5	29 letter	ط ظ ع غ ف ق ك ل م ن و ه ا ب ت ث ج ح خ ذ ر ز س ش ص ض ي

In this game, players are asked to match hijaiyah letters with hijaiyah letters written in Latin letters by dragging the hijaiyah letters and placing them (drop) on hijaiyah letters written in Latin (dropzone area). If the hijaiyah letter being dragged matches the hijaiyah letter written in Latin, it will make a sound from the hijaiyah letter. Conversely, if the hijaiyah letters drawn are placed in the area of the dropzone that is not correct it will make a sound that indicates that it is wrong.

Each level also has a challenge that is if the player makes a mistake when placing letters exceeds the provisions then the game will end (game over) and if you want to play it again must repeat from the initial level. In addition to game design, interface design also needs to be done to facilitate users in the process of interacting with the system. The interface design for the system to be made is as follows: Interface Design Start Page Game (Figure 3) has 3 menus, namely the game menu, the learning



menu, and the instructions menu. Each becomes navigation for the user to go to games, learning, and instruction.

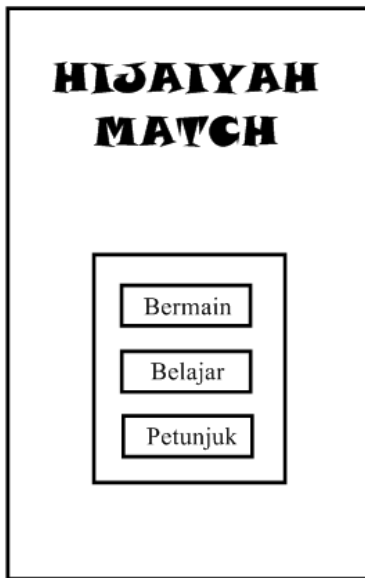


Figure 3. Game Start Page Design

In the game menu, fields are displayed in stages according to their level. The object of the challenge increases with levels. In addition, there is also a score column to display the acquisition value. Figure 4 shows a level 1, 3, and 5 game interface design.

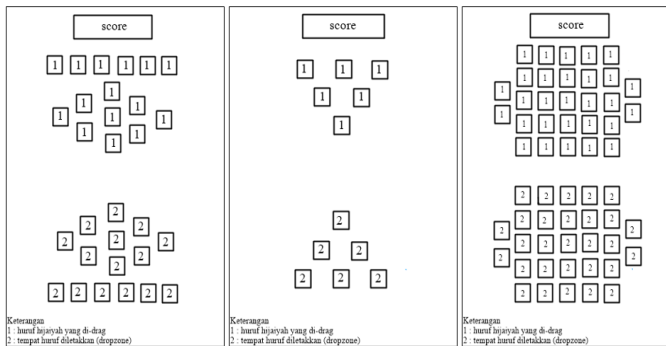


Figure 4. Interface Design of Level 1, 3, and 5

IV. IMPLEMENTATION AND TESTING

The development of this application is implemented using the HTML5 programming language in the Windows operating system environment with the help of the Notepad ++ text editor and the buzz.js and kinetic-v4.5.4.min.js libraries. code writing implementation is differentiated for several functions, namely: back sound script, draggable script, drop position check script, score script, and drag-drop disable script.

Interface implementation is done for every page design of the application that is built. Figure 5 shows the results of implementing the game home page interface.



Figure 5. Game Start Page

There are three menus displayed on this page, namely:

- 1) Game menu, if the player presses the play button then the game page will display at level 1.
- 2) The learning menu for hijaiyah letter recognition, if the player presses the learning button, a hijaiyah letter recognition page will be displayed.
- 3) How to play menu, if the player presses the hint button then the game instructions page will be displayed.

Figure 6 is a game display on level 1. On this page, the player is asked to match the hijaiyah letters with the pronunciation written in Latin letters consisting of 6 letters.



Figure 6. Game level 1



The level of difficulty will increase as the level of the game increases. In order to move up to the next level, players must be able to match hijaiyah letters according to their writing in Latin letters with drag-drop. The number of objects is 10 at the second level, 15 at the third level, 20 at the fourth level, and 29 at the fifth level (Figure 7).



Figure 7. Interface Implementation at Levels 3 and 5

Next, Figure 8 shows the implementation of the instructions page which gives an explanation of the rules of the game. Figure 9 is the display that appears when the learning menu on the main page is clicked. The learning menu provides training for players regarding the answers of each hijaiyah letter pair and its writing in Latin letters.



Figure 8. Game Instructions Page

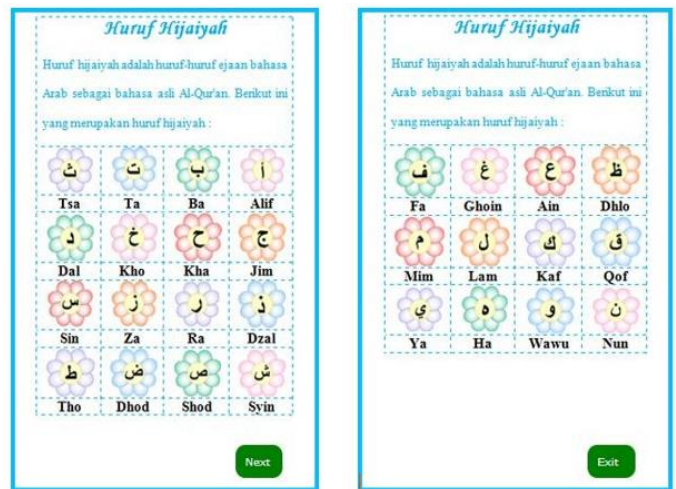


Figure 9. Display the learning page

Testing

System testing is done aiming to find errors or deficiencies in the software being tested. Testing intends to find out the software that is made already meets the criteria in accordance with the design objectives of the software. The testing phase of the Hijaiyah Match Game begins with testing the capabilities of the application starting from the main appearance of the game that appears, testing the work of the game against the main menu buttons including play menu, instruction menu, and learning menu as well as other buttons found in the game.

Tests carried out in this application include alpha testing and beta testing. Alpha testing used the white box and black-box methods. Alpha and beta testing are done by involving 25 respondents aged 6-12 years old to play the Hijaiyah Match Game. Next up is beta testing. This test is used to determine user responses to game applications by conducting questionnaires. Respondents were asked to provide answers to questions in the usability testing questionnaire. While testing the functionality involved 15 respondents consisting of children and several groups.

B. Alpha Testing

Alpha testing is carried out in a software development environment to ensure that programs are run properly.

1) White Box Testing

The white box method is a test case design method that uses a procedural design control structure to obtain a test case. By using the white box testing method, the system engineer can perform a system that: 1 Provides a guarantee that all independent channels on a module have been used at least once. 2 Uses all logical decisions on the true and false sides. 3 Executes all loops at the engineer's limits and at the engineer's operational limits. 4 Uses internal data structures to guarantee their validation. Alpha test results are shown in Table III.



TABLE III. ALPHA TESTING RESULTS

Input	Expected results	Results
Select the play button	Display page level 1	Was successful
Complete level 1	Display page level 2	Was successful
Complete level 2	Display page level 3	Was successful
Complete level 3	Display page level 4	Was successful
Complete level 4	Display page level 5	Was successful
Complete level 5	Display text "You Win"	Was successful
Select the hint button	Display the instructions page for how to play	Was successful
Click the back button on the instructions page	Exit the instructions page and return to homepage	Was successful
Select the learn button	Displays the learning page in the form of an introduction to hijaiyah letters	Was successful
Click the next button on the first page of learning	Displays the second page of learning	Was successful
Click the exit button on the second page of learning	Exit the study page and return to the homepage	Was successful

Based on the results of alpha testing as in Table III and tests performed on devices written in the same table, overall the system built can be said to be successful or accepted, because functionally the system can work and produce the expected outputs. Tests carried out on several operating systems with Mozilla and Chrome browsers.

2) Black Box Testing

The method carried out by entering the results issued by the system is the same as the data that is loaded into the system or the results issued by the system in accordance with the results of calculations that are in the system. Black box testing is designed to uncover errors in functional requirements without ignoring the internal workings of a program.

Beta testing is done to get conclusions from applications that have been made by giving questionnaires to users. Tests involving 25 respondents were conducted to see whether the game is suitable for children and can help the process of recognizing hijaiyah letters. Table IV. Table V is the result of the questionnaire.

TABLE IV. USABILITY TEST RESULTS

No.	Statements	Assessment				
		VA	A	N	D	VD
1.	I understand how to play the game hijaiyah this match.	15	8	2	0	0
2.	After playing this game, I understand Hijaiyah better.	13	9	3	0	0
3.	<i>This game helps my enthusiasm for learning in studying hijaiyah letters.</i>	12	1 2	1	0	0
4.	<i>This hijaiyah match game is a game which is interesting to me.</i>	13	2	10	0	0
5.	I want to play this game again.	11	1 0	4	0	0
6.	I agree that the instructions in the game are easy to understand.	9	1 5	1	0	0
Total		73	5 6	21	0	0

TABLE V. FUNCTIONALITY TEST RESULTS

No.	Statements	Assessment	
		Yes	No
1.	<i>Games can display game instructions on the instructions menu.</i>	15	0
2.	<i>The game can display an introduction to hijaiyah letters in the learning menu.</i>	15	0
3.	Players can drag and drop hijaiyah letters.	15	0
4.	<i>The game can display the score and sound of letters when hijaiyah letters are placed in the correct position.</i>	15	0
5.	<i>The game can provide notification in the form of text and sound when the player successfully completes the game on each level.</i>	15	0
6.	<i>The game can provide notifications in the form of text and sound when the player successfully completes the entire game.</i>	15	0
7.	<i>The game can provide notification in the form of text and sound when the game ends (Game Over).</i>	15	0
Total		105	0

Percentage of system usability test results:

Answering Strongly Agree: $(73/150) * 100\% = 48\%$

Answering Agree: $(56/150) * 100\% = 37\%$

Respond Neutral: $(21/150) * 100\% = 14\%$

Answering Disagree: $(0/150) * 100\% = 0\%$



Answering Agree: $(0/150) * 100\% = 0\%$ Percentage of system functional test results:

Answering Yes: $(105/105) * 100\% = 100\%$

Answering No: $(0/105) * 100\% = 0\%$

Based on the results of functionality testing involving 15 respondents, it can be seen that the majority of users expressed good judgment on the games that have been made. From the results of the questionnaire, the results of functionality testing show that 100% of respondents stated that the application was running well and 0% of respondents stated that the functional system was not working well.

Based on testing in terms of usability games for children aged 6-12 years, the test results show that most respondents were interested in the application made. Based on the results of these tests, it can be concluded that the application that has been made is feasible to use. However, further, development is needed to get the optimal application.

V. CONCLUSION

Based on the results of research and discussion that has been done, it can be concluded that the Hijaiyah Match game can be run on various operating systems through a browser that supports HTML5 and based on the results of the questionnaire shows that this application helps children better understand hijaiyah letters.

REFERENCES

- [1] A. Mahtarami and A. W.D, "Pengembangan KOnen e-Learning Berbasis Game KOnputer untuk Materi Ekspresi Reguler," SNATI, 2010.
- [2] B. Fling, *Mobile Design and Development: Practical Techniques for Creating Mobile Sites and Web App*. California: O'Reilly & Associates, INc, 2009.
- [3] P. Lubbers, B. Albers, and F. Salim, *Pro HTML5 Programming*. New York, 2011.
- [4] I. Sommerville, *Software Engineering (Rekayasa Perangkat Lunak)*. Jakarta: Erlangga, 2011.
- [5] S. Dharwiyanti, *Pengantar Unified Modelling Language (UML)*. Ilmu Komputer, 2003.

