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Development of Mandarin Education Quiz Game Using Android-Based Multimedia Development Life Cycle

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Abstract

Mandarin is a language that is widely spoken and studied by people all over the world. Parents who start enrolling their children in Mandarin language courses from an early age with the hope that their children will become accustomed and proficient in using Mandarin. However, for elementary school children, the difficulty of constructing sentences in Mandarin is a major obstacle for children in the process of learning Mandarin. The purpose of this research is to create a unity-based mandarin quiz educational game application that is useful as an alternative media in the learning process to make it easier to learn. which is useful for a. Help make it easier for tutors in learning activities teaching by utilizing media technology in the form of Android-based educational games. Help students learn Chinese HSK material with a happy feeling and don't feel bored, because the content in the educational game "Mandarin Quiz" is displayed in an attractive way with audio, animation, and games on an Android smartphone. Helping children's enthusiasm for learning to know Mandarin.
System development for users will be developed using the Multimedia Development Life Cycle (MDLC) methodology. Each step or stage of this method is suitable for system development in multimedia applications and these stages can swap positions according to research needs. It is hoped that the results of testing and designing the Mandarin Quiz educational game application using Unity 2D can be further developed so that this application can help increase interest in learning.
The test results and feasibility of this educational game used the Usability Scale System (SUS) which consisted of 46 functions with 10 questions, the final test result was obtained with a score of 88, so that the mandarin quiz educational game was declared acceptable.

Keywords: Quiz, Mandarin, Unity, MDLC, Edugame

INTRODUCTION

Mandarin is a language that is widely spoken and studied by people all over the world. In terms of Mandarin the most unique is from the pronunciation. [1] Stated that Mandarin can be said to be relatively difficult because most people only understand the pronunciation, and do not understand and the intonation. So, it is necessary to pay attention to the spelling of "pinyin" and the notation in Mandarin must be correct because if the spelling or pronunciation is wrong, it will be misunderstanding by other people. One of the problems for students in learning Mandarin is compiling sentences, vocabulary learning, and non-vocabulary are the main problems for students in the learning process. There has been research done and below are the results of the research [2] The results of the study show that it is true that Mandarin is difficult for students to learn. To overcome this, many parents register their children to learn Mandarin. This causes many Chinese language course institutions to offer Chinese learning for children, but with classroom learning methods that make students feel bored. According to research [3] with the title "Mandarin Language Learning Applications for Android-Based Vocational High School Level at Harmony

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Vocational School in Batam City". explained that the design of an Android-based mandarin learning application was designed by utilizing photo and audio media to help increase student interest in learning Mandarin and students could learn Mandarin outside of school hours. Therefore, the researcher wants to develop an educational application to teach students to learn vocabulary and android-based mandarin quizzes using the Multimedia Development Life Cycle (MDLC) method. Because MDLC is a suitable method in designing and developing media applications which are a combination of images, sound, video, animation, and other media. Based on the background of the problem, the researchers conducted research entitled "Development of Mandarin Education Quiz Game Using Android-Based Multimedia Development Life Cycle (MDLC)".

METHODS

In this digital era, technological advances are highly developed, such as in the field of games. Since long ago, the world of games has been one of the most popular. specially for men of all ages. games are an exemplary representation of interactive experiences, and direct user control over the form and content of this information on the screen is one of the many reasons why games are enjoyable and meaningful experiences for players [4].

Educational game is defined as a learning facilitation by the use of games and also a form of innovation from interactive multimedia containing educational content [8]. entertainment that can hone skills and can also be make it a medium of learning and education [5].

Multimedia Development Life Cycle method is a multimedia-based development method. This development method is carried out according to 6 stages, namely concept, design, material collection, assembly, testing, distribution. In the research of M. Setiawan, Lumenta, and Tulenan [6] using the MDLC method so that the design process runs smoothly and safely because the method is clear and organized.

HSK (Hanyu Shuiping Kaoshi) is an international standard exam to measure a person's Mandarin language ability. This is an official exam that is recognized worldwide to evaluate Chinese proficiency. If a student wants to learn Mandarin and wants to measure their language skills, HSK can be the right choice. Here are the HSK levels and indicators for each level [7].

Unity 3D is a cross-platform based game engine. unity is used to create games that can be used on computers, android, iPhone etc. unity is an integrated tool in game creation, building architecture and simulation. unity can also be used in PC games and online games at the Putra Hospital [12].

The research method used is the multimedia development life cycle or MDLC, which consists of six stages of research namely concept, design, material collection, manufacturing, testing, and distribution. According to J. Oliver (2018), MDLC is a system development method that is suitable for multimedia-based development [12].

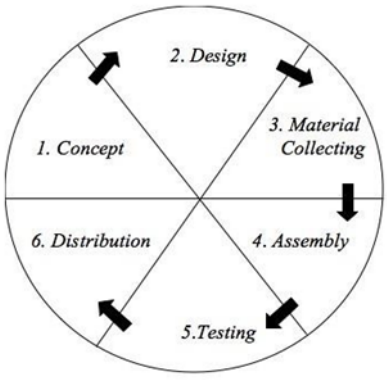


Fig. 1. MDLC Method Flow

The stages of research that will be carried out by this research are based on the MDLC process consisting of the following:

1. Concept
   The concept stage is the stage for determining the purpose and to whom multimedia is addressed (audience identification) and the type of application to be made.
2. Design
   Design (design) is the stage of making specifications including project architecture, style, appearance and material or material requirements for the program. Specifications are made as detailed as possible so that in the next stage, namely collecting and assembling materials, new decisions are no longer needed.
3. Material Collecting
   Material collection is the stage of collecting materials according to the needs being worked on. This stage can be done in parallel with the assembly stage.
4. Assembly
   The assembly stage is the stage of making all objects or multimedia materials made. Making the project is based on the storyboard design stage, and the navigation structure.
5. Testing
   Done after completion of the assembly stage by conducting a series of trials on the program to look for loopholes or bugs.
6. Distributions
   The stage where the application is stored in a storage medium.

Before you begin to format your paper, first write, and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Finally, complete content and organizational editing before formatting.
Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

RESULT AND DISCUSSIONS

The final result that can be obtained from this research is an educational game media quiz in Mandarin. This educational game is made to include several menu options including the Compose Sentence menu and the Learning Vocabulary menu. The stages in making this educational game start from the first stage (concept) to the final stage (distribution), and will be explained as follows:

3.1 Concept

At this stage the purpose of the game, user identification, and the device used are explained.

1. The purpose of making this Mandarin quiz educational game is to foster children's interest in learning through quiz games that make students happy and easy to understand Chinese material.
2. Identification of educational game users in the study were children with an age range of 6 years to 15 years.
3. The devices used for development are as follows.

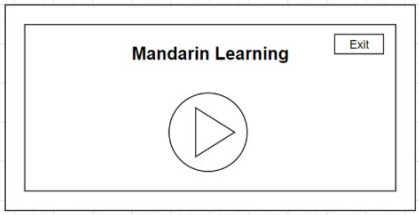
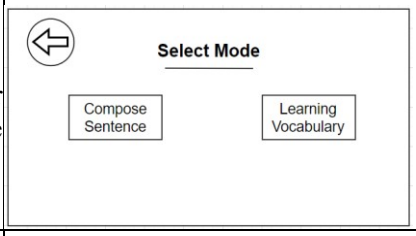
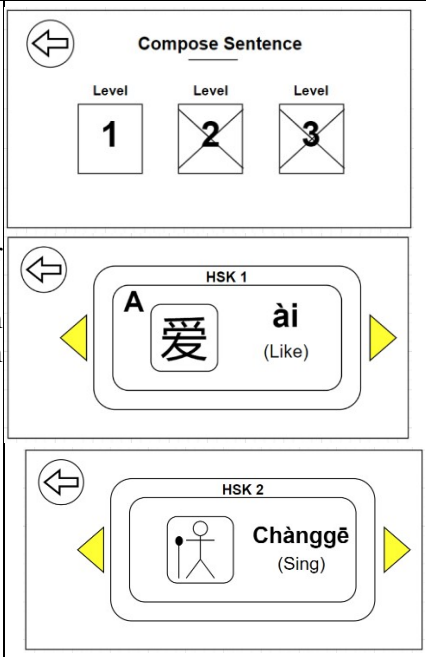
Table 1. Laptop Specifications

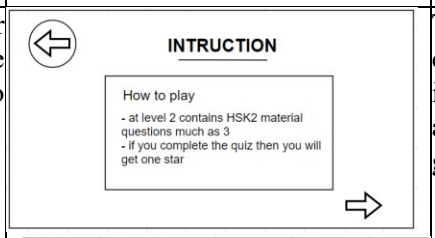
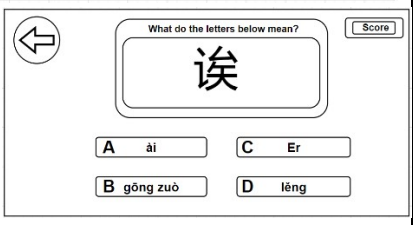
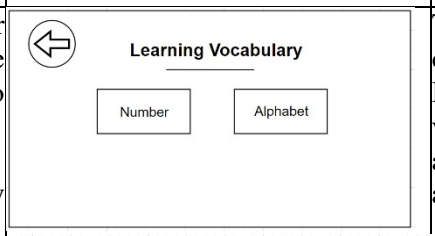
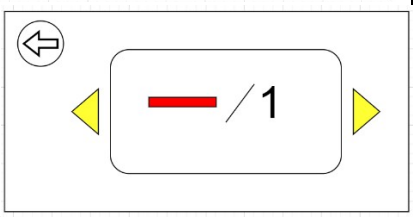
Screen Size	14 inch
Processor	AMD Ryzen 5 4600HS/AMD Ryzen 7 4800HS/AMD
Operation System	Windows 10 Home Single Language 64-bit
Memory	8GB RAM
Sound	Speaker Realtek® Audio

3.2 Design

At the design stage it consists of a storyboard in the game. The storyboard consists of what the GUI looks like which is provided as follows.

Table 2. Storyboard

No	Name	Scenario	Appearance	Content	Description	MDLC
1	Opening Game	User Clicks the start button to start the application		Initial display during application run contains title and button for continue	The Opening Game is the opening display of the Chinese Language Quiz Education Game	Sound : bg main.MP3 Fonts: Gretoon Highlights Picture :Logo. jpg.
2	Main Game	User chooses desired button for use the available features		this view contains buttons, compose sentences and learning vocabulary	User select menus which exist in in menus main	Picture: bg.jpg
3	Compose Sentences	The user clicks the button to scan compose sentence		This view contains HSK 1-HSK3 material	User select menus which exist in in Compose sentence	Picture: bg.jpg, material hsk.jpg

						
4	Game Quiz	The user clicks the button to scan Intruction game	 	This view contains instructions and quiz games	after studying the HSK1HSK3 material, the user can play the Mandarin quiz	Picture: bg.jpg,
5	Learning Vocabulary	The user clicks the button to scan Learning Vocabulary	  	This view contains Learning vocabulary, alphabet and number	User select menu which exist in in learning vocabulary	Picture: bg.jpg, Kosakata number.jpg kosakata alphabet.jpg, Sound: kosakata number.mp3, Kosakata alphabet.mp3

3.3 Material Collecting

The third stage of the MDLC method is the collection of materials to support the creation of an educational game for Japanese hiragana letters. The materials used are images, icons, sounds, and animations.

3.4 Assembly

The manufacturing stage, as is known as the process of making games using unity coding, making animations, and etc.

1. The stages of making the main menu using the background that was made at the time of gathering the material.

Fig. 2. Making the Main Menu

2. Stages of making quiz levels 1-3 using the background that was made at the time of gathering material.

Fig. 3. Creating a Level Quiz

3. Display the main game of the Chinese language quiz educational game, namely the quiz game according to the flow of the HSK material image displayed.

Fig. 4. HSK Materials

4. Display the main game of the Chinese language quiz educational game, namely the quiz game according to the flow of the HSK material image displayed.

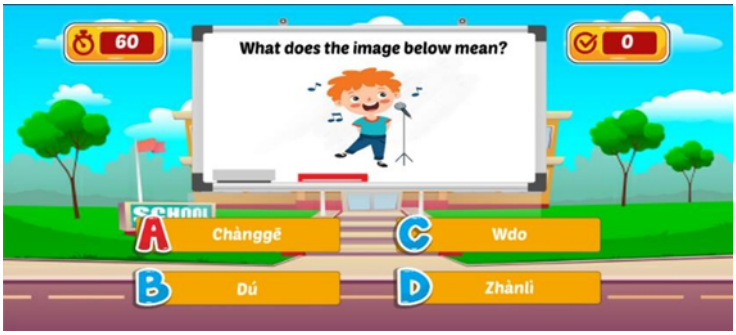


Fig. 5. Quiz Mandarin

5. Coding level manager to unlock the next level.

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.UI;

public class gembok : MonoBehaviour {
    public string namagembok;
    public int nilaigembok;
    public GameObject button;
    //hampir sama dengan bintang, intinya ketika value playerpref sama dengan value variable nilaigembok
    //maka tombol level yang masih terkunci akan aktif, dan gambar gembok akan di destroy
    void Start () {
        if (PlayerPrefs.GetInt (namagembok) == nilaigembok) {
            button.GetComponent<Button> ().enabled = true;
            Destroy(gameObject);
        }
    }
}
```

Fig. 6. Coding Game Object Level Manager

6. Coding Answers and Scores for Chinese Quiz.

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.UI;

public class jawab : MonoBehaviour {
    public GameObject feed_benar, feed_salah;
    // Use this for initialization
    void Start () {

    }

    public void jawaban(bool jawab){
        if (jawab) {
            feed_benar.SetActive (false);
            feed_benar.SetActive (true);
            int skor = PlayerPrefs.GetInt ("skor") + 10;
            PlayerPrefs.SetInt ("skor", skor);
        } else {
            feed_salah.SetActive (false);
            feed_salah.SetActive (true);
        }
        gameObject.SetActive (false);
        transform.parent.GetChild (gameObject.transform.GetSiblingIndex () + 1).gameObject.SetActive (true);
    }

    // Update is called once per frame
    void Update () {

    }
}
```

Fig. 7. Coding Game Object Answer and Score

3.5 Testing

The trial phase is carried out using the black box technique which is carried out after completing the manufacturing stage by running an educational game and seeing whether there are gaps or bugs or not. Black box testing is presented in the following table:

Table 3. Black Box test results

NAME BUTTON	FUNCTION	TESTING	
		ACCEPTABLE	NO ACCEPTABLE
SCENE (OPEN LEARNING MEDIA)			
Start button	Go to main menu	√	
SCENE (MAIN MENU)			
Play Button	Go to the select menu page	√	
Destination Button	Go to the destination page	√	
Profile Button	Show profile pop up	√	

Exit Button (X)	Go to application exit navigation	√	
Yes Button	Closes the application	√	
No Button	Return to the main application menu	√	
SCENE (SELECT MODE)			
Back Button	Return to the main menu scene	√	
Compose Sentence Button	Go to the HSK materials page	√	
Learning Vocabulary Button	Open the learning vocabulary page	√	
SCENE (COMPOSE SENTENCE)			
Back Button	Return to the main menu scene	√	
HSK Level 1 Button	Go to the HSK level 1 page	√	
HSK Level 2 Button	Go to the HSK level 2 page	√	
HSK Level 3 Button	Go to the HSK level 3 page	√	
SCENE (MATERIAL LEVEL 1)			
Back Button	Return to the compose sentence	√	
Swipe Right Button	Go to the next slide material	√	
Left Swipe Button	Go to previous slide material	√	
Next Button	Go to the next page	√	
SCENE (INSTRUCTION HSK1)			
Back Button	Return to the compose sentence	√	
Next Button	Go to the next page	√	
SCENE (GAME QUIZ LEVEL 1)			
Countdown Timer HSK Level 1	Displays the countdown time while playing	√	
Score HSK Level 1	Displays each point level 1 game questions	√	
Continue Game Button	Finish game level 1 and continue game level 2	√	

Repeat Game Button	Repeat the game from question HSK1 game level 1	√	
Answer Button	To answer and complete each question on HSK level 1 game	√	
SCENE (MATERIAL LEVEL 2)			
Back Button	Return to the compose sentence	√	
Swipe Right Button	Go to the next slide material	√	
Left Swipe Button	Go to previous slide material	√	
Next Button	Go to the next page	√	
SCENE (INSTRUCTION HSK2)			
Back Button	Return to the compose sentence	√	
Next Button	Go to the next page	√	
SCENE (GAME QUIZ LEVEL 2)			
Countdown Timer HSK Level 2	Displays the countdown time while playing	√	
Score HSK Level 2	Displays each point level 2 game questions	√	
Continue Game Button	Finish game level 2 and continue game level 3	√	
Repeat Game Button	Repeat the game from question HSK2 game level 2	√	
Answer Button	To answer and complete each question on HSK level 2 game	√	
SCENE (MATERIAL LEVEL 3)			
Back Button	Return to the compose sentence	√	
Swipe Right Button	Go to the next slide material	√	
Left Swipe Button	Go to previous slide material	√	
Next Button	Go to the next page	√	
SCENE (INSTRUCTION HSK3)			
Back Button	Return to the compose sentence	√	
Next Button	Go to the next page	√	

SCENE (GAME QUIZ LEVEL 3)			
Countdown Timer HSK Level 3	Displays the countdown time while playing	√	
Score HSK Level 3	Displays each point level 3 game questions	√	
Continue Game Button	Finish game level 3 and back to home	√	
Answer Button	To answer and complete each question on HSK level 2b game	√	

CONCLUSIONS

An educational game application has been developed that has HSK1-3 Chinese language learning materials as well as games that support the xinlong mandarin education center Bimbel learning activities about Chinese language educational games. The results of the testing and feasibility of this educational game using the Usability Scale System (SUS) which consists of 46 functions with 10 questions obtained the final test result with a score of 88, so that the mandarin quiz educational game is declared Acceptable.

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