Designing Educational Games as Learning Media for Lontara/Bugis Script for Children 7-8 Years old

Memory Game with Aksara Lontara Content

Ahmad Ade Nugraha
Institut Teknologi Bandung
Bandung, Indonesia
ahmadadenugraha14@gmail.com

Alvanov Zpalanzani Mansoor
Institut Teknologi Bandung
Bandung, Indonesia
alvanov.mansoor@itb.ac.id

Abstract— **Learning the Bugis tribe local language, especially the introduction of the Lontara script for children, is still being carried out starting from the elementary school level in several areas in South-Sulawesi, including the city of Parepare. This is an effort to preserve one of the traditional scripts that exist in Indonesia while several other traditional scripts have become extinct. There are several problems in implementing Lontara script learning: the lack of student mastery of the script, which can be seen from the repetition of teaching materials regarding traditional scripts recognition at several school levels. Educational mobile games have begun to be widely developed as learning media because they can increase children's enthusiasm for learning and smartphone users in Indonesia, including among children. Educational games with the memory game genre can help improve children's mastery of the Lontara script. This study uses the Double Diamond method with a formal and dramatic approach to producing an educational game design with Lontara script content that can be used as a reference in making script games in South Sulawesi which can be used as learning media for children aged 7-8 years where the material for introducing the characters is taught.**

Keywords— *Lontara script; Educational Game; Memory game; Pelmanism game; Bugis script.*

I. INTRODUCTION

The Lontara script is one of several traditional scripts owned by Indonesia. The Lontara script is also known as the Bugis script because its users come from the Bugis tribe scattered in the South and West Sulawesi Provinces. According to Mattulada, when viewed from the themes in the La Galigo script, it is most likely that the Lontara script has existed from the 7th century to the 12th century [1], The Lontara script went through a relatively long process, but it still looks like it is related to the Rejang script derived from the Kawi script [2].

The Old Lontara script has several changes with the new Lontara script that is currently available. The old Lontara script is no longer used, as with several other scripts used in South Sulawesi, namely The Jangan-Jangan script, The Bilang-Bilang script The Arab Serang Script.

The Lontara script writings can be found in past Bugis work documents such as Lontara Gowa, Lontara Wajo, or scientific texts such as Lontara Kutika (astronomy), Lontara Allaoung Rummang (Farming), and the use of the script in the epic La Galigo which is known as the longest literature work in the world and has been designated by UNESCO as Memory of the World in 2011.

However, the Lontara script in The South and West Sulawesi Provinces life is rarely used, directly proportional to the decreasing number of speakers of the Bugis tribal language. The Lontara script in South Sulawesi can sometimes still be seen on street name signs or the name of an agency whose placement is under Latin/Roman letters. The naming of roads, public facilities, and government offices with letters in some places is enough to maintain their existence in this modern era. However, often the priority is the only aesthetic purpose [3].

In the education field, learning about the Lontara script is still carried out in South Sulawesi, especially in areas where most of the population is Bugis. However, there are still some obstacles and problems that are quite complex. Learning in schools is still lacking in prestige with other subjects, and the curriculum is still unclear. As quoted by the Fajar newspaper, the chairman of the Regional Language Teachers Association Parepare (IGBD) Rahmaniar said that the current regional language subject is a foreign subject that students less demand. In the process of learning the Bugis language, it still seems monotonous [4].

Learning about the Lontara letter/character's introduction is often repeated up to the junior high school level because of the lack of student mastery of the Lontara script. Few elementary schools in the Bugis area in South Sulawesi can teach these subjects due to limited human resources or expert teachers. Teachers who teach these subjects are usually teachers of other topics. Unfortunately, mastering or memorizing letters/scripts is very basic when studying the Bugis regional language. Amalia, Syamsurijal & Rahman revealed that the difficulties often experienced by students in learning the Lontara script are remembering the shape and pronunciation of the Lontara script. [5].

Fig. 1. New Lontara Script.(Source: edited from [6])

Currently, the game functions as an entertainment tool and developed in several ways, one of which can work as a medium in conveying knowledge. The game is included in the educational (educational game) type, which is abbreviated as edugame. The educational game can be interpreted as a combination of educational content, learning principles that create a learning process for the players [7].

Educational games are also used as a medium to repeat the material that has been taught; the use of games in education aims to help students remember what they have learned, as active participation is encouraged [8].

Memory games can also be used as educational games to help children remember things, depending on the content presented, including remembering letters or characters. The Memory Game (also known as Pexeso, Pelmanism, Shinkei-suijaku, Pairs, Concentration game, …) is a classic cardboard game that helps train short-term memory [9].

Fadillah, in his book playing and early childhood games, explains that children who are at the age of 2-7 years are in preoperational (symbolic play) who begin to understand symbols, and the appropriate types of games are those that can stimulate their imagination, while children at the age of 7-11 years are in concrete operational (social play) at the age of 7-11 years where children have been able to reason and use logic well so that the appropriate type of game can stimulate these abilities well, where the type of puzzle game can be used at both kinds of age [10].

The findings in previous studies regarding educational games with the theme of scripts can be used as a reference in developing educational games with the theoretical approach of Tracy Fullerton using formal and dramatic elements. [11]. This research is expected to help the development of educational games that have script genre content so that it can be one of the media options in learning traditional characters, especially children both at school and outside of school so that there is not too often repetition of material regarding Lontara scripts recognition.

II. RESEARCH METHODS

A. Double Diamond

We use the Double Diamond method in the media design process, which the British Council developed in 2005. The Double Diamond Method is a solution-based approach to solving existing problems. This method is easy to apply because it follows a standard way of working through a project. In this method, the design process is divided into four phases: Discover, Define, Develop, and Deliver.
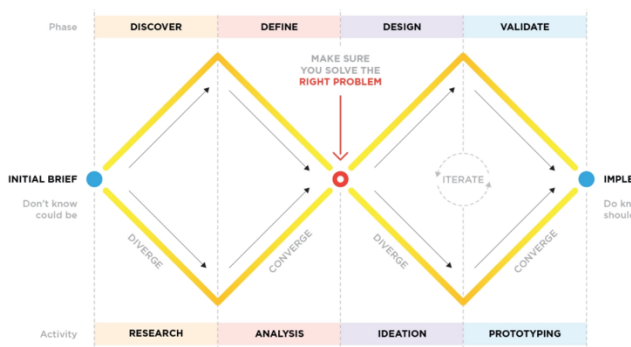

Fig 2. Double Diamond Metodh (Source: [12])

- *Discover*

Identify problems or phenomena faced by local language teachers/teachers or elementary school students aged 7-8 related to the introduction of the Lontara script. The approach is conducted qualitatively through observation, interviews, and a literature study to determine the design concept. The quantitative approach is by distributing questionnaires to several regional language teachers as a preliminary study in designing.

- *Define*

Analyze the data obtained and then formulate or define the core problems that become the basis for determining solutions in the development ideation stage of designing Lontara script educational games.

- *Develop*

The pre-production stage includes making media, including making flowcharts, sketches, and game elements that will be used. The game design will use a formal approach and dramatic elements from Tracy Fullerton's theory at the development stage.

- *Deliver*

Stages where the concepts obtained in the development stage will produce a prototype educational game design with Lontara script content.

B. Formal Element and Dramatic Element

Gibson includes Tracy Fullerton's theory as one of the three most common frameworks used in learning or building a game in his book "Introduction to Game Design, Prototyping, and Development" [13].

In her book entitled "Game Design Workshop: A Playcentric Approach to Creating Innovative Games," Tracy Fullerton explains that the game structure consists of two elements: [14].
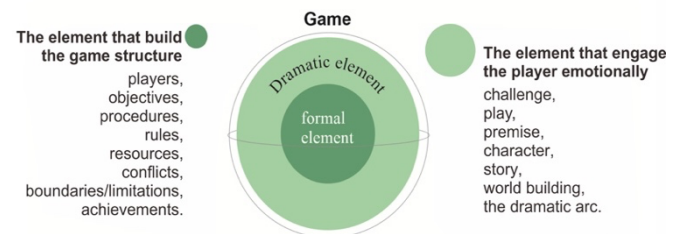

Fig 3. Tracy Fullerton's Game Elements theory.

(Source: adapted from: [15]).

Formal elements that are the core of a game are categorized into several parts: interaction patterns of the players, the missions/objectives of the game, procedures, rules of the game, resources, conflicts, limitations, and achievements. The second is a dramatic element that will enrich the formal elements so that players are emotionally involved, which consists of: challenges, play, premise, characters, stories, World Building, and The Dramatic Arc.

Based on the data that has been obtained previously and through the analysis process, the basic idea of this design is

to provide options in the development of educational games that have script genre content so that they can be one of the media options in learning traditional scripts, especially the Lontara script in South Sulawesi.

The games offered are educational in the form of memory games or pelmanism games. Matching games have a relatively simple gameplay and are not too heavy so that it is suitable for the age of the target audience, aged 7-8 years, the type of game is in the form of a puzzle where the game matches images. It is a puzzle-type game [16].

The game will create a process of play and learning by Players will be challenged to match the same image from the shuffled card, so players will try to remember the same shape and picture from the Lontara script. When each card is clicked, it will make a sound in the form of the Lontara script.

The Gameplay type is a memory game in general. Players are only challenged to match pictures. By providing dramatic elements, the game will give players emotional involvement. A character is a useful tool for dramatic engagement in games, and many games, especially digital games, have explored this area of potential [14]. Giving a character will provide its challenges and not only match pictures. Educators should supplement games that challenge students to play characters from distant cultures and social backgrounds with additional lesson planning and instructional materials[13].

The design of the educational game that was developed is shown in the flowchart as follows:
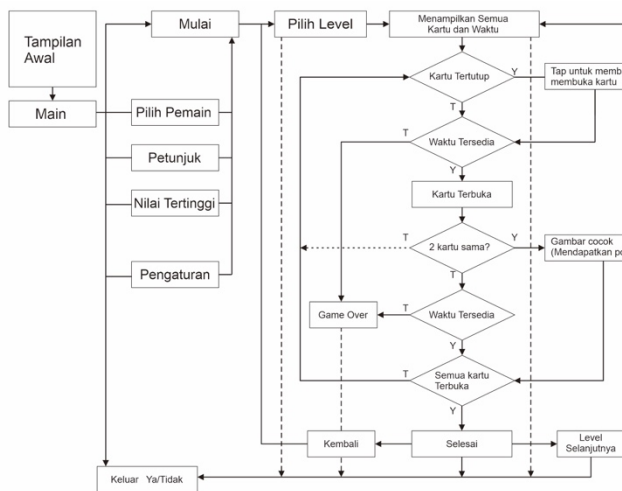
Fig 4.   Game Flowchart. (Source: The author).

C. Sketch

This stage is the stage of developing the concept based on the elements needed and following the flowchart that has been made; this sketch is then used as a reference in digitizing the prototype of the Lontara script educational game.

Fig 5.   Game UI Sketch. (Source: the author).

III.   RESULT AND DISCUSSION

The researchers conducted a questionnaire on 35 respondents (9 males and 26 females) who were local language teachers from elementary school to high school. Most of the respondents were members of the Regional Language Teachers Association (IGBD Parepare) in the regional language MGMP (Subject Teacher Consultation) workshop, conducted online from Parepare on April 10-12, 2021.

Below are the results of the questionnaire that has been given online using google form regarding the experience of respondents in teaching local language subjects in their respective schools.

The questionnaire results were based on the opinion of respondents regarding the mastery of teaching materials at the beginning of the meeting.
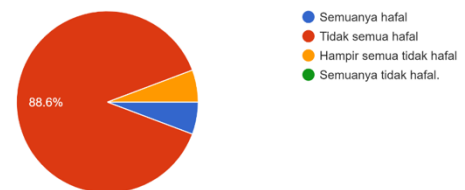
Fig 6.   Results of the Lontara script mastery questionnaire according to respondents (Source: the author)

With a rate of 88.6%, respondents answered that not all of their students had memorized or mastered the script at the beginning of the learning meeting. The repetition of the script recognition material was because there were always students who had not remembered the 23 Lontara characters well.

The Questionnaire results regarding the repetition of material at the beginning of the semester.

Fig 7.   The questionnaire results for the repetition of teaching material according to the respondents. (Source: the author)
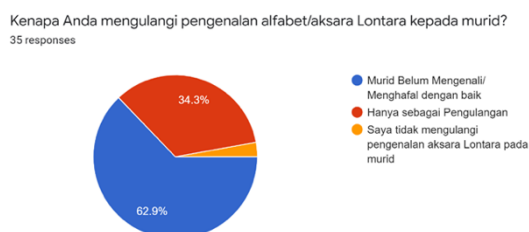

Fig 8.   The questionnaire results on the repetition of teaching materials according to the respondents. (Source: the author)

Almost all bugis language teachers answered, teaching the introduction of the Lontara script at each meeting at the beginning of the semester. For these subjects and 62.9% answered the repetition because the students had not mastered the characters either in memorizing or recognizing the characters.

The results of the questionnaire from respondents' opinions regarding the level of student difficulty in memorizing the Lontara script and the location of the difficulty
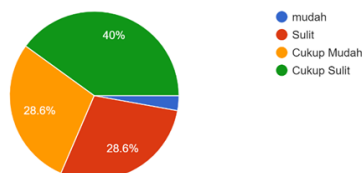

Fig 9.   Results of the Lontara script mastery questionnaire according to respondents. (Source: the author)
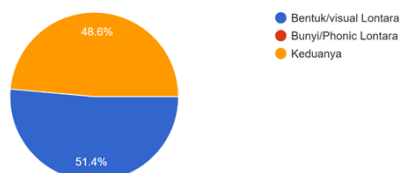

Fig 10. Results of the student difficulty questionnaire according to respondents. (Source: the author)

The majority of respondents, 40%, think that students are still quite difficult to memorize. Students' difficulty lies in identifying the form / visual or *phonic*/ sound of the Lontara script. Amalia, Syamsurijal & Rahman revealed the difficulties that students in learning the Lontara script often experience in remembering the visual and pronouncing the Lontara script [1].

At this time, children aged 7-8 years in Indonesia are generally in grade 2-3 elementary school (SD). The stages of play development for children aged 7-8 years are between preoperational (symbolic play) 2-7 years and concrete operational (social play) at the age of 7-11 years, Fadillah in his book Early Childhood Play and Games [1], explains:

1. Preoperational (symbolic play): At this stage, the child is 2-7 years old. At this stage, children begin to imagine and pretend, ask a lot of questions, and try new things and understand certain symbols. The appropriate game tools at that age can stimulate children's imagination, such as drawing, blocks/lego, and puzzles.

2. Concrete operational (social play): At this stage, children are at the age of 7-11 years. At this stage, children play already using objective reasoning and logic. Therefore, the right game tools for children at that age can stimulate children's thinking so that through these games, children can use reason and logic well. Some of the games that can be used are dakon, puzzles, snakes and ladders, checkers, and monopoly.

Games are generally better known to function as entertainment or entertainment, even though games can be an educational medium because children like games. Educational games are also used as a medium to repeat the material that has been taught, The use games education aim to help students remember what they have learned as active participation is encouraged (Zirawaga et al., 2017). Memory games can be used as educational games to help children remember things, depending on the content presented, including remembering letters or characters. The Memory Game (also known as Pexeso, Pelmanism, Shinkei-suijaku, Pairs, Concentration game, …) is a classic cardboard game that helps train short-term memory (Voborník, 2020).

Based on the steps and processes that have been described, this design results in an educational game design that contains Lontara script content. This educational game is a memory game or Pelmanism game using a formal elements and dramatic elements.

A. Formal and Dramatic Element

The following are formal elements and internal dramatic elements, which are displayed in tabular form.

TABLE I.   FORMAL ELEMENT

Formal Element	Structure
a. Player	1. 7-8 Years Old 2. Number of Players = 1 3. Single Player vs. Computer
b. Objectives	1. Guessing 2. Matching
c. Procedures	1. Players are directed to a page with several button options: Select a player to choose a character provided. The hint button if you want to know how to play, the highest score button if the player

	wants to see the player with the highest score, the setting button for adjusting the sound, and the start button if the player is ready to start the game.
	2. Players will be directed to the level page to choose which level to play.
	3. Players play a game where players will guess and match cards with the same letters written at a predetermined time.
	4. Players can exit the game whenever they want by pressing the x button on the layer.
d. Rules	1. Players must write a name and choose a player character before playing.
	2. Players play a game where players will guess and match cards with the same Lontara script at a predetermined time.
	3. If the time runs out, the player fails to continue to the next level and must repeat at that level.
	4. If the player succeeds, the player will get points and continue to the next level.
e. Resources	1. Life. 2. Time.
f. Conflict	1. Guess the location of the script. 2. Remember the location of the same script. 3. Match the same Script. 4. Compete with time.
g. Boundaries/ limitation	1. The game area is only on the screen. 2. The Life is only used for one game. If the player fails, then the game must be repeated.
h. Achievements	1. Point 2. Open next level

- Player

One person plays this game, where the target audience is children aged 7-8 years who are taking elementary school education in grades 2-3 of Elementary School, studying Lontara / Bugis script, and having gadgets with the Android system.

- Objective

The purpose of this game is for players to shoot cards that have the same letters and then match them. This memory genre game aims to make players remember the visual form and sound of the Lontara scripts. Every time the player touches the card, the player will be shown the script in Latin alphabetic and listen to the scripts' sound.

- Procedures

This game is designed with game procedures in the Indonesian language to make the players understand how to play the game easier. After the player opens the game, there is a "play" button. If the player agrees to play, the player will enter a page where he can choose the character he wants to play, write the name, set the sound, find out the highest score, and when finished, the player can press the " start" to enter the level page you want to play.

- Rules

The rules in this game are pretty easy. First, players must write names to distinguish the players playing and determine how far the player has passed the level. The player must complete the game according to the specified time to pass a level.

- Resource

Resources are almost anything in a game that players can be produced, gather, collect, or destroy, like money, energy, time, etc [17]. The resources owned by the player are one life and time in completing a level. If the player fails to achieve the mission, then the game must be repeated.

- Conflict

The conflict that will be present is players will fight with time to guess exactly where the same card is. The conflict will increase with a dramatic element in character because the player will emotionally try to save the character from the monsters who will catch him if the mission is not finished and the time is up.

- Boundaries

Boundaries in a game are boundaries built between the game and the real world and things that players cannot reach in the game. In this game, the player can only play in the area that has been determined in the layer because this game adopts a pelmanism game-type game where the original game is a board game type game, players can only flip the cards in front of them, and if they guess wrong, the card will be covered again. In this game, the player only has a certain time to complete a level, and there is no additional time.

- Reword

In this game, players will get points and can continue to the next level. In the education field, the level and points obtained can reference which player has mastered the game. The more players repeat the game. The more repetition occurs, the more the player can master visuals and sounds from the Lontara script.

TABLE II. FORMAL ELEMENT

Dramatic Element	Draft
a. Challenge	1. Memorize the shape and position of Lontara scripts cards. 2. Knowing the pronunciation of the Lontara scripts.
b. Play	1. Tap and touch play. 2. Matching picture game. 3. Play and Learn
c. Premise	Match the character cards before time runs out to move to the next level.
d. Character	Tara and Monster Kondo
e. Story	Tara must save Lontara's script from an illiterate (Buta Aksara) monster named Kondo by matching the layered card; otherwise, the Kondo monster will catch it.
f. World Building	In The Forest
g. The Dramatic Arc	The scene when a kondo monster chases Tara

- Challenge

The challenges are presented to make the players feel excited about completing the game. Therefore, the challenges are made not too heavy and too easy to complete. Keep in mind that the game design is an educational game, so it challenges players in strengthening their memory of something. Therefore, it is expected that the player can improve his memory of the shape and sound of the Lontara script in a more fun way.

- Play

The game system designed for players is relatively easy, namely Tap and Touch Play. Touching or tapping the covered card will make it turn around and emit a sound from the Lontara script. In front of the layer will show an image of the alphabetic Latin script. The mission is to match the same picture if it is wrong. Then the card will be covered again, and the player can try again until the time runs out.

- Premise

Briefly, the premise of this game is a game of matching cards written with Lontara characters where the player has a certain time to complete it. If he manages to get points and advances to the next level, if the player fails, then the player must repeat at that level.

- Character

The characters presented in this game are Tara and the Kondo monster, inspired by a primate animal named Tarsier who lives in the forest of the Sulawesi Island, which is also starting to be feared for extinction and has similarity to the

Bugis language. At the same time, the Kondo monster was inspired by one of the cultural performances of the Bugis Makassar tribe named Kondo Buleng, a crane who becomes a rival to fishers for stealing the fish. In this game, an illiterate monster will steal Lontara scripts from Tara's character.

Fig 11. The Inspired characters of monster kondo(left) and Monster kondo development(right). (Source: [18], [19], [20])

Fig 12. The inspired character of Tara (left) and Tara's visual development (right). (Source: [21]).

In this game, Tara wants to save the Lontara scripts from being lost by matching them before an illiterate monster (monster buta aksara) named Kondo, who always wants to steal the scripts. The story also is shown in the game instructions to strengthen the dramatic elements.

- World Building

The game is taking the forest area because animals also inspire the game characters. Therefore, Taking the forest area will give the impression of adventure even though the boundaries are only shown in one area.

- The Dramatic Arc.

The dramatic arc is a crucial display in the game that can amplify dramatic elements. For example, the dramatic arc shows Tara being chased by a Kondo monster while collecting Lontara characters.

B. Game Overview

The following is a display of mobile edugame with Lontara script content entitled "Tara & Lontara":
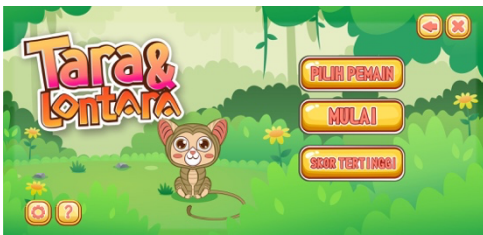
- Opening Page and Main Page

Fig 13.   Opening and Main Page. (Source: the author)

In the initial screen, players will be shown The dramatic arc view, where the Kondo Monster is chasing Tara's character. This view is the opening page. When the player decides to play, the player will be directed to the main menu page.

- Choosing Character and level Page

Fig 14.   Choosing Character and Level Page.
(Source: the author)

Players can play 2 different characters: Tara, the main character, and Tari, Tara's twin sister, and players are required to fill in the name in the name column.

On the level page, the player can play the unlocked level. The only way to unlock is to pass the levels in succession.
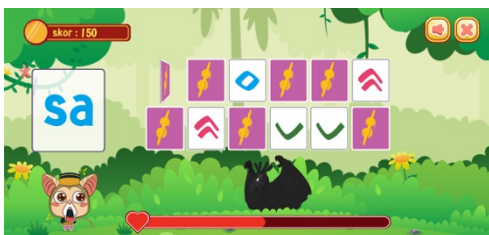
- Game Page

Fig 15.   Game Page.(Source: the author)

On the play page, players will be challenged to complete the game by matching pictures before the kondo monster captures the character of their choice. Each level increases, the difficulty level increases, failure is expected to occur several times so that players can get used to the visuals and audio of the game aksara lontara, so the learning process happens.

- Reward Page

Fig 16.   Reward Page. (Source: the author)

If the player completes a level, the player will get a reward in points.

IV.   CONCLUSION

Educational games can be one of the media choices in learning the Lontara script and improve their ability to master traditional characters in a fun way. Pelmanism games, memory games, or matching picture games can be developed for ages 7-8 years because they are still following their playing patterns.

In the development of educational games, the approach using formal elements and dramatic elements developed by Tracy Fullerton can be a suitable game development method because, in its development, the game does not only focus on game structure, namely formal elements, but also on adding elements that can involve players emotionally in the game. Dramatic elements. The addition of characters in building a game is also a good choice.

For further research in making games, it is better to do repeated prototyping tests to find out the game's shortcomings where the playcenteric approach can be made. According to Fullerton in Yoga et al., designers go through an iterative cycle from processing, prototyping, and evaluation. [22].

In the end, the design of this educational game is expected to be a reference in the development of educational games for children with Lontara script content in South Sulawesi, so that repetition of the Lontara character introduction material in schools does not repeatedly occur at several levels of education.

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