

Essential Elements In The Development Of Educational Games For Language Scripts

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ABSTRACT

Along with the increasing use of smartphones in adolescents and children, mobile games in the form of educational games have been developed by Indonesia and other countries as a learning medium to increase student motivation, including learning scripts. Indonesia is an archipelago country with several aksara/scripts, such as the Rejang script from Sumatra island, the Jawa script from Java Island, the Bali script from Bali island, and the Lontara script from Sulawesi island. Still, there are concerns that some aksara/scripts in Indonesia will become extinct. There are several educational mobile games designed for children using aksara/script recognition content where the game can be used as a supporting medium for learning the script while playing. The author analyzed the contents of several educational mobile games comparatively to gain insight into how educational mobile game developers educate players about aksara/scripts. This study used a descriptive qualitative approach with game design theory as a reference for comparative studies. From this research, it is expected that readers will gain insight into approaches to learning letters or scripts through mobile educational games. In addition, these findings can be used as a foundation for developing educational games about scripts.

Keywords: “Mobile Games,” “Educational Games,” “Aksara,” “Learning Media.”

1. INTRODUCTION

Indonesia has a lot of diversity in languages, but not many of these regional languages have characters. There are 718 mother tongues or regional languages in Indonesia, but there are only 12 languages that have scripts as published by Kementrian Pendidikan dan Kebudayaan (KEMENDIKBUD). The 12 scripts are the ancient Javanese scripts and Sundanese scripts from the Java island, the Balinese script from the Bali island, the Bugis/Lontara script from the Sulawesi island, the Rejang script, Lampung script, Karo script, Pakpak script, Simalungun script, Toba script, Mandailing, and Kerinci/Rencong scripts from the Sumatra island. Basically, script/aksara can be interpreted as a collection or set of letters with a particular writing system. [1]



Figure 1 Aksara-Aksara di Indonesia.

However, the preservation of regional languages does not seem to be as expected. Several previous studies have discussed the decline in the existence of regional languages, including their scripts/Aksara. One of them was explained by Madeamin through the Regional Language congress in South Sulawesi, held in 2007 and 2012 [2]. From the congress, known that the existence of and traditional scripts were starting to be abandoned. The use of scripts is still used only for specific purposes. One of the most iconic is its use in street names and government offices in various regions in Indonesia [3]. On the other hand, children or the younger generation have already begun to leave their local language/mother-tongue due to the powerful influence of globalization [2]. Of course, it also impacts the use of traditional characters that are increasingly common among them.

Another example is the learning of the Lontara script in South Sulawesi, precisely in Pinrang Regency. Bugis traditional language was a field of study in the past. Now, these subjects are combined in local content. So it is not required to be taught by the school anymore [4], which can lead to the lower literacy of children towards their traditional script.

One of the conservation efforts continues to be carried out by several parties in various ways, including in script-themed competitions. the Department of Education, Dinas Pendidikan, Pemuda dan Olahraga (Disdikpora) Denpasar City, Bali held a Nyurat (writing) Balinese script competition, as quoted in the digital newspaper *Republika*. Elementary and junior high schools followed the competition in the context of the 231st Anniversary of Denpasar City in 2019. The competition aims to educate and introduce the Balinese language, script, and literature early. Anak Agung Made Wijaya Asmara, the Secretary of Disdikpora, said the activity was an effort to preserve and develop the Balinese language described by the locals [5].

In digitizing the script/aksara field, this is being done by the Indonesian Internet Domain Name Manager (PANDI) so that Indonesian scripts/aksara are registered on Unicode. Yudho Giri Sucahyado As the chairman of PANDI, the aim of the digitizing script is that the younger generation of Indonesia can recognize and understand the original scripts of the previous regions, which are now increasingly being eroded by the time [6].

As these efforts were carried out, educational games about learning characters have also begun to be developed, such as Arabic script, Korean script, Japanese script, and several other characters. Development of character-themed educational games. It is hoped that in the future, the learning of traditional hands through mobile educational games can be carried out to add new media in language learning to preserve scripts/characters, especially in Indonesia, where the use of traditional characters is starting to be abandoned.

2. METHODOLOGY

The research method applied in this research is a comparative descriptive qualitative approach with game design theory as a reference for comparative studies in the game design document view to know the game vision more broadly to describe the overall concept of the game, target audience, gameplay, interfaces, controls, characters, levels, media assets, etc. In short, everything the team needs to know about the design of the game. Tracy Fullerton's theory will be used in her book "Game Design Workshop: A Playcentric Approach to Creating Innovative Games". [7]

In a book entitled "Introduction to Game Design, Prototyping, and Development," Gibson includes Tracy Fullerton's theory as one of the three frameworks most commonly used in learning or building a game

Introduction to Game Design, Prototyping and Development [8]. Using basic theory because of its more straightforward implementation and ease of application, Tracy explained that the game's structure comprises two elements: formal elements and dramatic elements. Formal elements are the essence of a game. In this case, Fullerton categorizes it into several parts: the interaction patterns of the players, the mission/objectives of the game, procedures, rules of the game, resources, conflicts, limitations, and achievements in the game. While the dramatic elements in question enrich the formal elements so that players are emotionally involved, the following are dramatic elements: challenges, games, characters, stories, World Building, and The Dramatic Arc.

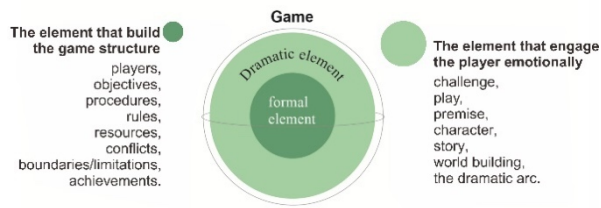


Figure 2 Tracy Fullerton's Game Elements theory.

The researcher found several studies of educational games about scripts that have been done before. Several studies on educational games that previous researchers have carried out include; Learning Arabic With Games [9], which discusses the design and implementation of a game framework in facilitating Arabic skills for children to evaluate the effectiveness of game-based learning. Next is the research entitled Mobile Application for Learning and Memorizing Japanese Characters using Game-Based Learning [10], which aims to help students in memorizing, recognizing the different symbols of Hiragana and Katakana scripts. Research from [11] entitled Kurdish Language Learning tool in Serious game. They designed a serious smartphone game to learn Kurdish to improve vocabulary aimed at foreign people who desire to learn Kurdish. Uiphanit & Sunandha's research (2021) is entitled China Word Vocabulary Quiz Game for Promoting Chinese Vocabulary Memory among 10th Grade Students [12]. This study aims to design a learning game in a mobile application to learn Chinese characters and vocabulary aimed at students in class 10th in Suphanburi Province, Thailand. And [13] Development Finite State Machine Agent in Edugame "Hangug Word" Learning Media of Korea Hangul scripts designed a game that aims to introduce the Korean Hangul Script to children and teenagers know the shape and pronunciation of the Hangul Scripts.

The method used found that the findings of an approach can be used to develop game content for learning scripts, especially Indonesian scripts/Aksara that do not yet have various types of learning media.

3. RESULT AND DISCUSSION

Until now, smartphone user data has continued to grow. Based on the latest report by HootSuite and the We Are Social agency until early 2021 in a report titled "Digital 2021", smartphone users in Indonesia

reached 167 million users or 89% of the total population of Indonesia. The addition cannot be separated from children and adolescents in Indonesia learning from home during the Covid-19 pandemic as circular letter number 15 of 2020 by Kementerian Pendidikan dan Kebudayaan. Besides that, The survey conducted by KPAI (Komisi Perlindungan Anak Indonesia) in June 2020 on 25,164 child respondents and 14,169 Parent respondents spread across 34 provinces in Indonesia found most respondents as much as 71.3 percent stated that children already have their gadgets own.

The use of Smartphones as educational media through mobile games in the form of educational games also continues to grow. As a result, many educational games have been developed in various content areas, including computer science, economics, geography, history, language, pathology, physics, biology, astronomy, and ecology [14]. However, research on educational games with the theme of language and characters is still being carried out, so it is necessary to search for approaches taken by previous studies to be used in-game education development about literacy learning in Indonesia.

According to Maulana, a script is a collection of letters with a particular writing system [3]. The term script is better matched with the word *script*, which has a broader meaning than the word alphabet because the script only symbolizes a collection of letter sets neutrally without further categorization. The usual method for teaching letters in schools is the phonetic method. The phonetic method is a method that teaches students the sound of letters, where students will be taught logo symbols of each letter [15] graphically. The phonetic method is a method that is often used in learning to recognize letters, discovered in the 19th century. This method of learning about basic knowledge of sounds from pronunciation, mastery of sounds, and shapes of letters is a critical initial stage before mastering a language. If further attention is paid to introducing characters by visually recognizing sounds and letter shapes in several character games, some examples will be presented in the following presentation.

In 2021 the Game is a medium that is very close to children, teenagers to adults; apart from the ease of access, the existence of gadgets amid society has become inseparable, the covid-19 pandemic has also made the need for devices higher and higher so that

school children begin to be facilitated by gadgets in the form of laptops or smartphones by their parents.

Games have several types, as described by designer Tracy Fullerton who divides them into several types, namely: action, strategy, role-playing, sports, racing/driving, simulation/building, flight, and other simulations, adventure, educational, children's, casual, and experimental [7]. *Games are* no longer seen only as entertainment tools or tools to spend free time. Games are also developed in several media, one of which can function as a medium in conveying knowledge called educational *games*, abbreviated as edu-games. Educational games can mean combining educational content and learning principles that create learning for players [16].

The use of media games in education aims to provoke participants' interest in learning while playing to convey learning to students. Through these media, learning can be more fun for the *audience*, especially children, so that can say that *games* are an excellent alternative in learning. This was also explained by Abdillah & Aditya. He stated that creative educational games could be a solution, where *games* are very close in the daily life of students so that it can bring them closer to the lesson to be conveyed [17].

The author has found several literacy educational games from previous studies, including "Learning Arabic With Games" [9], "Memory Song Game" and "Match Puzzle Game" [10], "Kurdish Language game" [11], "China Word Uiphanit & Sunandha" [12] and "Hangug Word" Edugame [13]. These several studies show that Edu-games have a good level of effectiveness in teaching language or characters. Here are some studies on the effectiveness of edu-game media as a learning medium for characters to determine the success rate of these studies.

Table 1. Edu game effectiveness research table

Research purposes	Research result
1. Learning Arabic With Games [9].	
To evaluate the effectiveness of game-based learning. In addition, the supporting platform is used to devise experiments to assess	These games allow children to gradually acquire linguistic skills from the letters of the alphabet to simple sentences. In addition,

the value of our model.	players develop competence in reading, writing, and listening.
2. Mobile Application for Learning and Memorizing Japanese Characters using Game-Based Learning [10].	
Develop games to help students memorize, recognize the different symbols of Hiragana and Katakana characters, and promote better student understanding using the ADDIE model as a framework.	This project has been successfully achieved, the majority of respondents are satisfied because this game is valuable and good in improving Japanese language learning. It was found that they enjoyed the challenging part of the game
3. Kurdish Language Learning tool in Serious game [11].	
Design and implement a smartphone application to learn Kurdish and increase vocabulary through serious games. Application designed for Android devices allows users to understand and improve the Kurdish language. The main objective is to learn Kurdish vocabulary using crosswords, solve hidden words, find and circle crosswords in puzzle solutions in serious games.	The aspirations of Kurdish language app users increase as they have to challenge themselves to pass all three game levels. In addition, future versions of the game may include specific Kurdish language modules in secondary or primary schools in the Kurdistan region of Iraq to help students cover module topics and assist instructors.
4. China Word: Vocabulary Quiz Game for Promoting Chinese Vocabulary Memory among 10th Grade Students [12].	
This research aims to develop a China Word mobile game application to promote Mandarin vocabulary memorization for 10th graders.	China Word Game has been developed to help improve the quality of Chinese vocabulary learning and serve as an alternative classroom material that can make lessons more engaging. Games will also increase students' enthusiasm in class, reduce their boredom when learning

	dry, outdated grammar, or prevent them from avoiding complex Chinese vocabulary.
5. Development Finite State Machine Agent in Edugame "Hangug Word" Learning Media of Korea Hangul Letters [13].	
Develop a game called "Hangug word" as a medium for learning Korean Hangul Letters with Game Agent Finite State Machine based on Android, which can be exciting entertainment and teaching media and aims to recognize Korean Hangul letters.	This research is an Edugame that uses random shuffle, which functions to randomize objects with the aim that players can not only remember the location of things in the game. There is a character in the game (smart agent) who interacts with the user. There need to be improvements and additional features so that this game can appear more attractive.

From the table, it can seem that educational games are quite effective media that can use for character recognition or learning because they can provide new experiences for users, not only knowledge but also playing. We can see also that each game has a different concept in the design of its educational game. Still, the game mechanics may have similarities in both the matching system or the adoption of serious games such as crossword puzzles but do not forget the educational aspect. The initial game mechanics may or may not change, depending on the designer's needs, but its content will be altered to present the learning aspect correctly [18].

Determining the target audience is very important in shaping edugames. Tracy Fullerton offers a "playcentric" method that can be used in designing a game, where the involvement of players has been done from the start to get feedback and is the key to designing games that are fun and involve the audience because the game mechanics are developed from the ground up with the player experience in the beginning [7].

Tracy Fullerton, in his book entitled "Game Design Workshop: A Playcentric Approach to

Creating Innovative Games," Tracy Fullerton divides the elements in designing games into two elements, namely formal elements, and dramatic elements. Formal elements consist of Player, Objectives (objectives), Procedure, Rules, Resources, Conflict, Boundaries, and Outcome. In comparison, dramatic elements consist of Challenge, Play (Play Pattern), Premise (Basic / Foundation), Character (Character), Story, World-Building, and The Dramatic Arc (Plot).

To gain insight from some of these games, the researchers tried to dissect some of these games using Fullerton's theory to find some approaches to learning letters or scripts through mobile educational games.

Fullerton explains formal elements are structural elements used in building a game design, "[Formal elements] are elements that make up the structure of a game. Without it, the game is no longer a game... This is the essence of the game [7].

1. Player:

According to Fullerton, games are experiences designed for players. If a player has entered the game, they adopt the responsibilities and abilities determined, how many players are there, and what roles are played. In the game, the player uses the characters provided or plays the role of himself.

In the game "Learning Arabic With Games" [9], players play a monkey child character with a single-player type of game. In the game "China Word Uiphanit & Sunandha" [12], players will be invited to choose a character for children who wear typical Chinese clothes, but the selected character is a partner. The character has its mission because the character saves for questions in the form of words in the game. For example, Chinese language and players must guess the inscription in Thai; otherwise, monsters will attack the character and reduce the score. The "Hangug Word" Edugame [13] uses a single player, but the player will be accompanied by a character who acts as a reacting agent when the player succeeds or fails to complete each level.

In the game titled "Memory Song Game" and "Match Puzzle Game" [10] using single-player, where this game does not use the player's character being challenged to drag and drop Hiragana and Katakana script cards according to their respective places using the Drag and Drop game concept. Single-player is also applied to the game "Kurdish Language Game" [11].



Figure 3 Character on China Word game.



Figure 4 Character on China Word game.

2. Objectives:

Objectives are the player-specific steps to win the game, complete stages, defeat enemies, etc. Goals will motivate players to engage with the dynamics of the game.

Educational games can adopt games that have simple objectives, such as the "Kurdish Language game" [11], which adopts serious games such as crossword puzzles by finding hidden words, or in the Memory Song Game" and "Match Puzzle Game" [10], Players have to drag and drop the image on the right square.

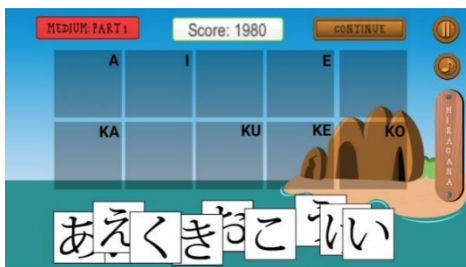


Figure 5 Matching the correct matching.



Figure 6 Kurdish Language game-player have to find hidden words from random letters.

Educational games aim to provoke players' interest to learn while playing so that the learning process occurs in the game. In games have different goals, the goals of learning also must be fulfilled. For example, in Learning Arabic With Games" [9], there is background music in the background music and the sound of the pronunciation of falling objects such as letters or words. Players indirectly learn new words through the objects collected.

3. Procedure:

Procedures are ways of playing and actions that players can take to achieve game goals. The procedure of playing, starting from the beginning to the end of the game. How the players reach their destination, the way the opponent stops them.

In "Learn Arabic With Games," the player's task is to move the monkey towards objects that fall from above, such as Arabic letters, words, fruits, monsters, etc. The player must avoid a lion-shaped monster for player gameplay with object collection.



Figure 7 Monkey's kids have to collect some objects.

This game aims to make basic knowledge habituated to further knowledge, and the level will continue with increasing difficulty levels, such as the same letter shape, writing variations, and others.

4. Rules :

Rules are restrictions that apply and should not be violated in a game. Rules contain lists that players can and cannot do, such as finishing the game with the allotted time. If it is too late to finish the game, the player cannot start the next round. The player only has a few chances. After that, the player must guess the right one, and so on.

In digital rule-based games, the game has been determined at the beginning of the game so that players will know the rules that have been made. Fullerton added that the players obey these rules because they are the main structural elements of the game, and without them, the game will not run [7].

5. Resources:

Resources are resources that players need in playing the game, such as lives, health, opportunities, food, duration/time, weapons, currency/coins, power-ups, etc. These resource limitations allow players not to have immortality so that the game will take advantage of opportunities with considerations, and game strategies become more exciting with these limitations. As in Learning Arabic With Games” [9], players have resources in the form of 3 lives. If the lives run out, then the player must repeat at that level. On the other hand, the Memory Song Game and “Match Puzzle Game” [10] do not limit the resources in the form of lives/opportunities. Hence, players are free to stop at any time. So that players will get less pressure in the game.

6. Conflict:

Conflict is an obstacle or feud faced by players against enemies/opponents that must be through. In the China Word game [12], they will face several obstacles. If they want to win the game, the player must answer questions to choose the correct answer. On the other hand, they must answer the question correctly before time runs out, and some monsters will attack the character.



Figure 8 Conflict on the china word game.

7. Boundaries:

The area limitation of the World game that the player can reach has been created, so the player will not be able to go anywhere other than the area determined. In games that adopt board games, the game will only be limited to board games, even though it is a digital game, unlike games with adventure or racing genres, players will feel the boundaries of a wider area.

Boundaries on Learning Arabic with Games” [9] is in a forest area and is limited by tree trunks. Therefore, players can only observe the site and cannot leave the room.

While in the game "Hangug Word" Edugame [13]. Creating an area is like being in a traditional place in Korea, but because the game is to match words with pictures, the characters only work as agents who help players, so they can't move around.



Figure 9 Boundaries "Hangug Word" Edugame

8. Outcome:

Rewards/results that players will get after playing the game include coins, scores, stars, the fastest time during gameplay. According to Fullerton, uncertainty in the outcome is one of the most important for a game based on play centric because it is the main motivator for players [7].

In the games "China Word Uiphanit & Sunandha" [12] and "Hangug Word" Edugame [13], the results

were different, namely in the form of scores and rewards in the form of stars.

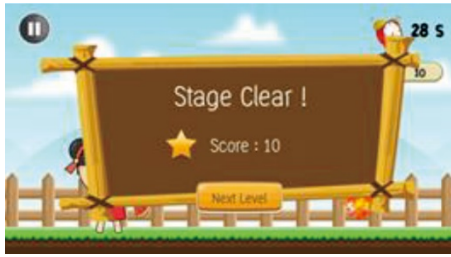


Figure 10 Outcome of the china word game.

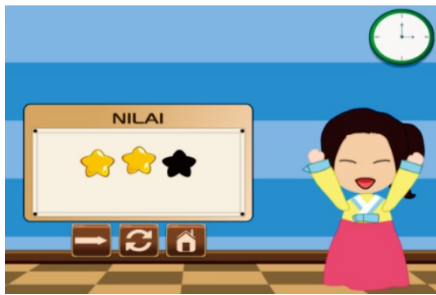


Figure 11 Outcome "Hangug Word" Edugame.

Besides consisting of formal game elements in building a game, drama elements are also needed. Fullerton explains the dramatic element aims to engage players emotionally by creating dramatic content. The element of drama helps players understand the rules and encourages players to have emotional interactions in the game. Here are some of the dramatic elements in a game.

1. Challenge:

Challenge in China Word - Game [12], Players will be given 30 seconds to answer each game, and if the answer is correct, the character will attack the monster and increase the score. If the answer is wrong, then the monster will attack the player character and reduce the score. The player must complete each level to move to the next level. If it fails, then the player must repeat at that level.

In the "Kurdish Language Game" [11], the challenge is that this game has three levels Easy, Medium, Hard. The higher the level, the more words you will find. The higher the level, the more words that must be found. Unfortunately, there is no time limit given, so that the Challenges presented focus on completing the game without a time limit.

2. Play :

Fullerton explains that there is a deep and important relationship between game and play. Engaging with a game system means playing it, but playing itself is not a game. [1] "Play" is the amount of movement the steering wheel can make. Interactive patterns that players can do in a game. If the game is not made interactive, then the "play" process in the game is reduced.

In Learning Arabic With Games" [9], what happens is that even though players have limitations, players still have the freedom to direct children in the desired direction, choosing the objects they want to collect.

3. Premise:

Premise Is the basis in building a narrative game so that the purpose of the game is made. Fullerton gives an example of the game's premise from a "monopoly" board game where the players are each landlord to become the richest player in the game. They buy, sell, and develop valuable items by buying, selling, and creating real estate items [7].

Unfortunately, some of the journals we researched did not explain the narrative concept of the games they made. Some educational game genres focus on the learning they want to convey, so they don't develop a premise that is one of the dramatic elements so that players feel they have an emotional involvement.

4. Character:

Characters are people or figures who are around the game world and become part of the game. Some character-making games in a game can be intense so that players know the character well, know the abilities, weaknesses, and how to play the function of the character in a game.

In the "China Word game" [12], two characters can be identified as a child who wears traditional Chinese clothes and a monster who is the opponent as a conflict in the formal elements of the game. While in Hangug Word," Edugagame [13] tells a character who acts as a smart agent who reacts when the player succeeds or fails to complete each level.

5. Story, World Building & The Dramatic Arc (Plot)

Not all games can be identified without a story in them, depending on the purpose of the game being made, because some simple games are only made for simple purposes too. However, games that have story elements will, of course, increase player engagement in the game.

In some of the game research that we examined also did not explain the story in the game they made, so if the "story" of the game has not been identified, then the same goes for "World Building" because "World Building" is the world of the game that was built, if the story is the part that completes the profile of the character or the purpose of the game itself, then the world-building is even more significant because it is part of the scenario how all these characters appear like things in making a fictional film.

The Dramatic Arc (Plot) Is a plot or scene that will occur in the game. The plot can display scenes that players will face from low levels to the next level so that players have a desire or curiosity to continue the game.

4. CONCLUSION

In some elements of society, especially those interested in traditional culture and arts, either locally, groups or individuals have realized that regional scripts decline. Hence, they try to preserve them in various ways [3]. In the field of design, one of the things that can be offered is the development of educational games regarding the introduction or learning of scripts/Aksara.

Games are also one of the growing sectors in the creative economy. From several research results regarding literacy learning, using educational game media has entirely satisfactory research results. The results have a good impact, especially in terms of the players' enthusiasm for using it. It would be nice if there were research on the design of educational games regarding character recognition using game media in the future.

From the results of a comparison of several educational games about characters, it can be seen that if using the theory from Tracy Fullerton, the game can be dissected into two elements that support in making a game, namely formal elements and dramatic elements. The more elements that are fulfilled, the more complex the game, the more conflicts there will be given will be more challenging and high difficulty

of the game. However, if the elements are not met, the game will tend to be monotonous and flat.

Of the several games that have been dissected, they are very focused on the content they want to convey, namely education, so some elements of the game from Fullerton's theory have not been fulfilled. Still, it does not significantly reduce the effectiveness of educational games. Furthermore, the use of good visuals will also significantly affect the appearance of a game. Considering how complex the existing games are, educational games should offer an attractive appearance to attract the target audience's attention.

The use of game media in education can provoke participants' interest in learning while playing so that learning is conveyed to students. Moreover, through these media, learning can be more fun for the *audience*. From this research, it is hoped that readers will gain insight into approaches that can be used in learning scripts through mobile educational games to be used to develop learning games for the traditional script in Indonesia.

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