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Storyboard Visualization for Gamification Design for Deaf Children's Education Using Octalysis Approach

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ABSTRACT

Deafness is a condition of deafness that makes it impossible to perceive various sound stimuli. Therefore, for the education of hearing-impaired students, it is necessary to develop special methods for the learning process, especially with regard to personality learning. In this digital age, the use of digital media and technology is a very suitable solution, especially in the field of education. The purpose of this study is digital by prioritizing visual elements in a way that hearing-impaired students can see and understand, that is, by creating gaming for hearing-impaired students. It's about developing learning media. Gamification aims to support the process of education and learning for hearing-impaired students. Gamification has a framework called octalysis. Octalysis is a tool for strategic and visual analysis of gamification. The way to design a gamification is to create a visualization in the form of a storyboard based on the gamification framework. Storyboards can be used as the basis for developing gamification, allowing you to focus more and convey the material presented. As a result, by creating a good storyboard, you can create the right gamification visualizations for hearing-impaired students to motivate them and capture the power of learning offered at school.

Keywords: Deaf Student, Gamification, Octalysis, Storyboard, Education

INTRODUCTION

Deafness can be interpreted as a state of hearing loss which results in students not being able to catch various stimuli, especially through their sense of hearing. Due to its limitations, it is necessary to design a special method for the learning process of deaf students (Juherna, et al., 2020). To help deaf children can be developed various kinds of visualization. One of the visualizations that has been done is to make a device with a local network that can visualize sign language into the system into a text, the results of the research have confirmed that the system can recognize speech correctly when the content is simple. When the content is complex, the accuracy is low, but it can be improved by adjusting the speaking speed (Nguyen, et al., 2017). Visualization to help the deaf in learning has also been done by developing gamification. Gamification is a learning approach by applying elements in the game to non-game situations, so as to increase the attractiveness of the learning process as a mechanism to increase motivation and learning outcomes (Dicheva, et al., 2015). Through gamification students can better understand the material to be taught through game media with a more pleasant atmosphere. To develop gamification, a special design is needed, especially in conceptualizing visualization in the game, one of the visualization methods used to develop gamification is to create a storyboard. A storyboard is a pictorial representation of a story. Storyboards can be used for a variety of purposes. Storyboards are often used in the development of new technologies to illustrate imagined scenarios of how application features work (Truong, et al., 2015). Therefore, research will be conducted on how to design storyboards in order to meet the needs of deaf students in order to create maximum gamification.

LITERATURE REVIEW

In this literature review section, several theories that support this research will be explained, such as regarding deaf students, gamification, octalysis and storyboarding.

Deaf Student

Deaf student or Hearing impaired students are those with hearing loss and speech impairment. Experienced deafness leads to an understanding of very complex concepts and cognitive intellectual abilities that are generally behind compared to regular students (Wuryanti, 2018). Deafness is an individual who has different psychological, social, and cultural aspects. (Solichah, 2014). Psychologically, hearing-impaired children tend to be egocentric, impulsive, rigid, frustrated, suspicious, or easily worried. With such mental illness, hearing-impaired children tend to be socially dependent and separated from society (Jatnika, 2020). A teacher should be able to maintain student interest in learning by generating and designing innovation as one of the strategies (Sulispera & Recard, 2020) When teaching hearing-impaired students, visualization of learning materials is one of the key ways to meet the needs of special education. ICT and the latest technology are important in this context. Presentation of learning materials both during class activities and during the self-learning process (Krasavina, et al., 2019) .

Gamification

Gamification emerged with the development of Science and Technology. This affects the development of new learning resources and learning media. The computer is currently a tool that is starting to be used to develop computer-based learning media (Information and Communication Technology / ICT). ICT is now an important tool in influencing the quality of a country's education (Brown, et al., 2009). With Gamification, the implementation of digital media learning for students has the benefit of increasing student

motivation in learning so that the learning process becomes more effective. One of the benefits of games can also improve students' cognitive and reasoning skills, because students must make decisions in the form of giving simple commansds through game controllers. The reason for increasing student learning motivation through gamification is described in a framework, the framework contains elements starting from dynamics whose effects are generated from the mechanics produced by components (Boudadi & Colon, 2020). An important aspect of gamification design is the context in which it is applied. Not all contexts are suitable for gamification. (Nacke, 2017)

Octalysis Framework

One of framework will use in this paper is called Octalysis. Octalysis is a tool for strategy building as well as analyzing gamification (Cruz & Oliveira, 2018). According to Yu Kai Chou as the inventor of the octalysis framework, there are eight drives for humans to be motivated to carry out certain activities (Landsell & Hagglund, 2016) . The eight drives are referred to as core drives. These core drivers are :1) Meaning & Calling, 2) Development & Accomplishment, 3) Empowerment of Creativity & Feedback, 4) Ownership & Possession, 5) Social Influence & Relatedness, 6) Scarcity & Impatience, 7) Unpredictability & Curiosity, 8) Loss & Avoidance. Within each core, there are a number of game elements to suit every drive. For example, points, badges, Leaderboards, rewards and progress bars are closely tied to the core achievement boost. This is only one approach to engage users in use applications based on perception; the more they use the app, the bigger the rewards and points they will get. (Ewais, 2015)

a. Meaning

Users when carried away by this core will be motivated if they can do something greater than themselves. In a game, the existence of a narrative can strengthen this core. For example, when entering the game, there is a narration as well as an explanation and explains how the characteristics are in accordance with the game's objectives so that users can be motivated

b. Accomplishment.

The next Core Drive is the development and achievements achieved by users so that it motivates them to get more achievements.

c. Empowerment of Creativity and Feedback

In this Core, users can be motivated because of challenges that make them repeat games that require creativity and high thinking.

d. Ownership and Possession

This core relates to the user's motivation for getting something after completing the game, because of this achievement the user can collect something that is a matter of pride and feeling of belonging.

e. Social Influence and Relatedness

This core unites all the social elements that drive a person. Such as acceptance, social responsiveness, friendship, and competition and jealousy

f. Scarcity and Impatience

These cores keep players motivated to get something they can't have due to time constraints. For example, there is a special event that can only be achieved once a month, so users will wait for the event to come and continue to play the game.

g. Unpredictability and Curiosity

This core makes players motivated to play the game because there are things that are unpredictable and the plot in the game is not easy to guess so that players will tend to play the game until it's finished.

h. Loss and Avoidance

This core is an encouragement to the user to avoid defeat which results in losing something that was previously obtained

Storyboard

According to Luther, Storyboard is a description of each scene that clearly describes the object and its behavior. The storyboard is an area containing sketch images that are used as a planning tool to visually show how the action of a story. Storyboard also plays a role in determining the time, point of view, linkage of elements in one frame. Storyboards are a way to outline a sentence as a planning medium (Kardian & Pratiwi, 2017). Storyboards can combine stories and visualizations to align scripts and visuals. This storyboard will help you lay out the plot and create a rough drawing before creating the original product (Pardew, 2005). Basically storyboards are used to make films or games, at this time Storyboards are very suitable for conceptualizing a digital game, especially in conceptualizing educational-based digital games, because through storyboarding the concept of educational-based digital games can be made effectively (Fujima, et al., 2014). The concept in making a game is the same as making a story with a sequential plot so that the user can understand what story or material the developer will bring, therefore making a storyboard is like making comics. Many researchers say that making comics or storyboards for educational purposes is a positive contribution from a visual perspective (Mou & Chen, 2013), This is because research is being conducted to teach math courses by developing a system called The Mat that combines cartoon characters to support education and provide mentoring. The results of this study will allow students to become more interested and have new experiences, resulting in a better understanding of their materials (Herbst, et al., 2011).

RESEARCH METHOD

In this study, it focuses on making and visualizing the basic storyboard design which can then be developed into a complete gamification. The first step is we must know the standard format of storyboard.

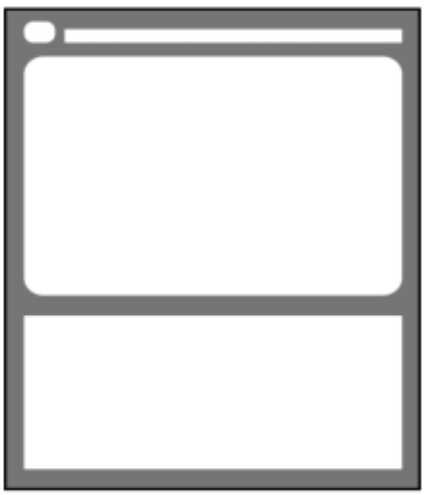

Figure 1 Standard Format of Storyboard *(Pardew, 2005)*

The picture shows a storyboard template consisting of several parts. Some of these sections are the main section for displaying footage from the game that is presented, and below it there is a section for writing descriptions of the images presented, which can be in the form of descriptions or illustrations of the images displayed. The storyboard

must be adapted to the purpose of its manufacture, if to make gamification then the storyboard must include the components that exist in gamification.

According to Boudadi, N. A. & Colon, M. G., (2020) in gamification there are several levels of elements, namely dynamic, mechanics and components. Starting from the most basic, namely components. The gamification e consists of characters, prizes, levels, points, and some descriptive content about the game. Therefore, storyboard creation also needs to be coordinated with this level of elements. So we can make storyboard to display the front view, achievements view, and setting view to support the mostc basic elements.

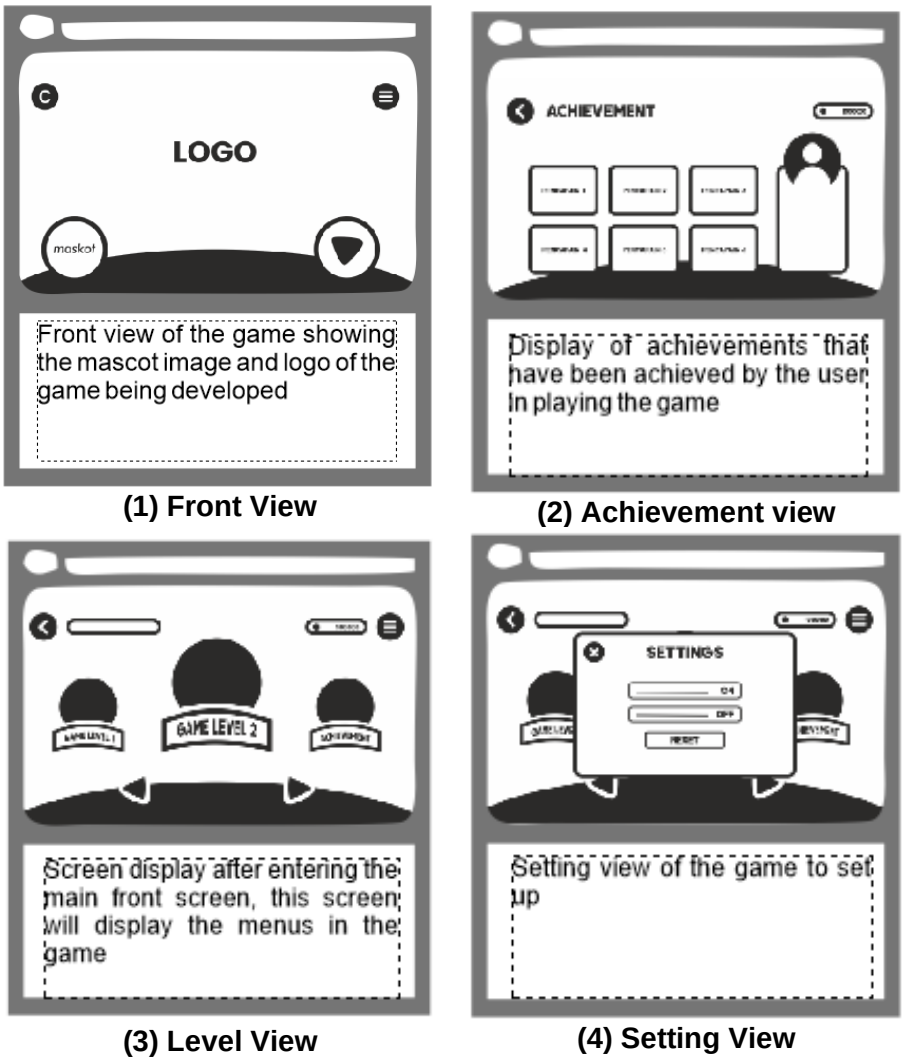

Figure 2 Component level of Element Gamification

The next element of gamification is mechanics which is a process that is carried out in gamification such as challenges, opportunities, competitions, feedback, prizes, transactions, turns, and how to win.

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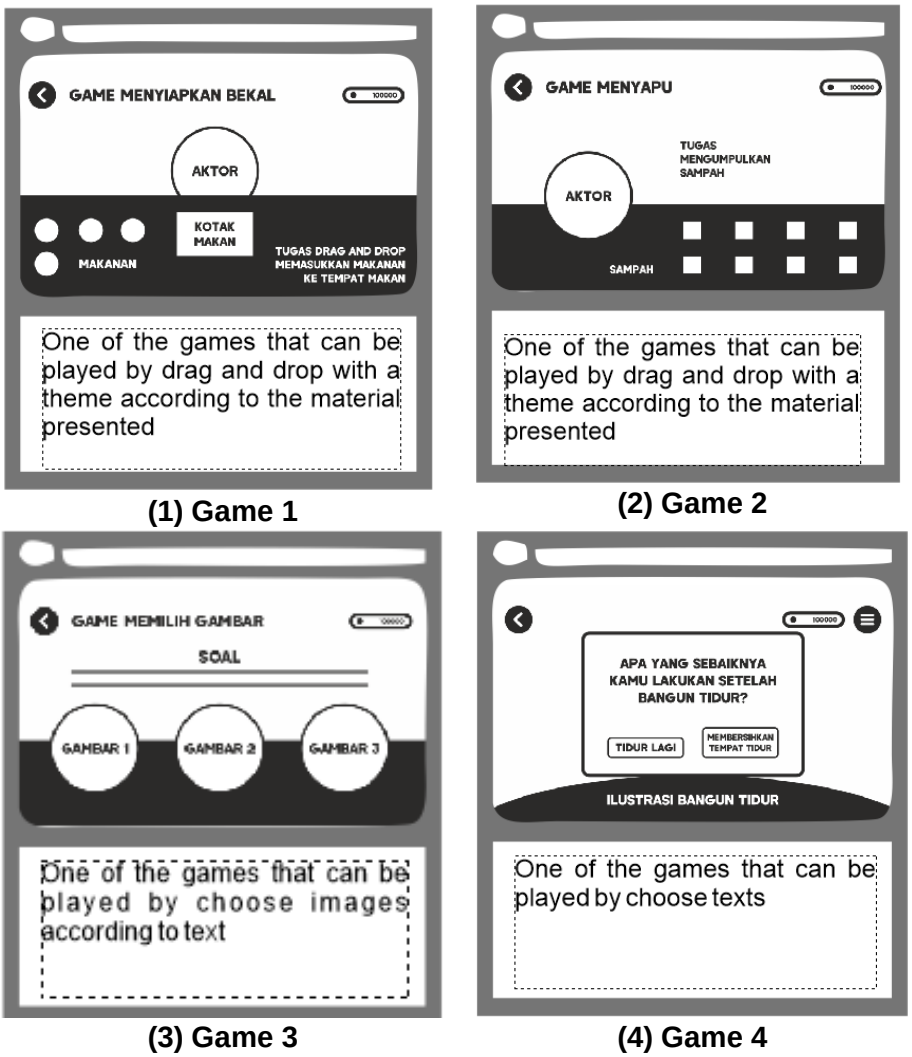

Figure 3 Mechanic level of Element Gamification

RESULTS

In figure 2 there are several storyboard panels, starting from Front View (1) which contains narration and explanations about the game, characters, etc. This section is an important framework of gamification called Meaning. After that the level view that must be reached by the user so that it will stimulate the creativity and ability of the user, this section is included in the gamification framework, namely Empowerment of Creativity and Feedback at this level, if the user plays together with other friends, it can lead to competition and jealousy which can increase motivation users to reach a higher level, especially there are achievements that can be achieved by users so that the motivation to get many achievements will increase, in the gamification framework this is referred to as Social Influence and Relatedness and Ownership and Possession

Another Gamification Framework can be found in the storyboard collection in figure 3 which shows how the game runs, as a game that is shown for deaf players, the game is designed as attractive as possible with clear game goals and objectives. In addition, there is a gamification framework that can encourage players to play the game, namely Unpredictability and Curiosity, meaning that something will happen when the game has

been played or vice versa, players will avoid defeat because players will lose something in the game if they lose. Loss and Avoidable). If we summarize in a table it will be like the following table

Table 1 Core of Octalysis Framework

Code	Elements
A	Meaning
B	Accomplishment
C	Empowerment of Creativity and Feedback
D	Ownership and Possesion
E	Social Influence and Relatedness
F	Scarcity and Impatience
G	Unpredictability and Curiosity
H	Loss and Avoidance

Through these eight cores it can be designed what parts of the game need to be designed in the storyboard before finally becoming a complete game, here is the relationship between the appearance in the game and the octalysis framework

Table 2 Relationship Between Game Display and Octalysis Framework

Core	A	B	C	D	E	F	G	H
Main View with showing character	V	V						
Achievement view		V		V		V		
Challenge menus		V			V			
Screen if successfully completed the task							V	
Screen if failed to complete the task								V
Main Game	V		V	V		V	V	V
Information about the game	V							

Each game display has several cores contained in it, the more cores that enter the game display or visualization needs to be considered such as the Main view, Achievement View, and Main Game View.

DISCUSSION

Deaf students will respond more through the visuals presented from the designed gamification, therefore the materials that will be delivered into the gamification can be compressed on a display that contains many cores from the octalysis framework. Based on interviews with several game users also stated that if the octalysis framework is true it can make someone always motivated to play games, therefore based on the research that has been done it can be analyzed the display that needs to be followed up so that the visualization is more interesting and easy to understand, especially for deaf students.

The views include Main View, Achievement View, and Main Game View. In the main view section where characters will also be presented as if they will show the characters being played, because the target is deaf students at the elementary school level, the image of the character must also be adjusted like a picture of a small child with other characters who are fellow small children and carry out daily activities. together. In addition to acting as Meaning which means making players feel as if they are characters in the game, Main View also serves as the first impression when the user enters the game so it is very important to pay attention to the quality of animation and visuals. The

next visual that needs to be prioritized is the Achievement View because it is one of the main reasons users play the game, namely to collect the achievements obtained after completing the game. Achievements that need to be distinguished for each game or material that has been completed so that the user has more motivation to play each game and learn all the material in order to get the achievement. and Visualization which is very important to prioritize, namely playing game view, because it is the essence of gamification, namely the appearance of the game itself, making sure all game and educational elements can be summarized into a fun game with visualizations that are easily captured by the user especially deaf student.

CONCLUSION

Visualization is important for designing gamification, especially if the user is a deaf student, to design gamification so that it has a basic design before being developed into a complete game, storyboards can be made. Making this storyboard shows the parts of each game and is analyzed using an octalysis framework approach. The parts that need to be given more visuals are on several displays such as the Main Menu, Achievement Menu, and Main Game. For this reason, the storyboard needs to be visualized as well as possible in some of these parts so that when it is developed into a complete gamification it can become a game with attractive visuals so that the game material to be delivered can be well absorbed by deaf students who can only rely on sight to learn.

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DECLARATION OF CONFLICTING INTERESTS

In this study, there is no relationship with certain institutions

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