Gamification design for high school student with unstable internet connection during covid-19 pandemic

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Abstract. Balinese society is a unique combination of traditions, culture, religion, values and moral values with a background of beautiful nature. As the centre of this combination is the Hindu Religion, which is the faith of the majority thus it is taught to students from elementary school to high school. However, the Covid-19 pandemic, the teaching of Hindu religion has been switched to online learning, at it poses challenges, such as lack of technological skill on the part of the teachers, unstable internet access, the use of large internet quotas, and inadequate electronic devices on the part of the students. The methods that can be used to increase student motivation and student involvement is gamification. Marczewski Gamification Framework was used to design gamification in Hindu religious subjects. In this study, the achiever user type was applied. This research used 3 game mechanics, Level/Progression, Quest/Challenges, Achievements/Rewards.

1. Introduction

Hindu religious education is not only about divinity but also about customs, manners, and moral values which is very important to be taught from an early age. At schools, students also get Hindu religious lessons, starting from elementary school (SD) to senior high school (SMA). This continues up to high school level since the high school period is a period of self-discovery. Therefore, it is necessary to teach moral values and ethics contained in Hinduism so that students do not do negative things. So far, Hindu religious subjects are taught face-to-face in class. The interaction between teachers and students is easier. Besides that, students are easier to understand what is being taught.

However, since the spread of the corona virus (COVID-19) in Indonesia, more and more people have been infected with the corona virus which has an impact not only in the health sector but also in education. To prevent the spread of the corona virus, the government closed the schools. Students are required to study online from home with all the limitations that exist. Teachers who do not understand using technology, the unstable internet access, the use of large internet quotas, and students do not have adequate electronic devices were identified as the challenges during learning from home. The availability of access to the internet is the main thing in online learning. Internet access may not become a problem for urban area however, rural areas still struggle for the stable internet access, even they sometimes do not have access to the internet. With the lack of internet access, online learning cannot be carried out optimally. Students have difficulty accessing learning videos or assignments given. It was experienced by 11th graders at SMA Negeri 1 Banjar, located in Banyuatis village which...
is surrounded by hills. Sometimes, it is difficult to get internet access. Students are given material along with assignments that must be done online with a submission time limit of 2 to 4 hours. However, the internet connection is often unstable, causing tasks that are received or sent are often late. In addition, online learning causes almost no interaction between teachers and students. So that the involvement and motivation of students to learn decreases. The decline in student interest in learning can be seen from the number of students who do not collect assignments in Hinduism subjects.

Therefore, it is very important to increase student motivation and involvement even in online learning. What can be done is to make learning more fun, and interesting. When learning is made more fun, students will learn on their own without any pressure. In order to make learning more fun and interesting, the use of gamification method is the right choice. Gamification is a practice of game mechanics in non-game contexts [1]. Gamification uses elements in the game, making learning more fun [2]. In addition, the use of gamification in education can achieve the expected learning objectives. The use of gamification in education is no longer a new strategy. Research from Burke proves that gamification can increase student engagement and interest in learning [3]. By conducting tests on 100 students and in general gamification has a positive encounter on student participation in lessons. Likewise, research conducted by Wkh et al. related to the use of gamification for student learning in technology and law lessons [4]. The results also showed that gamification can increase learning motivation and students really enjoy learning with the gamification method.

2. Literature Review

2.1. Gamification
The term of gamification is first coined by Nick Pelling in 2002 to describe the process of change on user interface to make electronic transactions game-like and more fun [5]. Gartner defines gamification as the use of game mechanics and design experiences to digitally engage and motivate people in pursuing their goal [6]. Werbach sees gamification as a process and defines gamification as the process of creating a game-like activity [7]. Gamification is not as complex as game. It can be said that gamification is simpler than games because gamification only uses game elements and does not need space like games [8]. Gamification can be in the form of giving points or badges when the user has completed a task or is involved in an activity.

2.2. Marczewski’s Gamification Framework
On his research, Marczewski proposed a gamification framework that consists two parts. Part one is eight questions to ask yourself when starting to design gamification. Part two is list of things to remember about gamification [9].

![Figure 1. Marczewski’s Gamification Framework.](image-url)
2.3. Marczewski’s User Type Hexad
On his research, Marczewski divides users into six types based on what motivates them. There are six types of users [9]:
1. Socialiser, are motivated by connectedness. Socialiser wants to interact with other people and make social connections.
2. Free Spirit, are motivated by autonomy and self-expression. Free Spirit wants to create and explore.
3. Achievers, are motivated by mastery. Achievers wants to learn new things to develop themselves. This type also wants a challenge for them to overcome.
4. Philanthropist, are motivated by purpose and meaning. Philanthropist wants to contribute and improve others without expecting a reward.
5. Players, are motivated by rewards. Players will do anything to be able to collect prizes. Players only thinks of themselves.
6. Distruptor, are motivated by change. Distruptor will interfere with the system either directly or through other people. Distruptor wants to force positive or negative changes.

![User Type Hexad Diagram](image)

**Figure 2.** Marczewski’s User Type [9].

3. Research Method
This study applied Marczewski Gamification Framework to design gamification for increase learning motivation high school students with low internet connections during the Covid-19 pandemic. There were two phases in this research, namely the planning phase and the design development phase. In the planning phase, there were three things done. The first stage was the “What” question. “What activities will be gamified?” This stage determined the learning activities that will be gamified. The second stage was the “why” question. “Why is it gamified?”. This stage is to determine the underlying reasons why the activity is worthy of being modified. The third stage was the “who” question. “Who are the user?” This stage aimed to find out who the users are involved in the gamification system to be made. Knowing the target user is important because it determined what motivates them in learning and helps to solve the problem of user who are not motivated in learn[10].

In the development design phase, there were two stages carried out. The first stage was determining the motivation of the users who have been determined. The second stage was selecting feedback and game mechanics to be used for gamification.
4. Result and Discussion
Gamification design for Hindu religious lessons applied the Marczewski Gamification Framework. Marczewski Gamification Framework is the most widely used in the design or development of gamification [11]. Its main focus is on planning and design, which is outlined in Table 1.

Table 1. Planning and designing based on the Marczewski Gamification Framework.

| No | Question | Answer |
|----|----------|--------|
| 1  | Planning |        |
| 1.1 | What is being gamified? | In this study, researchers planned to design a gamification for Hindu religious teachings, in the form of a web and also an SMS gateway. |
| 1.2 | Why is it being gamified? | The main reason was the difficulty of internet access and also the lack of interaction between teachers and students in online learning. It caused student motivation and involvement in Hindu religious lessons to decrease. |
| 1.3 | Who is the users? | There would three users who would use it. The first would be the admin whose job would be to manage and enter questions. The second would be the teacher, who would be in charge of correcting student assignments and giving badges. As well as students who answer assignments. |
| 2  | Design   |        |
| 2.1 | How to gamify? | In this design, two elements from the Marczewski Gamification Framework would be used, namely motivation and game mechanics [11]. Motivation would be used to determine the type of user, and the game mechanics that would be used are adjusted to the type of user. |
| 2.1.1 User Types | The type of user in this gamification design would be the achiever. The goal would be that users increase their knowledge, learn new things, and pass existing challenges or exams [10]. |
2.2 Game Mechanics

This gamification design would use 3 game mechanics from 5 game mechanics in the Achiever user type, Level / Progression, Quest / Challenges, Achievements / Rewards.

1. Level/Progression

The level of gamification would be based on the material topics taught in the Hindu religion subject, which consists of 3 subjects, namely yogasanas, yajna and moksha. Therefore, the level in gamification would be adjusted to the basic competition into 3 levels.

2. Quest/Challenges

The level in this gamification would be based on the material topics taught in the Hindu religion subject, which consists of 3 subjects, namely Yogasanas, Yajna and Moksha. Therefore, the level in gamification would be adjusted to the basic competition into 3 levels.

3. Achievement/Rewards

The rewards that each student would get for completing the challenge are points, badges, and trophies.

a. Points

Points would be earned by students after completing each level.

b. Badges

There would be 3 badges obtained by students if they get points that meet the value requirements. The badges design would based on three holy characters, namely ANG, UNG, and MANG.

c. Trophies

There would be 2 trophies that students could get. The first would be awarded when students can complete the midterm exam. The second trophy would be awarded if the student could complete the final exam.

The gamification system can be accessed by students in two ways, namely SMS and the web. The SMS option is used when the internet is unstable, so students can choose this option in case of such conditions. Then the second option is students can access it via the web. The web was designed to be compatible with mobile devices, because the majority of students use mobile devices for online
learning. This is known based on a questionnaire distributed online to 40 students taking Hinduism subjects.

![Diagram of student device in online learning during pandemic.](image)

**Figure 3.** Graphic 1. Student device in online learning during pandemic.

With the conditions of the hilly area, it caused an unstable internet connection. Online learning using video or conferences is not possible. SMS is a solution for this condition, because SMS is text based and does not require a large bandwidth. The SMS option can be used for assignment information, announcements, submission of assignments, student status, points or student badges. Then the choice of the web is more optimized for the majority of smartphone users by reducing images that are too large so that load from the web requires less bandwidth. This option can be used for assignment information, announcements, submission of assignments, student status, student points or badges. An overview of the gamification system can be seen in Figure 3.

![Diagram of the gamification system.](image)

**Figure 4.** Overview of the gamification system.

In gamification, there is a need for game rules. Game rules are important to apply, because there are clear game rules about when to get badges, how many points are earned or determine to win and lose [10]. Figure 3 shows the rules used in the gamification design. The rules applied were leveling, giving points, giving badges and trophies.
This design was tested by content Expert and an instructional design expert. With the criteria shown in table 2 and table 3. The evaluation results showed the design is feasible to be implemented. Suggestions from instructional design experts added discussion activities to further increase student involvement in learning.

Table 2. Content Expert Assessment Criteria.

| No | Criteria                                           |
|----|---------------------------------------------------|
| 1  | Suitability of material with learning objectives |
| 2  | Suitability of material with target user          |
| 3  | There are no misconceptions                       |
| 4  | The consistency of the subject matter with the material |
| 5  | Material presented systematically                 |

Table 3. Instructional design Expert Assessment Criteria.

| No | Criteria                                                                 |
|----|--------------------------------------------------------------------------|
| 1  | Clarity of learning objectives used in instructional media              |
| 2  | Suitability of material and activities on learning media with learning objectives |
| 3  | The material is sorted logically and systematically                     |
| 4  | Increase user interest and motivation                                   |
| 5  | Increase user engagement                                                 |

5. Conclusion
Marczewski Gamification Framework can be used to design gamification in Hindu religious subjects. The type of user needs to be known in advance so that it is easy to determine the game mechanics to be used. In this study, the achiever user type was used. The Marczewski Gamification Framework has 5 game mechanics for the Achiver user types. It doesn't have to be all used. This research implemented 3 game mechanics, Level / Progression, Quest / Challenges, Achievements / Rewards.

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