## Implementation of Octalysis-Based Gamification Method Cross-Platform for Design of Time Management Application

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| Article Information | Abstract |
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| | Time management is an important skill in college. The greater the student's skill in managing his time, the greater the student's academic performance. However, there are students who do not have these skills and almost drop out of college. Therefore, application design and development are carried out.time management using the Octalysis framework gamification method, which is cross-platform-based so it can be accessed anywhere. The application has been completed and has been evaluated by 31 respondents using the Unified Theory of Acceptance and Use of Technology Model (UTAUT), amounting to83.20%. From the results of this evaluation, it can be concluded that the time management application was well received by students. |

## A. Introduction

A person's skills in managing time, completing tasks, and managing time effectively really help someone in their daily lives. Time management can be trained and developed in everyone. Especially for students, time management is a good and important character skill in college [1]. Students who have good time management have better academic performance [2]. The way students set goals, set deadlines, and feel in control of time has a significant correlation with their academic grades [3]. Time management is important for students, but there are still students who experience difficulties with time management. Many students who are on the verge of dropping out have problems with time management. These problems can include not being able to balance studies and work, often procrastinating on work, and being too active in activities outside of lectures [4].

Gamification is a human-focused design that optimizes the efficiency of human motivation [5]. Gamification based on information systems can increase interest and productivity [6]. Gamification has also been applied in time-tracking software applications, which show an increase in effectiveness of 28.4% compared to software applications that do not use gamification methods [7]. Based on a Kominfo survey in the ICT Use Survey (2017), 70.98% of students already have smartphones, 22.32% of students already have laptops, and 8.91% of students have computers. The survey also concluded that 60% of respondents agreed that developments in information and information technology encourage productivity at work. Based on this survey, it can be concluded that the largest use is smartphone use. Given this problem, a combination of a cross-platform-based time management and gamification application that can be accessed via smartphones, laptops, and computers was designed in the hope of motivating students to manage their time well.

In 2015, Yu Kai Chou succeeded in creating a gamification framework called Octalysis. By using this framework, the time management application that will be created can be assessed to see whether it is interesting for users [5]. This framework has been used to build Android-based learning applications, which have succeeded in increasing user interest by having a joy value of 85.14% and a perceived ease of use of 88.97% [8]. The octalysis framework is also used in learning applications for the JavaScript HTML programming language, which has succeeded in increasing user interest by having an evaluation percentage of 80.13% in the behavioral intention to use category [9].

There are several previous studies related to time management applications using the cross-platform based octalysis gamification method, including, "Application of gamification in e-commerce to improve the quality of sales for resellers and dropshippers (Nabillah Store Case Study)" by [10], "System design employee scheduling application at St. Theresia Jambi based on Android" by [11], "Implementation of an Android-based time and date combining activity schedule reminder application" by [12], "Analysis of an online learning system based on gamification collaboration to support independent learning using the octalysis framework" by [13], " Analysis of exercise habits during Covid-19 using the Octalysis gamification framework" by [14], and "Designing gamification in academic systems to improve student study progress" by [15]. Unfortunately, in

this research, there is no time management application using the cross-platform octalysis gamification method.

Therefore, this research aims to design a time management application using the cross-platform-based octalysis gamification method. One of the arguments by Yu Kai Chou [5] regarding the results of using the octalysis framework is that this framework can increase interest in applications. So this research designs and builds a time management application using a framework, with the hope that this application can increase user motivation to learn and improve time management. The design of this application will use the Unified Theory of Acceptance and Use of Technology (UTAUT) model to analyze student acceptance.

Time management is the ability to manage time possessed by carrying out responsibilities, planning, and scheduling in daily life [16]. Gamification is the process of combining rules in games, namely patterns, designs, and game mechanics, which aim to change non-game activities into activities to make them more interesting for users [17]. Octalysis is a gamification design framework; the name Octalysis comes from an octagonal shape (octagonal) with 8 core drives representing each side [5]. Cross-platform software is software that is developed on one platform and can produce applications on various other platforms quickly and easily [18].

## B. Research Method

The research stages carried out in this research are :

1. Literature study
   Starting with an in-depth look at the basic theories that support research, such as gamification, the octalysis framework
2. Needs Analysis
   Analyze the requirements needed for the application to be created. This analysis will be carried out by reviewing the results of the literature study.
3. Application Design
   Design the application based on the results of the analysis carried out previously, along with the gamification features that will be used.
4. Application Implementation
   Realization of the design that has been created by creating an application that is ready for use by the user.
5. Application testing
   Conduct trials on designed applications by asking students who are currently active in lectures to try the applications that have been created and conducting surveys regarding the applications.
6. Report writing
   Write reports based on application testing results from the previous stage.

**Figure 1**. Octalysis elements used [5]

Figure 1 is a gamification element in the octalysis core drive framework, which will be implemented in a time management application. The gamification elements used are: epic meaning and calling elements; accomplishment and development elements; empowerment creativity and feedback elements; ownership and possession elements; social influence and relatedness elements; scarcity and impatience elements; unpredictability and curiosity elements; as well as loss and avoidance elements.

**Figure 2**. Application Model

Figure 2 is an application model used to design a time management application. This model is based on references regarding applications that have been completed that use a real-time database from Firebase as data storage [19].

The time management application built using the Octalysis gamification framework functions to manage the user's time with a to-do list that the user will work on. Users can set the time to complete the to-do list, which will affect the amount of XP going up and down, which can make the user's level increase or decrease. The more time to complete the to-do list, the greater the XP the user will get when they succeed, and vice versa. When the user level increases, the user gets a summon ticket, which can be used to get a random plant. The variety of plants that can be found by the user is limited by the user level; the greater the user level, the more plant variations that can be collected. Users can also exchange a number of summon tickets to get a Claim Field Ticket, which can be exchanged to get land in the World menu, which is used to show off the plants they own. In the world

menu, the user can plant plants from inventory in the available fields. Here, users can decorate their own world with any plant and see how many likes have been given to the user's world. Users can see the positions of other users from the leaderboard menu. From the leaderboard menu, users can see worlds from other users, and users can like worlds from other users. Users can see the achievements or accomplishments that have been achieved in the achievement menu.

Flowcharts aim to explain the flow of the application to be built. Figure 3 is the main flowchart.

**Figure 3**. Main flowchart

When the user opens the application, they will enter the login/signup module. After that, the user will be taken to the timer module, and the user can move to another page using the tab navigator button. The navigator tab button can move the user to six pages in the form of: timer, to-do list, leaderboard, achievements, world, and summon.

## C. Result and Discussion
### a. Application implementation
The following are the results of the implementation of the time management application based on the application design that has been created.

**Figure 4**. Results of Running Timer Implementation

Figure 4 is a timer module where the to-do list will be carried out. Users can start the timer by pressing the start timer button and the timer will decrease.

**Figure 5**. Results of Completed Timer Implementation

Users can complete the to-do list by pressing the success button after the timer runs out. As in Figure 22, the user has 5 minutes after the timer runs out to press the success button. If the user is late in completing the to-do list, the success button will become a failure button. Users will experience a decrease in XP and an increase in XP based on the time on the timer. If, after the change, the XP is greater than the maximum XP, then the user level will increase. Conversely, if the change in XP makes the XP value smaller than 0, then the user level will decrease. The user's max XP is a value three times the user's level. After the user experiences a level increase, they will get one summon ticket.

**Figure 6**. Results of To-Do List Implementation

Figure 6 is a page where users can create a to-do list that will be done. Users can add items to the to-do list by pressing the floating action button, which will bring up capital to input information on the to-do list. Users can enter names, descriptions, times, and tags according to the user's wishes. Users can delete the to-do list they want to delete by sliding the to-do list to the left and pressing the delete button. Users can also start a to-do list by pressing the start button to move the to-do list to the timer module. There can only be one to-do list that can run at the same time.

**Figure 7.** Summon Implementation Results

Figure 7 is a summon module where the user can exchange 1 summon ticket to get a plant and exchange 5 summon tickets to get 1 claim field ticket. When the user presses the summon button, they will get a random plant that is influenced by the user's level. Plants obtained by the user will be displayed to the user. The plants that users get have a rarity; the greater the rarity of the plant, the

less likely the user is to get it. If the user does not have enough summon tickets, an error will appear.

**Figure 8**. World Implementation Results

In Figure 8, there is a world module where the user can exchange claim field tickets for land, and the land can be planted with plants owned by the user. Users can exchange tickets by pressing the floating action button. An error will be displayed if the user does not have enough ticket claim fields. Users can plant the land by pressing the empty land and selecting a plant owned by the user that has not yet been planted. Users can remove plants from the desired land by pressing the land and then pressing the remove plant from field button.

### b. Application testing

Application testing is carried out by distributing questionnaires using the UTAUT model and Likert scale. The distribution of the questionnaire was carried out using Google Forms. There were 31 respondents (students) who filled out the questionnaire. The questions asked of respondents are in Table 1, which is divided into 5 sections.

**Table 1**. Table of Value Intervals and Answer Categories

| Intervals | Category |
|---|---|
| 0%-20% | Strongly Disagree |
| 20%-40% | Don't agree |
| 40%-60% | Doubtful |
| 60%-80% | Agree |
| 80%-100% | Strongly agree |

Table 1 is the categories of answers to the questions given in the questionnaire distributed, and Table 2 is the results of the answers from the survey conducted.

**Table 2**. List of Questions and Questionnaire Answers

| Code | Question | SD | DA | D | A | SA |
|------|----------|----|----|----|----|----|
| | Effort Expectancy | | | | | |
| EE.1 | I feel the Your World application is easy to use | 1 | 2 | 0 | 12 | 16 |
| EE.2 | It's very easy for me to be skilled in using the Your World application | 2 | 1 | 0 | 16 | 12 |
| EE.3 | It was easy for me to learn how to use the Your World app | 1 | 2 | 3 | 12 | 13 |
| EE.4 | Interacting with the Your World app is clear and understandable | 1 | 2 | 1 | 15 | 12 |
| | Performance Expectancy | | | | | |
| PE.1 | Using the Your World application improved my time management skills as a student | 1 | 2 | 2 | 12 | 14 |
| PE.2 | Using the Your World application increases the effectiveness of my activities as a student | 1 | 2 | 1 | 13 | 14 |
| PE.3 | Using the Your World application increases the power opportunities to achieve higher achievements | 1 | 2 | 1 | 13 | 14 |
| | Social Influence | | | | | |
| SI.1 | A significant person in my life reminded me to use the Your World app to improve my time management skills as a student | 1 | 3 | 2 | 10 | 15 |
| SI.2 | My friend thinks that I would be better off using the Your World app to improve my time management skills as a student | 3 | 0 | 1 | 9 | 18 |
| | Facilitating Conditions | | | | | |
| FC.1 | I have enough tools and resources to use the Your World application | 3 | 0 | 0 | 14 | 14 |
| FC.2 | I have sufficient reasoning ability to use the Your World application | 1 | 2 | 1 | 12 | 15 |
| | Behavioural Intention To Use | | | | | |
| BI.1 | I plan to use the Your World app in the future | 1 | 2 | 1 | 13 | 14 |
| BI.2 | Assuming I can use the Your World application I intend to use the application | 2 | 1 | 2 | 17 | 9 |

Table 2 contains 13 questions which are divided into several sections, namely Effort Expectancy, Performance Expectancy, Social Influence, Facilitating Conditions, Behavioral Intention To Use.

**Table 3**. Table of Percentage Results of Questionnaire Scores with Likert Scale

| Code | Formula | Answer |
|------|---------|--------|
| EE.1 | ((16*5)+(12*4)+(0*3)+(2*2)+(1*1)/(5*31)*100%) | 85.80% |
| EE.2 | ((12*5)+(16*4)+(0*3)+(1*2)+(2*1)/(5*31)*100%) | 82.58% |
| EE.3 | ((13*5)+(12*4)+(3*3)+(2*2)+(2*1)/(5*31)*100%) | 81.93% |
| EE.4 | ((12*5)+(15*4)+(1*3)+(2*2)+(1*1)/(5*31)*100%) | 82.58% |
| PE.1 | ((14*5)+(12*4)+(2*3)+(2*2)+(1*1)/(5*31)*100%) | 83.32% |
| PE.2 | ((14*5)+(13*4)+(1*3)+(2*2)+(1*1)/(5*31)*100%) | 83.87% |
| PE.3 | ((13*5)+(14*4)+(1*3)+(2*2)+(1*1)/(5*31)*100%) | 83.22% |
| SI.1 | ((15*5)+(10*4)+(2*3)+(3*2)+(1*1)/(5*31)*100%) | 82.58% |
| SI.2 | ((18*5)+(9*4)+(1*3)+(0*2)+(3*1)/(5*31)*100%) | 85.16% |
| FC.1 | ((14*5)+(14*4)+(0*3)+(0*2)+(3*1)/(5*31)*100%) | 83.22% |
| FC.2 | ((15*5)+(12*4)+(1*3)+(2*2)+(1*1)/(5*31)*100%) | 84.51% |

| | | |
|---|---|---|
| BI.1 | ((14*5)+(13*4)+(1*3)+(2*2)+(1*1)/(5*31)*100%) | 83.87% |
| BI.2 | ((9*5)+(17*4)+(2*3)+(1*2)+(2*1)/(5*31)*100%) | 79.35% |

Table 3 is the result of calculating the percentage score using a Likert scale. The highest percentage score is in the question code "EE.1" with the question "I feel the Your World application is easy to use," which has a percentage of 85.80%. The lowest percentage score is in the question code "BI.2" with the question "Assuming I can use the Your World Application, I intend to use the application," which has a percentage of 79.35%.

**Table 4**. Recapitulation of Social Influence Evaluation

| UTAUT Aspect | Percentage |
|---|---|
| Effort Expectancy | 83,22% |
| Performance Expectancy | 83,44% |
| Social Influence | 83,87% |
| Facilitating Condition | 83,87% |
| Behavioral Intention to Use | 81,61% |
| Rata-rata | 83,20% |

Table 4 is an overall average data calculation that combines all aspects of UTAUT with the following calculations: (83.22%+83.44%+83.87%+83.87%+81.61%)/5= 83,20%. The results of the average calculation show that the time management application that uses the octalysis gamification method is very well received.The largest percentage is in the aspect of social influence and facilitating conditions, with a total percentage of 83.87%. The smallest percentage is in the behavioral intention to use aspect, with a percentage of 81.61%.

## D. Conclusion

Based on research regarding the design of time management applications using the cross-platform-based Octalysis Gamification method, several conclusions have been drawn, namely :

1. The time management application using the cross-platform octalysis gamification method has been completed. This application was built using the React+Ionic framework, which uses the typescript programming language.
2. This application has been evaluated by 31 respondents through a survey created based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The results of the survey show an average student acceptance score of 83.20%, which means that the time management application was well received by students.

Suggestions that can be given after designing a time management application using the cross-platform-based Octalysis Gamification method are as follows :

1. Added features for sorting and searching to the inventory so that users can search and see what plants they have obtained, which can encourage users to collect more plants.

2. Improve the UI/UX so that the application becomes more attractive for students to use.

### E. Acknowledgment

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