

DESIGN APPLICATION SIMPLE LEARN BASED ON MOBILE WITH IMPLEMENTATION GAMIFICATION FOR LEARNING ONLINE

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ABSTRACT

The COVID-19 pandemic has affected the learning system in academic institutions, with the transition from face-to-face learning to online learning. With the advancement of mobile learning, educational systems are changing with learning process through mobile devices. According to the Quick Innovation Survey Results, out of 46 respondents, only 42% used online learning applications as learning media. This obstacle could hinder academic institutions from achieving their desired results. The smartphone ubiquity and accessibility combined with the mobile application and gamification development in teaching have encouraged the way for learning online. Therefore, it can be concluded that online learning using applications can be further developed. This study aims to increase the fun and productivity of learning in students even in the form of online learning. The proposed model of learning will be designed in game in order to attract students to learn by playing the game. Simple Learn application development for online learning with gamification implementation using games mechanics and games dynamics implementation. Application testing was carried out by conducting a survey of 36 people, the survey was made based on the Hedonic-Motivation System Adoption Model (HMSAM). The evaluation results stated that the percentage of users who will use the application again in the future is 88.48% and the percentage of users who get carried away when using the application is 88.89%, thus it can be concluded that the application has been received positively by users for online learning.

Keywords: *Applications; Game Dynamics; Game Mechanics, Gamification, HMSAM.*

1. INTRODUCTION

The COVID-19 pandemic has had a significant impact on every aspect of Indonesian people's lives. One of the sectors affected by COVID-19 is education, especially students. This affects student learning when switching from face-to-face learning to online learning. This online learning is also supported by the Letter of the Minister of Education Number 36962/MPK.A/HK/2020 concerning Online Learning and Working from Home to prevent the spread of COVID-19 [1]. In this study, the online learning system has been applied synchronously and asynchronously. However, online learning has become a new problem because of the need for adaptation of students and lecturers to online learning. Research by Arif Widodo and Nursaptini proves that related to this problematic online learning in the perspective of 140 respondents of PGSD students at the University of Mataram, 96.4% admitted to having difficulties in online learning [2]. The results also show that the biggest

problem in online learning is internet connection, with a percentage of 57.86%, because there are students who live in remote areas and are not reached by the internet [2]. After that, the problem which is often faced is the difficulty of students in understanding the material, with a percentage of 12.14 % because the conditioning house is not conducive [2].

According to the Rapid Innovation Survey Results (13-14 April 2020), 24 % of 191 respondents who claimed to carry out learning online, online learning activities that are often done are assignment (89%) and assignment correction (76%), while for material delivery only (57%) [3]. Thing This shows that assigning and correcting tasks is more often done compared to the delivery of material in learning online. In addition, the results of the Rapid Innovation Survey (13-14 April 2020) also stated that of the 46 respondents who admit to doing online learning, only 42% who using online learning applications as learning media [3]. From these two data, it can be concluded that

learning online can be developed further, not just stuck on the delivery of material and the assignment of monotony, as well as the percentage of use of learning applications online as a learning medium is relatively low.

The use of gamification is very effective in making tasks that are usually boring or less fun to be much more fun to do so that users can be involved for a longer time [4][5]. In education, gamification has been recognized as a new approach and positively impacts teaching and learning activities. Research conducted by Ab. Rahman, Sabrina Ahmad, & U. R. Hashim in 2018 reveals this, where students showed a positive response to the use of gamification in the classroom because the learning environment became fresh and innovative [6]. As many as 92% of students agree that gamification technology is easy to use and 96% of students feel that gamification helps them increase engagement [6][7].

For this reason, the researcher raised the title of this study which aims to design a mobile-based application with the implementation of gamification to increase students' desire to learn with online learning. This Simple Learn application takes game elements (gamification) and applies them to the following features. The first feature is fetched and knows where students can use this feature to read learning materials in the form of pdf documents. The cause of learning materials used in the form of pdf files because the database used is an online Firebase database, where user access to Firebase is not extensive so that users cannot freely modify the Firebase, and the data files in the form of videos are large enough to burden the database and application performance. The second feature is daily prizes, and students can log in every day to spin the wheel with the aim of getting coins, these coins are intended to be exchanged for facilities or services provided by UMN. The third feature is a fun quiz, this feature is basically a quiz to test students' understanding and skills, but what makes the difference is the system of rewards, boosters, and leaderboards.

This reward system will apply after the user has completed the quiz, the user will be rewarded with coins based on the number of questions answered correctly, as well as the experience when the user completes the examination. Meanwhile, there are two boosters in this fun quiz, namely fifty-fifty and time freeze, these two things aim to increase the user's chances of answering questions correctly. These leaderboards are the ranking order

of each user based on the number of coins that have been obtained. The design of the Simple Learn application will be carried out in stages for each feature and use application design software and specific programming application references. Application testing will use a Likert scale calculation to be implemented in the Hedonic Motivation System Adoption Model (HMSAM) method. Because this HMSAM can measure whether users will use this application again or not, it can be seen from the motivation and interest of users to learn with learning applications with gamification implementation [8].

Very effective use of gamification to do work which is usually dull or less fun become much more fun to do, so users can engage for a longer time [4][9]. In the field of education, gamification has been recognized as a new and positive approach to activities learn how to teach. This is revealed by research that done by Ab. Rahman, Sabrina Ahmad, & U. R. Hashim in 2018 where students showed a response positive towards the use of gamification in the classroom because the learning environment becomes fresh and innovative [6]. As much 92% of students agree that gamification technology is accessible to used, and 96% of students feel that gamification helps them in increasing engagement [6].

For this reason, the researcher raised this research which aims to design a mobile-based application with the implementation of gamification to increase students' desire to learn with bold learning. This Simple Learn application takes games without elements (gamification) and applies them to the following features. The first feature is fetched and learn, where students can use this feature to read learning materials in the form of pdf documents. The cause of learning materials used is in the form of pdf files because the database used is the online Firebase database, where user access to Firebase is not extensive, so users cannot easily modify Firebase, and the data files in the form of videos are large enough to reduce database and application performance. The second feature is daily prizes, and students can log in every day to spin the wheel by getting coins, these coins are intended to be exchanged for facilities or services provided by UMN. The third feature is a fun quiz, this feature is basically a quiz to test students' understanding and skills, but what makes the difference is the reward system, boosters, and leaderboards.

2. RESEARCH METHODOLOGY

The methodology used in this research goes

through several stages of implementation so that the methodology and system design can run well.

2.1 Literature Study

At this stage, a study is conducted to collect data and information related to the concepts and theories needed to meet research needs. The information sought is related to mobile applications, gamification, and online learning.

2.2. Planning

The application system design stage consists of three activities, namely making an initial plan by listing all the features in the outline, collecting and creating assets needed by the application such as images, buttons, icons, etc., and making system flows and mechanics the application.

2.3. Development

In the application development process with gamification implementation, there are two interrelated elements, namely, game mechanics and game dynamics. Game Mechanics is a variety of actions, behaviours, and control mechanisms that are used to turn an activity into a game, such as competitions, points, and others. This provides an engaging user experience and expects user feedback, just like in a game. Meanwhile, game dynamics is the nature of the user's interest in activities that have included game elements, and these properties result from the user's desire and motivation to play it again, for example, there is a system of giving rewards and achievements given to users [10]. Here are some game mechanics and game dynamics used in this Simple Learn application:

Game mechanics used include:

1) Points

The points element used in the Simple Learn application is a coin-earning system. These coins can be obtained from the results of quizzes and the spin wheel. Coin received from the quiz results will be accumulated based on the number of correct answers and multiplied by ten. Meanwhile, coins from the spin wheel are obtained by the user spinning the wheel to get a random number of coin every day and will get an arbitrary number of coins. These coins will be intended to be exchanged for services or services from UMN, such as software provided by UMN, for example, Windows 10 Student, Office 365, and others.

2) Levels

The level element that is implemented is the experience the user gets from each quiz question that is answered correctly. This experience will be used to increase the level of a user. The Simple Learn application has three levels: student, class president, and undergraduate. The difference in additional benefits in the form of bonus coins obtained can be accessed at the class leader level of 50 coins and the undergraduate level of 100 coins.

3) Challenges

The challenges element is when the user will face several challenges in the form of several quizzes. Each quiz question is given a limited processing time to make users feel more challenged to complete the quiz. During the quiz process, users can use several boosters to help the quiz process. There are two boosters, namely fifty-fifty and time freeze. Fifty-fifty is a booster that can be used by users to eliminate two incorrect answers, thereby increasing the user's chances of answering correctly by 50%. Meanwhile, a time freeze is an additional benefit that users can use to stop the time for questioning. Scores obtained from the fun quiz feature can also be integrated into quiz scores or assignments during the learning period of a course.

4) Leaderboards

This leaderboard element is used in the ranking system in the Simple Learn application. This ranking system ranks each user based on the number of coins in order of the most significant number of coin to the smallest number of coins. The implemented game dynamics are:

a) Rewards

The reward element is used in the coin acquisition system, where this coin earning system motivates students to complete quizzes by providing the best answers and using the Simple Learn every day. This system aims to appreciate every effort that has been made by the user so that the user feels valued.

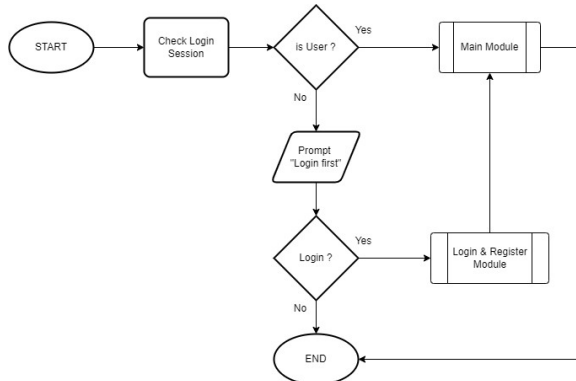
b) Status

This status element is implemented on a tier system in the Simple Learn application, which can be achieved by gaining experience. This system gives users a sense of pride when they reach a certain level compared to other users.

c) Competition

This competition element is also applied to the

rank or leaderboards feature in the Simple Learn application. This feature establishes a competitive environment among users and makes users' performance compete higher. In addition, this



element can motivate users who feel left behind to provide even better.

Fig. 1. Flowchart Application

Fig. 1. describes the beginning of the user opening the application. On the first page, the user is only shown the initial menu display, whether a login session will be checked or not. If not, a message will be displayed to suggest that the user log in first. Users can log in or register by opening the navigation bar and selecting login. However, if the user has logged in soon, then the user can directly access all the features in the main menu.

1) Login and Register Module: user will be shown a login form that asks for email and password input. If the user already has an account, they can directly enter their email and password, which will be validated. If the email and password entered match the ones stored on Firebase, the user will enter the main menu page and can access it. However, if the user forgets the password, the user can select the forgot password feature. This feature will ask the user to enter his email address to be sent an email containing a link to change the password so that the user can log in using his new password. On the other hand, if the user does not have an account and wants to register, a registration form will appear. Users are asked to fill in data in the form of name, email, NIM, password, and confirm password. If one of the fields is left blank, ensure the password and password do not match, and the password is less than eight characters, an error message will appear as a notification to the user. The user will go directly to the main menu page if the validation is successful.

2) Main Module: when the user accesses the dashboard view, the user can choose to access the

navigation bar. The navigation bar has feature options like wallets, leaderboards, and profile pages. While in the dashboard view, there are a choice of features that can be accessed by users, namely the fetch and learn component, the fun quiz feature, and the daily spin feature.

2.4. Application Testing and Evaluation

Application testing was carried out using google Forms as a questionnaire survey media based on the Hedonic-Motivation System Adoption Model (HMSAM). This test is carried out by distributing applications to students in the campus and church environment through social media. The respondent will try to download the application and install it on the respondent's smartphone. Respondents are free to test any features, and if they have finished testing the application, respondents are asked to provide their responses regarding the application that has been made by filling out the questionnaire that has been provided. At this stage, an evaluation of the making of online learning applications with the implementation of gamification is also carried out, where this evaluation is obtained from the results of a survey that has been distributed. The results of the application test will be used as a conclusion for the application as a whole

3. RESULTS AND DISCUSSION

3.1 Implementation Application

The programming languages used in the implementation process of the Simple Learn application are Java and XML. The icon assets used to come from creating personal assets and other sources of free source icon providers. The following is a view of the application implementation.

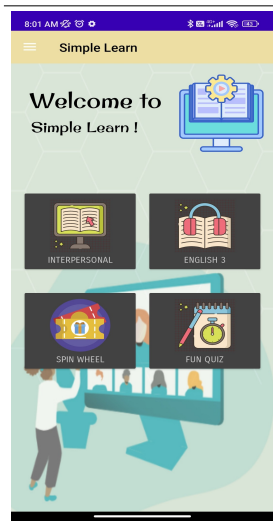


Fig. 2. Homepage

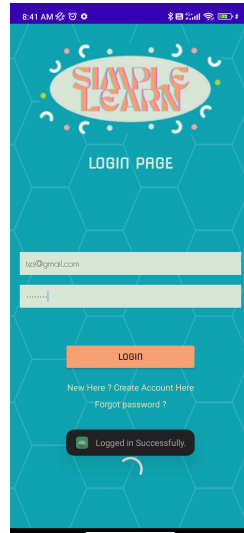


Fig. 3. Login Page

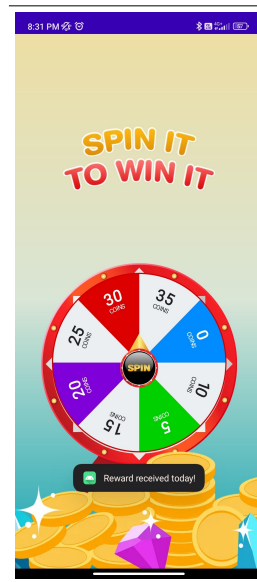


Fig. 6. Daily Spin Page

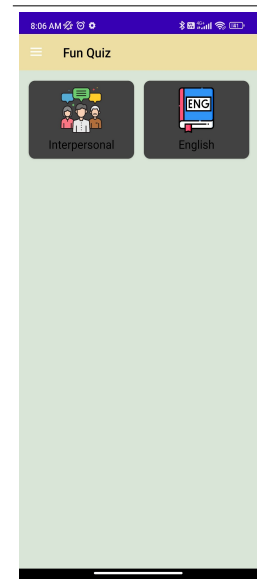


Fig. 7. Fun Quiz Page Categori

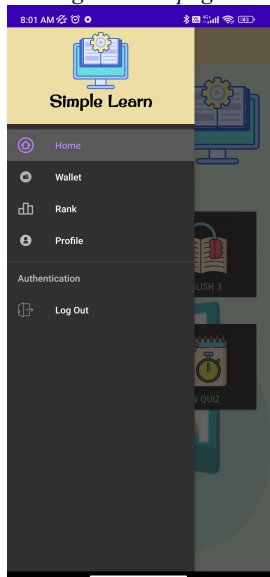


Fig. 4. Navigation Bar

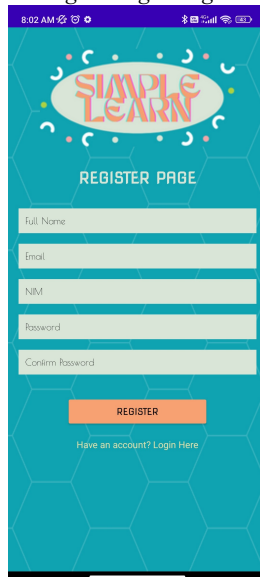


Fig. 5. Register Page



Fig. 8. Fun Quiz Page

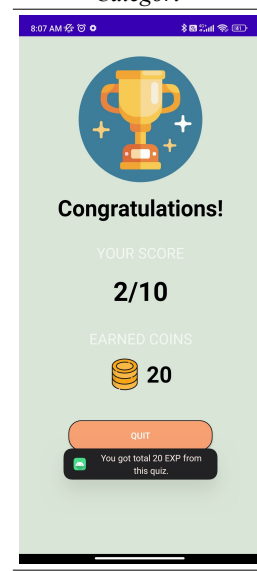


Fig. 9. Fun Quiz Page Result

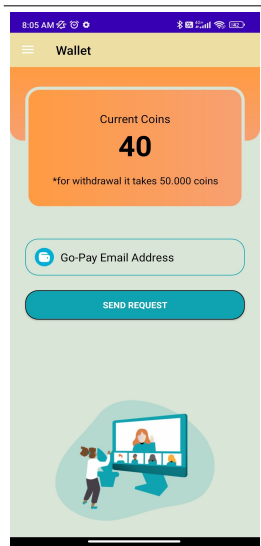


Fig. 10. Wallet Page

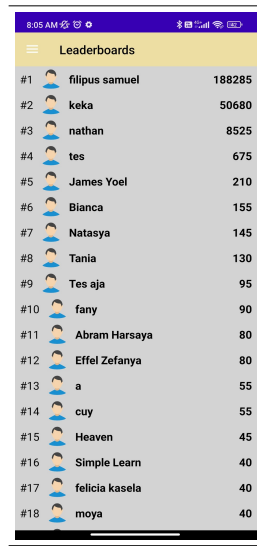


Fig. 11. Leaderboard Page



Fig. 12. Profil Page

```
Calendar calendar = Calendar.getInstance();
int year = calendar.get(Calendar.YEAR);
int month = calendar.get(Calendar.MONTH);
int day = calendar.get(Calendar.DAY_OF_MONTH);
String todayString = year + "" + month + "" + day;

SharedPreferences preferences = getSharedPreferences("PREFS", mode 0);
boolean currentDay = preferences.getBoolean(todayString, false);

if (!currentDay) {
    Toast.makeText(context, this, text: "Daily reward!", Toast.LENGTH_SHORT).show();
    SharedPreferences.Editor editor = preferences.edit();
    editor.putBoolean(todayString, true);
    editor.apply();
    showedToday = true;
} else {
    Toast.makeText(context, this, text: "Reward received today!", Toast.LENGTH_SHORT).show();
    showedToday = false;
}
```

Fig. 13. Source Code Daily Spin

3.2. Test Results

Table 1. Questionnaire Results

#	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	HMSAM Aspect
1	0	1	0	13	22	Perceived ease of use
2	0	0	1	19	16	Perceived usefulness
3	0	0	2	13	21	Curiosity
4	0	0	5	16	15	Joy
5	1	0	2	11	22	Control
6	0	1	4	16	15	Behavioral Intention of use
7	0	0	5	11	16	Immersion

Table 1 shows the results of the answers to the questionnaires that have been distributed based on the Hedonic-Motivation System Adoption Model (HMSAM). The questionnaires were distributed from June 8, 2022, until June 10, 2022. During that period, a total of 36 respondents were obtained. The distribution of this questionnaire is targeted at prospective students, active students, and alumni with a distance from the 2016 to the 2022 batch.

Table 2. Calculation Results Of HMSAM Aspects With Likert Scale

HMSAM Aspect	Percentage	Classification
Perceived ease of use	91,11%	Strongly Agree
Perceived usefulness	88,33%	Strongly Agree
Curiosity	90,56%	Strongly Agree
Joy	85,56%	Strongly Agree
Control	89,44%	Strongly Agree
Behavioral Intention of use	85%	Strongly Agree
Immersion	86,11%	Strongly Agree

Table 2. Is the result of the percentage recapitulation for each aspect of HMSAM. So, the average percentage result obtained from all elements is 88.01%. From these average results, it can be concluded that the application has been received very positively by students.

Table 3. Calculation Results of HMSAM

Aspects		
Aspek HMSAM	Percentage	Klasifikasi
Perceived ease of use	91,11%	Strongly Agree
Perceived usefulness	89,72%	Strongly Agree
Curiosity	90,84%	Strongly Agree
Joy	88,34%	Strongly Agree
Control	90,28%	Strongly Agree
Behavioral Intention of use	88,48%	Strongly Agree
Immersion	88,89%	Strongly Agree

In Table 3, it can be seen that the percentage of the most significant aspect is the aspect of perceived ease of use of 91.11%, indicating that users can use and operate the application efficiently. Meanwhile, the percentage of the most minor aspect is the joy aspect of, 88.34%, which refers to the elements that make users less enjoy the application.

Table 4. Most Interested App Features

Nama Fitur	Percentage
Fetch and Learn	11,1%
Daily Reward	25%
Fun Quiz	19,4%
Leaderboard	8,3%
EXP and Coins System	36,1%

Table 4 is a table of the results of respondents' answers for the most desirable features, and these results are obtained from the same questionnaire as the questionnaire used for the HMSAM model. This is because the author wants to know what gamification elements have the most role in implementing the application. From the table, it can be seen that of 36 respondents, 13 responded that the experience and coin system features were the most exciting features. From this data, it can be concluded that the game mechanics that play a significant role in the application are points and the dominant game dynamics applied are rewards.

Previous such works presented gamification for mobile learning application is a working prototype that has required work continuation for its efficacy in increasing students' interest. This research proved to be helpful for students learning process during this pandemic COVID-19. It created attractive and motivating online learning process based on the assessment.

Furthermore, given that this is an ongoing work, further development could be performed to intensify the current prototype. The application should be developed to adjust the needs of students better. In this work, the implementation of gamified application is necessary to be implemented within the web application of the university.

4. CONCLUSIONS

Based on the research that has been done, some conclusions can be drawn as follows. The Simple Learn application for online learning with gamification implementation has been successfully designed and built. This application is mobile based and implements game mechanics and game dynamics. The application uses Android Studio, Firebase, and Windows software with the Java programming language during the development process, and this application has been tested and evaluated by 36 (thirty-six) respondents using the Hedonic-Motivation System Adoption Model (HMSAM). The survey results were conducted using Google Forms. They got a percentage result of 88.48% on the behavioural intention of use, meaning that users desire to use the application in the future and 88.89% on the immersion aspect, which means that users get carried away when using the app.

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