Developing English Grammar Learning Application based on Gamification

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Abstract: In this modern era, there are many applications available in the marketplace, one of which is learning applications. Even though the current learning application has implemented a good design and features, this application is just a standard system that simply carries out the rules of the system. This can make users quickly bored because the elements and elements of the system are less attractive. So that this makes learning applications in the marketplace unpopular and still below other types of applications. Due to this, this study develops gamification-based learning applications where applications are built by applying elements that are commonly applied to a game. The focus of this research is learning English grammar because this material is very important for students, especially students. Testing is done in a unittest way to see whether the elements applied to this application have met the gamification element. In addition, this learning application was also tested on respondents to get feedback. The results show that the application can run smoothly and get positive feedback from the respondents which has average score 76. So it can be concluded that this research is expected to be a guide in developing further learning applications and be useful for students, especially students in learning English Grammar.

1 INTRODUCTION

The widespread use and use of technology today such as the Internet, social networks and cell phones can affect the educational process in schools and colleges. One of the important roles that technology has today is in terms of education which can make communication better, the implementation of information systems becomes more actual, and is useful as a learning medium. In addition, the latest technology also supports individual, collaborative learning, content management, activity management, formal, informal, and work. One of the most common education systems supported by information technology is E-learning (Yunanto, Herumurti, Kuswadayan, & Rochimah, 2018).

However, the increasing number of learning applications or e-learning systems that are currently rampant tends to have monotonous content. Based on observations on the Google Playstore, applications with educational themes have a lower number of downloads compared to applications with other themes. One application that is very popular with young people today is a game or game-based application.

Game or game-based applications are very popular among young people today, especially for children and adolescents. Based on a report from the Federation of American Scientists, children who are 8-18 spend an average of 50 minutes playing games per day (Scientists, Federation of American, 2006). According to the EU kids Online Network, internet users aged 9-16 years spend 88 minutes per day online. As well as when children use the internet, reports show that playing games is the second activity children often use after completing homework (Livingstone & Haddon, 2009).

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Because of this, many game developers and researchers use games for specific purposes as well as entertainment media. One topic that is popular among researchers is about utilizing the latest technology, games, and education (Andhik Ampuh Yunanto, 2021). Many recent studies have reported the benefits of educational computer-based games in promoting student motivation to learn. Digital game-based learning has been considered a very potential issue among various approaches in the development of learning technology (Yunanto, Herumurti, Kuswadayan, Hariadi, & Rochimah, Design and Implementation of Educational Game to Improve Arithmetic Abilities for Children, 2019). In addition, games currently being developed also apply modern technologies such as artificial intelligence (Yunanto, Herumurti, Kuswadayan, & Rochimah, Intelligent System for Agent in Educational Game Using Dynamic Gram Similarity, 2018), computational intelligence (Herumurti, Kuswardayan, Khotimah, Yunanto, & Yusuf, 2019), text processing (Yunanto, Herumurti, Rochimah, & Kuswardayan, 2019), virtual reality (Herumurti, Yuniarti, Rimawan, & Yunanto, 2019), and game simulation (Kuswadayan, et al., 2019).

Since the era of globalization launched by the world, especially for ASEAN, interactions between countries have become more open and freer. For this reason, the ability of foreign languages such as English is one of the abilities that must be owned by everyone, especially young people. However, based on existing surveys, the English language skills possessed by most students are still very minimal and lacking.

This can be seen from the TOEFL test results that have been followed by students where the scores obtained tend to be below standard. For example, a survey shows that 70% of new students score below 477. Not only that, not a few final year students also have difficulty completing the judicial requirements due to the failure of the TOEFL test. So that most students fail to graduate for that reason. This is a very basic problem and must be resolved in Indonesia immediately.

From the description above shows that currently an effective and efficient learning approach is needed to teach English education to students in order to face the era of globalization. Therefore, this study builds a game-based learning approach. This research focuses on developing game-based English grammar learning applications. This study aims to improve the user's ability to master English grammar in a more fun way. This research is also useful for students in helping to do the TOEFL test, especially for grammar material.

2 LITERATURE REVIEW

2.1 Gamification

From 2010 until now, a new trend called gamification has emerged. Gamification can be defined as the use of game design elements to motivate player behavior in a non-game context (Deterding, 2011). According to Dominguez, gamification is the act of combining game elements into non-game software applications to improve user experience and engagement (Dominguez, et al., 2013). Gamification has been implemented in many different domains in recent years in an effort to improve the work and performance of developers in their daily development tasks (Hugos, 2012). Gartner Corporation predicts that more than 50% of organizations will undertake a process of innovation towards games as gamification that provides accelerated feedback, clear objectives and challenging tasks by 2015 (Gartner, Inc., 2011). According to the Bureau, gamification has some elements common to the theory of learning behaviors such as positive help or support, small or simple tasks, prompt feedback, and progressive challenges (Biro, 2014). Education-based gamification also implements the use of a game rule system such as player experiences and cultural roles that are used to shape student behavior (Sua & Cheng, 2013).

3 METHOD

This research has several phase including the design phase, implementation phase, and testing phase.

1. Design Phase

The design stage includes the process of preparing the materials needed to build the application. One of the things needed to build a game-based application is an asset. Figure 1 shows the assets used in the study. Besides these assets, there are other assets such as backgrounds, objects, and so on

Figure 1: Character Assets.

Table 1: Examples of English grammar questions and answers.

Level	Question Type	Question	Answer Option
1	Sentence has a subject and a verb	… was backed up for miles on the freeway.	a. Yesterday b. In the morning c. Traffic d. Cars
2	Object of Preposition	With his friend … found the movie theatre.	a. has b. he c. later d. when
3	Appositive	… , Andhik, is attending the lecture.	a. Right now b. Happily c. Because of the time d. My friend

After making and collecting the assets needed, a dataset of English questions and answers has been collected. The English questions taken were grammar questions. The questions are obtained from several sources such as the TOEFL questions in the TOEFL book and on sites about learning English grammar. Examples of questions and answers to be used are shown in Table 1. These questions and answer keys are taken from the author of Deborah Phillips' book entitled "Longman Complete Course For the TOEFL Test" which is often used by Tutoring Institutions as a TOEFL study guide.

2. Implementation Stage

This game-based application development uses the Unity game engine with the C # programming language. The database used is SQLite so that it can be planted directly on the device. The implementation of this game will have fighting gameplay that is inserted with English Grammar questions. In the game, users are asked to answer existing questions in order to fight against their enemies. If the question the user answers is correct, the character's attack power will increase. On the other hand, if the questions are answered incorrectly, the character strength will decrease. Figure 2 shows the general flow of the game applied to the application.

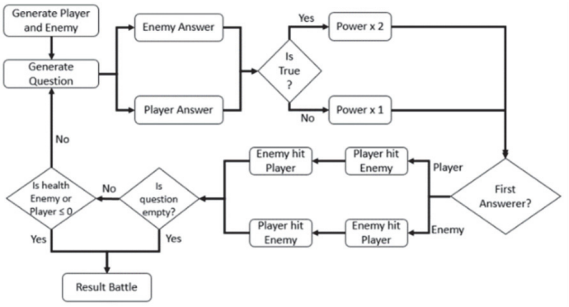

Figure 2: The general flow of the game.

3. Testing Phase

After the game development has been completed, the game will be subjected to unit testing or unit testing to find out whether the system is running smoothly or not. If the system is running normally, it will then be tested on the user to get feedback.

4 RESULT AND DISCUSSION

In this study, after carrying out the implementation, testing was carried out to obtain results and conclusions. This test focuses on testing the performance of the system that is built and focuses on the feedback provided by the user. So that in this study, several testing scenarios were carried out so that the results obtained were relevant to this research. In addition, after obtaining the test results, a discussion is also conducted regarding the advantages and disadvantages compared to other research or applications.

The test scenario consists of 2 types, namely unit tests and user tests. For the first one a unit test will be carried out. Unit test is a system per unit test where to find out whether the unit or feature can run properly or not. An example of a game display interface is shown in Figure 3 until Figure 6.

Figure 3: Interface of main menu.

Figure 4: Interface of level difficulty.

Figure 5: Interface of battle gameplay.

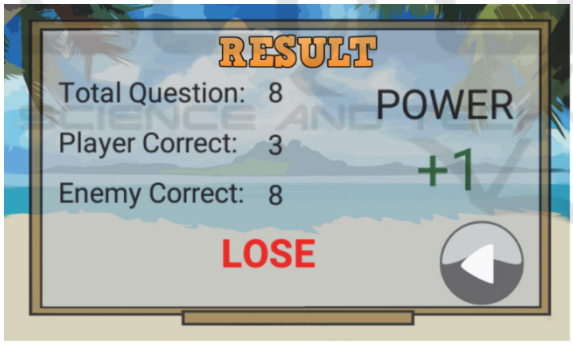

Figure 6: Interface of battle result.

Figure 3 until Figure 6 shows that game-based applications can run smoothly. So that the unit test is deemed sufficient. Furthermore, user testing is carried out to find out the feedback from users regarding this game that has been built. Tests were carried out by 27 users who had ages 21-25. The value provided by the user is from the number 1 to 10. This score was categorize by design application element and education element. After the user give us the feedback, the results are averaged in order to get the final score.

During testing, we asked 27 users several questions to find out how the performance of this developed application was. Some questions concern the application design, namely reusability, user interface, gameplay while the educational elements include the questions displayed, the difficulty level, and the variety of questions. The average results of this test are shown in Table 2.

Table 2: Feedback score from users.

Quality Characteristic	Average
Design Application	7,38
Education Element	7,83
Average	7,60

Table 2 shows that the value obtained from the game application design elements has an average value of 7.38. This indicates that the game-based application has been accepted by the user. However, this result is still not getting enough interest from users. Based on questions and answers from users, the application that is built can still be improved regarding its UI and UX to make it more attractive.

In addition, the results for educational materials scored 7.83. This means that the material implemented in the game application has received a positive response from users. However, this score could still be improved if the questions given were more varied and more graded. According to the Questions and Answers, the questions given were too simple and less challenging. So that furthermore, it is also necessary to add questions related to English grammar from easy to difficult levels.

The average value of 7.60 shown also means that the game application has been accepted by the user. However, based on the analysis received, this game application is still not suitable for publication on the marketplace. So that the main advice given by users is to improve this game application to make it even more interesting.

However, even though the feedback is shown like that, user responses also give appreciation that the application being developed is a good idea as a form of innovation. Hope in the future, this game-based application can become a real product that can combine elements of education and elements of entertainment into one. So that users who play it don't feel bored to continue learning through the application.

From the results of this study, there are several advantages and disadvantages that can be identified. For advantage, this research is an alternative that can be implemented to assist the education sector in a more interactive way. When compared to ordinary learning applications on the marketplace, these learning applications are still monotonous. But with this research, it can be an alternative and solution to solve these problems. On the other hand, for case

studies of learning English, a lot of application has not implemented the game elements in the application. In addition, this research or this application built not only in desktop platform but also in mobile platform which is show in Figure 7 and Figure 8.

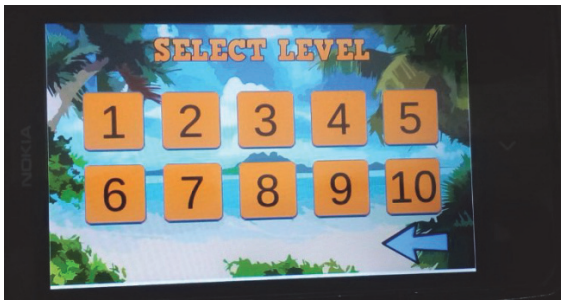

Figure 7: Interface of game level in android device.

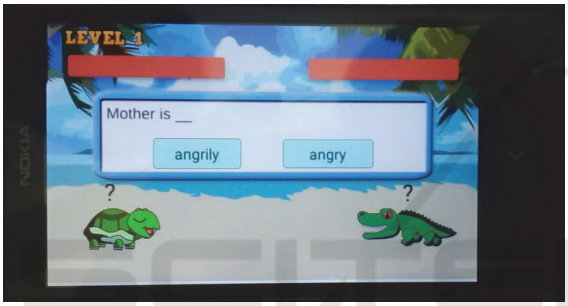

Figure 8: Interface of battle result in Android device.

On the other hand, this research also has some disadvantages. One of them is that the developers or researchers are working harder in developing the application. This is because the abilities that must be considered are not only about the learning application but also the game media. Of course this makes the development of this application take longer than standard applications. In addition, regarding the results of the implementation, this research is still considered to be less conclusive compared to studies related to educational games. In terms of complexity, this study still looks very simple compared to other studies. On the other hand, this study was only tested on 27 users. So that in the future this research can be improved and developed to make this research has better result.

4 CONCLUSIONS

The conclusions obtained from this study include the development of English grammar learning applications that can be implemented smoothly on desktop and mobile systems. The feedback provided by the user also shows good and acceptable results. Besides that, the application that was built can also help users to learn English grammar in different ways. The next development for this research is to increase the complexity of the game system so that it is more diverse and has more content. In addition, increase the number of English grammar questions in order to make the questions more varied.

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