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The Design of Mobile Educational Role-Playing Game For Biology “Bio Saga”

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Abstract - Biology subject is one of the compulsory subject in Indonesia school's curriculum. But, many high school students think that biology subject is difficult. The reason is because there are so many terms related to organisms and nature that need to be memorized by the students. The purpose of this research is to design a learning methodology which is a Mobile Educational Role-Playing Game For Biology to help the students learn biology subject and to increase their interest in biology subject. The methodology which is used by the researcher to design the game is RAD (Rapid Application Development) methodology starts from planning process, design process, and implementation. The researcher will use GDD (Game Design Document) to design the game and Unity to develop the game. The trial results to the high school students and biology teachers show that Bio Saga helps high school students in learning biology subject and increases their interest in biology subject. Furthermore, Bio Saga also helped teachers teach biology subject to high school students.

Index Terms - Biology, Role-Playing Game, Rapid Application Development, Game Design Document, Unity.

I. INTRODUCTION

Biology subject is one of the compulsory subject in Indonesia school's curriculum. But, many high school students think that biology subject is difficult. The reason is because there are so many terms related to organisms and nature that need to be memorized by the students. Based on the survey done by the researcher against 54 respondent, biology subject ranked second as the most difficult high school subject. Therefore, it is necessary to do some development about instructional media that can help students to learn biology terms and to increase their interest in biology subject. One of those instructional medias is by using game.

Recently game has been utilized as one of the instructional media. Game that have educational content is called educational game. The purpose of this educational game is to increase students' motivation in learning against school subjects especially biology subject while playing, so that with happy feeling, students can understand school

subjects more. Furthermore, this instructional media position is also as independent learning resources. Independent learning resources are not only used as learning tools but also can be used by the students with or without teachers in subject concerned.

There are a lot of video game genres that are available to play. One of those genres is *Role-Playing Game (RPG)*. *Role-Playing Game (RPG)* is a game in which players assume the roles of characters in fictional settings[1]. Players take responsibility for acting out these roles within a narrative, either through literal acting or through a process of structured decision-making or character development. Actions taken within games succeed or fail according to a formal of structured decision-making or character development[2]. This game genre will be used by the researcher to design educational game for biology subject.

The reasons that the researcher use *RPG* is because the researcher believe that there are elements in *Role-Playing Game (RPG)* that can make educational game for biology becomes more interesting and can motivate students in learning biology more. Those elements are among others, battle system in which the students must answer biology questions to defeat enemies, and the development of player's character from ordinary human into super hero. Furthermore, based on the survey done by Agate Studio (one of the most productive game studio in Indonesia) in 2012 showed that *Role-Playing Game (RPG)* genre is the most loved genre by Indonesian gamers[3].

In addition to the distribution of games by genres, there are also distribution of games by platforms. The examples are among others, arcade games, PC (*Personal Computer*) games, console games, handheld games, and mobile games. Recently mobile games have rapid progress because of the increasing sales of smartphones. Based on the data by www.emarketer.com, it is predicted that the Indonesian smartphone users in 2015 will reach 52,2 million users[4]. Furthermore, based on a website that provides statistics data which is www.gs.statcounter.com, in Indonesian mobile games rank first and then followed by PC (*personal computer*) games. Based on the statistic results

above then the researcher will design educational *RPG* game for biology using mobile platform so that the game can be accessed by many students in Indonesia.

The researcher expect that this mobile educational *RPG* game for biology can help high school students to learn biology subject and to increase their interest in learning biology subject.

II. Research Methodology

A. Step Study

This step study contains every step's explanation used in designing mobile educational role-playing game for biology :

1) Preliminary Survey

Observation is done before the real research with purpose to get general overview from research object.

2) Literature Review

Review is done in order to get more understanding about the research object theoretically by collecting relevant literatures.

3) Analysis of the Issue

Analyzing why high school students have difficulty in learning biology subject.

4) Question Bank Design

From the analysis of the issue then the researcher will design question bank to hone the students' skill in learning biology subject.

5) Game Design

Designing a game which consists of *game concept, story, target audience, target platform, system requirements, feature sets, core gameplay, game mechanics, level design, and assets* by using *Game Design Document (GDD)*[5].

6) Game Development

From the game design process, the researcher will create the mobile educational role-playing game for biology to help students in learning biology subject.

7) Implementation

After the game development process is done, implement it by uploading the game to *Google Play* so that it can be played by the students.

8) Internal Evaluation

Evaluating the game by *debugging* to find the *bug* in the application. After the *bug* has been found, fix it by changing the codes which contain the *bug*.

9) External Evaluation

Evaluating the game by using the *reviews* from the users that have downloaded and played the game throught *Google Play* wether the game help the students in learning biology subject or not.

10) Report Preparation

After evaluating the game, prepare the report accompanied by conclusions and suggestions.

B. Core Gameplay

Player enter the main menu scene and then choose one of the two roles provided. Player then choose and enter the stage. Every stage will be guarded by three enemies. To clear the stage, player must defeat all the three enemies by answering biology questions. Player can use items to assist them in answering the questions. Player's goal is clear stage five which is guarded by the final boss named *Dr. Mutant*. The game will be over if the player die before defeating the third enemy or the player quit the stage.

Here are the lists of action that can be done by the players in *Bio Saga* game :

- 1) choose the main role,
- 2) choose the stage that the player wants to play,
- 3) answer the questions given by the enemies,
- 4) attack the enemies if the player can answer the question correctly or attacked by the enemies if the player fails to answer the question correctly or the time has run out,
- 5) use items to assist the player in answering the questions,
- 6) buys items from the shop,
- 7) clear the achievements and claim the rewards,
- 8) earn gold and experience by defeating the enemies,
- 9) level up the player's role,
- 10) pause the game,
- 11) quit stage,
- 12) quit *Bio Saga* game.

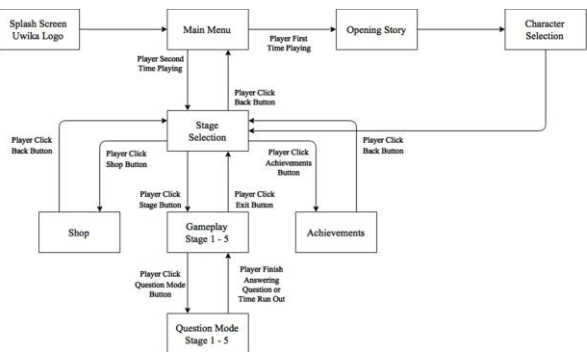


Figure 1 Bio Saga Scene Flow

C. Scene Design

Figure 1 shows *Bio Saga* scene flow. Player starts from the splash screen in which an UWIKA logo contained and then the player enters the main menu scene. If the player is playing the game for the first time, then the player will enter the story scene. After reading the story, player will then enter the role selection scene where player can

choose one of the two roles provided. After choosing the role, player will then enter the stage selection scene. If player is playing the game for the second time, then the player will enter the stage selection scene. In the stage selection scene, player can choose what stage to play. There are five different stages with each stage contains different theme. Stage one is virus themed, stage 2 is kingdom plantae themed, stage 3 is kingdom animalia themed, stage 4 is motion system themed and stage 5 is mutation themed. Player can also enter the shop scene to buy items by clicking shop button in stage selection scene or enter the achievement scene by clicking the achievement button in stage selection scene. Every gameplay has a question mode button. If the button is clicked then the player will enter the question mode scene to answer the question. If player has done answering the question or the time has run out then the player will be back to the gameplay scene.

III. Results and Discussions

The implementation of Bio Saga game is run through smartphone with android 4.2 Jelly



Figure 2 Splash Screen Scene Beans operating system.



Figure 7 Shop Scene



Figure 8 Shop Scene



Figure 4 Story Scene



Figure 6 Stage Selection Scene



Figure 9 Gameplay Scene

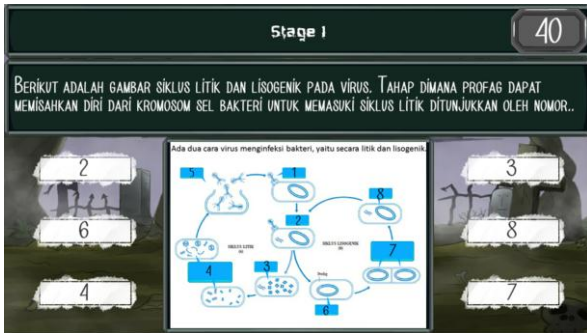


Figure 10 Question Mode Scene

List of scenes in the figure 2 - 10 are splash screen scene, main menu scene to start the game, role selection scene to choose main role, stage selection scene to play stages, shop scene to buy items, achievement scene to claim rewards, gameplay scene where player fight enemies, and

question mode scene to answer biology questions.

IV. Conclusions

The conclusions of Bio Saga game are :

- 1) Overall the players like Bio Saga game both in terms of concept, story, graphics, audios, control, fun factor, and replay factor.
- 2) Bio Saga game helps students in learning biology.
- 3) Bio Saga game increases students' interest in learning biology subject .
- 4) Bio Saga game help teachers teaches biology subjects to high school students.

V. References

- [1] Haggerty, Matt. (28 November, 2012). *The State of Mobile Game Development*. gameindustry.biz. <http://www.gamesindustry.biz/articles/2012-11-28-the-state-of-mobile-game-development>.
- [2] Harris, John. (2 Juli, 2009). *Game Design Essentials:20RPGs*. Gamasutra. http://www.gamasutra.com/view/feature/4066/game_design_essentials_20_rpgs.php.
- [3] Helgason, David. (November 2, 2012). *Game Developers, Start Your Unity 3D Engines*. GamesBeat. Interview oleh DeanTakahashi(VentureBeat). <http://venturebeat.com/2012/11/02/game-developers-start-your-unity-3d-engines-interview/>.
- [4] Millward, Steven. (25 March 2014). *Indonesia diproyeksi lampau 100 juta pengguna smartphone di 2018, keempat di dunia*. Technasia. <https://id.technasia.com/jumlah-pengguna-smartphone-di-indonesia-2018>.
- [5] Oxland, Kevin (2004). *Gameplay and design*. Addison Wesley.