

An Educational Video Game Based on Basic Principle of Biology

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Abstract

Video games have been extremely attractive to gamers of all ages, especially the young ones. They spend much time playing such games for pleasure and entertainment. Thus, this paper aims to gamify education by incorporating 3D video games elements into science subjects. Science subjects such as Biology have always been visualize by students to be difficult because there are a lot of concept and processes to be memorized. This leads to lack of interest in learning Biology Science subject among students in Malaysia. This application focuses on microorganism topic. Apart from that, the elements of effective educational video game design in terms of motivation, narrative of context, goals and rules and interactivity to further engage student in their learning process will be discussed. The benefit of student-generated activities using 3D video games and Biology subject for secondary school explained further in this paper. Playing video games, as a lifestyle habit, by respondents shows an association with positive attitude. In other words, those who play video games themselves are more likely to have favorable attitudes toward using those games for education.

Keywords

Educational Video games, multimedia, Biology, 3D games

Introduction

Nowadays, education is thriving with many touted new theories and practices promising to offer solutions to learning difficulties. They have emerged because of the digital revolution. Many studies have shown that playing digital games has become an integral part of the contemporary youths' life activities; and digital games are popular among children, adolescents and even adults (Wan Rozali et al., 2007). A research reported that 88% of MIT freshmen (N = 650) had played videogames before the age of 10 and 75% of them still play [2]. Moreover, according to [3], Trip Wire Magazine reported that in 2011 about 61.9 million people were engaged in online games; an increase of 9 million from 2010. These gamers were aged between 20 and 34 years.



Many aspects of digital games can serve education; [4] reported that with the use of digital games, students “are experienced to learn by doing”. Digital games offer learning experience that can meet a variety of learning styles [5]. Furthermore, researches have shown that students’ negative attitudes toward difficult subjects such as math or boring subjects such as history can be changed through using digital games by making them easy or fun to learn [6].

According to [7], there are four elements of effective educational video games mainly motivation, narrative context, goals and rules and interactivity. Adventure and strategy games were found to be the most stimulating. Players were more motivated to play games with objectives requiring higher order thinking skills, including visualization strategies that nurture creative problem solving and decision-making [8]. [9] further elaborated on goals in effective video games, finding that goals of different levels help motivate learners to continue playing. [10] examined the role of interactivity as a critical element in effective games, adding that game designers should consider the extent to which the game rules, props, and tools affect stimulated and natural social interaction.

Most of the studies conducted are mainly from the western country. Lack of study has been done in Malaysia to fully utilize the usage of video games to enhance students’ performance in Biology subject. In Malaysia, video games usually associated with negative behavior such as discipline related behavior. Thus, parents, educators, administrator and policy makers are not fully aware of learning potentials of video games [11].

Biology is one of the subjects that must be taken by the students who are in the science stream in secondary school. Biology always stands on its own as a separate subject unlike the other science subjects like Chemistry and Physics [12]. Students also visualize Biology to be difficult as there are lots of concepts, abstracts and complex processes that cannot be observed by naked eyes [13]. According to [14], a study was conducted by Academy of Sciences Malaysia found that, students are unable to see the connections between science subjects and their possible career. They would prefer business courses as it is easier option and students can relate to job industry. Some students find science subjects are boring and not relevant to their daily life.

Thus, an interactive 3D video game is developed based on a topic from Biology subject, which is microorganism. The environment of the 3D games will be in an abandoned science lab where several types of microorganism can be found. The player has to collect the specimen and answer several questions in order to advance to next level of the game.

Methodology

The purpose of these education video game is to help Biology students in Secondary School to master microorganism topic. A questionnaire survey has been conducted to the secondary students who are currently taking Biology subject. The purpose of this survey is to identify the issues faced by students and to find students opinion on integrating video games as part of learning process. Google form was used to disseminate the questionnaire to the participant. It is recorded that 20 participants from a secondary school in Nilai answered the survey.

Results and Discussions

Based on the survey, 85% of the participants have played educational video games before. It is found that 100% of the participants agreed that the 3D video games can help students to learn and master microorganism topic. 52.9% of participants agreed that a good storyline and adventure theme of a video game can help students enjoy the game better. 100% of the respondent agreed that quizzes in the game is an effective method to test students' knowledge on the topic. 100% of the participants agreed that a result reporting function in the video games can help students to monitor and assess their performance from time to time.

Conclusions

In conclusion, video games can help students to improve their learning habit and performance especially for Biology subject. Biology subject has been known difficult due to concepts, abstract and complex processes. Gamifying education into 3D video games can help students to increase their knowledge in Biology subject as well as monitor their performance through result reporting function in the video game. Nevertheless, the literature reveals that a number of distinct design elements, such as narrative context, rules, goals, rewards, are necessary to stimulate desired learning outcomes. In the future, the research may extend on the gender preferences as well as improving the learning the learning outcome of the educational game play.

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