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INVENTOPIA 2023

EXTENDED ABSTRACT BOOK

"IDEAS UNLEASHED: THE ULTIMATE INNOVATION CHALLENGE"

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Ideas Unleashed: The Ultimate Innovation Challenge
INVENTOPIA 2023: FBM-Seremban International Innovation Competition (FBM-SIIC)

EXTENDED ABSTRACT

GAME-BASED LEARNING OF SCIENCE SUBJECT FOR PRIMARY SCHOOL

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ABSTRACT

An alarming statistic in Malaysia education roadmap according to the National STEM Association (NSA) shows that only 19 percent of students in secondary level opted to a science stream since 2020. Among the contributing factors to the lack of interest related to this matter begin at the primary school level which is the uninteresting method of teaching and learning, and the extensive syllabus that leads to difficulty of understanding. Current implementation of teaching and learning in this subject is conducted conventionally and less interactive. Thus, student find the subject is difficult to understand and unexciting. A game-based learning inspired by "Saidina" board game were constructed to attuned for this purpose, namely Saidina Sains Tahun 6 which consists of four challenging Science topics specifically, 'Mikroorganisma', 'Interaksi Antara Hidupan', 'Pemeliharaan Dan Pemuliharaan' and 'Kestabilan dan Kekuatan'. The game is created to help year 6 students improve their understanding of science subjects on the above topics. A total of 20 respondents was involved in this pilot study whom 90 percent agreed that the procedure or game plan in this method of learning game is clearly described in the rules form with majority agreed that the game is easy to use. 95 percent respondents also support that the game can increase their knowledge in science subject, therefore agreed to use this game in the future and will recommend it to others.

Key Words: science, game-based learning, primary school, teaching, and learning.

1. INTRODUCTION

An alarming statistic in Malaysia education roadmap according to the National STEM Association (NSA) shows that only 19 percent of students in secondary level opted to a science stream since 2020. Among the contributing factors to the lack of interest related to this matter begin at the primary school level which is the uninteresting method of learning and teaching, and the extensive syllabus whereby leads to difficulty of understanding. Therefore, Prime Minister has urged the Ministry of Education (MOE) and the Ministry of Science, Technology, and Innovation (MOSTI) to find new teaching and learning approaches to attract students to Science and Mathematics subjects.

Teaching and learning of science subject for primary school can be amplified through game-based approach. Current implementation of teaching and learning in this subject is conducted conventionally and less interactive. Thus, student find the subject is difficult to understand and unexciting. A game-based learning inspired by "Saidina" board game were constructed to attuned for this purpose, namely Saidina Sains Tahun 6 which consists of four challenging Science topics specifically, 'Mikroorganisma', 'Interaksi Antara Hidupan', 'Pemeliharaan Dan Pemuliharaan' and 'Kestabilan dan Kekuatan'. The game is created to help year 6 students improve their understanding of science subjects on the above topics.

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This tool has fashioned two innovativeness namely, the incorporation of complicated concepts from science into the game as well as the use of scientific terminology to describe the locales on the game board.

Regarding product applicability, students will engage in more perceptive active learning because they are familiar with the game. Consequently, advocating STEM as the future career of choice and the primary focus for students.

2. BACKGROUND OF THE STUDY

Recent research shows that gamification in teaching and Learning give a positive impact in students understanding and motivates them to explore further on the subjects. (Rowicka and Postek, 2013), Krath et al., 2021), (Taspinar et al., 2016), (Parra-Gonzales et al., 2021), (Annunpattana et al., 2021). amification concept introduced in schools can be divided into physical and digital based tools. Tools created is executed following an innovative and engaging methodology to motivate students and enhance their learning process. However, despite an increasing academic interest, teachers' attitude towards gamification in the past years, an actual use of gamification remains a neglected research area.

This would, in turn, suggest that more works and awareness is needed to introduce this concept, not only for motivations that shape students' learning experience but rather the opportunity created for those students (by their teachers and by the system) to follow the needs and motivations they naturally have.

Thus, the gamifications tools or games created should be design and tested in a manner that are effective and meaningful for learners. The subject of this invention is a Saidina-inspired game-based learning program called Saidina Sains Tahun 6, which covers scientific topics and is discussed in detail in the next section.

3. PRODUCT DEVELOPMENT

The product is development by taking into consideration on user requirements, product development and product testing. Each phase is discussed further in the next sections.

3.1. User Requirements

Several interview sessions have been conducted on standard six science teachers and students at multiple schools in Kedah to identify the most challenging topics in science subject. The results consensually identified four most challenging topics which are Mikroorganisma', 'Interaksi Antara Hidupan', 'Pemeliharaan Dan Pemuliharaan' and 'Kestabilan dan Kekuatan', thus will become the prime case study introduced in this game.

3.2. Product Development

The product is inspired from the Saidina board game; therefore, it is named Saidina Sains Tahun 6, as shown in Figure 1. The workings of the game include a game instruction regarding the chosen topics to became 4 sets of question cards together with answers, a land grant, dice, the replica of the house and hotel and utilising Malaysian currency systems. At one time, the game play can only be participated by maximum of four players/students, including a banker. Each player must take turn on tossing the dice and based on numbers acquired will determine the actions of that player during stopover process. The game will iterate until all the cards and assets on the board were used up and acquired by the players to determine the winner of the game.

Aside from its practicality, this alternative teaching and learning tool can also stimulate student creativity by encouraging independent study and urging the player to employ strategy and careful planning.

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Figure 1. Saidina Sains Tahun 6 Game Board

3.3 Product Testing

A set of questionnaires was set up which consist of questions related to usability of the game. Convenient sampling techniques was used in this study and the board game is tested among twenty 'Standard Six' students at different schools. The science teacher was present as a facilitator to observe the teaching and learning process during the board game practice.

4. RESULTS AND DISCUSSION

A total of 20 respondents (Year 6 students) and their teachers was involved in this pilot study for usability testing as well as in teaching and learning experience. Results shows that 90 percent agreed that the procedure or game plan in this method is clearly described in the rules form and is easy to use, whereas 95 percent respondents support that the game can increase their knowledge and understanding in science subject related topics. Teachers feedback on the games acknowledging that the method can help their delivery on difficult topics and to spam an interest among students for the science subjects. Subsequently, all the users agreed to use this game in the future and will recommend it to others.

Three parties, namely the Ministry of Education, educators, or teachers, and particularly pupils, may benefit from the novelty of this idea. By 2050, the Ministry of Education can support the country's transition by increasing STEM enrolment with the aid of this invention. While this product, like Saidina Sains Tahun 6, can be a novel approach and instrument for teaching and studying science through gamification for educators and teachers. Regarding the students, this product has the potential to increase their interest and involvement in the classroom.

It is anticipated that this invention will lead to novel insights into the most difficult science subjects' teaching and learning methodologies. The publication of research in a SCOPUS, refereed, or indexed journal is another anticipated result. This invention has applied for intellectual property rights (IPR LY2023P04214) and joined a competition for innovative ideas like INVENTOPIA. Another anticipated result is the eventual gamification of Saidina Sains Tahun 6 through digital means.

5. CONCLUSION AND RECOMMENDATION

In conclusion, this game-based Saidina Sains Tahun 6 can spark curiosity and help kids gradually understand sciences and mathematics. There are three opportunities for commercializing a product. Online games or digital gamification of Saidina Sains Tahun 6 come first with more science topics can be introduce as well. Second, this product appeals to kids as a learning game that can be played indoors. And finally, expanding the usefulness of online gaming.

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