





## EFFECTIVENESS OF ONLINE GAME BASED LEARNING IN SCIENCE FORM 1 FOR SUBTOPIC BODY SYSTEMS

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## PROJECT PAPER PRESENTED TO QUALIFY FOR A MASTER'S DEGREE IN EDUCATION BIOLOGY (COURSEWORK MODE)

## FACULTY OF SCIENCE AND MATHEMATIC SULTAN IDRIS EDUCATION UNIVERSITY

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## ABSTRACT

This study aimed to determine the effectiveness of online game-based learning activities as a teaching tool for Science Form 1. Besides, it is conducted to study students perception towards online game-based learning activities as a teaching tool for Science Form 1. The sample of this research consisted of a total of 68 students with 34 control and 34 treated students from SMK Taman Tasik Ampang, Selangor. The results of data analysis suggested that the student's perception was positive towards online game-based learning activities as a teaching tool for Science Form 1 in SMK Taman Tasik Ampang, Selangor. It was also shown that the achievement of treated students based on pre and post-test after intervention process was slightly higher than control students, though the difference was statistically significant. Based on the first objective, the result showed that the online game-based learning can improve students' achievement where it showed a significant increase of test marks after the intervention. The second objective also have been achieved where the result of this study show that pupils have an overall good perception on the use of online game-based learning in teaching Science Form 1 for the subtopic of the Human Body System. The result showed that the mean score of post-tests for treatment group was higher (66.23%) than the pre-test group (57.53%). The overall mean value from questionnaire survey was 3.62. It was concluded that, the treated students require online game-based learning activities as a teaching tool in class. The implications of this research is that teachers are able to know such a way to help underachieving students and implement suggestions to improvise and upgrade the understanding level of a Science chapter in the school.





### KEBERKESANAN AKTIVITI PERMAINAN ATAS TALIAN DALAM PEMBELAJARAN SAINS TINGKATAN 1 BAGI SUBTOPIK SISTEM BADAN MANUSIA

## ABSTRAK

Kajian ini bertujuan untuk menentukan keberkesanan aktiviti pembelajaran berasaskan permainan atas talian sebagai alat pengajaran untuk Sains Tingkatan 1. Selain itu, kajian ini juga dijalankan untuk mengkaji persepsi murid terhadap aktiviti pembelajaran berasaskan permainan atas talian sebagai alat bantu mengajar untuk Sains Tingkatan 1. Sampel penyelidikan ini terdiri daripada 68 murid dengan 34 kawalan dan 34 murid yang dirawat dari SMK Taman Tasik Ampang, Selangor. Hasil analisis data menunjukkan bahawa persepsi murid adalah lebih positif terhadap aktiviti pembelajaran berasaskan permainan atas talian sebagai alat pengajaran Sains Tingkatan 1 di SMK Taman Tasik Ampang, Selangor. Ia juga menunjukkan bahawa pencapaian murid yang dirawat berdasarkan ujian pra dan pos selepas proses intervensi adalah sedikit lebih tinggi daripada murid kawalan, walaupun perbezaannya secara statistik signifikan. Berdasarkan objektif pertama, dapatan kajian menunjukkan bahawa pembelajaran berasaskan permainan atas talian dapat meningkatkan pencapaian pelajar di mana ia menunjukkan peningkatan markah ujian yang ketara selepas intervensi. Objektif kedua juga telah tercapai di mana hasil kajian ini menunjukkan bahawa muridmurid mempunyai persepsi yang baik secara keseluruhan terhadap penggunaan pembelajaran berasaskan permainan atas talian dalam pengajaran Sains Tingkatan 1 bagi subtopik Sistem Badan Manusia. Hasil kajian menunjukkan bahawa skor min ujian pasca bagi kumpulan rawatan adalah lebih tinggi (66.23%) berbanding kumpulan ujian pra (57.53%). Nilai min keseluruhan daripada tinjauan soal selidik ialah 3.62. Kesimpulannya, murid yang dirawat (lemah) memerlukan aktiviti pembelajaran berasaskan permainan secara atas taliansebagai alat pengajaran di kelas. Implikasi kajian ini ialah guru dapat mengetahui cara sedemikian untuk membantu murid yang memerlukan perhatian dan melaksanakan cadangan untuk menambah baik dan menaikkan tahap pemahaman sebuah subtopik subjek Sains di sekolah.









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## LIST OF ABREVIATIONS

SPSS : Statistical Package for Social Sciences

### **GBL** : Game-Based Learning





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## LIST OF SYMBOLS

	n	Number of samples
	М	Mean
	SD	Standard Deviation
	df	Difference
	f	Frequency
	р	Probability value
	<	Lower than
	%	Percentage
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	H <sub>0</sub>	Null hypothesis
	$H_1$	Alternative hypothesis
	sig	Significance







## LIST OF APPENDICES

- А Pre-Test
- В Post-Test
- С Questionnaire Form
- Validity of Research Instrument D





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# **EFFECTIVENESS OF ONLINE GAME-BASED LEARNING IN SCIENCE FORM 1** FOR SUBTOPIC BODY SYSTEMS



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## **CHAPTER 1**

## **INTRODUCTION**



#### 1.1 Introduction

The chapter begins with an introduction to the study emphasizing on the effectiveness of online game-based learning for subtopic body systems in Science for Form 1. Traditional directed instruction is fundamentally teacher-centered and converges on role and fact-based learning (Serin & Hamdi, 2018). Effective practice of it allows the active engagement in the learning process and this has strong implications on the learner and the learning process (Muganga, Lawrence & Ssenkusu, Peter, 2019). The following discussion brings to attention the need and use of online game-based learning through online educational websites as one of the learning strategies for those underachievers or those students in the edge of dropout or in low performing classes. In the subsequent







discussion, aspects fundamental to the study such as the problem statement, objectives, significance of study, limitations of study and definition of terms were explicated well. Furthermore, hypotheses of the study are presented.

#### 1.2 **Background of the study**

Although the Malaysian educational system can produce students with good results, this current education system has been criticized for fashioning of mindless memorization and regurgitation of facts and figures, which students do not know how and when to apply (Ng Wan, 2015). Rusdiana, (2020) stated that the low level of technological mastery among educators resulted in the delivery of online teaching and learning materials to students was also unsatisfactory. By traditional or during chalk and talk sessions, students were normally assessed on their abilities to recall information and to understand important relationship between various ideas (Raja, Farhan & Khan, Najmonnisa, 2018). Therefore, these might be the reasons on why students were usually engaged and encouraged to memorize information and reproduce it during examinations (Ng Wan, 2015).

Similar instructive concerns have also surfaced in Malaysian classrooms. In an examination dominated culture in Malaysia schools, students have little say on taking responsibility for their own learning (Salina & Othman, 2012). Online learning was perceived to be more feasible alternative from traditional classroom teaching, following the huge development of the Internet online technologies. Hung, M.-L. (2016) said that online learning as a form of e-learning, by which learning is delivered through a server or a host computer that is linked to the online platforms. Participation to online learning





also leads to better involvement in the learning process. Hence, it was no surprise that the Malaysian Ministry of Education anticipates considerable use of the Internet in teaching and learning process in hope to provoke better learning outcome and learning opportunities.

For the part of policy, there is 11th Malaysia plan that encourages development of ICT education in Malaysia. To implement an online learning approach that will be more effective teachers need to have good knowledge and readiness. Teachers should be prepared in overcoming the problem of online learning (Ain Agus, 2021). Neat setup with internet equipment and special rooms for online learning can further strengthen the teaching and learning process. COVID-19 is a contagious epidemic that demands teachers to change the work culture that typically teaches face-to-face to online learning

It is evident in Malaysia that the development of online discussion platforms has been relentless since the acknowledgement of e-learning as one of the major E-Thrust Areas. Rusdiana, (2020) said that diffusion of online learning process, ranging from pedagogical concerns to increasing students' performance with e-assessment. Studies have indicated that online learning platforms possess unexplored potential to defy traditional approach of teacher-centered teaching to promote student-centered learning (Muganga, Lawrence & Ssenkusu, Peter, 2019).

Moreover, learning through the internet also establishes positive impact on student learning to advance collaborative learning strategies and to encourage students' inquiry and reflective thinking skills (Kornilov, et.al, 2020). This shows a reciprocal

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relationship for this online game-based learning topic, as learning is not just knowledge based. It can be done through various learning activities which suits for the students in trend of the year (Ain Agus, 2021). So, to help those underachieving students who requires extra attention on science topics through different methods of teaching and learning is where the online game-based learning activities entered in. Some excellent students can perform well with basic cookbook steps of learning. But there are also some categories of students need special efforts on understanding science related topics in different manner. The online game-based learning method is the extension to the usual fact notes in helping students to match the correct organs involved in a body system. Example, stomach and intestines are involving in Digestive system at where students need to match and remember the position and arrangement of the proper organs for this system will be displayed through this online use of online game-based learning activity. Hence, this research also has focused on the perception of students on online game-based learning as a teaching tool in classroom.

### **1.3 Problem Statement**

A traditional teaching and learning method are a teacher-centered teaching in which result cookbook steps of activities and demonstrations (Serin & Hamdi, 2018). The traditional teaching and learning approach also provide students with little, or none, valuable learning skills (Azlina, 2016). In the context of this study, the traditional teaching and learning approach referred to face-to-face teaching in a conventional classroom with no chances of utilizing any form of online based learning.







In 2007, 30% of the totally tertiary education-age population in Malaysia was enrolled in tertiary education. In 1999 it was 23%, Malaysia targets that by 2020, this total will increase to 50% and out of that 60% will be in STEM (The Star Online, 2014).

Science subject is one of the major subject to be taken by students in school. Nowadays, the traditional teaching methods in science are challenged for their inability to foster critical thinking, holistic learning environment among students. Suppose the science subject must develop science process skills where students observe, measure, classify, process information, interpret think on solving problems, analyze, synthesize, formulate conclusions including creativity as the essential element of science (Maheshwari, 2017). Teachers less in creativity cause the students to get bored easily and become less motivated (Ngasiman, 2014).

Hence, the study on student's perception of the online game-based learning is essential to be conducted to get a better understanding of this matter.

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### 1.4 Conceptual Framework



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### 1.5 **Research Objectives**

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This research aims to study the effectiveness and student's perception towards online game-based learning as a part of teaching and learning process.

- 1. To determine the effectiveness of the online game-based learning as a teaching tool in learning Science Form 1.
- 2. To investigate student's perception towards online game-based learning in learning Science Form 1.

#### 1.6 **Research Questions**

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To carry out the research, there are research questions which are essential to reflect the objectives. The questions are:

- Are the online game-based learning activities helpful in learning Form 1 a) science subtopics?
- What is the student's perception towards online game-based learning b) activities in learning Form 1 science subtopics?

### 1.7 Hypotheses

Ho1: No significant difference in test marks (pre) of the science subtopic between control group and treatment group before carrying out intervention process?

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Ho<sub>2</sub>: No significant difference in test marks (post) of the science subtopic between control group and treatment group after carrying out intervention process? Ho<sub>3</sub>: No significant difference in test marks (pre & post) of the science subtopic for treatment group before and after carrying out intervention process? Ho<sub>4</sub>: No significant difference in test marks (pre & post) of the science subtopic for control group before and after carrying out intervention process?

#### 1.8 **Significance of Research**

This research attempts to study the effectiveness and student's perception towards online game-based learning as a part of teaching and learning process. This study will highlight two critical impacts that provides convincing justifications for continued research in this area of the teaching and learning process. Effective practice of it allows the active engagement in the learning process and this has strong implications on the learner and the learning process (Muganga, Lawrence & Ssenkusu, Peter, 2019).

Theoretically, this study is expected to enhance empirical support to the existing studies, literature, and research findings related to student's perception on online gamebased learning as a part of teaching and learning process in Science Form 1 for secondary schools.

Next, this study also might provide strong evidence to exploit the success of better understanding for those students need extra attention to certain Science subtopics. The use of this kind of online game-based learning tools are really needed for those





students in the edge of dropout or in low performing classes. Learning through the internet ascertains positive bearing and thoughts on students, like learning processes including reflective thinking, inquiry learning, and to engage in autonomous and interactive learning (Carida et al, 2021).

The findings of the study might benefit to teachers by providing them with a critical perspective for further and continued investigation or research on advancing the practice of online game-based learning through online educational websites in the teaching and learning process at secondary schools.

This research is expected to help teachers teaching Science for low performing students or so, called underachievers from backdrop classes in Form 1, in improvise their more attracting way of teaching and tackle this category of students. It might give teachers some insights on well planned way of teaching.

#### 1.9 Limitations of the Study

The following discussion acknowledges several limitations of the study. The most apparent limitations are in the terms of accessible population. This study conducted at a regular secondary school near Ampang, Selangor. Moreover, with concern to movement control order (MCO 3.0) during COVID-19 pandemic, only one secondary school is selected. Each experimental and control group of students are from Form 1 classes. This is because, it is a non-examination class and started freshly to digest more learning experiences compared to students from other forms. Based on these grounds,





it must be noted that the findings of this study might not be feasible to be generalized beyond the parameters of this study and of similar studies.

#### 1.10 **Conceptual Definition**

The following details aims to address some terms that is being used in the report of the study. These definitions of terms constitute the conceptual definition. The conceptual definition is defined based on the past research and ideas. Meanwhile, operational definition refers to the characterization based on the observable attributes of the object being defined (Castanuela, Mary-Helen 2020).



## 1.10.1 Effectiveness

The degree to which something is successful in producing a desired result or success (Online Oxford Dictionary, 2019). In contrast to efficiency, effectiveness is determined without reference to costs and, whereas efficiency means "doing the thing right," effectiveness means "doing the right thing" (Business Dictionary, 2019).







## 1.10.2 Online game-based learning

Online game-based learning describes an approach to teaching, where students explore relevant aspect games in a learning context designed by teachers. Teachers and students collaborate to add depth and perspective to the experience of playing the game (Bakan, Ugur & Bakan, Ufuk, 2018). The core concept behind online game-based learning is teaching through repetition, failure, and the accomplishment of goals. Games that are planned and designed well will offer enough difficulty to keep it challenging while still being easy enough for the player to win. Online game-based learning takes this same concept and applies it to teaching a curriculum. Students work toward a goal, choosing actions and experiencing the consequences of those actions. They actively learn and practice the right way to do things (Gavin Cahill, 2019).

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#### 1.11 **Summary**

This chapter has discussed the background of the study, problem statement and the objectives along with the hypotheses of the study. It has highlighted the significance of the study on the effectiveness and student's perception towards online game-based learning as a part of teaching and learning process. Conceptual definitions of the variables are also provided in this chapter.





