Learning Mathematics 3D Objects Through The 5E Instructional Model Lesson: Minecraft Education Edition

Goh Kok Ming

***Abstract* – The purpose of this study is to see how the 5E instructional model with the Minecraft Education Edition and traditional teaching approach affect students in learning the 3D objects. A total of 60 participants were involved in this study and were divided into two groups namely the control group and the treatment group. The experimental group received the 5E instructional model with the Minecraft Education Edition, while the control group received the traditional teaching method. A T-Test analysis was performed and the results of the study showed that there were significant differences between the two groups in this study. Therefore, the 5E instructional model lesson with the Minecraft Education Edition has a significant impact on student learning performance. As the results of the analysis, it showed that the participants of the treatment group performed better than the control group.**

***Keywords* – 5E Instructional Model lesson, Mathematics, Minecraft Education Edition**

I. INTRODUCTION

Recent research has revealed that new teaching approaches are more effective than traditional teaching ways that have been pushed aside, leading to a search for more effective new teaching approaches. Unfortunately, because many schools, today use conventional teaching methods, it is impossible to disregard them (Tezer & Cumhur, 2017). As a result of these issues, educators and academics have been working to develop more efficient and effective pedagogical practices (Huang & Shimizu, 2016; Thorsteinsson, 2016). Nowadays, Minecraft: Education Edition helps children prepare for the future by instilling future-ready abilities such as creativity, problem-solving, and systems thinking, as well as fostering a love of play. Minecraft has become one of the most popular games among children aged 10 and up in recent years. In fact, about 131 million people will play Minecraft on a monthly basis in 2020. It is regarded as one of the most popular video games of all time. Minecraft is a pixelated virtual world where you can build structures, explore the landscape, and fight creatures. In that regard, the 5E Instructional lessons with the Minecraft Education Edition and traditional Chalk and Talk approaches were used in this research.

II. PROBLEM STATEMENT

It is impossible to organize the work into neat divisions when looking at the wide variety of articles that have addressed various areas of learning issues related to Mathematics. However, this research addressed and acknowledged the learning obstacles that occurred among primary school students based on observations, document analysis, and focus group conversations with a few primary Mathematics teachers about learning 3D objects. The majority of primary school students are unable to recognize the implications of representations. Students are unable to mentally visualize 3-D images or form 3-D mental representations when learning the 3D objects.

III. LITERATURE REVIEW

Mathematics is a discipline whose application we can see in our daily lives and which we can utilize to gain meaning in our lives. As a result, mathematics, which has a significant impact on our lives, is an important lesson in our schools. As a result, it is critical to teach mathematics courses in such a way that students will be able to tackle real-world problems (Tezer & Cumhur, 2017). Consider what mathematical principles are connected to occurrences we experience in our daily lives and offer them as problem scenarios (Güzel, 2016).

Engage, explore, explain, elaborate, and evaluate are the steps of the 5E instructional model lesson. Bybee (2009) was the one who came up with this model. This 5E Model, which began with the subject of "How People Learn," has evolved into a model for educational institutions, particularly in science and mathematics education. According to studies in the literature, the 5E Instructional Model was primarily used in the subject of science, but it has now evolved into an important model that includes and studies the field of mathematics. The 5E instructional model was extensively employed in worldwide mathematics education in the bulk of the studies, and the effects of students on scientific process skills were explored (Bybee, 2009).

Minecraft: Education Edition is a game-based learning platform that helps students develop STEM skills, unleash their creativity, and collaborate and solve problems. Minecraft allows teachers to meet students where they are and stimulates deep, meaningful learning in a variety of areas. In this study, the teacher begins the 5E instructional model lesson in a virtual world that was created in the Minecraft Education Edition to get students to come up with new ideas and ask questions about the information presented about 3D objects. Then, students are required to explore the information and materials provided in the virtual world. After that teacher explain the characteristics of the 3D objects. At the end of this lesson is the evaluation which involves both teachers and students assessing the learning performance.

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IV. METHOD

In this study, the experimental method with a pre-test and post-test control group was used. Tests were applied to the students in the Treatment group and the Control group in the study before and after the experiment as Table 1. To minimize the risk of research bias in this study, each group will be taught by different Mathematics teachers, and each teaching and learning session will be evaluated and monitored by the researcher. The treatment group received 5E instructional lessons with Minecraft Education Edition, whereas the control group received traditional chalk-and-talk instruction. Pre-tests were given to both of these groups before the intervention was revealed at the start of the trial to determine their level of achievement. For a month, both groups received interventions using different teaching approaches, followed by a post-test to compare their mean scores.

TABLE I: INFORMATION OF BOTH GROUPS

	Gender			
	Female		Male	
Group	N	%	N	%
Experiment 1	15	50	15	50
Experiment 2	18	60	12	40
Total	30	100	30	100

V. FINDINGS

The pre-test and post-test scores for the Treatment group and the Control group were analyzed and computed using SPSS Version 23.0 software, and a t-test analysis was done to show that there were no significant differences between the two study groups at the start of the study. However, test analysis revealed that when the treatment group received the intervention, namely the 5E instruction model with the Minecraft Education Edition teaching approach, test scores were significantly higher than when the control group experienced traditional methods (Table 2). The findings of the t-test analysis test are shown in Table 3.

TABLE 2: FINDINGS OF T-TEST

	Group	N	Mean	Standard Deviation
Pre-test	Treatment	30	17.23	1.813
	Control	30	17.27	1.782
Post-test	Treatment	30	18.79	0.145
	Control	30	17.43	0.245

The findings of the t-test analysis, as shown in Table 2, revealed that the two groups did not differ at the initial stage based on the mean score. There was a significant difference between the treatment and control groups after a month of intervention, the treatment group's mean score was higher than the control group.

TABLE 3: FINDINGS OF T-TEST

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
									Lower	Upper
Pre-test	Equal variances assumed	0.216	0.644	-0.114	58	0.910	-0.054	0.417	-0.997	0.890
	Equal variances not assumed			-0.114	58	0.910	-0.054	0.417	-0.997	0.890
Post-test	Equal variances assumed	12.731	0.001	6.034	58	0.000	1.893	0.314	1.264	2.522
	Equal variances not assumed			6.034	40.494	0.000	1.893	0.314	1.259	2.527

VI. DISCUSSION

The findings show that there was a significant difference between the treatment and control groups after a month of intervention and the treatment group's mean score was higher than the control group. This is because Minecraft Education Edition facilitated student freedom and autonomy in the 5E instructional lesson. Besides, the structured learning activities greatly increased students' feelings of self-efficacy and self-esteem. The game required students to follow logical sequences involving the use of inductive and deductive mathematical reasoning. In that regard, students can enhance their 21st-century skills (Morgan, 2015) and develop core aptitudes such as digital literacy among themselves through the 5E instructional lessons (Thorsteinsson, 2016).

VII. CONCLUSION (OR LIMITATION OR SUGGESTION FOR FURTHER STUDIES)

Minecraft Education Edition can be applied in a well-thought-out, well-supported, and well-intentioned way (Callaghan, 2016). If significant educational aims are to be met, this type of structure must be maintained. In the lack of structure, a computer game like Minecraft Education Edition, which has considerable pedagogical benefits, will be ineffective. As a result, it is important to take an open approach like integrating the 5E instructional model with the Minecraft Education Edition, which allows students to grow as the game advances while maintaining gameplay freedom.

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