Increase 3-Dimensional Structure Drawing Skills For Special Needs Students With Learning Disabilities Through Minecraft Game

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***Abstract*—Minecraft is a technology tool in exploring the three-dimensional. The purpose of this study is to look at the skill level of the drawing object and structure of three dimensions by using the game Minecraft. The study involves ten special needs pupils to be an experimental sample. All the selected goals sample use Minecraft for learning activities for three months. Pre-and post-tests performed were using the classroom self-assessment instruments that developed by Curriculum Development Division, Ministry of Education Malaysia. The result of pre-testing eight out of ten samples can accurately draw a three-dimensional object. The post tests have ten samples of completed three-dimensional objects with more accurately according to the actual shape and size. Two students are still in a moderate level. While The structure test only shows three students can draw the structure accurately. The result of the test post shown eight people can draw sample with the right shape and size. Finally, the application of Minecraft helps to improve skills, draw object and structure more quickly and accurate with the given size. Minecraft should be a medium to the SEN who take multimedia visual skills subject.**

Keywords—minecraft, three-demensial object, learning disabilities

I. INTRODUCTION

Minecraft is a technology tool in exploring the three-dimensional. The Microsoft Education has adjusted this to a more suitable medium for teaching and learning. Minecraft, a multiplayer online game (MOG) is one of the fastest growing forms of media for youth and adult consumers. It allows players to build simulated, virtual worlds, Minecraft aims to foster creativity, control, and imagination. During playing this game, students will collaborate each other and use their critical thinking, and problem-solving skills. The game is set up in the world of three-dimensional imagination and helps the pupils especially for special needs students. Based on the standard curriculum of secondary school special education, there are one vocational subject that aim the purpose students teach science subjects, namely three-dimensional visual multimedia. As such, Minecraft is a medium suitable to help understanding and abilities pupils better. The objective of this study is to look at the skill level of the drawing object and structure of three dimensions by using the game Minecraft.

II. LITERATURE REVIEW

According to G. Foerster [1] gamification is a medium of integration between elements of games and learn that requires a critical thinking[2]–[4]. This game has its own features that the learners need to perform a task to complete the challenge. The power of the game lies in the diversity of the medium and the incidence of a report can be changed to meet the needs of education. This game has also seen them is a tool that can used as therapeutic tools for learning disabilities raised him to form skills of life and their social.

L. Vygotsky [5] believed that individual cognitive development occurs in the surrounding culture that affects behavior and thoughts of individuals. The importance of interaction in the cognitive development of the children portrayed by Vygotsky in proximal Development zone draft. It is a term used by Vygotsky to explain how sticky skills that can be carried out by children successfully with the help and guidance of people-adults or counterparts that are more skilled[5].

Minecraft already used as an educational tool for very different topics all over the world. It is also been used to enable early access to the topic of spatial geometry during class level 5/6, to teach about sustainable planning, language and literacy[6], digital storytelling [4] social skills[7], and computer art application[4].

III. RESEARCH METHODOLOGY

The study involves ten special needs pupils to be an experimental sample. Table I below show the details of sample. Nine over ten students are male and all of them were in a 14 to 17 age range. Five of them is an autistic student, two cerebral palsy, two developmental delay and one syndrome down.

TABLE I. SAMPLE DETAILS

Name	Gender	Age	Disabilities Category
Yeoh	Male	14	Autism
Lin	Male	17	Autism
Lee	Male	15	Autism
Pee	Male	16	Cerebral Palsy
Yong	Male	17	Developmental Delay
Chan	Male	14	Autism
Phrompon	Male	15	Autism
Dani	Male	15	Developmental Delay
Muhammad	Male	16	Cerebral Palsy
Nani	Female	16	Syndrome Down

All the selected goals sample use Minecraft for learning activities such as drawing object and structure of three-dimensional for three months. Table II show schedule of the pre and post-tests that activities during lessons. Pre and post-tests performed were using the classroom self-assessment instruments that developed by Curriculum Development Division, Ministry of Education Malaysia.

Pre-test test performed using the software online, namely Tinkercad[8]. As an introduction, the teacher shows how to draw the basic three-dimensional shape using the application. Teacher also used Lego set as a tool to help student imagination. Next post-test performed using applications Minecraft as a medium for drawing three dimensional objects[9], [10].

TABLE II. PRE AND POST-TEST SCHEDULE

	Month	Focus Activities	App & Tool Used
Pre test	Week 1 – 2 Week 3 – 4 Week 5 – 7	• Introduction to Tinkercad • Drawing basic three-dimensional object • Drawing three-dimensional structure of building	Tinkercad Lego set & Tinkercad Lego set & Tinkercad
Inter-vention	Week 8	• Introduction to Minecraft	Minecraft
Post Test	Week 9 Week 10	• Drawing basic three-dimensional object • Drawing three-dimensional structure of building	Lego set & Minecraft Lego set & Minecraft
Analysed	Week 11-12	• Teacher compared the students work	

IV. FINDINGS

The results are shown in Table III below. Based on basic shapes, only four students can draw well by their own, three of them were helped by teacher and three others cannot draw the basic shapes. After that the students were gave sketch structure of a building and asked to draw back according to the specifications of the measurements provided. Only two of them can draw on their own, two of them were helped by teacher and six others cannot draw as order in the task.

TABLE III. PRE-TEST RESULT

Task	Tinkercad Application		
	Draw on their own	Teacher helped	Cannot draw
3D basic shape	4	3	3
Building	2	2	6

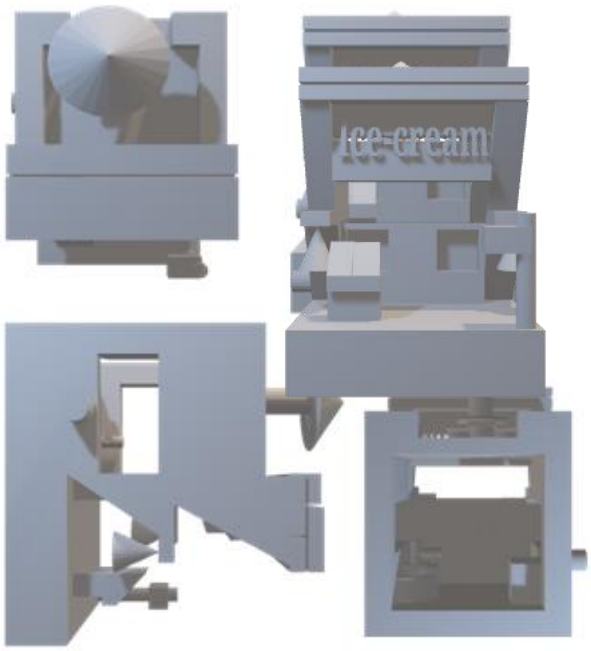

Fig. 1. Example of a 3D building drawn by students on their own using Tinkercad.

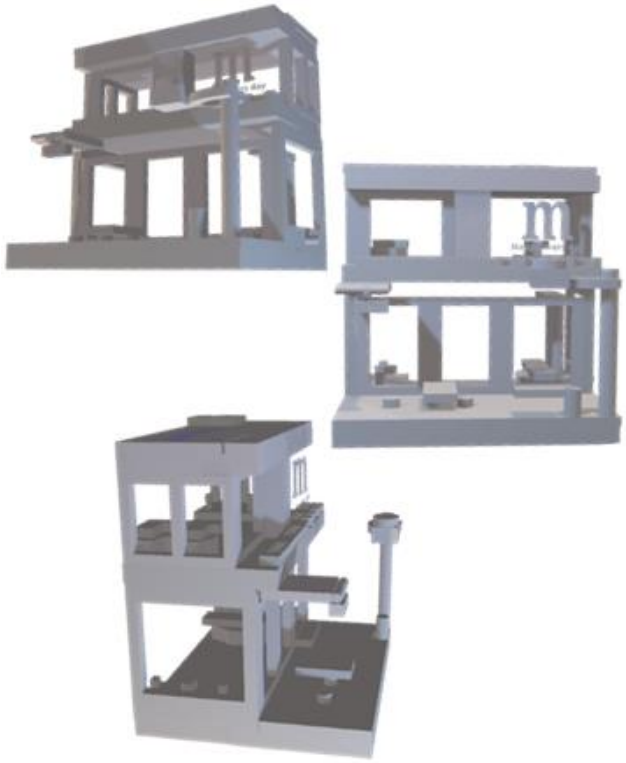

Fig. 2. Example of a 3D building drawn by students with teacher helped using Tinkercad.

Fig. 3. Example of a 3D building that cannot drawn by students using Tinkercad.

The findings show a significant improvement in the students ' performance. Table IV shows the dissemination of students ' performance.

TABLE IV. POST-TEST RESULT

Task	Minecraft Application		
	Draw on their own	Teacher helped	Cannot draw
3D basic shape	10	0	0
Building	9	1	0

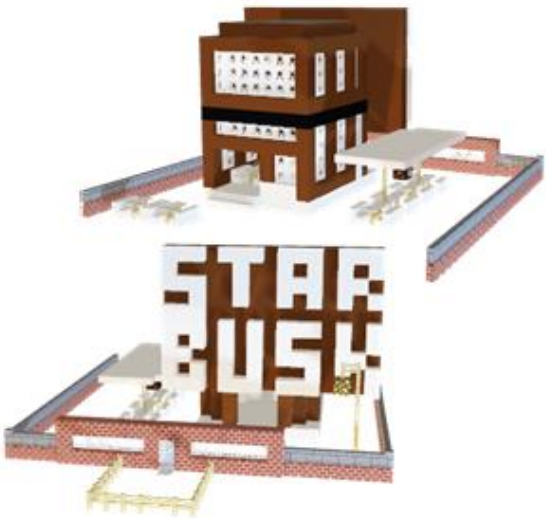

Fig. 4. Example of a 3D building drawn by students on their own using Minecraft.

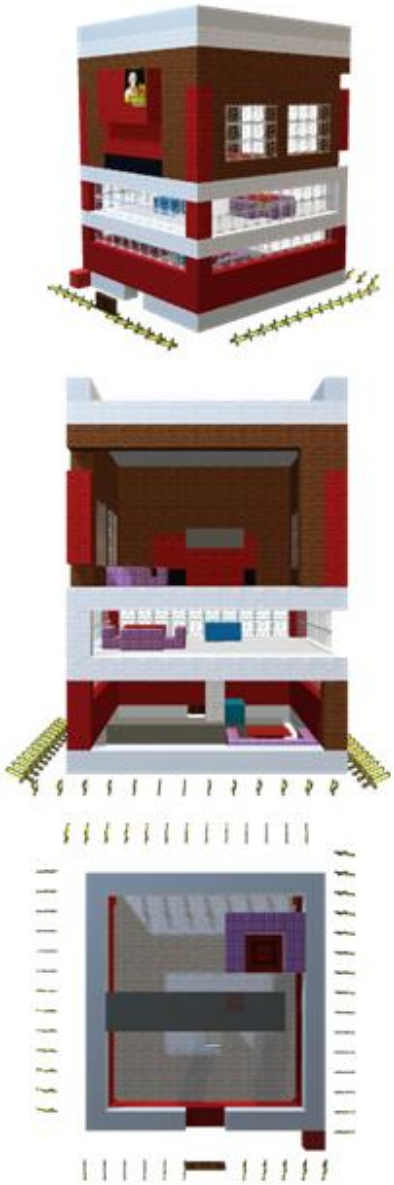

Fig. 5. Example of a 3D building drawn by students with teacher helped using Minecraft.

V. DISCUSSION

Both applications are good for teaching three-dimensional object. However, Tinkercad is more complicated compared to Minecraft. Students need an extra time to finish drawing using Tinkercad. All the sample need around three weeks to complete drawing using Tinkercad. Compared to using Minecraft, they only need one week to draw the three-dimensional structure.

Finding of the research clearly shown that using Minecraft: Education Edition application can improve students' skills in drawing three-dimensional object and structure. They can draw accurately with the size given. They also can do it faster with Minecraft. The best part is when the student that cannot draw using Tinkercad can draw very well using Minecraft.

Using Minecraft also can help SEN to understand about size and plan easily. Students also enjoy the application because they can play, craft and learn at the same time. It is a must for every teacher that teach Visual Multimedia to learn and mastering the Minecraft. They can use this application to teach the SEN because it can cover few topics in Visual Multimedia subject such as animation, graphic design and video.

VI. CONCLUSION

Minecraft is an application that is built into Windows 10 and is easy to control. This application is also a user-friendly application, interesting and has good animations. The application is easily mastered by SEN in addition to help they train their focus. Therefore, Minecraft needs to be used as the main application in teaching and learning sessions. Through this application also can make Visual Multimedia subjects' is an interesting subject for SEN.

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