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Application of the Use of Digital Media in Learning Solar System in Elementary School

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Abstract. This research aims to find out how elementary school students respond to teaching about the definitions and concepts of the Solar System using digital media. The researcher uses a quantitative method with a Pre-Experimental Design model to support this research because the data collected and the analysis are quantitative. The target of this research is students in elementary school, which is then taken as a sample of 20 students from sixth grade in Bandung Regency, Indonesia for research. The media used during the research were powerpoint and Infographics. The research was carried out offline and one class was divided into two groups, namely Group A and Group B. The results of this study indicate that the use of digital media in science learning material for the Solar System is declared effective, as can be seen from the results of the pre-test and post-test which show improvement, especially in the aspect of students' knowledge in understanding the material of the Solar System. The Pre-Test shows that almost all respondents do not know much about the solar system. However, when given learning materials using digital media such as powerpoint and Infographics, respondents, namely students, understood and understood the material as evidenced by the Post-Test results. Therefore, it can be concluded that in this study, the application of digital media to elementary school students can be implemented properly.

1. Introduction

Elementary school is the initial stage for children to receive an education. In elementary school, students can explore or seek new knowledge and skills and become a place to socialize with one another. In addition, an elementary school is also a place for forming students' basic attitudes which can later be used in daily activities [1]. One of the materials taught to elementary school students is about the solar system. The solar system refers to the collection of celestial bodies consisting of a star called the sun and all objects bounded by its gravity. These objects include 8 planets in orbit (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune), 5 dwarf planets, 173 natural satellites, and millions of other celestial bodies, namely asteroids, comets, and meteoroids [2].

Application is an activity to practice a theory or method to achieve a certain goal and for certain interests desired by individuals or groups that have been arranged previously. Usually, teachers as educators try to apply what they know to students to educate students. One of the tools for teachers to transfer knowledge to their students is using digital media. Digital media

is media that is a combination of data, text, sound, and images stored in digital format. Digital media is usually used to make it easier for someone to show or use data without the need to use conventional media. Digital media refers to the media that are encoded in machine-readable formats. Digital media can be created, viewed, communicated, modified, and preserved on digital electronics devices such as softwares, digital images, videos, web pages, websites, social media, digital data, digital audio and E-books [3].

Many research articles discuss the use of digital media in explaining the Solar System. First research from Retnoningsih explains "Learning Methods for Introduction to the Solar System in Elementary Schools Based on Computer-Based Instruction (CBI)". However, there are shortcomings in this study, one of which is not explaining in detail how students' initial understanding of the material presented and also not explaining what factors caused the research to be successful [4]. The second research from Putra and Negara explains "Development of Multimedia Solar System in Science Class VI Content". In this study, there are shortcomings regarding how students respond to the use of media made by researchers and do not explain how learning outcomes change before and after being given learning media [5].

The third research is from Eryanto and Prestiliano regarding "Design of learning media for the solar system lesson using animation and virtual reality". This study explains how the use of animation and virtual reality in explaining the solar system. There are advantages and disadvantages to using this media. The advantage is the use of these media that can make students enthusiastic about learning. While the shortcomings of this research are the manufacturing process and virtual reality tools which are quite expensive, so they are not suitable for implementation in elementary schools [6]. The fourth research is from Sahari and Wahyudi regarding "Development of Macromedia Flash-Based Solar System Media as Online Learning Innovation for Elementary School Students". This research explains how to make interactive media about the solar system using Macromedia Flash software. The drawback of this research is that there is no pilot data for elementary school students [7]. The fifth research is from Nugraha and Hidayat regarding "Implementation of Interactive Learning Media "Solar System" for Class VI Elementary School". From this research, there are shortcomings in terms of data before conducting research [8].

Therefore, this study aims to determine the response of elementary school students regarding learning the definition and concept of the Solar System by using digital media. In carrying out the research, the researcher uses the Pre-Experimental Design method because the data to be collected and analyzed is quantitative. Researchers took a sample of 20 elementary school students in Bandung Regency, Indonesia. Before conducting the lesson, the researcher used a Pre-Test with 20 questions as an initial assessment of students' knowledge of the solar system material.

Initial results show that students still don't know much about the solar system in space. So that researchers use digital media such as powerpoint and infographics in providing the material. The learning process is carried out offline with the class divided into two groups, namely group A and group B due to the school's policy of implementing limited face-to-face meetings. In addition to using digital media, researchers also use conventional methods such as question and answer and discussion so that students do not get bored during learning. After presenting the material, the researcher assigned the students to make a simple model of the solar system by drawing the sequences of the planets of the solar system from the closest planet to the farthest planet with the creativity of each student.

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The novelty of this research is (i) adding new learning methods using learning media; (ii) obtaining new data on how students respond to the material provided; (iii) strengthening and adding to the shortcomings found in previous studies. Then, the success of this research is determined by the results of the Post-Test which is carried out after the delivery of the material is complete. The result is that after being given learning materials and assignments, the Post Test shows an increase in students knowledge about the material. So it can be said that the research was successful.

2. Methods

This study uses a quantitative method approach with a pre-experimental design model because the data collected and the analysis are quantitative. The method is defined as a method with a systematic form to find the influence of one variable with another variable by providing special treatment and strict control in a condition. The form of this research is One-Group Pretest-Posttest Design. Sugiono explain that by conducting this form of research, you can see how the treatment of a variable is more accurate because it can be compared with the situation before being treated [9].

The object of this research is the application of the use of digital media in the material of the Solar System. The population of this study was 52 students in grade 6 at the elementary school level, with a sample of 20 students. The place and time of this research are at SDN Gadis 02 Ciparay and it is carried out offline and is divided into two large groups, namely Groups A and B on January 13 - January 20, 2022. The technique of collecting data is using a questionnaire. While in the learning process, researchers used powerpoint and infographics media.

3. Results and Discussion

3.1. Demography

This research was conducted on 6th-grade students at SDN Gadis 02 Ciparay, Bandung Regency, Indonesia. The study population was 52 students who were divided into two large groups, namely groups A and B. Then the research sample was 20 people when broken down into 10 people from group A and 10 people from group B.

3.2. Pre-Test and Post-Test Results

Table 1 describes the questions asked during the pre-test and post-test. The first questionnaire taken was the pre-test questionnaire. This questionnaire was distributed to 6th grade students to find out the level of understanding of the solar system and consists of 20 questions. We will then provide information about the solar system through powerpoint media and infographics. After explaining the material, we redistribute the questionnaire with post-test questions to students with the aim of finding out how much matter is understood about the solar system.

Table 1. Pre-Test and Post-Test results.

No	Questions	*Pre-Test*	*Post-Test*
1	Is the Sun the center of the solar system?	70% (Yes); 5% (No); 25% (Don't Know).	100% (Yes); 0% (No).

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2	Is it true that Mercury is the closest planet to the sun?	35% (Yes); 20% (No); 45% (Don't Know).	95% (Yes); 5% (No).
3	Does Venus have a rotation time of 225 days?	0% (Yes); 0% (No); 100% (Don't Know).	60% (Yes); 40% (No).
4	Is it true that Earth has 1 natural satellite?	55% (Yes); 10% (No); 35% (Don't Know).	100% (Yes); 0% (No).
5	Is it true that Mars is dubbed the red planet?	25% (Yes); 15% (No); 60% (Don't Know).	100% (Yes); 0% (No).
6	Is Jupiter the largest planet in the solar system?	45% (Yes); 35% (No); 25% (Don't Know).	100% (Yes); 0% (No).
7	Is it true that Saturn has 62 natural satellites?	5% (Yes); 5% (No); 90% (Don't Know).	70% (Yes); 30% (No).
8	Is it true that Uranus is a planet with a revolution time of 84.02 years?	0% (Yes); 10% (No); 90% (Don't Know).	60% (Yes); 40% (No).
9	Is it true that one of the satellites of the planet Neptune is called Triton?	0% (Yes); 10% (No); 90% (Don't Know).	100% (Yes); 0% (No).
10	Are asteroids bigger than meteoroids?	45% (Yes); 20% (No); 35% (Don't Know).	100% (Yes); 0% (No).
11	Is it true that Halley's Comet appears once every 76 years?	0% (Yes); 10% (No); 90% (Don't Know).	90% (Yes); 10% (No).
12	Is it true that Meteor is a rock whose size is small and moves freely?	25% (Yes); 0% (No); 75% (Don't Know).	90% (Yes); 10% (No).
13	Is it true that the satellite made in Indonesia is the Palapa Satellite?	0% (Yes); 0% (No); 100% (Don't Know).	90% (Yes); 10% (No).
14	Is it true that the time the earth rotates on its axis is 24 hours?	50% (Yes); 0% (No); 50% (Don't Know).	100% (Yes); 0% (No).
15	Is one of the effects of Earth's rotation is there is day and night?	30% (Yes); 15% (No); 55% (Don't Know).	100% (Yes); 0% (No).
16	Is it true that the Earth's time to evolve is 365 ¼ days?	20% (Yes); 5% (No); 75% (Don't Know).	90% (Yes); 10% (No).
17	Is it true that a lunar eclipse occurs because the moon is covered from the sun by the earth?	5% (Yes); 15% (No); 80% (Don't Know).	75% (Yes); 25% (No).
18	Is it true that a solar eclipse occurs because the Earth is covered from the Sun by the Moon?	20% (Yes); 5% (No); 75% (Don't Know).	75% (Yes); 25% (No).
19	Does a leap year happen every 4 years?	40% (Yes); 15% (No); 45% (Don't Know).	80% (Yes); 20% (No).
20	Is it true that the determination of the beginning of the day in the Hijri calendar begins with the setting of the sun?	0% (Yes); 10% (No); 90% (Don't Know).	80% (Yes); 20% (No).

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The results of the study as shown in the table above show that after students listened to the material on the Solar System using digital media, there was an increase. As for the discussion:

(i). For questions number 1-9 regarding "Planets in the Solar System," the results have increased compared to the results of the pre-test. This is because students' understanding of the material increases through explanations using digital media and assignments. However, some answers are answered incorrectly, this is because students still cannot find a way to remember.

(ii). For questions number 10-13 regarding "Other celestial bodies in the Solar System" the results of the test have increased compared to the results of the pre-test. This is because students have been given teaching materials using infographic media and making children enthusiastic about learning it.

(iii). For questions number 14-20 regarding "Motion of the Earth and Moon towards the Sun" the results have increased compared to the results of the pre-test. This is because the concepts provided by the researcher make students able to understand the material presented. Even though in the post-test there were still some students who were wrong in answering the questions.

Based on the description above, it can be seen as a whole that learning by using powerpoint and infographic media has succeeded in increasing students' understanding of the material presented. This is evidenced by the increase in the results of the pre-test and post-test. The combination of conventional teaching methods and digital learning materials in the form of powerpoint and infographics can provide different activities and experiences for students. Although this research still uses conventional teaching methods, in practice, the researchers still provide opportunities for all students to actively participate in the learning process, such as questions and answers, and quizzes. Through active participation, students can gain valuable activities and experiences that make learning productive.

After using powerpoint learning media and infographics, it is known that students are interested in the learning media because the learning media contains real pictures and some videos that make students understand the material presented better. Students feel more enthusiastic about participating in the teaching and learning process. In addition, the use of powerpoints and infographics is very helpful to develop imagination and creativity, especially with attractive illustrations. Using powerpoint-based learning media, students can see directly the material presented by the teacher so that students can more easily understand the learning material [10]. Based on this explanation, it can be concluded that the use of powerpoint learning media, and infographics is very helpful in increasing the understanding of 6th-grade elementary school students.

4. Conclusion

Learning about the solar system uses digital media using the Pre-Experimental Design research method and limited offline learning activities with 20 students being the research sample from a total of 52 students. The digital media used in this research are Powerpoint and Infographics. This research begins with giving a Pre-Test to the sample regarding the material that will be given. The results show that there are still Yesng students who do not know the definition and concept of the Solar System material. In practice, researchers describe the definition and concept of the solar system through a powerpoint application that includes the material of the planets that are included in the solar system. The next meeting discussed other objects circulating in the solar system such as comets, asteroids, and meteoroids as well as

natural and artificial satellites using infographic media. In the last meeting, a Post-Test was held which was the same question, aiming to see students' understanding of the material that had been taught. The result is an increase in students knowledge about the material of the solar system.

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Author Note
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