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Application of Learning Media Based on 3 Dimensions on The Solar System Materials To Increase Student Results Class VII MTS Pondok Pesantren Al-Ishlah Kampar

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ABSTRACT

The purpose of this study was to describe student learning outcomes by applying 3-dimensional-based learning media on solar system material for class VII MTs and to determine the improvement of student learning outcomes on solar system material by using 3-dimensional-based learning media. The type of research used is Quasi Experiment (Post-test only control design). This research will be conducted at MTs Pondok Pesantren Al-Ishlah Kampar by using a test of students' cognitive learning outcomes on solar system material as a research instrument. This study uses two classes, namely the experimental class that is subjected to treatment or treatment (taught with 3-dimensional-based learning media), while the second class as a control class that is not subjected to treatment or treatment is only taught with conventional methods. In this study, the learning outcomes of students in class VII MTs who applied 3-dimensional-based learning media on solar system material were higher than the learning outcomes of students who applied conventional learning, and there was an increase in the learning outcomes of students in class VII MTs who applied 3-dimensional-based learning media on solar system material.

Keywords: *3-dimensional based learning media, Student learning outcomes, Solar system*

1 Introduction

Human life continues to experience developments in various fields. One of them is the development in the field of education, which is the most important part of human life, with higher education expected to produce quality humans (Widayanti, 2018: 21). Education is a place in the learning process (Yusandika, 2018: 187).

One of the subjects studied by junior high school students is science. Science subjects have an important role in developing aspects of students' ability levels in the learning process, this is because science is part of the subjects that aim to develop knowledge, attitudes and skills competencies. These three aspects can be developed through the science learning process which has scientific and logical characteristics through the observation process (Yusuf, 2021: 70). In science learning there is solar system material. This material includes material that is difficult to observe directly or is abstract, so it requires visualization or animation to learn it (Nadzif, 2022: 18).Along with the times, the rapid emergence of technology today makes a big revolution in the world, all work feels easy and cheap. Likewise, in education related to the teaching and learning process at school, we must use several variations of learning media to teach knowledge to students who are increasingly advanced and sophisticated. This aims to improve learning outcomes, learning is more interesting, and students can longer remember the messages received, and are more motivated to learn (Iswanto, 2018: 9). The development of Information and Communication Technology (ICT) has an influence on the world of education by adjusting technological developments to efforts in improving the quality of education, especially in the learning process. The role of ICT in learning can help students and teachers in learning (Budiman, 2017: 82).

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The teaching and learning process at school, teachers tend not to pay attention to the learning principles contained in Permendikbud Number 22 of 2016 which states that one of the learning principles that must currently be used is the use of information and communication technology media to improve effective and efficient learning (Yusuf, 2021: 71). This is supported by Muhammad Nadzif's research (2022: 18) which states that the science learning media used are still limited to package books, the lack of learning media facilities and facilities has an impact on the low quality of education in Indonesia.

Learning science on solar system material which is considered difficult, abstract and lack of learning media is the cause of low student learning outcomes. This is experienced by students of MTs Pondok Pesantren Al-Ishlah Kampar, the learning methods used by teachers in the learning process are lecture and discussion methods to achieve learning objectives. Students have not understood the learning material taught specifically, because the use of learning media in schools is only textbooks and lack of supporting images of learning material, so that the material received by students is only in fantasies that cannot be proven in the form of media, so that students are unable to do the questions given properly. Then all learning activities only focus on the teacher. Based on the existing problems, it has an impact on the low learning outcomes of students. This is known based on the average score of seventh grade students in the last two years on solar system material, the average score of students in the 2021/2022 academic year was 69, out of 60 students only 45% of students were complete, and in the following academic year, the average score of students was 70, out of 58 students only 50% of students were complete.

The proper development of Information and Communication Technology (ICT) can improve the quality of student learning. ICT in learning can help package teaching materials more effectively (Purnasari, 2020: 191). The use of technology in learning can be realized by developing learning media such as 3-dimensional learning media. Based on research by Liza, it is stated that 3-dimensional animated learning media can increase interest and learning outcomes in physics (Liza, 2021: 172). The advantages of using 3-dimensional learning media are: provide direct experience, present objects concretely and avoid verbalism, can show the shape of the object as a whole, can show the organizational structure clearly, can attract students' attention and focus, so as to increase student motivation and learning outcomes (Rohmatullah, 2022: 142).

Based on the description above, the author conducted research on the application of 3-dimensional-based learning media, with the aim of helping students improve science learning outcomes, especially in solar system material, with the research title "Application of 3-Dimensional Based Learning Media on Solar System Material to Improve Student Learning Outcomes in Class VII MTs Pondok Pesantren Al-Ishlah Kampar".

2 Research Methodology

The type of research used in this study was quasi-experimental research with a post-test only control design. This group design uses two classes, namely the experimental class and the control class. The experimental class will use 3-dimensional based media and the control class will use conventional learning. The population in this study was the same as the sample, which amounted to 56 students of class VII MTs Pondok Pesantren Al-Ishlah in the 2023/2024 academic year

The data collection method in this study was a test technique, the data was collected by giving a post-test (learning outcomes test) to the experimental class and control class. The research instrument in this study was a test of student cognitive learning outcomes. Tests of student cognitive learning outcomes in the form of multiple choice tests made based on indicators of achievement in solar system learning. This data collection instrument aims to determine the level of students' cognitive learning outcomes. To analyze data on cognitive learning outcomes, the following formula is used (Mirjanah, 2017: 21):

$$cognitive\ test\ score = \frac{jumber\ of\ scores\ obtained\ by\ students}{maximum\ score} \times 100$$

After obtaining student score data, proceed with calculating the average value. The scores obtained from the learning outcomes test are classified into five categories of learning outcomes assessment criteria in Table 1 below.

Table 1 Learning outcome assessment criteria

Value	Criteria	Description
85≤X≤100	A	Very Good
75≤X<85	B	Good
65≤X<75	C	Fair
55≤X<65	D	Deficient
0≤X<55	E	Very Poor

(Fatikasari, 2020: 67)

After obtaining data on the ability of student learning outcomes, it is then processed to determine the percentage of student learning outcomes with the following formula (Fatikasari, 2020: 67):

$$P = \frac{f}{N} \times 100\% \quad (2)$$

$P =$ percentage number

$f =$ the frequency for which the percentage is being sought

$N =$ jumlah frekuensi atau banyaknya individu

3 Results and Discussion

Research on the application of 3-dimensional-based learning media obtained data on the categorization of the level of student learning outcomes which can be seen in Table 2.

Table 2. Categorization of the level of student learning outcomes

Value	Criteria	Description	Experimental Class		Control Class	
			Number of students	Percentage (%)	Number of students	Percentage (%)
85≤X≤100	A	Very good	12	43	6	21
75≤X<85	B	Good	13	46	15	54
65≤X<75	C	Fair	3	11	7	25
55≤X<65	D	Deficient	0	0	0	0
0≤X<55	E	Very Poor	0	0	0	0
Total			28	100	28	100
Average Score			85		80	

Based on the categorization data of student learning outcomes, it can be seen that for the experimental class, the frequency of student learning outcomes is mostly in category B (Good) with 13 students and a percentage of 46%. For the control class, the highest frequency of student learning outcomes was in category B (Good) with a total of 15 students and a percentage of 54%. The category of student

learning outcomes in the experimental class is better than the control class, this occurs due to differences in the treatment given during the learning process.

The percentage of student learning outcomes based on the cognitive level of students in the experimental and control classes can be seen in Figure 1.

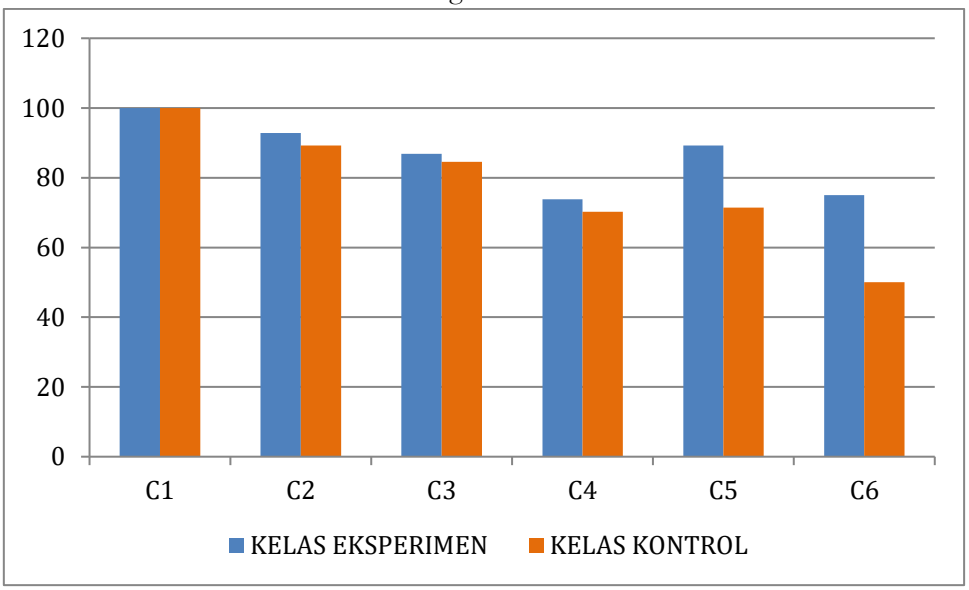

Figure 1. Comparison of the percentage of student learning outcomes based on cognitive level categories.

The difference in the percentage of the two classes based on Figure 1 can be seen the comparison of cognitive level categories between experimental and control classes at the cognitive level C1 (remember), C2 (understand), C3 (apply), C4 (analyze), C5 (evaluate), C6 (create). The experimental class was superior to the control class at the C2, C3, C4, C5, and C6 cognitive levels. At the C1 level both classes have the same ability. The discussion of student learning outcomes on cognitive assessment based on this research can be explained as follows:

a. Remembering (C1), related to retrieving knowledge from long-term memory. Based on post-test data processing, the percentage in both classes is the same, namely the control of 100%. This shows that the use of 3-dimensional-based learning media is successful in improving student learning in the category of remembering. In the cognitive ability of the realm of remembering (C1) in Ubaidillah's research (2022: 103) states that by using 3-dimensional learning media students are invited to recognize information related to learning material in different ways. So that students can remember the material well.
b. Understanding (C2), related to building an understanding from various sources. Based on data processing, in this category the experimental class is superior with a percentage of 93% which shows that the use of 3-dimensional-based learning media is successful in improving student learning in the understanding category. In Ubaidillah's research (2022: 104) by using 3-dimensional learning media, students can see longer and repeatedly related to learning material so that students can construct their thoughts and understand the material properly and correctly. In the display of 3-dimensional learning media, it shows an overview of the solar system and its movements longer and repeatedly, so that students in the experimental class better understand the learning material and make it easier for students to build their thoughts on the material presented.
c. Applying (C3), related to procedural knowledge. In Qarimah's research (2022: 2058) states in the applying category, by applying 3-dimensional learning media students can solve problems given by the teacher. The percentage of experimental class learning outcomes in the application category reached 87%. This happens because the use of 3-dimensional learning media is able to explain the material, so that most students are able to solve and answer questions correctly. Therefore, the

use of 3-dimensional-based learning media is successful in improving student learning in the understanding category.

d. Analyzing (C4), solving a problem, looking for connections and finding out how these connections can cause problems. The percentage of learning outcomes in the experimental class reached 75%, with the difference in learning outcomes in the two classes indicating that the use of 3-dimensional-based learning media was successful in improving student learning in the analysis category. In Qarimah's research (2022: 2058) explains that 3-dimensional learning media can improve students' ability to analyze categories, because 3-dimensional learning media can display the characteristics of parts of learning material separately and sequentially. Students are invited to build relationships between parts of the learning material as a whole. So that it can help students in solving problems related to analyzing skills. Based on this research in the experimental class, the use of 3-dimensional learning media can display the material better, on the material of the characteristics of the members of the solar system, the characteristics of each member are displayed along with a 3-dimensional image.
e. Evaluating (C5), making decisions based on criteria and/or standards, this includes checking and criticizing. The learning outcomes of the experimental class reached a percentage of 89%, this shows that the use of 3-dimensional-based learning media is successful in improving student learning in the evaluation category. In research by Rohmatullah (2022: 142) states that the use of 3-dimensional learning media provides direct experience to students so that students interact directly with the media which makes students better understand the learning material. The experimental class that used 3-dimensional learning media explained the solar eclipse and lunar eclipse material well. The illustration of the eclipse process allows students to observe directly to better understand the material even to the level of evaluation. Students in the experimental class were superior in interpreting the causes of solar eclipses and lunar eclipses.
f. Creating (C6), combines parts to form a coherent whole and directs students to produce a new product by organizing it. The experimental class was superior to the control class. In Badriah's research (2018: 63) states that the C6 cognitive level is fairly difficult so that students have difficulty answering questions. This cognitive level requires students to be able to make decisions and provide arguments (reasons). In the cognitive category of creating, students are able to create something new by remodeling some elements or parts into a form that is not explained by the teacher. Although not optimal, students are able to answer questions correctly because students understand the basic concepts of learning materials with the help of learning media. (Silva et al, 2023: 48). In the experimental class, the use of 3-dimensional learning media can show the difference between full tide and high tide. 78% of students in the experimental class were able to make decisions and provide arguments to explain the differences between full and high tides.

The difference in treatment given to the experimental class is the application of 3-dimensional-based learning media as a solution to the difficulty of learning materials and abstract materials in the implementation of learning. By using 3-dimensional-based learning media and going through the phases of the direct instruction learning model, it is hoped that it can help students to better understand the learning material and improve student learning outcomes. Based on the results of Nurkisnawati's research (2020) which states that the use of direct instruction learning models can improve the quality of science learning and have a positive impact on improving student learning outcomes. In research by Erwin Umbu Dangu Ela (2022: 1227-1235) showed an increase in student learning outcomes through the use of three-dimensional media.

Based on the entire learning process in the experimental class, students seemed active in giving responses, seemed enthusiastic about using 3-dimensional-based learning media, and during discussions could work well together. This is conveyed in research by Rohmatullah (2022: 142) that the use of 3-

dimensional learning media can have a positive impact on the learning process, such as being able to attract student attention and focus which can increase student motivation and learning outcomes.

The control class tends to be passive and bored with two-dimensional media (Badriah, 2018: 58). In the implementation of learning in the control class, it looks different from the experimental class, students tend to be passive in responding and not enthusiastic during the learning process. This happened because the learning media used were only books and the teacher only delivered the material according to the contents of the book. Each student has a book, so in group discussions students tend to work independently.

The application of 3-dimensional-based learning media students get a new experience directly with a display that presents objects in a concrete manner, shows the organizational structure clearly so that it can attract attention and increase student learning motivation, this is in accordance with Rohmatullah's research (2022: 142). The use of 3-dimensional learning media is feasible to use and effective to improve understanding of material and student learning outcomes, in accordance with the results of research by Ressi Kartika Dewi (2019: 30).

4 Conclusion

Based on the research that has been done, learning science by using 3-dimensional-based learning media in class VII MTs Pondok Pesantren Al-Ishlah Kampar, the following conclusions are obtained:

1. Student learning outcomes by applying 3-dimensional based learning media on solar system material for class VII students of MTs Pondok Pesantren Al-Ishlah Kampar got a higher average score than classes that did not apply 3-dimensional based learning media.
2. The use of 3-dimensional-based learning media on solar system material can improve learning outcomes with differences in student learning outcomes between experimental and control classes.

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