

The Effect of Multimedia in Increasing the Integers Operation Ability

R Rodiyana^{1,2}, E Santoso^{3*}, W Dwi Puspitasari², and H Miko⁴

¹ School of Postgraduate Studies, Universitas Pendidikan Indonesia, Bandung, Indonesia

² Elementary Teacher Education Departement, Universitas Majalengka, Majalengka, Indonesia

³ Mathematics Education Departement, Universitas Majalengka, Majalengka, Indonesia

⁴ Department of Oral Health Therapy, Poltekkes Kemenkes Tasikmalaya, Jl. Tamansari No.48, Tasikmalaya Indonesia

*eriksantoso@unma.ac.id

Abstract. This study aims to reveal the effectiveness of multimedia in increasing the ability to calculate integers. This research was conducted in the third class of SDN Cibodas Majalengka. The research method uses quantitative methods with a pre-test post-test control group design. One class uses multimedia and one class uses ordinary learning. After analysing the data, it can be concluded that the ability to calculate integer operations of the experimental class is better when compared to the control class. Other results show that student responses are positive after the use of multimedia learning.

1. Introduction

Education is a conscious and planned effort to develop individuals in society so that they can humanize human beings [1]. The purpose of manipulating humans is to form humans as part of individuals who cannot be separated from society. Mathematics as a subject that must be given to students has an important role in the development of technology. Through mathematics, we can solve problems that can be used in solving everyday problems. Therefore, one of the goals of mathematics is that students can think systematically.

Problems in mathematics are of concern to mathematic activists themselves. Problems that arise include mathematics material which is considered to be the foundation of mathematics learning. One often encountered a problem is in integer operating material. Difficulties occur in plus and minus operations when combining positive and negative integers. This problem occurs at SDN Cibodas Majalengka. Extra energy is needed so students understand well the operation of integers. This is based on the importance of material operating numbers which are the foundation in working on other mathematical problems. It needs innovation in learning mathematics so that the material that is the foundation of this problem can be solved. The effort that can be taken by the teacher in overcoming the problem is to use the media. Media that can be used of course media that can make a visualization of the material. The use of multimedia is a way that can be taken by the teacher in making it easier for students to understand integer operation material. Through multimedia learning mathematics that seems abstract can be seen more concretely because it was previously prepared in advance by the teacher.



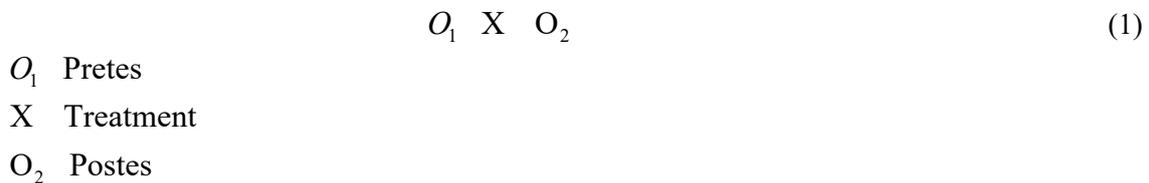
Multimedia is media that combines several elements such as graphics, writing or the other. This is following the opinion of saying that Multimedia is the use of computers to present and combine text, sound, images, animation, and video with aids (tools) and connections (links) so that users can navigate, interact, work and communicate [2]. Multimedia technology empowers the educational process by means of increased interaction between teachers and the students [3]

Based on this opinion, it can be seen that multimedia learning uses computer devices as hardware and programs in the form of software in the implementation of learning. Simple multimedia can also be interpreted as a combination of several media, but if it is further examined, multimedia is a combination of text, graphics, sounds and picture in the form of animation that design for meaningful learning [4].

Multimedia if done well it can have a considerable influence on changing views of mathematics in the eyes of students is a difficult and frightening subject. Through interactive multimedia learning becomes more dynamic because there is communication between students and multimedia created. Multimedia can change the teacher's role as a facilitator in learning and can control students in implementing learning well. Regarding the benefits generated from multimedia are as follows: Kristi & Belet states that technology support which aims to annihilate students' negative views, attitudes and relationships about learning can make learning more effective. it can be emphasized that the use of multimedia can reduce student negativity towards learning then student attitudes become better which in turn can facilitate teachers to achieve learning goals [5].

2. Research Method

This research was conducted in third-grade students at SDN Cibodas Majalengka. The number of students is 32 students. The study was conducted in 2019. This study uses a type of research with a quantitative approach, with the design of "One Groups Pretest-Posttest Design".. The research design drawings are as follows:



O1 is a pretest used before learning by using multimedia use. X is the treatment of learning that is learning using multimedia learning and O2 is a post that is used to see the extent of understanding that students have after the implementation of learning by using multimedia learning. Tests used in this study are paired sample t-test if the prerequisite and Wilcoxon test are not eligible. The pretest is done by students on learning multimedia as well as post-tests carried out by students on multimedia learning that is made. Pretest and posttest deliberately carried out through multimedia in the hope that students can see first hand the value obtained after all the questions are done. This will be an encouragement for students to carry out learning if they get a small pretest value. The description of research thinking framework can be seen in tabular form as follows:



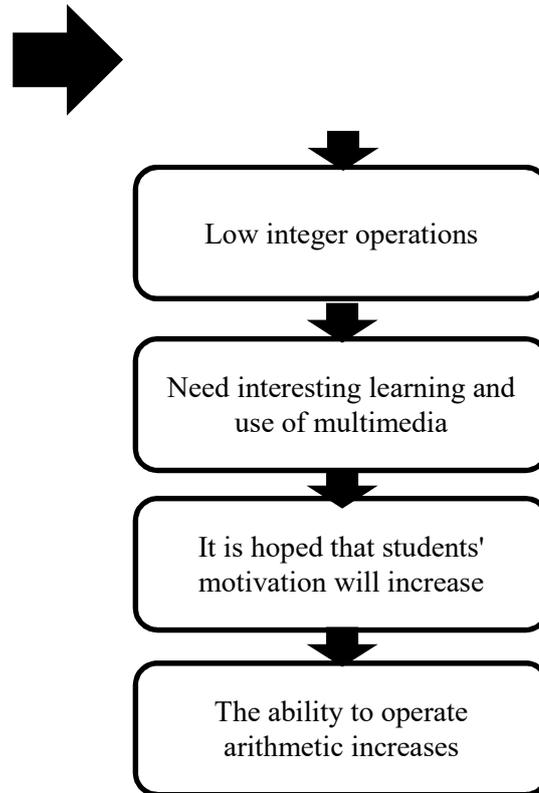


Figure 1. Framework

3. Result and Discussion

The results of the study provide an overview of the ability of integer operations of third-grade students of SDN Cibodas Majalengka. This research started by making learning multimedia so that it can be used in the learning process in class III SDN Cibodas. Multimedia previously provided to experts for validation. Experts taken are Dendi S. Kom for multimedia experts and M. Gilar Jatisunda M.Pd. as a mathematician content expert. The following is an overview of multimedia created by the teacher.



Figure 2. Interactive Multimedia Display

Figure 1 is a display of mathematics learning on integer operating material prepared by researchers. Researchers provide a parable in the operation of integers added by modeling the apples so that learning mathematics is concrete. By giving examples like this it is hoped that students can better understand the material being taught. To answer at the beginning of the meeting students are given answer choices while in subsequent questions students must directly answer questions from the teacher. Through

schemes like this students can already correct answers directly from the multimedia created. The following is the display when students answer.



Figure 3. Interactive Display of Wrong Answers

The picture is a display when students answer questions. Based on the picture, students answer incorrectly, so students must answer the questions again. At the time of practice, students must arrive correctly in answering the questions provided so that they can proceed to the next question. If students experience difficulties then there is a teacher who is ready to help to solve the problem. Through this, the teacher's role changes to become a facilitator in learning.

In general, the multimedia display is made simple and contains contextual elements because it is given to elementary school students. The figure shows the integer number operation. Students by themselves can already know whether the answers made are correct or wrong if wrong because this is a learning process students can still correct it. All learning processes are carried out in a multimedia program created. Multimedia learning is ready, then the next step is to do pre-test and post-test on integer operation material. The pretest is done before learning is carried out and the posttest is done after learning is done. The description of pretest and posttest obtained by students in class III SDN Cibodas Majalengka is as follows:

Table 1. Description of Pre-test and Post-test Data

	Pretest	Posttest
Average	57,66	74,69
Maximum Score	75	100
Minimum Score	45	60
Standard Deviation	7,72	7,92

Based on these data it can be seen that the average post-test score is greater than the pretest. The average pretest was 57.66 while the average posttest was 74.69. The maximum value for the posttest reaches the maximum value of 100. These values only describe the description of the data. To analyze and test hypotheses, it is followed by prerequisite tests. The first prerequisite test is the normality test using the Shapiro-Wilk test. The significance value for the pretest is 0.89 thus it can be concluded that the data distribution for the pretest is normal, while for the posttest data the significance value is 0.022 thus it can be concluded that the posttest data is not normally distributed because of the significant value <0.05 . The test used to answer the hypothesis is a non-parametric test because one of the prerequisites for data distribution is not fulfilled. The test used is the Wilcoxon test, the result of the significance value is 0,000. These results when compared with alpha then <0.05 so it can be concluded that H_0 is rejected means that there is a significant difference in the students' integer operating ability before and after multimedia learning is given. These results indicate that multimedia learning influences on improving students' understanding of integer operations. Multimedia has a positive influence including students' views in learning mathematics becoming more dynamic. This is because there are animations that make learning media more interactive.

Another thing that can be seen by researchers when the research takes place is that it seems that students' motivation is increasing because of the use of this multimedia. Motivation is formed because students feel learning is not saturated and there are challenges when working on problems so that each student during learning becomes more motivated to get the best results. This is following the opinion of, the advantages of interactive multimedia include: can increase student motivation [6], different if the teacher applies the traditional model. Traditional learning media used in teaching and learning activity also made students less motivated [7]. Student motivation can be seen from the results of the interview that students feel motivated by learning to use multimedia. Students' views change in learning mathematics because mathematics learning is packaged in an interesting way using multimedia learning. The researcher asks in what part students are interested in multimedia learning. Students answer in the multimedia response section when we do an incorrect answer. This means that when a student answers an incorrect question quickly he can fix it without waiting for the teacher. This makes it easy for students to return to answering questions from the teacher. Another thing that is obtained from the multimedia learning information is students can carry out learning anywhere and anytime. Through multimedia, students can practice anytime and anywhere.

4. Conclusion

The results of data processing and analysis illustrate that the ability to operate student numbers has increased from pretest to posttest. Based on the results of hypothesis testing using the Wilcoxon test, it was concluded that there were significant differences in the students' integer operating abilities before and after multimedia learning was given. Suggestions from this study are teachers of elementary school students can make multimedia learning as an alternative in implementing learning in mathematics learning. This is based because multimedia learning can improve mathematical abilities and make learning more dynamic. Another thing that also underlies that this research can be applied by other teachers is that student motivation increases in learning mathematics after implementing learning by using multimedia learning.

References

- [1] Nurkholis, "PENDIDIKAN DALAM UPAYA MEMAJUKAN TEKNOLOGI," *Jurnal Kependidikan*, vol. 1, no. 1, pp. 24-44, 2013.
- [2] Fred T Hofstetter, *Multimedia Literacy*, Thrid Edition ed. New York: McGraw-Hill International Edition, 2001.
- [3] Hana Jamal Abadi, Akram M Zeki, Waleed F Faris, and Roslina Bt Othman, "Animation as a Problem Solving Technique in Mechanical Engineering Education," *International Journal of Scientific & Engineering Research*, vol. 5, no. 1, pp. 96-99, May 2013.
- [4] Richard E Mayer, *Principles for managing essential processing multimedia learning: Segmenting, pre training, and modality principles. In R. E. Mayer (Ed.), Cambridge handbook of multimedia learning*. New York: Cambridge University Press, 2005.
- [5] Nur Rahmi Akbarini, Wiedy Murtini, and Andre Rahmanto, "Design of Interactive Learning Multimedia Development in General Administration Subject," *International Journal of Multicultural and Multireligious Understanding*, vol. 5, no. 4, pp. 138-148, August 2018.
- [6] Newby T. J., et. All, *Instructional technology for teaching and learning*. New Jersey: Prentice-Hall Inc, 2000.
- [7] Dwi Yuniasih Saputri, Rukayah, and Mintasih Indriayu, "Need Assessment of Interactive Multimedia Based on Game in Elementary School: A Challenge into Learning in 21st Century," *International Journal of Educational Research Review*, vol. 3, no. 3, pp. 1-8, 2018.