Using a Multimedia for Natural Science Learning in Improving Concept Skills of Elementary School Teachers

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Abstract

The research objective was to improve the understanding and creative thinking skills of elementary school teachers in the learning process. The research design used is to make the teacher's group into small groups. During the learning process, observations on teacher collaboration during learning with multimedia media were carried out to assess the understanding and creative thinking abilities of teachers. The results of observations in each cycle are evaluated as reflection material in the next cycle to improve the understanding and creative thinking skills of teachers in accordance with predetermined targets. Data analysis was carried out in a quantitative descriptive manner. From the results of the T-test, it is known that there are significant differences. This means that the understanding of concepts and Science Process Skills increases after the teacher experiences the learning process using multimedia learning media. From these results, the average value of concept understanding increased from 39.89 to 93.48. 98% of teachers gave a positive response, namely agreeing and strongly agreeing that the learning process with multimedia learning media can improve science process skills and material understanding in subjects for elementary school teachers

Keywords
Creative, thinking, skills, multimedia, sains.

1. Introduction
Elementary school teachers basically have a strata one education background that is universal. In learning, individual learning often results in uneven student learning outcomes (Suchyadi & Karmila 2019). Teachers must be creative in improving students' abilities, understanding and interest in learning (Suchyadi 2017). Elementary school teachers must have the ability to understand and think creatively well in solving various learning problems, especially thematic or science. Thus, students who have less academic ability can study independently and thus improve their academic abilities. Thinking skills and scientific processes must be developed through science learning with certain models and media to grow students' ability to think creatively, innovatively and productively. Science learning must be taught in an integrated manner, with more emphasis on the process of building knowledge through observation, practicum, and group discussions. Students are not always able to understand the concepts in science learning, sometimes students have difficulty in learning science lessons. Difficulties in learning thematics, especially the science family, are caused by many factors, one of which is from the students themselves, such as low motivation and interest in learning, not studying the material that has been obtained, not reading textbooks, lack of experience students as initial knowledge, and low ability to think creatively. While the content of the material in the science group courses is considered difficult because some science studies are cumulative, if they do not understand one concept, students will have difficulty following other concepts, some studies in science study objects that are abstract (Suchyadi & Nurjanah 2018).

1.1 Objectives
To overcome this problem, elementary school teachers who teach science group subjects must have creativity and the ability to deal with them, without reducing the essence and quality of learning. In developing the process of students' creative thinking skills, interactive multimedia can be developed, because in this media students are trained

in psychomotor, affective and cognitive creative thinking skills. Some of the problems that can be analyzed are whether the use of interactive multimedia can develop students' creative thinking skills in science lesson groups? How students' science process skills are evaluated after participating in learning using interactive multimedia. From this analysis, it can be concluded that the goal to be achieved in this study is to obtain an overview of the understanding and creative thinking skills of elementary school teachers in participating in science group learning using interactive multimedia.

2. Literature Review

In the digital era, technology can be utilized optimally in supporting the educational process, especially in learning, thus helping teachers in packaging and presenting information to students. The use of media in learning will arouse the desire of enthusiasts, increase motivation and stimulation of learning activities, and have a psychological effect on students (Putra and Ishartiwi, 2015). Creative learning design is expected to make the learning process innovative, interesting, interactive, effective, the quality of student learning can be improved, the teaching and learning process is carried out anywhere and anytime, and students' attitudes and interest in learning can be improved. In learning activities emphasizing on competencies related to process skills, the role of learning media is becoming increasingly important. Well-designed and creative learning by utilizing multimedia technology and within certain limits, will be able to increase the possibility of students to learn more, understand what is being learned better, and improve the quality of learning.

The student learning process is strongly influenced by the quality of the teacher. Teachers are the main component that has a central role in the success of education (Susanto, 2017). The rapid development of Science and Technology requires teachers to be able to innovate in the learning process and leave the old ways to go to new, modern and innovative ways through the use of technology, so that the learning process becomes more interesting, motivating, and able to create higher quality learning and create graduates. who are competent and highly competitive (Sole and Anggraeni, 2018).

Multimedia is a combination of several other media elements, including text, images, graphics, animation, audio and video, as well as interactive delivery methods that can create a learning experience for students as in the real life around them (Bardi and Jailani, 2015). Vaughan (Jumasa and Surjono, 2016) also suggests that multimedia is a combination of text, images, sound, animation, and video delivered through computer, electronic, or other digitally engineered devices. The use of interactive multimedia in learning certainly has advantages, namely: (1) the learning system is more innovative and interactive; (2) educators will always be required to be creative and innovative in seeking learning breakthroughs; (3) able to combine text, images, audio, music, animated images or videos in a unit that supports each other in order to achieve learning objectives; (4) increase the motivation of students during the teaching and learning process until the desired learning objectives are obtained; (5) able to visualize material that has been difficult to explain with just conventional explanations or teaching aids; and (6) train students to be more independent in gaining knowledge, Munir (Nazalin and Muhtadi, 2016). Mardika (Rosita, 2015) also argues that multimedia in the teaching and learning process can be used in three functions, namely: 1) multimedia can function as an instructional aid; 2) multimedia can serve as interactive tutorials, for example in simulations; 3) multimedia can serve as a source of learning instructions, for example, multimedia is used to store a series of microscope slides or radiographs.

Sudjana (Rusdewanti and Gafur, 2014) states that multimedia is useful in the learning process, thus making: (1) teaching more attractive to students so that it can lead to learning motivation; (2) the meaning of teaching materials is clear so that it can be understood by students and allows students to master the learning objectives well; (3) more varied teaching methods; (4) students do more learning activities, because they do not only listen to the teacher's explanation but are involved in other activities such as observing, doing, demonstrating and others. So based on this opinion, it is concluded that interactive learning multimedia is a digital media that combines several aspects of other media into a single unit such as text, images, sound, animation, video and their interactivity, thus multimedia will be able to attract student interest and student motivation in learning so that students can master the material well. This is evidenced by research conducted by (Riyadi and Pardjono, 2014) which states that multimedia is more effectively used in learning to improve student learning outcomes when compared to conventional learning. (Widyatmojo and Muhtadi, 2017) stated that learning multimedia can be said to be a medium that has enormous potential in helping the learning process. (Nugraha and Muhtadi, 2015) stated that multimedia learning was declared effective in improving student learning outcomes.

Multimedia learning is designed to help facilitate students in the learning process, where in the learning process the materials presented by the teacher are supported by strengthening images, sounds, videos, and animations contained in multimedia to clarify material that is difficult for students to understand. Thus the learning material will be more interesting and easy to understand. So that it can increase students' motivation in participating in the learning process which leads to increased student learning outcomes. In addition, this media will also make it easier for teachers to deliver learning materials. This is in line with the opinion of Ivers and Barron (Sudarma, et al, 2015) which states that interactive multimedia is a computer program used to deliver learning that contains digital content with combinations of audio, text, image, video and animation simultaneously. integrated whole. Through a combination of integrated components such as text, images, audio, video, and animation, interactive multimedia is suitable to be used to clarify abstract concepts to become more concrete (Diyana, et al, 2019). In interactive multimedia, learning material is delivered through static visualization and dynamic visualization (animation), so this can avoid excessive verbalization in the learning process (Maria, et al, 2019). In addition, interactive learning multimedia is a learning media that has a variety of features that can be adapted to student needs and can accommodate students who have visual, auditive, and kinesthetic learning styles (Prasetya, et al, 2018).

3. Methods

This research is an exploratory research with the research subject of Elementary School Class Teachers. The object of research that is expected to be mastered by the teacher is viewed from the cognitive, affective, and psychomotor aspects. This research was conducted at the Elementary School in the Teacher Working Group of Cluster II Environment, North Bogor City. The independent variable of the research is the form of learning implementation, namely learning science clusters using multimedia learning media. The dependent variable in this study is the teacher's competence which includes conceptual understanding and creative thinking skills. The research instrument consisted of learning units, multimedia learning media, worksheets, concept mastery test sheets, questionnaires and interviews. Research data collection is done by determining the data source, then the type of data, data collection techniques, and instruments. To see the increase in mastery of concepts and science process skills, an analysis of the test results of mastery of concepts and science process skills was conducted before and after learning using multimedia learning media. Comparative analysis before and after the implementation of the learning model was carried out by t-test. To see the responses of teachers and students to the learning model, questionnaires and interviews were analyzed. The analysis of creative thinking skills looks at the cognitive, affective, and psychomotor aspects seen from the assessment format.

4. Data Collection

Data collection as the procedure of collecting, measuring and analyzing accurate insights for research using standard validated techniques. Evaluate hypothesis on the basis of collected data. The results of the concept comprehension test were carried out before, of the control class and of the experimental class who managed to score. Critical thinking skills data obtained from the results of the pre-test-post-test on skills critical thinking in the control and experimental classes is shown in Table 1.

Table 1. Data on the results of the pre-test and post-test scores for the control and experimental classes

Data	Pre-test		Post-test	
	Control	Experiment	Control	Experiment
Total number of teachers	75	75	75	75
Total Value	464	528	1701	1994
The highest score	30	37	83	100
Lowest value	17	18	37	73
Average	28,56	29,87	71,09	86,86
Median	20	20	67	87
Modus	20	21	68	90
SD	6,44	8,56	14,31	10,12

Based on the data in Table 1, the average value of the pre-test in the control and experimental classes is 28.56 and 29,87, respectively. While the average value of the Post-test in the control and experimental classes is 71.69 and 86,86, respectively. From the data shown in Table 1, it shows that the average gain in the experimental class is higher than the average obtained in the control class. This happens because learning in the experimental class is assisted by the use of multimedia which can assist teachers in understanding the material because teachers are

required to be actively involved that the highest learning is obtained when students receive information through varied multimedia. The more senses that are used to receive and process information, the more likely it is that the information is received and absorbed easily and well in the form of messages in the material presented. This initial test is used to measure the initial abilities of students, both in the control class as well as in the experimental class.
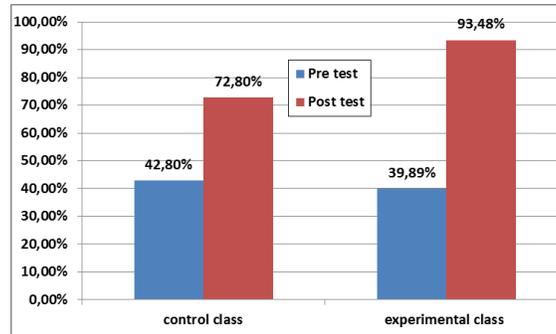

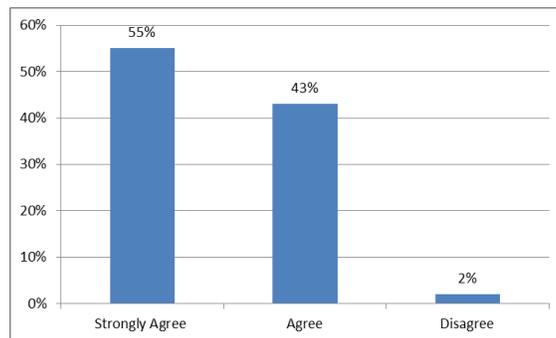
Figure 1. The results of the concept comprehension

Figure 2. The results of the questionnaire received

The teacher's response to the learning process using multimedia in science group subjects can be observed from filling out the questionnaire. The results of the questionnaire got the answers Strongly Agree, Agree and Disagree.

5. Results and Discussion

Based on the results of the study, it can be seen that the learning process of the science group using multimedia learning media has been able to develop a number of mastery of higher order thinking skills for elementary school teachers. The findings on the overall mastery of chemical concepts that were tested showed that the N-gain (%) was at a moderate level for the control class; while for the high-achieving experimental class. This finding is possible because there are more science topics to develop higher order thinking skills. King (Hussain, Ali, Majoka, & Ramzan, 2011) states that higher order thinking requires unusual thinking skills, involving metacognition, reflective thinking, critical and creative thinking. This thinking ability can be activated with inquiry learning strategies. This study obtained data from the assessment of the material mastery test and observations on the worksheets before treatment (pretest) and after treatment (posttest) conducted by a sample of teachers in science group lessons. To see the increase in mastery of material concepts and KPS before and after treatment, a T-test was carried out on the teacher's response to learning using multimedia which was developed by evaluating the results of the questionnaire filled out by the teacher. The teacher's understanding of the subject matter of the science group was developed from a questionnaire on the worksheet.

The results of the concept understanding test were carried out previously. 42.8% of the control class and 39.89% of the experimental class who managed to score above 70. In both classes, no class managed to get a score above 80. This initial test was used to measure the teacher's initial ability, both in control class and in the experimental class. Furthermore, to see how far the effect of treatment on the learning outcomes of the classroom teachers, a post-test was conducted on the effect of using multimedia learning chemistry media between the control class and the experimental class. In general, there was an increase in the percentage of test scores in both classes, namely in the control class 72.8% of teachers had scores above 70, none had scores below 60, while in the experimental class there were 93.48% of students who had scores above 70. , no one got a score below 50. If the two classes were compared with the percentage of the number of each class, the level of improvement in learning outcomes in both classes showed a significant increase in results. However, from the two classes, the percentage of teachers who scored above 80 was greater in the experimental class than in the control class. Thus, it can be seen that the treatment using multimedia learning media in the science group for the experimental class teacher has a significant effect on learning outcomes. The average level of learning outcomes for both classes shows that all students, both experimental class and control class, scored above 70, but the percentage of students who scored above 80 was still higher in the experimental class. The high average learning outcomes of the experimental class compared to the control class can be caused by the use of multimedia media in learning which motivates teachers to focus more. Based on observations made during learning, in general, teachers are more active in reading, observing and studying the material. The results of this study are in accordance with the findings of Mohler (Mohler, 2001) which states that the use of multimedia can improve learning outcomes, especially those related to spatial concepts that are widely found in science learning concepts.

Learning media by utilizing multimedia media can help students' abstraction power. Materials that are relatively abstract or difficult to observe are concrete through pictures, animations and videos contained in this media so that students become more interested and happy to learn the material. The response of elementary school class teachers to the learning process using multimedia in science subjects can be observed from filling out the questionnaire. The results of the questionnaire received an answer of Strongly Agree as much as 55%, Agree 43% and Disagree 2%. So 98% of the answers answered agree, while the other 2% answered less agree. This means that it can be concluded that the teacher's desire to use multimedia in science-based subjects to improve Science Process Skills is a positive response. Carind and Sund stated that the advantage of student-centered learning is that students will be trained to think continuously through activities to identify problems, identify problem variables, and finally find steps to solve problems (Carind & Sund, 2008). Learning science-based subjects in this study is intended to develop higher-order thinking skills for teachers. Although it has been well designed by considering the situation and class, from observations during the research there are still some limitations. Some of the limitations in its developed application are that this learning requires a computer/laptop, and depends on the presence or absence of an electrical network.

6. Conclusions

From the results of the t-test, it is known that there are significant differences between elementary school teachers and the use of multimedia in the learning process. This means that the understanding of concepts and Science Process Skills increases after the teacher experiences a science-based learning process using multimedia learning media. From these results, the average value of concept understanding increased from 39.89 to 93.48. 98% of elementary school teachers gave a positive response, namely agreeing and strongly agreeing that the science-based elementary school learning process with multimedia learning media can improve science process skills and material understanding on subject-based for elementary school teachers

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Biography

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