

# THE USE OF MULTIMEDIA AS AN EFFORT TO IMPROVE ELEMENTARY TEACHER EDUCATION STUDY PROGRAM COLLEGE STUDENTS' COMPREHENSION ABILITY AND CREATIVE THINKING SKILLS IN FOLLOWING SCIENCE STUDY COURSES

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**Abstract.** The research objective was to improve the understanding and creative thinking skills of elementary teacher education college student as prospective teachers in following science courses. The research design used is to make college student groups into small groups. During the learning process, observations about college student cooperation during learning with multimedia media were carried out to assess their understanding and creative thinking skills. The results of the observations of each cycle were evaluated as material for reflection in the next cycle to improve college student understanding and creative thinking skills in accordance with predetermined targets. Data analysis was carried out by descriptive quantitative. From the results of the T-test, it was found that there were significant differences. This means that understanding of concepts and Science Process Skills increases after prospective teacher college student experience the science learning process using multimedia learning media. From the results, the average value of understanding the concept increased from 53.61 % to 89.78%. and science process skills increased the average value from 43.57 to 87.32. 92% of college student gave a positive response, namely agreeing and strongly agreeing that the science lecture process using multimedia learning media can improve science process skills and understanding of material in science subjects for elementary teacher education college student

**Keywords:** multimedia; comprehension ability; creative thinking skills

## I. INTRODUCTION

In general, students of Elementary Teacher Education Study Program have a universal upper secondary education background. Students in taking science lectures tend to carry out the learning process individually, resulting in unequal student learning achievement. Lecturers must have an effort to improve the skills, understanding and interests of students in science lectures. Prospective Educator students must have the ability to understand and think creatively, especially in solving various learning problems, especially science. Thus students who have less academic abilities can learn independently and thus improve their academic abilities. Thinking skills and scientific processes must be developed through science learning with certain models and media to foster students' abilities 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, students sometimes have difficulty studying science courses. Learning difficulties in science, especially the science family, are caused by many factors, one of which is the students themselves, such as low motivation and interest in learning, not learning the material that has been obtained, not reading textbooks, lack of student experience as initial knowledge, and low levels of learning [1]. the ability to think creatively. Meanwhile, the content of

the material in the science class subject is considered difficult because some studies in science are cumulative, when they do not understand one concept, students will have difficulty following other concepts, some studies in science study objects that are abstract.

To overcome this problem, lecturers who teach science courses must have creativity and 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 these media students are trained in psychomotor, affective and cognitive creative thinking skills [2]. Some of the problems that can be analyzed are whether the use of interactive multimedia can develop students' creative thinking skills in science? How are students' science process skills evaluated after participating in learning using interactive multimedia.

From this analysis, it can be concluded that the objectives to be achieved in this study are to obtain a description of the understanding and creative thinking skills of Elementary Teacher Education Study Program students in taking science courses using interactive multimedia.

Education is an important factor that requires serious attention from all parties, because education is a determinant of the nation's progress in the future. National goals and ideals for the intellectual life of the nation are contained in the 1945 Constitution. The government together with the community must continue to seek educational development for the creation of a nation that is independent, superior and

ready to face the world of globalization. The big challenge for the Indonesian nation in entering the era of science and technology (IPTEK) is its ability to adapt to the latest things in science and technology. In this era of globalization, what was previously unimaginable will happen. For this reason, it is necessary to develop quality Indonesian people through formal and informal education. The learning process and curriculum in Elementary Teacher Education Study Program aims to make students able to master the concepts of knowledge and science, their relationship and their application in everyday life and in technology, students must be able to apply various concepts of knowledge and science to solve problems in daily life and technology scientifically and mastering concepts to increase awareness of advances in science and technology and environmental sustainability. From these objectives it can be understood that Elementary Teacher Education Study Program students, not only have to master or understand the concepts of science and technology, but must be able to apply the concepts of science and technology in solving problems. Process skills are a teaching and learning approach that leads to the growth and development of certain skills in Elementary Teacher Education Study Program students, Elementary Teacher Education Study Program students to be able to process information so that new useful things are found in the form of facts, concepts and the development of attitudes and values. Through process skills, Elementary Teacher Education Study Program students will be more meaningful because students' thinking skills will be more developed. In developing process skills, practicum methods can be used, because in practicum the skills that are developed are not only psychomotor skills but also cognitive and affective skills [3].

The objectives of science learning include providing knowledge of science concepts and teaching science process skills to students. Science process skills are a number of processes that scientists develop in seeking scientific knowledge and truth [4]. Attempts to equip students with knowledge of scientific concepts and the ability to process science need to be considered so that they are able to face problems in real life [5]. To achieve the goals of science learning, learning strategies are needed that can trigger students to learn actively so that learning becomes meaningful and provides learning experiences to students [6]. The implementation of active learning strategies in class requires monitoring student learning in order to achieve the goals of science learning. Natural science is a series of sciences that are composed of observations of natural phenomena. Chemistry Studies as a part of Science which studies something abstract, and sometimes difficult for students to understand. To help understand the thinking process, namely the holding of learning media. According to Rusman [7], learning media is a tool that allows students to understand and understand something easily and remember it for a long time compared to the delivery of material face to face and lectures without tools. In other words, the media can support the learning process. Delivery of material can be done in an effective and efficient manner. With a creative

learning design, it is expected that the learning process will be innovative, interesting, more interactive, more effective, the quality of student learning can be improved, the teaching and learning process can be done anywhere and anytime, and students' attitudes and interest in learning can be improved [8].

One of the learning media with a creative design process is multimedia. The definition of multimedia varies depending on the scope of application as well as the development of multimedia technology itself. Multimedia does not only have meaning between simple text and graphics, but also comes with sound, animation, video, and interaction [9]. Niken and Haryanto [10] argued that multimedia is a combination of various media (file formats) in the form of text, images (vector or bitmap), graphics, sound, animation, video, interaction, etc. which have been packaged into digital files (computerization), is used to convey messages to the public [10] the benefits of multi-media, namely: (1) Introduction to information and communication technology to students, (2) Providing new and enjoyable experiences for both teachers and students, (3) Catching up with behind-the-scenes knowledge about science and technology in the field of education, (4) The use of multimedia can generate learning motivation for learners, (5) Multimedia can be used to help learners form mental models that will make it easier for them to understand a concept, (6) Keep up with science and technology developments. According to Sigit [11], multimedia is divided into two categories, namely: linear multimedia and interactive multimedia. Interactive multimedia is a tool that is equipped with a control device that can be operated by the user in selecting something they want. Examples of interactive multimedia are: interactive learning multimedia (interactive multimedia-based learning), game applications. Interactive multimedia is intended to assist educators in delivering material and to help students be involved in the learning process in understanding the material being taught.

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## II. RESEARCH METHODS

This research is an exploratory research with research subjects odd semester students of the Study Program in Elementary School Teacher Education who took the Chemical Studies course. The research object that is expected to be mastered by students in terms of cognitive, affective, and psychomotor aspects. The research was carried out in the Study Program in Elementary School Teacher Education, Faculty of Teacher Training and Education, Pakuan University.

The independent variable of the study is a form of lecture implementation, namely learning Chemistry Studies using interactive multimedia learning media. The

dependent variable in this study is student competence which includes concept understanding and creative thinking skills. The research instruments consist of the Lecture Unit, interactive multimedia learning media, student 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 results of the test of mastery of concepts and science process skills was carried out before and after learning using interactive multimedia learning media. Comparative analysis before and after the application of the learning model was carried out by the t test. To see the responses of lecturers and students to the learning model, an analysis of questionnaires and interviews was carried out. Analysis of creative thinking skills to see cognitive, affective, and psychomotor aspects seen from the assessment format.

### III. RESULTS AND DISCUSSION

Based on the research results, it can be seen that the learning process of Chemistry Studies using multimedia learning media has been able to develop a number of mastery of higher order thinking skills for prospective elementary school teachers. The findings about the overall mastery of chemical concepts that were tried out showed that the N-gain value (%) was at a moderate level for the control class; while for the experimental class on high achievement. This finding is possible because the subject of more chemistry studies is to develop higher order thinking skills. King [12] stated 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 (Hussain, [13]).

This study obtained data from the assessment of material mastery tests and observations on student worksheets before treatment (pretest) and after treatment (post-test) in the Chemical Studies course. To see an increase in mastery of material concepts and Science Process Skills before and after the treatment, a T-test was carried out on student responses to learning using multimedia which was developed by evaluating the results of the questionnaire filled out by students. Students' understanding of Chemistry Study material is developed from a questionnaire in student worksheets.

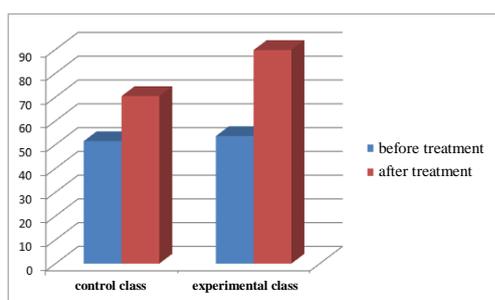


Figure1. Diagram of Student Concept Understanding Achievement

The results of the concept comprehension test were carried out before. 51,5 % of the control class and 53.61% of the experimental class who managed to score above 70. In the two classes, neither class managed to get a score above 80. This initial test is used to measure the students' initial abilities, both in the control class, as well as in the experimental class.

Furthermore, to see how far the effect of treatment was on student learning outcomes, a post-test was carried out on the effect of using multimedia media for Chemical Studies, between the control class and the experimental class. In general, there is an increase in the percentage of student test scores in both classes, namely in the control class 70.4% of students have a score above 70, there is no score below 50, while in the experimental class there are 89.78% of students who have a score above 70, there is no value below 50. If the two classes are compared with the percentage of the total class of each, then the level of improvement in learning outcomes in both classes shows a significant increase in results. However, of the two classes, the percentage of students who scored above 80 was greater in the experimental class compared to the control class. Thus it can be seen that the provision of treatment using multimedia media for chemical studies subjects to students in the experimental class has a significant effect on their learning outcomes. The average level of learning outcomes for both classes shows that all students in both the experimental and control classes scored above 70, it's just that 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 students to focus more. Based on observations made during learning, in general students are more active in reading, observing and studying the material. The results of this study are in accordance with the findings of Mohler [14] which states that the use of interactive multimedia can improve learning outcomes, especially those related to spatial concepts that are found in many chemical concepts.

Science Process Skills that were observed before and after the use of multimedia in learning, were observed more deeply than with the questionnaire for the Science Process Skills pre-test and Science Process Skills post-test. The Science Process Skills Test developed consists of questions related to observation, application of material concepts, interpretation or conclusion of results, and the planning process. The pre-test data collection for Science Process Skills and post-test for Science Process Skills were carried out simultaneously with the pre-test and post-test for understanding concepts, both the initial test, the middle test and the final test conducted on the two classes of Chemistry Studies courses. conducted on all students who took the Chemical Studies course, the results obtained were only 50.6% of the control class and 43.57% of the experimental class who managed to get a score above 70. In both classes none of them managed to get a score above 80. post -test is used to see the distinguishing factors and the effect of using multimedia media for Chemical Studies, between the control

class and the experimental class. In general, there is an increase in the percentage of student test scores in both classes, namely in the control class 65.4% of students have a score above 70, no score below 50, while in the experimental class there are 87.32% of students having a score above 70, there is no value below 50.

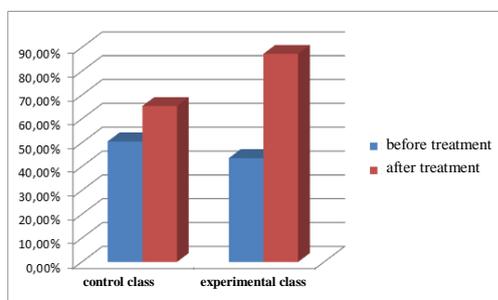


Figure 2. Achievement Diagram of Student Science Process Skills

If the two classes are compared with the percentage of the total class for each, then the improvement rate in Science Process Skills in both classes shows a significant increase in results. However, of the two classes, the percentage of students who scored above 80 was greater in the experimental class compared to the control class. Thus it can be seen that the provision of treatment using multimedia media for chemistry studies to students in the experimental class has a significant effect on students' Science Process Skills. Learning media by utilizing multimedia media can help students' abstraction power. Material that is relatively abstract or difficult to observe is concrete through the images, animation and video contained in this media so that students become more interested and happy to study the material.

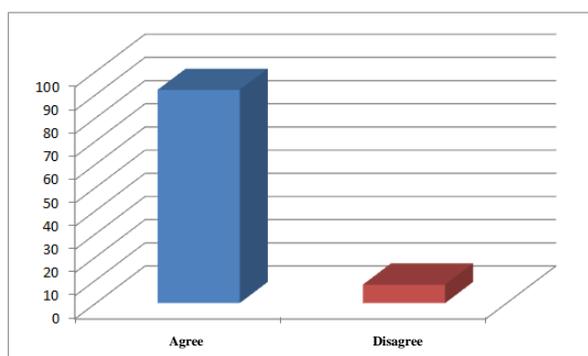


Figure 3. Student Response Diagram to Multimedia Learning Media

Student responses to the learning process using multimedia in the Chemistry Study Subject can be observed from the questionnaire filling. The results of the questionnaire received answers to Strongly Agree as much as 45%, Agree 47% and the answers Disagree 8%. So 92% of the answers responded agree, while the other 8% responded disagree. It means that it can be concluded that

the desire of students to use multimedia in the Chemistry Study Course to improve Science Process Skills is a positive response. This shows that students really like learning chemistry studies using multimedia because with this media students feel clearer about the material being taught. Students can find many new things contained in the media that can be discussed with friends, students can focus their attention well in following lessons and can make it easier for students to remember the material that has been taught. Thus, it can be said that the level of validity of the use of multimedia in the Chemical Studies course has been tested to be used as a learning medium independently by students.

The results of data processing in the pretest and posttest of mastery of the concept of chemical study material by paying attention to the integrated concept mastery test answers and higher-order thinking skills for each question. The N-gain price for mastery of basic chemistry studies subjects integrated high-level thinking skills are all in the high category. Zoller and Pushkin [15] state that there is a relationship between the applied learning model and the improvement of higher order thinking skills, laboratory-based inquiry learning models. The use of computer-based media can improve learning outcomes in chemical studies.

In the application of multimedia media for chemistry studies, several advantages were found, namely (a) it can be used to improve the basic chemistry concept mastery and higher order thinking skills for prospective teachers; (b) enable students to learn independently from prepared multimedia which is equipped with guiding questions and are arranged systematically and sequentially according to the concepts to be taught and various levels of difficulty so that students feel helped in understanding chemical concepts and level thinking skills. height developed by prospective teachers; (c) provide a direct example of the chemistry studies learning model and higher order thinking skills oriented towards prospective teachers.

In this study, with the active involvement of prospective teacher students continuously in learning chemistry studies and higher-order thinking skills, it is expected that they have regular thinking skills which are reliable tools to solve problems and be applied in everyday life. If this is related to the assignment of students as prospective teachers, it can be said to be very relevant because they do not only hear lectures, or just see, but even experience student-centered learning. This is a useful provision for prospective chemistry teachers because in the field later they will have a big role in determining the quality of chemistry learning in school. Carind and Sund [16] stated that the advantage of a student activity 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 the problem.

Learning chemistry studies in this study is intended to develop higher order thinking skills for prospective teachers. Although it has been designed well with the situation and class in mind, from observations during the study there are still some limitations. A number of limitations in its application that have been developed are that this learning

requires a computer/laptop device, and depends on the presence or absence of an electricity network. Judging from the results of the T-test pre-test and post-test on the mastery of concepts and improvement in Science Process Skills shows a significant difference. This means that there is a development of Science Process Skills and the development of conceptual understanding after students do learning using multimedia in the Chemical Studies Subject. The response of prospective teacher students to this learning model is very positive, if we observe each statement it can be revealed that the use of multimedia developed is more economical and interactive, guides learning creativity, develops thinking skills, raises interest in designing other similar experiments. It can be seen that the use of multimedia in the Chemical Studies course can develop the science process skills of Elementary Teacher Education Study Program students.

#### IV. CONCLUSION

From the results of the T-test, it was found that there were significant differences. This means that understanding of science process concepts and skills increases after prospective student teachers experience the learning process using multimedia. From the results of the average value of understanding the concept, increasing from 53.61 to 89.78. and science process skills increased the average value from 43.57 to 87.32. 92% of college student gave a positive response, namely agreeing and strongly agreeing that the science lecture process using multimedia learning media can improve science process skills and understanding of material in science subjects for elementary teacher education college student.

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