The effect of implementation of pictorial riddle strategy to increase the absorption and understanding of the concept of civil engineering in the course engineering physics

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Abstract. This research aims to describe the effect of implementation pictorial riddle strategy to increase the absorption and understanding of concept of Civil Engineering in course of Engineering Physics. Pictorial riddle strategy was teaching strategy to increase of absorption and understanding in discussion small and big group. Pictures, tools or media, and true concept to used increase the absorption and understanding of Physisc concept. The treatment for lecture and gave pre and postest with pictorial riddle strategy. The result pretest was 67.50% and posttest was 81.29% and good category. So, it can be concluded that learning by applying pictorial riddle strategy had an effect to increase absorption and understanding of student concept of Civil Engineering on Physics Engineering subject can increase absorption and understanding student concept.

1. Introduction

Physics is a knowledge learning about natural phenomena of scientific processes. The scientific processes is embedded on the basic of attitude and results with scientific product. The scientific product of three components such as concepts, principles, and theories that apply universal [1]. The Physics learning direct experience in developing the competence of students to be able to comprehend the natural surroundings through the process of finding out and doing, and to gain a deeper understanding [2]. The physics also is called basic of branch in other branches of science, of them on civil engineering. The students of civil engineering have must competence the concept of special courses of study program. In the civil engineering, physics is call engineering of physics [3].

The preliminary research about study conducted at Engineering Faculty of Civil engineering program of Universitas Pasir Pengaraian by giving any objective question. The result were students comprehension in concept of absorption of the materials that have been studied in Physics. So the impact on not maximal learning outcomes obtained in solving the result of physics students were given. Based on the results of the test was given, two students got score 90, 14 students got score 75, and 15 students under score 75. So, the students lack understanding in the concept of the absorption as far as the lesson. The assumption the physics learning very difficult for most enough just to understand the formulas but also must understand the concepts order to make it easier to absorb and understand the learned concepts [4].
The absorption is an ability or level of understanding in a person absorbing the material presented in the learning process. The very good level of understanding will affect his understanding of the concepts learned so that the results obtained will increase learning. An understanding is very influencing the success of learning process. The concept is the result of thinking of a person or group of the people expressed in the definition so that knowledge products principles, laws, and theories. The concepts can be derived from facts, events, experiences, through generalization and abstract thinking. The Piaget’s intellectual development theory, students are already in the normal phase. The normal phase in the phase of a person to be able to think hypothesis, proportional, logical, and synthesis so as to understanding abstract operations [5]. The students must very easier to absorbing and understanding of physics materials as a basic of discipline of science.

The many factors can be the cause of law absorption ability of students. During the course of learning activities physics tends to be dominated by lecture methods to explain matter. Classroom exercises are rarely given, and collaborative learning is also rarely done. As a result, the students become passive in the lectures, even not uncommon students who do activities outside the learning (off-task activity). However, the students are given house assignment to do the question. Classroom exercises are rarely given, and collaborative learning is also rarely done. As a result, the students become passive in the lectures, even not uncommon students who do activities outside the learning (off-task activity) [6].

In order for the absorptive power and understanding of the concept of student to physics materials can be improved and better yet, it takes a strategy to help students in thinking solving problem. The strategy that can be made as one of the alternatives is pictorial riddle strategy. The pictorial riddle strategy is a teaching strategy can be increase student’s motivation and interest in small and large group discussions. Real image, demonstration, or materials can be used improved student’s critical and creative thinking. A riddle is usually a plastered, poster or projected image of a transparency, then the teacher asks questions about the riddle [7]. The pictorial riddle strategy is usually a picture, either on blackboard, a poster board, or projection of a transparency, and a direct experiment, the educator asks question about riddle [8]. The use of images, direct experiments, or projected directly, will be able to help students to more easily absorb and understand Physics materials he studied.

From the existing problems it is necessary to apply a strategy that sharpens Students to think abstractly in accordance with its intellectual development by observing the extent of the influence of the implementation of pictorial riddle strategy to improve the absorption and understanding of the concept of Civil Engineering students in the subjects of Engineering Physics.

**Research Method**

This research is descriptive quantitative research which to knowing influence the implementation of pictorial riddle strategy to improve the absorption and understanding of the concept of civil engineering students in the technical of physics. The study was conducted with a one shot case study [9]. The study was carried out in advance by giving preliminary tests, then giving treatments or treats with pictorial riddle strategies and giving a test to determine the students' absorption and comprehension after learning with the strategy. Technique analysis of data used in research this with a percentage of scores. To formula of analysing to absorption and understanding as follows:

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x = \frac{\text{score of obtained}}{\text{score of maximum}} \times 100\%
\]

The criterion of absorption and understanding are presented in the following Table 1.

| Interval (%) | Category    |
|--------------|-------------|
| 85-100       | Very good   |
| 70-84        | Good        |
| 50-69        | Not bad     |
| 0-49         | Not good    |
2. Results and Discussion

Absorption was one of the benchmarks in the cognitive domain to determine the extent to which a person's understanding after performing or implementing learning or learning by providing a treatment, one of them in study Physics. Understanding the concept of physics was a ladder in the cognitive realm that shows the ability to explain the simple relationship between factors and concepts of physics [10]. The absorption of Civil Engineering students in understanding the concept of Basic Physics subject by Table 2.

Table 2. Ability of Civil Engineering Students in Understanding the Concept of Basic Physics Course

| Value   | Pretest     | Postest     |
|---------|-------------|-------------|
|         | Number of Students | Percentage (%) | Number of Students | Percentage (%) |
| 85-100  | 2           | 6.45        | 4           | 12.90        |
| 70-84   | 14          | 45.16       | 19          | 61.29        |
| 50-69   | 15          | 48.38       | 7           | 22.58        |
| 0-49    | 0           | 0           | 0           | 0            |
| Average | 67.50%      | Average     | 81.20       |
| Category| Good        | Category    | Good        |

Table 2 explains that the amount of absorption result obtained by the students through pre and post learning test with pictorial riddle strategy were students with grades 85-100 from 6.45% to 12.90% and 70-84 to 61.29% or nearly half of the students obtained value B and understanding of the concept increases. Because the absorption will affect how far the students understanding of the concept or material of the Physics he studied.

The result of the research shows that there was a relationship between of application of pictorial riddle strategy with the understanding were students concept in understanding the material in the basic physics course is business material, vibration and wave, and fluid. Meanwhile, the absorptive capacity obtained for students shows that the absorption was relevant with the increased understanding of the concept obtained by the students.

The absorption was the ability or level of understanding in absorbing the material presented in the learning process. Absorption was calculated by comparison between the scores obtained against the maximum score applied. Each student has a different in absorbing lecture material so that the maximum score obtained by each student is different. Learning done with the implementation of pictorial riddle strategy, students are given images and experiments as a riddle through basic physics of lab book. In the lab book basic of physics given there are images or experiments that have been experienced and is the basic knowledge that students have after learning the theory or concept. According to Piaget, humans have a structure of knowledge in the brain such as boxes where each contains meaningful information that is different. The same experience for some people will be interpreted differently by each individual and will be stored in different boxes. Each new experience will be associated with the boxes (knowledge structures) in the human brain [11].

The results showed that there was a difference between the average absorption was rate obtained by the students with an average score of 81.2% after the lecture applied the pictorial riddle strategy, whereas before the pictorial riddle strategy obtained an average score of 67.50%. This shows that by applying the pictorial riddle strategy in the lectures can be increase the absorption and comprehension of student concepts individually or in groups.

The result with pictorial riddle strategy, students were invited to find their own concept that has been known to be a new concept. In the pictorial riddle strategy students are given pictures relating to their daily lives and are invited to try out the immediate problems they feel, in order to get answers to the problems that puzzle students. By providing contextual riddles, it will provide a range of activity choices in learning, so students with different learning styles and different levels of ability can perform
hands on activities and mind set activities in accordance with their learning environment [12]. With student activity finds itself the answer of the riddle through direct observation and experiment.

The students more quickly understand and have strong memory, and can increase the absorption and understanding of a good concept [13]. The average absorption rate in were students concept understanding was larger and well categorized. Because students were invited to think creatively and participate directly in the learning both in preparing the image in the form of puzzles and express opinions about the puzzle and develop tools for experiments that will be done each group.

From the results of research that has been done, it was found that there was a good influence for students in the lecture by applying pictorial riddle strategy to improve the understanding of the concept in studying the basic physics course for Civil Engineering students. So that the absorption of students in the lecture is also getting better

3. Conclusion

The conclusion that can be taken from the research that has been done was the influence of the implementation of pictorial riddle strategy to improve the understanding of the concept of civil engineering students in the basic physics course with the average value of before treatment of 67.50% was categorized enough good and after treatment of 81.20% categorized good. So, the application of pictorial riddle strategy was very influential in improving the understanding of the concept of civil engineering students in studying the basic physics courses. The suggestion that is pictorial riddle strategy is very good used in learning so that can improve understanding of student concept in studying physics elementary course in particular.

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