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THE EFFECT OF PROBLEM SOLVING BASED ONLINE LEARNING ON STUDENT RESULTS

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ABSTRACT

This study aims to describe the effect of problem solving-based online learning on student learning outcomes. The subjects in this study were students of the 4th semester STMIK Royal Kisaran with sample classes 4E (experimental class) and 4S (control class) in the Statistics Year 2019/2020 Academic Year. Learning is carried out using online which has been developed based on the problem solving model. The object of this study is to see the effectiveness of learning consists of student responses to the learning process. Hypothesis testing using the t test. Based on the results of research and discussion found that tcount = 2.08> t table = 1.697 at a significant level α = 0.05. The average value of class 4E (Using the Problem Solving Learning Model) is 85 and class 4S (Without Using the Problem Solving Learning Model) is 76.5. Thus it can be concluded that there is an influence of the use of Problem Solving Learning Model on student learning outcomes. Student responses to components and learning activities are positive

INTRODUCTION

Education is very important and very basic in improving the quality of human life. The purpose of education is to develop thinkers who are mature and can use the knowledge they have in real life. The quality of education can be used as a barometer of human resources.

Campus is a place for educational activities that functions as a creator of human resources. In every learning, it is hoped that students who are given learning will get the best learning results in accordance with the planned learning objectives.

In the industrial era 4.0 technology has had a major influence and participated in improving the quality of education. One of them is online learning. Many teachers and learners have used technology as innovation in learning. Changes in the paradigm in the world of education require a change in educational goals to be achieved. For this reason, it is highly demanded that everyone can master the science and technology and adapt to the situation. The use of online learning media is a learning activity that is quite effective because when students are outside the classroom, they can read the references used and have a sense of comfort because they are given easy access to information [1]

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Online learning utilizes distance technology that connects students with learning resources [2]. However, in the face of online learning there are some problems that often arise. Problems always arise in the form and varying degrees of complexity. Problems are often referred to people as difficulties, obstacles, disturbances, dissatisfaction or the gap between the current situation with the situation that will come or the desired goal.

The big problem faced by the world of education today is the existence of a paradigm crisis in the form of gaps and discrepancies between the objectives to be achieved and the paradigms used. Process skills are a very important aspect of learning. By using processing skills, students will be able to discover and develop their own facts and concepts and foster and develop attitudes and values. All actions in the teaching and learning process will create learning conditions that involve active students.

there are two kinds of problems [3]: 1. Problems to find, can be theoretical or practical, abstract or concrete, including puzzles. We must find the problem variable, then try to get, produce or construct all types of objects that can be used to solve the problem. The main parts of the problem are as follows:(a) What was sought? (b) How is the data known? (c) What are the conditions? 2. The problem with proving is to show that a question is true or false or not both. We must answer the question: "Is that statement true or false?". The main part of this type of problem is the hypothesis and the conclusion of a theorem that must be verified.

One effort to improve learning process skills by applying the model of problem solving. Problem solving is very important because in the learning process, it is possible for students to gain experience using the knowledge and skills they have to apply to problem solving that is not routine.Making the right decision in a critical issue is an intellectual behavior. This decision making process is not easy, it requires a suitable strategy. Determining the appropriate strategy is the step in solving the problem.

The problem solving process provides opportunities for students to play an active role in learning, searching, and finding information or data for themselves to be processed into concepts, principles or conclusions. Problem solving, is an individual who is faced with an urgent problem and needs to do a problem or find solutions by thinking. Problem solving is a process of thinking, learning, remembering and answering or responding in the form of decision making. So the ability to solve problems can be interpreted as the ability of cognitive activities and individual skills in effectively solving problems that include individual efforts to think, choose and maintain alternative answers to an ideal solution or solution by minimizing the negative impacts caused.

The characteristics of problem-based learning are: 1. dependence on the problem, the problem does not test ability, and the problem helps develop the ability itself, 2. the problem is really ill-structured, disagreeing on a solution, and when new information appears in the process , perceptions of problems and solutions can change, 3. Students solve problems, lecturers act as trainers and facilitators, 4. students are only given instructions on how to approach problems and there is no formula for students to approach problems, and 5. authenticity and appearance. [4]

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According to Polya [3], the steps of problem solving learning include: presenting problems in a clearer form, stating problems in a more operational form, compiling hypotheses of work and work procedures that are expected to be good, testing hypotheses and doing work to obtain results, recheck the results that have been obtained.

There are four steps that must be passed in learning problem solving, namely: 1. the stage of identifying the problem, 2. developing a solution to the strategy, 3. carrying out the calculation, and 4. checking the answers that have been obtained. By implementing the four steps of learning to solve this problem in learning mathematics, it will make it easier for students to understand and solve story problems. Because solving a story's problem requires modeling and arithmetic skills. Both of these capabilities are covered by all four steps of problem solving.

Indicators of problem solving ability: 1. Demonstrate understanding of the problem; 2. Organizing data and selecting relevant information in problem solving; 3. Present mathematical problems in various forms; 4. Choosing the right problem solving method; 5. Developing problem solving strategies; 6. Creating and interpreting mathematical models of a problem; 7. Resolve problems that are not routine.

On the existence of problem solving learning, it is expected understand and look for ways to solve problems in accordance with existing conditions [5] so that it is expected to improve learning outcomes.

Learning outcomes can be influenced by motivation, knowledge achievement, understanding, attitudes and behavior, skills and abilities[6]. By learning someone will experience a change in behavior, as a result of learning he has done. In connection with that changes in behavior that occurs in a person through learning activities are called learning outcomes. Learning outcomes are not only seen from cognitive abilities but seen from attitudes towards learning [7].

If the learning outcomes are good, the teaching process by the educator is successful, but if the learning outcomes achieved are low, it can be said that the teaching that has been done has not been successful [8].

METHOD

The subjects in this study were students of the 4th semester STMIK Royal Kisaran with sample classes 4E (experimental class) and 4S (control class) in the Statistics Year 2019/2020 Academic Year. Learning is carried out using online which has been developed based on the problem solving model. The object of this study was to see the effectiveness of learning consisting of active levels of student activity and student responses to the learning process. Hypothesis testing using the t test.

After the normality and homogeneity of the data are known, a t-test with the following possibilities is used : a. If the number of sample members is n1 = n2, and the variance is homogeneous ($\sigma 12 = \sigma 22$), then the t-test formula can be used for both separated and pooled variants, with degrees of freedom (dk) = n1 + n2-2.; b. If the number of sample members is $n1 \neq n2$, and the variant is homogeneous ($\sigma 12 = \sigma 22$), the

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pooled variant t-test formula can be used, with degrees of freedom (dk) = n1 + n2-2.; c. If the number of sample members is n1 = n2, and the variance is not homogeneous (σ12 ≠ σ22) then the t-test formula can be separated or pooled variant, with degrees of freedom (dk) = n1 -1 or n2-1.; d. If the number of sample members is n1 ≠ n2, and the variance is not homogeneous (σ12 ≠ σ22) then the t-test formula can be separated, with dk (n1-1) and dk (n2-1) divided by two, and then added to the price of t the smallest one.

The t-test formulas are as follows:

Formula of *Sparated Varian*

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}} \quad (1)$$

Formula of *Pooled Varian*

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (2)$$

Formula of Sample Varian

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1}\frac{s_2^2}{n_2} - 2r\left(\frac{s_1}{\sqrt{n_1}}\right)\left(\frac{s_2}{\sqrt{n_2}}\right)}} \quad (3)$$

Information :

$\bar{x}_1$ = the average value of the experimental class

x_2 = the average value of the control class

s_1^2 = sample class variance of the experiment

s_2^2 = control class sample variance

n_1 = number of respondents in the experimental class

n_2 = number of respondents in control class

After the t-count is obtained, then the t-count is then compared with the ttable with :

Reject Ho and accept Ha if: titung ≥ ttable¬

Accept Ho and reject Ha if: tcount¬ <t table

The formulation of the hypothesis in this study is as follows:

Work Hypothesis (Ha): There is an influence of Problem-based online learning on student learning outcomes.

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Zero hypothesis (Ho): There is no effect of problem-based online learning on student learning outcomes.

Student responses to the learning process using surveys [9] which are grouped into three categories of student responses: (1) Agree with the application of online learning; (2) Disagree with the application of online learning; (3) Doubt about implementing online learning.

CONCLUSIONS

Based on the results of the study it was found that tcount = 2.08> ttable = 1.697 at a significant level α = 0.05. The average value of class 4E (Using Problem Solving Learning Model) is 85 and class 4S (Without Using Problem Solving Learning Model) is 76.5. Thus it can be concluded that there is an influence of the use of Problem Solving Learning Model on student learning outcomes.

The effectiveness of learning consists of student responses to the learning process. Student responses to components and learning activities are positive regarding the flexibility of implementation.

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