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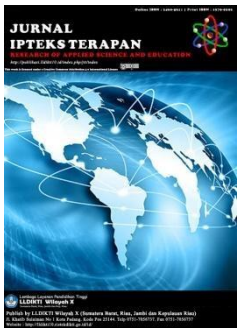

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BIINER LEARNING MODEL TO IMPROVE STUDENT'S SCIENTIFIC ATTITUDE

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Abstract

This study aims to assess the effectiveness of the BIINER Learning model in shaping students' scientific attitudes. This study uses a type of quasi-experimental experiment. Data was collected through questionnaires and observations. Data on students' scientific attitudes between the BIINER Learning group and the Project based learning group were analyzed using the T test. The results of the data analysis show that the value of tcount (5.772) is greater than ttable (2.381), which means that there is a significant difference in scientific attitude between the BIINER Learning group and the Project based learning group. Thus, it can be concluded that the BIINER Learning model is more effective in cultivating students' scientific attitudes than the Project based Learning model. Observational data also supports this conclusion. The scientific attitude of students in the BIINER Learning group showed a percentage of 8.3% (moderate), 47.2% (high), and 44.4% (very high), while the Project based learning group showed a percentage of 22.2% (moderate), 50% (high), and 27.7% (very high). Thus, students' scientific attitudes in the BIINER Learning model tend to be higher than Project based learning in the very high category, while in the medium and high categories, the percentage of students' scientific attitudes in the Project based learning model is higher than BIINER Learning. In conclusion, the use of the BIINER Learning model is more recommended because it is proven to be more effective in shaping students' scientific attitudes. Thus, it can be expected that students' scientific attitudes can develop better through the application of this learning model

Keywords: BIINER Learning, Project based Learning, Scientific Attitude

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INTRODUCTION

Higher education has an important role in shaping the younger generation who have a positive and critical scientific attitude. The scientific attitude is a cognitive and affective aspect that includes curiosity, critical thinking, a spirit of discovery, and openness to new knowledge. Students who have a strong scientific attitude tend to be individuals who are committed to exploring deeper knowledge, facing complex challenges, and contributing to scientific and social progress.

However, in practice, there are challenges in developing a positive scientific attitude among students in higher education settings. Some students may face difficulties in integrating scientific thinking in academic life. Several factors influence the development of scientific attitudes in students including the learning model applied, the learning environment, the role of the lecturer, and the curricula developed.

The computer network course is one of the compulsory subjects presented and taught in the Informatics Engineering Education Study Program FKIP Putra Indonesia University YPTK Padang, and must be mastered by all students in the Study Program. This course has a load of 3 credits of lecture activities and is given in semester II (two). In this computer network course, the learning objectives are for students to master professional competence in the field of informatics engineering with several competency indicators. This course provides knowledge about Network Devices, Network Topology, OSI Protocols, IP Addresses, Network Cabling, and Network Simulation.

Based on the results of previous research on this subject, several problems were found in the teaching and learning process. Some of the identified problems include: 1) Students face difficulties in overcoming problems related to understanding in analyzing a problem because many of them have limitations in mastering the basic concepts of computer networks. This can be seen through the results of the midterm exams (UTS), which show that students are not able to achieve good results. 2). The ability of students to respond to questions posed by lecturers in lectures is still relatively low. Only a few students were active in providing answers to these questions. 3). Students experience difficulties in connecting network concepts with other technological concepts, as well as in explaining case studies based on computer network concepts they have learned in class.

Based on the problems that have been identified, the researcher concludes the causes of these problems, including: the lack of variety of teaching methods used in learning, so that the process that occurs is only limited to the transfer of knowledge, the views of some students who state that computer network lectures are abstract and rarely implemented in daily life, so they only focus on the theory presented by the lecturer.

To overcome the problems above, an effort is needed so that students no longer experience difficulties in analogizing the concepts and work of computer networks. In order to improve students' scientific

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attitudes, efforts are made by implementing learning models that can develop students' abilities to solve problems and interact with other fellow students. The potential and effective learning model in developing this domain is using the BIINER Learning model. This model stands for Behavior, Instruction, Interactions, Need Monitoring, Evaluate, and Result. [1] This learning model will essentially form a reinforcement of the scientific attitude and character of the learner. In a computer network course, the character or scientific attitude can be seen from the perspective of attitude and work.

The results of the study show that a scientific attitude can improve learning outcomes and academic achievement. Interpersonal communication skills of lecturers which include openness, empathy, support, positive attitudes, and equality, have a positive effect on student academic achievement. [2]

This model also provides opportunities for students to actively draw conclusions in their understanding. This is reinforced by several previous studies that increase students' scientific attitudes in using project based learning models. [3] In improving students' scientific attitudes, many learning models can be used. On the other hand, it is also explained, the Inquiry learning model which encourages students to develop curiosity and explore and discover through the process of asking, investigating, and formulating hypotheses. [4].

RESEARCH METHODS

This study uses a quasi-experimental design in education. The population of this study were students at Putra Indonesia University YPTK Padang, while the sample was students of informatics engineering education (experimental class) and informatics engineering students (control class). The sample was selected using cluster random sampling technique.

Prior to further analysis, a homogeneity test was carried out to show that the research subjects had the same variance in their initial conditions. This homogeneity test uses the variance similarity test. In addition, a normality test with chi square was also carried out to show that the research subjects had normally distributed data distribution. The research data was collected through several methods, namely documentation, questionnaires, and observation. The documentation method is used to collect data about students. The questionnaire method was used to collect data about students' scientific attitudes. While the observation method is used to record learning recordings during the research.

After the data was collected, an analysis was carried out to test the increase in scientific attitude and to compare the increase in scientific attitude between the two groups. For this analysis, the t-test method was used.

RESULTS AND DISCUSSION

The learning model is a prescriptive strategy, instructions, to achieve learning goals. Learning models generally have components of teaching structures, social

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systems, roles/tasks of educators and students, support systems, and the impact of learning-accompaniment (influence) (Joyce, Weil, and Calhoun, 2009:116-117)[5].

Substantially BIINER stands for learning steps (syntax) used in computer network learning which includes six learning steps, namely 1). Stimulating students as an effort to strengthen character (Behaviour), 2). Providing learning directions and instructing assignments to students (Instruction), 3). Provide opportunities for students to interact in working groups (Interaction), 4). Monitoring the progress of task implementation (Need monitoring), 5). Evaluate and monitor the progress of task implementation (Evaluate), 6). Provide a final assessment of the evaluation results (Result).[1].

A. Results

Initial analysis aims to evaluate the homogeneity of the sample. The normality test in the experimental class and control class was carried out using the Liliefors formula. The normality test is used to determine whether the processed data comes from normally distributed data or not. the results of the normality test on the two samples.

Group	n	A	Lo	Lt	Result
Eksperiment	36	0,05	0,1348	0,1477	Normally
Control	36	0,05	0,0652	0,1477	

Table 1. Data Normallity Test

Based on the table above the calculation of the Normality test, it is obtained that L_{count} for the experimental class is 0.1348 and for the control class Lcount is 0.0652. Meanwhile, the Ltable value is 0.1477, obtained from the critical value of the L Liliefors test. Because the result is $L_{count} > L_{table}$, the sample is said to be normally distributed. This means that the prerequisites for proceeding to the Homogeneity Test stage have been fulfilled.

Group	n	dk	A	Lo	Lt	Result
Eksperiment	36	0,05	0,05	1,71	1,76	Homogeny
Control	36	0,05				

Table 2. Data Normallity Test

In the final stage of the analysis, the aim is to evaluate the ability of the BIINER Learning model in cultivating a scientific attitude. The results of the analysis in Table 2 show that the data used is homogeneous and has a normal distribution.

Furthermore, Table 3 shows the results of the Hypothesis Test analysis in this study which was conducted to find out whether the scientific attitude of students using the BIINER Learning model is higher than the scientific attitude of students using project based learning learning models. The test criterion is if $t_{count} > t_{table}$ at $\propto = 5\%$, then H_0 is rejected and accepted, and vice versa.

Group	Mean	S	DK	th	tt	Result
Eksperiment	73,22	14,17	70	5,772	2,381	Hypothesis accepted
Control	50,88	18,54				

Table 3. Hypothesis Test

Based on hypothesis testing, it can be seen that $t_{count} = 5.772$ while $t_{table} = 2.381$. It is concluded that $t_{count} > t_{table}$ at $\propto = 5\%$, then H_0 is rejected and H_1 is accepted (effect).

From Table 4 it can be seen that the percentage of students in the experimental class who are included in the very high

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scientific attitude category of 44.4%, high of 47.2%, moderate of 8.3%, low of 0%, and very low of 0%, while from Table 5 it can be seen that the percentage of students in the control class who belong to in the very high scientific attitude category of 27.7%, high of 50%, moderate of 22.2%, low of 0%, and very low of 0%.

Score Interval Class	Frequency	Percentage	Category
0-39	0	0 %	Very Low
40-55	0	0 %	Low
56-65	3	8,3 %	Currently
66-79	17	47,2 %	High
80-100	16	44,4 %	Very High

Table 4. Results of Analysis of Experimental Class Observation Sheets

Score Interval Class	Frequency	Percentage	Category
0-39	0	0 %	Very Low
40-55	0	0 %	Low
56-65	8	22,2 %	Currently
66-79	18	50 %	High
80-100	10	27,2 %	Very High

Table 5. Results of Analysis of Control Class Observation Sheets

The scientific attitude of students who use the BIINER Learning model is higher than the scientific attitude of students who use the project based learning model. In other words, the BIINER Learning model has significantly succeeded in improving students' scientific attitudes based on the results of the analysis that has been carried out.

B. Discussions

The current developments in RI 4.0 technology and industry as well as the competency demands of 21st Century graduates have changed the pattern of learning from teacher center to student center. Students are required to be able to study independently to master learning materials and the lecturer acts as a facilitator. Referring to this, the results of the interviews concluded that students find it difficult to learn because the use of the current learning model can answer students' needs in learning, such as the ability of the psychomotor domain in terms of building good networks.

The results showed that after participating in the lesson, students' scientific attitudes increased compared to before. This proves that the learning model can develop a scientific attitude in students. In the classroom, learning provides opportunities for students to carry out learning activities and experiences directly. They obtain information by constructing knowledge from the data obtained. In addition, in the learning process, students act as scientists. They have the freedom to choose the topics they want to know about, conduct investigations, draw conclusions from the results of their research, and share findings with other students, as well as provide criticism in the group evaluation stage.

As information seekers, students are required to be able to interact with other students. Able to read and explore teaching materials well from teaching material sources provided by lecturers and from other relevant sources. Students have to ask a lot of questions, discuss, and observe, in order to gain conceptual experience, appreciative experience and creative experience.

During the learning process, the lecturer acts as a mentor who is ready to provide scaffolding if students need it. Vygotsky's theory says that students should be given difficult, complex and

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realistic tasks where these tasks have never been studied, then given sufficient assistance to complete these tasks. The social system appears in the provision of the scaffolding.[6]

The results of the study in the control group showed that after participating in the BIINER Learning model, students' scientific attitudes improved better than before. These results also confirm that the BIINER Learning model can develop scientific attitudes in students. However, based on the test of differences in scientific attitude improvement between the control group and the experimental group, there was a significant difference. Therefore, it can be concluded that the BIINER Learnign learning model is more effective in cultivating students' scientific attitudes compared to other learning models used in the control group.

The BIINER learning model will essentially strengthen the character of students. The character is divided into work character and attitude character. Because students who have very high scientific attitudes are more in the experimental class, while students who have moderate and high scientific attitudes are more in the control class, the average scientific attitude in the two classes is almost balanced even though it is higher in the experimental class. This is of course due to the fact that the two learning models are both rooted in constructivism, so that both have good abilities in cultivating a scientific attitude.

Even though the significant difference in improving scientific attitude between the two models is not that big, the experimental learning model still shows an advantage in this regard. This shows that the BIINER learning model is more effective in significantly improving students' scientific attitudes, although the level of significance may not be that high.

Thus, from all these explanations, it can be concluded that the two learning models are able to foster scientific attitudes in students, but the experimental learning model has the advantage of significantly increasing scientific attitudes.

CONCLUSION

Based on the calculation results of the experimental and control group data, tcount = 5.772 and ttable = 2.381. It can be concluded that the results of the t test show that the experimental group has a better scientific attitude than the control group. In addition, this study also confirms that the learning model that uses the BIINER Learning Model is able to effectively foster a scientific attitude in students.

Thus, the advice that can be given is regarding the socialization and application of the BIINER Learning learning model as an alternative in technical vocational learning to develop students' scientific attitudes. This can help lecturers and teachers to consider the use of learning models that have been proven successful in cultivating a scientific attitude in students.

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