The Effect of Problem-Based Learning Models on Students' Self-Efficacy in Excretion System Material at SMA

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INFO ARTIKEL	ABSTRACT
	The background of this research is the lack of self-efficacy in students and the learning model used by teachers. The purpose of this study was to determine the effect of the problem-based learning model on the self-efficacy of SMA Negeri 2 Grabag students on excretion system materials. This research is a quasi-experimental study with a non-equivalent control group design. The population in this study were students of class XI MIPA 3 and XI MIPA 4 for the 2022/2023 academic year. The sample in this study used two classes from the population class which were used as the control class and the experimental class which were determined using a purposive sampling technique. The data obtained were analyzed using the Mann-Whitney u-test and the independent t test at a significance level of $\alpha =0.05$, and analyzed with the help of the SPSS program. The results showed that the average initial self-efficacy score of 68.86 experienced an increase in the final average self-efficacy score of 79.43 with an average of 10.57% with the influence of problem-based learning models. Based on research results problem-based learning models can be used as an alternative learning model to improve student self-efficacy. Teachers need to be more active in order to be able to develop learning models that are implemented, so as to increase self-efficacy in students.

INTRODUCTION

The current era of globalization, human resources are needed for the development of a more modern era than before. As an effort to improve the quality of human resources, the most important requirement in achieving the goals of developing the quality of these resources is Education. Education itself is a basic need that must be met by every human being (Anwar, 2017). In order for education to be carried out properly and precisely, a science is needed that examines in depth how education should be carried out (Hasan *et al*, 2021).

The not yet optimal quality of education is a problem that is currently being faced. One of the causes of the low quality of education is learning in the classroom that is not in accordance with the standards of the

educational process (Suryana, 2020). Learning activities are directed at the ability to memorize information, students are required to remember various information associated with daily activities. As a result, when students graduate from school, they are good theoretically but not practical (Diana *et al*., 2020).

Based on the description above, it is known that the teacher has an important role in determining the success of learning activities. The teacher acts as a compiler of learning strategies according to the conditions in the class to achieve learning goals (Hamdani, 2017). The quality of education can, of course, be determined by the quality of teachers, no matter how well the curriculum has been implemented, but if the quality of teachers is still inadequate then education will not work as expected. Therefore, the teacher is the main key to improving the quality of education. The teacher is a very important component in determining the implementation of the learning process in the classroom as one of the elements in the success of an education. Teachers are required to be able to manage learning in class well. One of them is in the selection and use of innovative learning models, so that students are more interested in participating in the learning process so that students' self-efficacy will be optimal (Dayu, 2016). Applying the right learning model can have a positive impact on students. If the teacher is right in choosing the learning model, the learning objectives will be easy to achieve (Arman, 2019). Accuracy in choosing a model will make students more enthusiastic in participating in the learning process in the classroom (Fani, 2022).

Self-efficacy becomes a factor internal which is allegedly the strongest in achieving learning achievement (Wulanningtyas & Ate, 2020). Noer (2012) explains the definition, self-efficacy is a person's opinion about one's own ability to do something. A person's self-efficacy reflects a person's belief in completing an action so that the desired goal can be achieved. Someone who has high self-efficacy

is able to perform tasks well and achieve maximum results, so as to increase the academic achievement achieved. As stated in Bandura social cognitive theory (1997), low self-efficacy can cause anxiety and avoidance behavior.

In reality, the self-efficacy possessed by students still tends to be not optimal, which can be seen from the lack of self-confidence in students when they find material or questions that they find difficult and tend to avoid them. this is because self-efficacy influences individuals in determining actions to achieve goals (Kusrieni, 2014).

The use of problem-based learning models greatly supports the process of increasing self-efficacy in high school students. Thus the problem-based learning model can be used as a learning model to be applied in learning activities.

METHOD
Types of research
This research is a *quasi-experimental research.* Implementation of this research in January 2023.

Research subject
The research subjects consisted of 69 people. It consists of students of class XI MIPA 3 and XI MIPA 4 SMA Negeri 2 Grabag.

Data collection technique
The technique used in data collection was a questionnaire filled out by students. The data owned will then be analyzed descriptively quantitativel.

RESULTS AND DISCUSSION
Self-Efficacy Descriptive Statistics
The values of the experimental class and the control class are summarized in descriptive statistics tables. The results of the descriptive statistical analysis of initial and final efficacy values the self-efficacy of the experimental

class and control class students is presented in   Tabel 1.

Tabel 1. Descriptive Statistics of Self-Efficacy Value

	N	Average	Median	mode	Lowest Value	The highest score	Baku Devi
Initial Efficacy of Experiments	35	68,86	70	70	50	83	7,163
Final Efficacy of Experiment	35	79,43	80	75	56	100	8,603
Initial Efficacy Control	34	68,53	79	60	48	82	7,648
Final Efficacy Control	34	72,44	73.50	70	59	89	8,280

Based on Tabel 1 it is known that the initial efficacy value of the experimental class in the self-efficacy questionnaire has an average value of 68.86 while in the final efficacy of the experimental class the result is 79.43. The questionnaire test study in the control class obtained an average initial efficacy of 68.53 while the final efficacy was 72.44. The data explains that the value of initial efficacy and final efficacy of self-efficacy has increased. Meanwhile, the distribution graph of the self-efficacy value of the experimental class is presented in Figure 1.
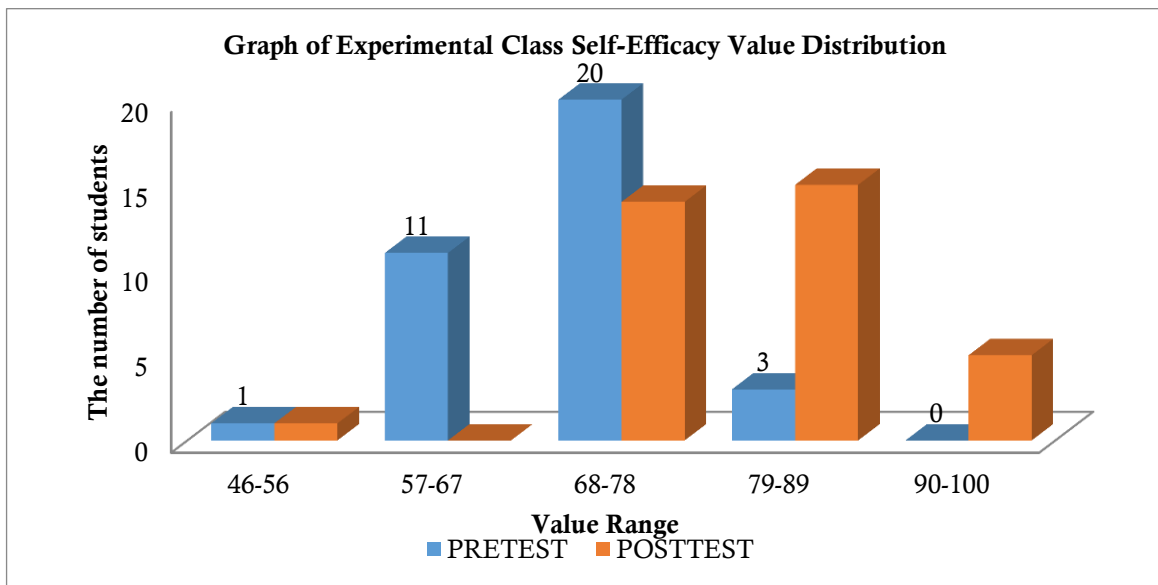
Figure 1. Distribution of Experimental Class Self- Efficacy Values

Based on Figure 1, it shows that the distribution of initial efficacy scores is the efficacy of the experimental class. The highest frequency is in the 68-78 interval of 20 students. The lowest frequency is in the 46-56 interval of 1 student. Furthermore, Figure 1 shows the results of the final distribution of self-efficacy scores in the experimental class. The highest frequency was obtained at intervals 79-89 of 15 students and the lowest frequency at intervals of 46-56 of 1 student.

While the distribution of self-efficacy values of control class students is presented in Figure 2.

Graph of Control Class Self-Efficacy Value Distribution
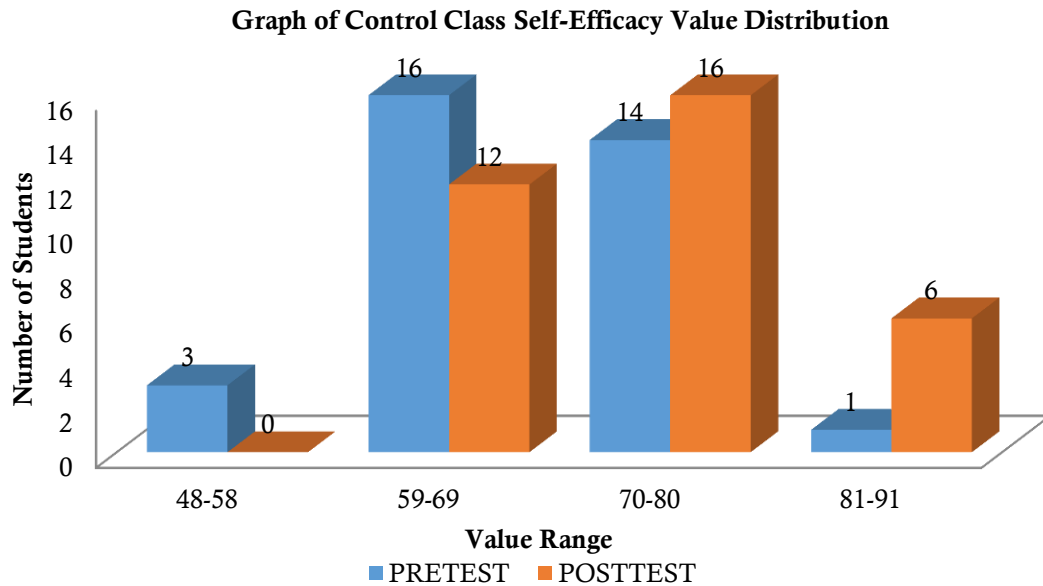
Figure 2. Graph of Control Class Self-Efficacy Value Distribution

Based on Figure 2, it shows the distribution of initial self-efficacy scores in the control class. The highest frequency is in the 59-69 interval of 16 students. The lowest frequency was obtained at the interval 81-91 with 1 student. Furthermore, Figure 2 shows the results of the distribution of the final efficacy scores of the control class. The highest frequency is in the 70-80 interval of 16 students. While the lowest frequency is in the interval 48-58 with a total of 0 students.

- Normality test

Based on data analysis carried out using the *Kolmogorov Smirnov test* through the SPSS version 25 application. The results of the normality test for the self-efficacy scores of students in the experimental class and control class are presented in Tabel 2.

Tabel 2. Normality Test Results of Self-Efficacy Test

Class	Statistics	Df	Sig.	Information
Initial Efficacy of Experiments	0.137	35	0.097	Normal
Final Efficacy of Experiment	0.108	35	,200*	Normal
Initial Efficacy Control	0.087	34	,200*	Normal
Final Efficacy of Control	0.121	34	,200*	Normal

Based on Tabel 2 it can be seen the results of the *Kolmogorov-Smirnov normality test.* In the experimental class, the initial efficacy value was obtained with a significance of 0.097 so that the data was normally distributed. Furthermore, in the final efficacy value of the experimental class, a significance of 0.200 was obtained so that the data were normally distributed. In the control class, the significance of the initial efficacy value was 0.200, which means that it is normally distributed. The final efficacy value of the control class obtained a significance of 0.200 so that the data is normally distributed. From the four data it can be concluded that the student's self-efficacy test has a significance level of > 0.05 , which means that all data is normally distributed.

- Homogeneity Test

Based on data analysis carried out using the *homogeneity of variances levene statistic test* through the SPSS version 25 application. The results of the homogeneity test of student self-efficacy data can be seen in Tabel 3.

Tabel 3. Homogeneity Test Results of Self-Efficacy Test

			Levena Statistics	*Df1*	*Df2*	*Sig.*	**Information**
Self-Efficacy Results	Initial efficacy	*Based on Means*	0.267	1	67	0.607	Homogeneous
	final efficacy	*Based on Means*	0.219	1	67	0.641	Homogeneous

Tabel 3 shows that the initial self-efficacy test has a significance level of 0.607 which means > 0.05 and for the end it has a significance level of 0.641 which means > 0.05. Homogeneous data indicates that the data comes from the same population or the same variance.

Hypothesis testing

Based on the results of the normality test and homogeneity test, data was obtained that in the analysis of self-efficacy values, the data were normally distributed and homogeneous so that a parametric test was then carried out using the *Independent sample t-test.* The results of the *Independent sample t-test* of self-efficacy can be seen in Tabel 4.

Tabel 4. Student Self-Efficacy T Test Results

Mark	**Class**	**N**	*Means*	*Sig. (2-tailed)*
Initial efficacy	Experiment	35	68,86	0.855
	Control	34	68,53	
final efficacy	Experiment	35	79,43	0.001
	Control	34	72,44	

Based on Tabel 4, it is known that the results of the significance of the *Independent sample t-test* for the initial efficacy is 0.855, which means >0.05 so that it can be concluded that H_O accepted and H_1 rejected, which means the problem-based learning model does not affect the self-efficacy of SMA Negeri 2 Grabag students on the material excretory system and it is known that the results of the significance of the *Independent sample t-test* for the final efficacy is 0.001, which means <0.05. So it can be concluded that H_O being rejected and H_1 accepted means that the problem-based learning model affects the self-efficacy of SMA Negeri 2 Grabag students in the excretion system material.

Discussion of Self-Efficacy

That problem-based learning can improve and affect students' self-efficacy. This proves that the research conducted by researchers is in accordance with previous studies, but what distinguishes it is the material used in the research.

According to Arends (2012) there are 5 stages of the problem-based learning model in stage 1 namely orienting students to problems, stage 2 namely organizing learning activities, stage 3 guiding independent investigations of group funds, stage 4 namely developing and presenting the work, and at stage 5 perform analysis and evaluation of the problem solving process. Through the problem-based learning model students experience learning through the problems that have been solved. The problem-based learning model encourages

students to be active in class, collaborate with each other, communicate well with friends or teachers. Students are encouraged to actively interact with their environment. This indirectly helps students to believe in what they are doing from one step to another to solve the problems that have been given by the teacher.

Students who have a high level of self-efficacy will be better at doing the tasks given by the teacher than students with self-efficacy that is not optimal. Even though the task given is difficult, students will try to do it until it is finished. The following is data on the results of student answers according to the dimensions of self-efficacy according to Bandura (1997).

The average achievement of the dimensions of student self-efficacy after learning with a problem-based learning model
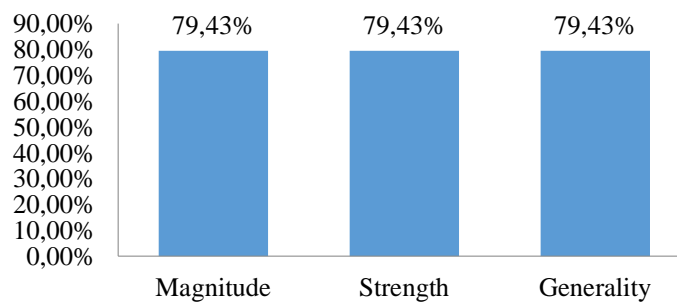
Figure 3. The Average Results of the Dimensions of Self-Efficacy

a. *Magnitude* (difficulty level)

This dimension is related to the behavior that students will choose when they find a difficult task or problem. In the experimental class the average value of student answers is up to 79.43 % , which means high. This indicates that students are trying to work on and solve problems given by the teacher without trying to avoid tasks beyond his ability (Sunaryo, 2017).

b. *Generality* (general/broad)

This dimension is related to student attitudes which describe students' beliefs about their ability to do the assignments given. In this dimension, the average student answer is 79.43 % , which means it is in the high category. This indicates that students are optimistic in working on it until it is finished well (Sunaryo, 2017). Problem-based learning itself trains students to be more active and improve their thinking skills in learning. This proves that successful learning has an effect on

increasing students' self-efficacy on the *generality dimension.*

c. *Strengths*

This dimension is related to the strength of students' beliefs in dealing with a problem, especially related to how to solve it. Students with a strong *strength dimension* will persevere in facing assignments without anxiety. In this dimension, the average answer in the experimental class is 79.43 % , which means it is in the high category. Strength in this dimension encourages students to complete their assignments even though they have no experience with the assignments given (Sunaryo, 2017).

Through the problem-based learning model students work together with their groups so that anything that raises doubts about the problems students are working on will give confirmation or enter one another, as well as the teacher who gives reinforcement to each student's learning progress. This proves that the problem-based learning model has

succeeded in increasing students' self-efficacy on the *strength dimension.*

Problem-based learning encourages students to be more active and improve their thinking skills in the learning process. Students become more active and improve their thinking skills in learning. Because the knowledge obtained from the students' own efforts causes learning to be memorable and beneficial for the lives of students in the present or in the future in dealing with problems in their environment. This affects students' self-efficacy because students are increasingly confident in their abilities to do the tasks given by the teacher. This is consistent with the factors that influence student self-efficacy according to Bandura (1997), that successful experiences affect student self-efficacy.

Excretion system material that is abstract and difficult to describe is reinforced by a statement (Simorangkir *et al*., 2020) which states that human excretory system material is subject matter that is not liked and even tends to be boring because the learning process requires them to memorize terminology and Latin in the introduction of organs involved in the human excretion process, it is difficult to distinguish the excretion process in humans, as well as an understanding of the process of urine formation which is difficult to understand.

Based on the problem-based learning model that has been done, this model is dominant in increasing self-efficacy in students. Students learn in solving the problems that have been given. This is able to train and measure students' cognitive abilities or understanding of the material so that they are confident in their ability to do *the posttest* at the end of the lesson. In addition to providing meaningful learning, problem-based learning models help students understand the material so that students' cognitive learning outcomes increase.

Based on the results of the data and explanation above, it can be concluded that the problem-based learning model has an effect on increasing students' self-efficacy. This is in accordance with the research objectives expected by researchers, as evidenced by the average *posttest score* which increases from the *pretest value* . The average *pretest score* was 68.86 and the average *posttest score* was 79.43.

CONCLUSION

The problem-based learning model has an effect on the self-efficacy of Grabag 2 Public High School students on the excretion system meter because the sig *.(2-tailed)* < 0.05. This is based on hypothesis testing with parametric analysis *Independent sample t-test* which obtains *Sig.(2-tailed)* 0.001.

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