

Research Article

Effectiveness of Prior Knowledge-based Flipped Learning strategy to increase students' self-efficacy

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ABSTRACT

This study aims to describe the effectiveness of the Prior Knowledge-based Flipped Learning strategy to increase students' self-efficacy in the learning process on Electrolyte and Non Electrolyte Solutions. This research was carried out in the even semester of 2022/2023 at SMA Negeri 1 Gandapura. The type of research conducted was experimental research using a nonequivalent control group design. The population of this study were all students of class X Science at SMA Negeri 1 Gandapura for the academic year 2022/2023 which consisted of 4 classes, namely classes X IPA 1, X IPA 2, X IPA 3, X IPA 4, with a total of 144 students. The sampling technique in this study was purposive sampling. The sample in this study was class X IPA 1 as the experimental class and X IPA 4 as the control class. The experimental class was treated using the flipped learning strategy while the control class was treated using the Student Teams Achievement Division (STAD) strategy. And the results of the expert validation test for the student's self-efficacy questionnaire obtained 24 questionnaire items with the conclusion that they were feasible to use. Testing students' self-efficacy questionnaires from the results of the Independent Sample T Test found that the Sig (2-tailed) value of students' self-efficacy was $0.091 < 0.05$ for the experimental class and $0.094 < 0.05$ for the control class. Based on the test results, it can be concluded that the Prior Knowledge-based Flipped Learning strategy and the STAD (Student Team Achievement Division) strategy are effective in increasing students' self-efficacy levels.

Keywords: Prior Knowledge; Flipped Learning; Self-Efficacy; Students; Learning and Teaching

1. INTRODUCTION

Education in this day and age is increasingly developing. These developments occur in science and technology which have a more positive impact on the quality of education. In its implementation, education is defined as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential (Fitriani, 2021). Senior High School (SMA) education in Indonesia is currently seen as an important level of education to produce quality human resources. So, there is one subject that must be tested in the final school assessment, namely the science subject. In general, science is divided into three basic sciences: physics, biology, and chemistry. Chemistry is the study of the properties and composition of matter (composed of compounds) and its changes.

Based on the results of interviews with one of the chemistry teachers at SMA Negeri 1 Gandapura, it is known that during the learning process students have less initial knowledge so that they do not understand learning, especially on the material of Electrolyte and Non-Electrolyte Solutions. As a result of students having little prior knowledge, the level of cognitive learning outcomes and self-efficacy in students becomes low, where self-efficacy is an internal factor in students. This factor affects students' interest in participating in the teaching and learning process, because many students experience difficulties in learning because students do not believe in their abilities (Muliaman, et al. 2022). Therefore, a strategy is needed that can place students as subjects (actors) of learning and teachers only act as facilitators in the learning process, where the methods used must be effective in learning. Learning effectiveness is a measure related to the success rate of a learning process. And to produce this effectiveness, researchers use the Prior Knowledge-based Flipped Learning strategy, to place students as subjects (actors) of learning who have prior knowledge and deepen the material of Electrolyte Solutions and Non-Electrolyte Solutions.

Flipped Learning (FL) is a learning strategy that shifts face-to-face learning in the classroom to individualised learning spaces with the help of technological devices. In the flipped learning strategy, teachers or lecturers can create materials in the form of writings, videos, podcasts and others that can be reached by students outside the classroom. The materials that

have been created in the form of learning content will be studied by students at home. When students are in the classroom, what they do is case studies, practicums or simulations or experiments (Hamid & Hadi, 2020). Other research says that Flipped Learning (FL) provides a space for students to discuss learning barriers during online discussions and increases the engagement of those who are hesitant to speak up during class meetings. Flipped Learning also provides learning opportunities for students to experience the learning process that suits their needs by flipping the delivery strategy. Students have been busy with lower cognitive levels (acquiring knowledge and understanding) and with flipped learning (FL) while in the classroom, they are engaged in higher phases of cognitive activity (application, analysis, synthesis, and evaluation). (Guisti Nyoman, et al, 2020:79). So that the flipped learning strategy will improve students' prior knowledge, where students' prior knowledge is a combination of knowledge that students already have and skills that have been built before students experience a new learning process.

Where in the learning process there are often concepts that are developed by students themselves so that they do not match the actual concept. (Hailikar, 2016). The requirement for someone to recognise a new knowledge is the knowledge they have previously had. According to Jonassen and Gabrowski, prior knowledge is the knowledge, skills, or abilities that a learner brings to the learning process. Meanwhile, Addison and Hutcheson (2010) define prior knowledge as existing knowledge, knowledge of the world, knowledge of skills, and previous knowledge. Research conducted by Addison and Hutcheson (2010) concluded that there was a significant difference in comprehension scores between groups who had learnt earlier with knowledge that was not learnt by prior knowledge. Prior knowledge suggests that the understanding and application of new concepts will be highly dependent on the application of prior knowledge that is relevant to the new knowledge. Therefore, with this initial knowledge, it will also increase the self-efficacy of students.

Self-efficacy is the belief that a person can overcome the situation and produce positive results. Children who have low self-efficacy tend not to want to try to learn because they believe that learning cannot help them solve problems while children who have high self-efficacy tend to like challenges (Ni Putu Diah, 2019: 405; Ni Wayan Suniasih, 2019; Gusti Ngurah Sastra Agustika, 2019). Other research also says that self-efficacy is individual beliefs about their abilities. "Self-efficacy is a belief in which individuals estimate their ability to carry out a task or action needed to achieve goals." Bandura (Qudsyi & Irma, 2016) which means efficacy is a belief in which the individual estimates his ability to carry out the tasks or actions needed to achieve it. The purpose of this study is to find out whether the learning process by using the prior knowledge-based flipped learning strategy can improve students' self-efficacy.

2. RESEARCH METHOD

This research is a type of quantitative descriptive research with experimental methods, namely the research method used to determine the independent variable (treatment/actor) of the dependent variable (results) under controlled conditions (Suigiyono, 2016). The approach in this study is the design experiment, according to Suigiyono (2018: 77) the quasi of the design experiment has a control group, but cannot function as to control external variables that have the implementation of experiments. This research will be conducted in January the even semester of the 2022/2023 school year, with a time of implementation for one month. The research location is at SMA Negeri 1 Gandapura which is located in Lapang Timu Village, Gandapura District, Bireuen Regency.

The population in this study were all students of class X Natural Sciences at SMA Negeri 1 Gandapura in the academic year 2022/2023 consisting of 4 classes namely class X IPA1, X IPA2, X IPA3, X IPA4, with a total number of students as many as 144 students. The sample used in this study was Class X IPA1 with the number of students 25 and class X IPA4 with the number of students 20. Sampling techniques in this study were purposive sampling, namely sample determination techniques with certain considerations (Suigiyono, 2018). In this study, class X IPA1 was taken as a sample of the experimental class using a prior knowledge-based flipped learning strategy. And class X IPA4 as a sample of the control class using the conventional strategy. The data collection instrument used to measure students' self-efficacy is to use a questionnaire. Analysis for student self-efficacy instruments in the form of Likert Scale Questionnaire.

$$\text{Percentage of feasibility \%} = \frac{\text{observed score}}{\text{expected score}} \times 100\%$$

This scale pays attention to the range of percentage numbers. The expected maximum value is 100% and minimum 0%. Distribution of the feasibility category according to Arikunto (2009: 44). The data obtained is then interpreted into the criteria for values as **Table 1**.

Table 1. Feasibility Category

Percentage (%)	Feasibility category
< 21%	Very inappropriate
21%-40%	Not feasible
41%-60%	Quite worthy
61%-80%	feasible
81%-100%	Very feasible

Data analysis is carried out to test the hypothesis of the research that has been carried out. The first analysis was carried out on the question instrument. Data analysis techniques use parametric tests with normality tests (shapiro wilk), homogeneity tests, and hypothesis tests using SPSS.

The final stage is a hypothesis testing with an independent sample t test. This test is used to determine effective or not using a prior knowledge -based flipped learning strategy to improve student self -efficacy. This test criterion is if the value of sig (2-tailed) $< \alpha$ ($\alpha = 0.05$), then H_0 is rejected and accepted by H_1 (Flipped Learning Learning Strategy based on Prior Knowledge is effective in increasing students' self-efficacy in electrolyte and non-electrolyte learning material Class X IPA SMA Negeri 1 Gandapura), and if the value of sig (2-tailed) $\geq \alpha$ ($\alpha = 0.05$), then H_0 is accepted (Flipped Learning Learning Strategy based on Prior Knowledge is not effective in increasing students' self-efficacy in electrolyte material and Non -Electrolyte Class X Students of IPA SMA Negeri 1 Gandapura) and rejected H_1 .

3. RESULTS AND DISCUSSION

Testing of analysis requirements

Testing requirements are used to determine the data obtained normally and homogeneously.

Normality test

The normality test aims to find out whether the learning outcomes obtained are normally distributed or not. For normality data analysis using SPSS Pasw Statistic 18 using the Shapiro Wilk test with a significant level of 0.05.

Table 2. Normality Test Results Data

Class	Shapiro Wilk		
	Statistics	Df	Sig
Questionnaire for self -efficacy of experimental students	0,945	25	0,196
Student self -efficacy questionnaire control	0,947	20	0,321

Based on **Table 2**, it is known that the significant value of the Self -Efficacy Data for Experimental Class Students is $0.196 \geq 0.05$, and the significant value of the self -efficacy questionnaire data of the control class is $0.321 \geq 0.05$ which shows that the data is normally distributed.

Homogeneity test

The homogeneity test in this study used the homogeneity of variance test with the homogeneity test using the SPSS 18 software was carried out by the Lavene Statistic test. Testing Criteria If the Sig value. (p-value) $< \alpha$ ($\alpha = 0.05$), then H_0 is rejected (variance is not homogeneous), and if the value is sig. (P-Vasiie) $\geq \alpha$ ($\alpha = 0.05$), then H_0 is accepted (homogeneous variance).

Table 3. Students' self-efficacy questionnaire

Levene Statistic	Variant homogeneity test		
	df1	df2	Sig
0,286	1	43	0,595

Based on **Table 3**, it gets a significant value of $0.595 \geq 0.05$ (5%) then H_0 is received and H_1 is rejected (homogeneous data).

Questionnaire data results

The results of the research that have been carried out is based on quantitative analysis data obtained from the student's self -efficacy questionnaire test. The test was given to 45 students, namely in the experimental class as many as 25 students and in the control class of 20 students. For data on the results of quantitative data analysis of students' self -efficacy questionnaire, can be seen in **Table 4**.

Table 4. Data on Students Self -Efficacy Questionnaire Results

Data	Number of Students	Min Value	Max Value	Average
Questionnaire for self-efficacy for experimental class students	25	70	100	84,9
Questionnaire of Self -Effective Control Class Students	20	69	100	80,7

Based on **Table 4**, states that student self-efficacy questionnaire in the experimental class has a minimum value of 70, a maximum value of 100 and an average value of 84.9. In the control class the student self-efficacy questionnaire has a minimum value of 69, a maximum value of 100 and an average value of 80.7. Based on the calculation of the average value of student self-efficacy questionnaire results are good, meaning that in both classes the level of student self-efficacy has increased. From the data above, it can be seen the ratio for the average value of students' self-efficacy questionnaire in the two classes with the following diagram.

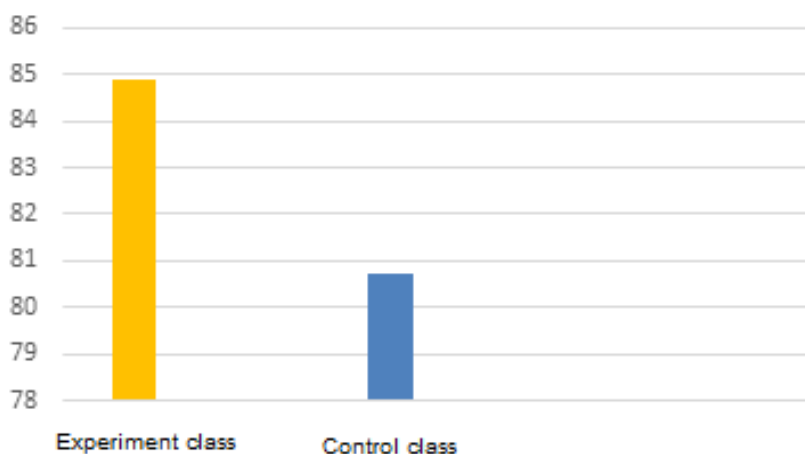


Figure 1. Diagram of the average results of student self-efficacy questionnaire

Hypothesis testing

Based on the results of the student's self -efficacy questionnaire hypothesis test with the Independent Sample T Test, data can be obtained as **Table 5**.

Table 5. Data from the Independent Sample T Student Fiiri Efficacy

Independent sample t test			
Class	T test for the equation of the average value		
Questionnaire for self-efficacy for experimental class students	The assumed variant	Df	Sig. (2-tailed)
		25	0,091
Questionnaire of Self -Effective Control Class Students	The assumed variant	Df	Sig. (2-tailed)
		20	0,094

The results of the Independent Sample Test of the student's self -efficacy questionnaire test in the experimental class obtained sig. (2-tailed) of 0.091 < 0.05 and for the control class obtained sig. (2-tailed) of 0.091 < 0.05. So it can be said that the prior knowledge -based flipped learning strategy is effective in increasing students' self -efficacy. So also for the STAD strategy is also effective in increasing students' self -efficacy. The results of data analysis in student self -efficacy are that between experimental classes and effective control in increasing student self -efficacy. In the experimental class it is said to be effective because it is seen in the initial knowledge (prior knowledge) of students, when the learning process is valued in expressing opinions and answering some questions raised by the teacher about the material of electrolyte and non -electrolyte solutions students can answer confidently and confidently. Whereas the control class is said to be effective in

producing a good improvement in students' self-efficacy through questionnaire data that has been obtained by researchers. This is based on research (Amalia Rohmah, 2018: 10; Dewi Kusuma, 2018: 11; Leny Novian, 2018: 8) that the application of STAD learning strategies can increase self-efficacy and student learning activities in the learning process. STAD can increase self-efficacy shown in studies that have increased in each cycle, where students in the learning process of students are more active and enthusiastic when learning.

4. CONCLUSION

Based on the results of the research data analysis, the conclusion of the prior knowledge-based Flipped Learning Learning Strategy and Student Teams Achievement Division (STAD) learning strategy was successful in increasing students' self-efficacy in the material for electrolyte and non-electrolyte solutions. This is shown from the results of the Independent Sample T test $0.091 < 0.05$ for the experimental class and $0.094 < 0.05$ for the control class, so that H_0 is rejected and H_1 is received. Thus, it can be concluded that the prior knowledge-based flipped learning strategy and Student Teams Achievement Division (STAD) learning strategies are effective in increasing students' self-efficacy in electrolyte and non-electrolyte solution material at SMAN 1 Gandapura.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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