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Improving Student Learning Outcomes by Implementing Synectic Learning Strategies

Elisabeth Sitepu[1*]

[1] Universitas Darma Agung, Indonesia.

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Elisabeth Sitepu
elisabeth_sitepu@gmail.com

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Abstract: This research aims to improve student learning outcomes by using synectic learning strategies at Jambi Medan Private High School. The population is all class XI high school students consisting of 2 classes. Samples were taken randomly in 2 classes consisting of an experimental class and a control class. The data observed were student learning outcomes, which were collected through a multiple-choice test of 25 questions consisting of 5 answer options, which had been tested for validity, reliability, level of difficulty and differentiating power of the test. The data obtained were analyzed using the t test, where the normality and homogeneity of the data had previously been tested. The experimental class learning outcomes averaged pretest (28.42 ± 6.71) and average posttest (73.51 ± 5.64) with an increase in Gain learning outcomes of 67% while the control class learning outcomes averaged pretest (21 .62 ± 6.48) and the posttest average (69.53 ± 5.96) with an increase in Gain learning outcomes of 61%. Hypothesis testing was carried out at a significance level of $\alpha = 0.05$ using a one-sided t-test, namely the right side where $t_{count} > t_{table}$ (2.85 > 1.67), which means Ho was rejected and Ha was accepted. By looking at the results of this research, it can be concluded that the learning outcomes of students who are treated through the application of Synectic learning strategies are higher than those using conventional teaching.

Keywords: Learning; Model; Synectics

Introduction

The development of intact and reliable human resources is a general goal of education (Facer & Selwyn, 2021; Lee & Lee, 2020), but this is often very idealistic and directionless, so it is not relevant to the needs of the field. Only empowered humans are able to overcome the problems in this life. Therefore, people who are tough, reliable, intelligent, characterful, and competitive. This is greatly influenced by three factors, namely innate nature, environment, and training (Daryanto, 2013).

According to Ramadhan (2008), teacher-centered learning still has several weaknesses. These weaknesses can be seen during the learning process in class, interaction between students and teachers or students with students rarely occurs (Muganga & Ssenkusu, 2019). Students are less skilled in answering questions or asking about the concepts being taught. Students are less able to work in discussion groups and solve the problems given. Students tend to study independently.

During the learning process, the teacher must have a learning strategy (Russell & Martin, 2023), so that students can learn effectively and efficiently, hit the expected goals. One of the steps to have that strategy is to master presentation techniques. The successful implementation of learning strategies is very dependent on the way teachers use learning strategies, because a learning strategy can only be implemented through the use of learning strategies (Zain & Djarmarah, 2010).

There are several learning strategies that can be used in learning, one of which is the synectic learning strategy (Fernandez et al., 2021; Komaria et al., 2019). For this reason, the teacher can develop strategies in synectic learning strategies so that the material presented by the teacher is acceptable.

The 2013 curriculum aims to prepare the Indonesian generation so that in the future they will

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have the ability to live as individuals and citizens who are faithful, active, productive, creative, innovative and affective and able to contribute to the life of society, nation, state and world civilization (Sitompul et al., 2019). To achieve the 2013 curriculum objectives above, Permendikbud No. 81A of 2013 stipulates that the learning process in the 2013 curriculum should consist of five learning experiences namely observing, asking, gathering information, associating, and communicating, which is abbreviated as 5M.

The Synectic Learning Strategy was developed by William Gordon and is a learning strategy that uses analogies to develop the ability to think from various points of view (Sari & Hermawati, 2021). Synectics provides a structure of freedom that can be realized in planning and implementing creative learning experiences (Kuswandi et al., 2017; Suyanti, 2010). Such procedures are useful in learning processes where complex problems arise requiring efficient and economical solutions. Of course, students will make discoveries and problem solving will play an increasingly extensive role in finding new ideas. Through the application of the Synectics learning strategy which is supported by learning chemistry, it is hoped that students will have a high interest in learning. Individuals (students) must be able to prepare provisions in the form of a mental attitude and learn to master several skills that support the implementation of learning.

Synectic Strategy is a learning strategy designed to develop student creativity (Djudin, 2017; Rufaida et al., 2022). Problem solving requires scientific research, and at the same time requires creativity, both in the process and in the methods of solving (Ahmed & Ekhlas Sabah Abdul Ameer, 2021; Sande & Sharma, 2021). There are two learning strategies that underlie the synectic procedure, The First Strategy is creating something new. This strategy is designed to recognize oddities and will help students understand a problem, idea, or product in something new that ultimately clarifies creativity. Second Strategy: Introduce strangeness. This strategy is designed to make something new, unfamiliar ideas more meaningful, we carry it out with analogies that students already know.

Learning places more emphasis on everyday life concepts so students need to be more creative in understanding the material. So that students can spend more time involved in learning activities, it should be integrated throughout the concepts of daily life. Therefore, the learning process using Synectics learning is expected to be able to improve the quality of creative thinking skills (Toirjonovich, 2023), which is a very valuable aspect in every human endeavor, because through creativity various new thoughts, theories, approaches and ways that are very beneficial for life can be discovered and produced. Synectics provides many opportunities for students to practice the skills needed to support the implementation of learning. In the future, we need someone who is able to generate new ideas (Salcedo, 2006). Synectic learning strategy is a learning strategy that is included in the personal strategy family. This strategy is also known as the strategy of creativity and individual development. Synectic strategy is also known as the Gordon strategy because the first person who designed it was named William J., Gordon, (Gordon, 1961). Synectic comes from the Greek "Synecticos" which means to connect or connect. The aim of this strategy is to foster creativity, so that students are expected to be able to face every problem. This strategy emphasizes the aspect of growing student creativity.

Synectics is a learning strategy that gives students the freedom to express ideas without thinking about grammar, how to start writing, etc (Joyce et al., 2009) stated that synectics is designed to increase individual and group creativity (Blosiu, 1999; Kalantarnia et al., 2020; Wiharsih et al., 2021). Discussing synectic experiences can build feelings of togetherness between students. Students learn with their classmates as they respond to ideas or problems. Thoughts are assessed as potential contributions to the group process. Synectic procedures help create a single-minded equality community. A very pleasant standard like this will certainly provide support to even very shy students.

Synectics has short-term results in broadening the view of concepts and problems (Mofield, 2022), but when students are exposed to applying these strategies repeatedly they can learn how to use them in a way that increases creativity and they learn to enter the metaphorical style in a way that increases poise and perfection (Serikbayeva & Beisenbayeva, 2020).

The synectic learning strategy is quite attractive and its lucky combination of increasing productive thinking, educational empathy, and interpersonal closeness makes it applicable to students of all ages and all curriculum areas (Joyce et al., 2009).

The success of the teaching and learning process must be supported by appropriate learning to convey subject matter to students (Bin-Tahir et al., 2019; Shah Ph & Kumar, 2019). Synectics learning is one type of learning that can be used to achieve instructional objectives to be achieved in a learning activity. Synectics learning is a learning strategy that belongs to the personal strategy family. This strategy is also known as the strategy of creativity and individual development of learning activities which in the learning process use or raise real problems as material for thinking for students in solving problems to gain knowledge from a subject matter.

Method

This research was carried out at Jambi Medan Private High School. The population in this study were all class X students of Jambi Medan Private High School, totaling 2 classes. The sample is a part of the population. Samples were taken randomly (random sampling) by selecting 2 classes, so that one class was taught with a Synectic learning strategy and the other class was taught with a conventional learning strategy (Supap & Viriyavejakul, 2019).

Before carrying out learning activities, a pre-test was carried out to determine the level of students' ability in the material in the control class and experimental class (Chandrasekaran, 2014). After the material is taught to students, a post-test is carried out to determine student learning outcomes in the control and experimental classes. The instrument in this research consisted of 20 multiple-choice questions with five options. Prior to conducting the research, the tests that had been prepared were tried out to determine the validity of the test, the reliability of the test, the level of difficulty of the test, and the discriminating power of the test.

The procedure in this study was to conduct a pretest on the research sample to determine student learning outcomes before being given treatment. The aim is to test the homogeneity and normality of the two sample groups, as well as to get a picture of students' initial abilities before being given different treatment regarding the material to be discussed as well as dividing students into study groups. Researchers gave different treatments to the two sample classes.

Hold a post-test at the last meeting to obtain data on the ability of the research sample to see the increase in learning outcomes after the teaching is completed. After the pre-test and post-test data were obtained, the data was processed to see how the learning achievement increased between the samples taught by applying the Synectic learning strategy and the samples taught using conventional methods.

Result and Discussion

Before the two samples were given different treatments, they were first given a pre-test which aimed to determine the initial ability of each student in both classes and to find out that the two classes were normally and homogeneously distributed (Singh & Rana, 2004). Furthermore, different learning was carried out, namely the experimental class with Synectic learning strategies and the control class with conventional learning strategies. At the end of the learning process a final test will be given to determine student learning outcomes. Based on the results of the study, after the calculations were carried out, the average pre-test was obtained for the experimental class (28.42) and for the control class (21.62). Meanwhile, the score for the post-test in the experimental class was (73.51) and for the control class (69.53). From the calculation results, the increase in experimental class learning outcomes was 68%, while the increase in control class learning outcomes was 62%.

Before the two samples were given different treatments, they were first given a pre-test which aimed to determine the initial ability of each student in both classes and to find out that the two classes were normally and homogeneously distributed. Furthermore, different learning was carried out, namely the experimental class with Synectic learning strategies and the control class with conventional learning strategies. At the end of the learning process will be given a final test to determine student learning outcomes.

Based on the results of the research, after carrying out calculations, the average pre-test for the control class was (21.62 ± 6.48) and the experimental class (28.42 ± 6.71). Meanwhile, the value for the post-test for the control class was (69.53 ± 5.96) and for the experimental class (69.53 ± 5.96).

From calculations based on tabulated data on test results for the two samples, the pretest and posttest scores for the control class and experimental class were summarized in Table 1.

Table 1. Average results, standard deviation of pre-test and post-test

Class	Data				ΔXX
	Pre-test		Post-test		
	X	SD	X	SD	
Control	21.62	6.48	69.53	5.96	47.33
Experiment	28.42	6.71	73.51	5.64	48.13

Table 1 shows that the Experiment class had a higher increase of 48.13 compared to the Control class of 47.33 on the difference between students' Pre-Test and Post-Test chemistry learning outcomes. To determine the increase in student learning outcomes, the pre-test and post-test data obtained are then calculated to obtain gain data. Based on the research results, after calculating the gain data, the average for the control class was (0.62 ± 0.088) and for the experimental class (0.68 ± 0.085). From calculations based on tabulated data on test results for the two samples, the pre-test and post-test scores for the control class and experimental class were summarized in Table 2.

Table 2. Mean and Standard Deviation, Variance of Data Gain

Experiment Class			Control Class			ΔXX
$\bar{X}$	SD	V	$\bar{X}$	SD	V	
0.68	0.085	0.0072	0.62	0.088	0.0078	0.06

Based on the data in Table 2, it can be seen that the increase in learning outcomes or the experimental class gain was 0.68 with a standard deviation of 0.085, a variance of 0.0072, and an increase in the control class of 0.62 with a standard deviation of 0.088 and a variance of 0.0078. The average difference in increasing student learning outcomes is 0.06.

Once it is known that the data is normally distributed and homogeneous, it can be tested the hypothesis using the statistical test t test one side, namely the right side. This test is to find out whether the hypothesis in this research is accepted or rejected. The test criteria is if $t_{count}>t_{table}$ then the alternative hypothesis is accepted and the null hypothesis is rejected. Hypothesis test results from data as in Table 3.

Table 3. Hypothesis Test Results Post-Test Data

Data of Class		t_{count}	t_{table}
Experiment	Control		
$\bar{X}$ = 76.88	$\bar{X}$ = 70.47	3.05	1.67
SD = 5.70	SD = 6.00		
S^2 = 32.00	S^2 = 36.00		

From the t distribution data obtained t table = 1.6705. while based on the calculation obtained tcount = 3.05 so that the price of tcount> ttable (3.05> 1.6705). Thus, the criteria for testing the hypothesis $t_{count} > t_{table}$ are met. This means that H0 is rejected, Ha is accepted, which means it can be concluded that the chemistry learning outcomes of students who are taught using Synectic learning strategies on the subject of colligative properties of solutions in class XII of high school.

Table 4. Average Gain Data for the Experimental Class and the Control Class

Class	Data
Experiment	$\sum X$ =21.78
	$\bar{X}$ = 0.68
	S^2 = 0.085
	S = 0.0072
Control	$\sum X$ = 19.78
	$\bar{X}$ = 0.62
	S^2 = 0.088
	S = 0.0078

Based on the calculation of normalized gain in both classes, it was concluded that in the experimental class, there were 23 students in the high gain category, 9 students in the medium gain category, while there were no low gain categories. Whereas in the control class, there were 5 students in the high gain category, 27 students in the moderate gain, and no low gain. This data is obtained from appendices 27 and 29. Where to determine the criteria for gain is g > 0.7 high; 0.3 < g < 0.7 moderate; g < 0.3 is low. Based on the normalized gain calculations for both classes, the gain data can be presented in Table 4.

The increase in chemistry learning outcomes of students in the experimental class and control class can be seen from the normalized average gain of the experimental class and the control class multiplied by 100%. Based on the table above, it can be seen that the increase in chemistry learning outcomes for students in the experimental class is higher than the chemistry learning outcomes for control class students.

Conclusion

Based on the results of the research that has been done, it can be concluded that the learning outcomes of students taught using Synectic learning strategies are higher than the learning outcomes of students who use conventional learning at Jambi Medan Private High School on the subject of colligative properties of solutions in class XII high school. The increase in chemistry learning outcomes for students in synthetic learning was 68%, while the increase in chemistry learning outcomes for students taught using conventional learning was 62%. So, there is a significant difference in improving student chemistry learning outcomes between Synectic learning and conventional learning. The magnitude of the difference in increasing student chemistry learning outcomes is 6%.

Author Contributions

Elisabeth Sitepu: Conceptualization, methodology, writing original draft preparation, formal analysis, investigation, and visualization.

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Conflicts of Interest

The authors declare no conflict of interest.

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