

HOW TO ENHANCE MOTIVATION AND BIOLOGY LEARNING OUTCOMES?

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Abstract. The study aims to determine the effect of inquiry-based learning strategies assisted by presentations and tiered questions on the motivation and biology learning outcomes of 10th-grade students at SMA Negeri 2 Denpasar. This type of research is classified as quasi-experimental with an Non-Equivalent Post-Test-Only Control Group Design. The sample in this study consists of students from class X IPA 7 and class X IPA 5 at SMA N 2 Denpasar, involving a total of 2 classes selected using the random sampling technique. The data obtained is quantitative data in the form of learning motivation scores and biology learning outcomes. Analysis using MANOVA with the help of SPSS 23.0 for Windows. The results of the hypothesis test show the following results: there is an influence of the inquiry learning

strategy assisted by presentations and tiered questions on motivation, there is an influence of the inquiry learning strategy assisted by presentations and tiered questions on learning outcomes, there is a simultaneous influence of the inquiry learning strategy assisted by presentations and tiered questions on motivation and biology learning outcomes in the X IPA class at SMA Negeri 2 Denpasar.

INTRODUCTION

The learning process is one of the problems of education in Indonesia. The learning process in the classroom is directed to develop children's brains are forced to remember and memorise a variety of information that has been given without being asked to understand the information. Various information that has been given without being asked to understand the desired information to connect it with everyday life (Sanjaya, 2017), to connect with everyday life Sanjaya (2006). Learning is a system provided by the teacher in order to learners to gain knowledge, skills, and the formation of attitudes and values (Suryadi, 2003). The learning process is composed of a number of components or elements that are interrelated with one another. The interaction between teachers and students during the teaching and learning process

plays an important role in achieving the desired goals important in achieving the desired goals. Learners can succeed in learning. Learning requires certain requirements, namely the ability to think critically, logically, systematic, and objective, generating high interest in the subject (Widana & Laksitasari, 2023).

Biology is a vehicle to improve knowledge, skills, attitudes, values and responsibility for nature and values and responsibility for nature (Aseany, 2023). The presentation and tiered questions in the learning strategy are to help improve students's motivation and learning outcomes. Presentation is an active activity in helping to support the smooth running of the learning process. Learning and serves to create a passion for learning, more direct interaction between learners and learning resources, providing the same stimuli, equalising experiences and creating perceptions, stimuli, equalise experiences and create the same perceptions. Presentations have advantages including being able to increase learning activities and can help students' understanding in understanding a material, can encourage students to think, be active, work together and issue encourage learners to think, move, work together and express their opinions while tiered questions are questions in the form of while tiered questions are questions in the form of analyze, evaluate and create as a support for the learning process. Learning process is also one of the techniques to improve the ability to think and improve the quality of learning for students thinking and improve the quality of learning for students. According to Sardiman (2011), learning requires motivation.

Motivation is an essential condition of learning (Adnyana, 2023). Learning results will be optimal if there is motivation. The more appropriate the motivation used, the more successful the lesson will be. Motivation is the driving force within students who motivation is the driving force within learners that generates, ensures continuity and provides direction for learning activities, so that it is hoped that the goal can be achieved. In learning activities, motivation is very necessary because someone who does not have motivation in learning, It will not be possible to do learning activities (Abidin, 2018).

Based on observations at SMA Negeri 2 Denpasar, the implementation of learning, especially biology learning, it can be seen that the learning outcomes of students are still below the minimum completeness criteria for class X science subjects set at 70. The results of observations in one class X, namely out of 45 students, only 32 students were found to have scores above 70, so the percentage of students who had scores below the minimum completeness was 30%. This is caused by conventional learning

Conventional learning strategies are traditional learning strategies or often referred to as the lecture method, because from the past this strategy has been used as a means of oral communication between teachers and students in the learning and teaching process. In conventional learning, the teacher still explains or lectures, and the students only listen and record the material given by the teacher, so the students' knowledge becomes limited (Djamarah, 2014). This learning strategy was chosen as an effort to increase student motivation and optimal learning outcomes in biology. The inquiry learning strategy has advantages, including learning is not teacher-centered, can provide opportunities to ask questions or express their opinions, and provide opportunities for students to seek and find for themselves what they want to know in the learning process through observation, while the teacher acts as a facilitator and

guide students to learn (Citrawan et al., 2024). The inquiry learning strategy is a set of learning activities that emphasize the process of critical and analytical thinking to seek and find answers to questionable problems. The inquiry learning strategy can also be coupled with giving presentations and graded questions as effective learning support to increase students' motivation and learning outcomes (Widana et al., 2021).

Based on the description above, this study aims to determine the effect of inquiry learning strategy assisted by presentation and tiered questions on motivation and biology learning outcomes of XIPA class students of SMA Negeri 2 Denpasar.

METHOD

Type of Research

This research is classified as a quasi-experiment. Because the control group control group cannot function fully to control variables that affect the implementation of the research. influence the implementation of the research. According to Sugiyono (2014), this research involves two groups of classes namely the experimental class group and the control class group. The two class groups received different treatments in the learning process. The form of quasi-experimental design used in this research is non-equivalent control group design. This pattern uses groups consisting of one experimental group (experimental group) and a comparison group (control group). The research was conducted to find out the effect of incuri learning strategies assisted by presentations and tiered questions on the motivation and learning outcomes of students.

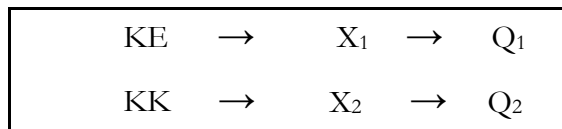


Image 1. Research Design

Description:

KE: Experimental group

KK: control group

X1: Treatment in the form of inquiry learning strategy

X2: Treatment in the form of conventional learning strategies

Q1: Post test of experimental group

Q2: Post test of control group (Sugiyono, 2014)

Research Population and Sample

The population in this study were all students of class X SMA Negeri 2 Denpasar in the 2020/2021 academic year consisting of 7 classes with a total of 316 people. The distribution of the population is presented in Table 1 below:

Tabel 1. Distribution of Research Population

No	Class	Gender		Total
		Female	Male	
1	X IPA 1	21	23	44
2	X IPA 2	22	23	45
3	X IPA 3	22	23	45

No	Class	Gender		Total
		Female	Male	
4	X IPA 4	23	22	45
5	X IPA 5	22	24	46
6	X IPA 6	23	23	46
7	X IPA 7	21	24	45
	TOTAL	154	162	316

Research Sample

Since the population is quite large, two classes were taken as samples in this study where one class was designated as the control group and one class was designated as the experimental class. In order to obtain a sample whose results are representative, the technique used is the random sampling technique by lottery and what is drawn is the class. The steps are as follows: (a) make 7 rolls of paper, each paper filled with class identity, namely X IPA 1, X IPA 2, X IPA 3, X IPA 4, X IPA 5, X IPA 6, X IPA 7; (b) the seven rolls were then placed in a bottle and drawn. c. From the seven rolls of paper, two rolls of paper were taken to be used as samples, the first roll of paper was designated as the treatment/experimental group, namely, Class X IPA 7, which was given treatment in the form of inquiry learning strategies supported by presentations and tiered questions, and the second roll of paper was designated as the control group, namely, Class X IPA 5, which was taught with conventional learning.

Research Procedure

This research was conducted at SMA Negeri 2 Denpasar in the 2020/2021 academic year. This research was carried out with the following steps:

Preparation: (a) prepare a research schedule, b) prepare learning tools such as syllabus, RPP (Learning Implementation Draft) material, media and LKS, c) developing instruments in the form of motivation questionnaires and student learning outcomes tests, d) prepare presentations and tiered questions, e) conduct validity and reliability tests on research instruments.

Implementation

At the implementation stage, different treatments were given between each class, namely the experimental class was treated with an inquiry learning strategy supported by presentations and tiered questions, while the control class used conventional learning. Both experimental class and control class implementation refer to their respective syntax and then at the final stage Provide a post-test to obtain data as biology learning outcomes in the experimental group and control group, then collect data to be analyzed using statistical analysis.

Data collection methods

Based on this type of data, the methods used in data collection are: a) questionnaire method, which is a data collection technique conducted by giving a series of questions or written questions to respondents to answer (Sugiyono, 2015); b) test method, which is a series of questions or exercises and other tools used to measure skills, intelligence knowledge, abilities, or talents possessed by individuals or groups. The test method is used to determine the learning outcomes of students using the inquiry learning strategy.

Research Instruments

The instrument used to collect learning motivation data is a questionnaire sheet. Questionnaire is a form of assessment instrument that is carried out by giving a set of questions or written statements through google form to students to respond according to the student's situation. Learning motivation is the score obtained by students through google form and obtained from distributing a questionnaire consisting of 20 items, consisting of 17 positive statements and negative statements.

Data Analysis Method

The collected data will be analyzed with parametric statistics, using the t-test and the multivariate analysis of variance (MANOVA) test, using the program SPSS 23.0 for Windows. Before testing the hypothesis, the preliminary analysis is carried out so that the conclusions drawn meet the requirements to be tested with parametric statistics.

RESULTS AND DISCUSSION

Data on students' motivation scores and biology learning outcomes after treatment with Presentation-Assisted Inquiry learning methods and tiered questions in experimental groups and conventional learning models in control and experimental groups are shown in the graph below.

Experimental group motivation data

Of the 45 students, 17 students (38%) scored below average and could be classified as having low motivation, 12 students (27%) scored average and could be classified as having moderate motivation, and 16 students (36%) scored above average and could be classified as having high motivation. For clarity, the data in Table 4.2 can be illustrated with histograms and polygons as shown in image 2. below.

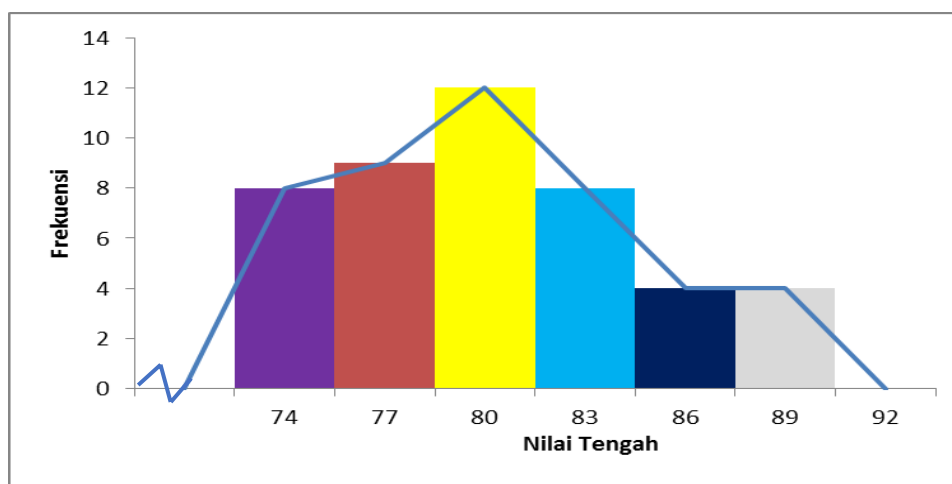


Image 2. Histogram and Polygon of Motivation Data of Experimental Group

Based on Figure 2, it can be seen that 8 learners are in the interval 73-75 with a median value of 74, as many as 9 participants in the interval 76-78 with a median value of 77, as many as 12 learners in the interval 79-84 with a median value of 83, as many as 8 learners in the interval 85-87 with a median value of 86, as many as 4 learners in the

interval 88-90 with a median value of 89. A total of 0 learners in the interval 91-93 with a midpoint of 92. It can be concluded that the highest score was obtained by 4 participants who were in the 88-90 interval and the lowest score was obtained by 8 students who were in the 73-75 interval.

Data on Biology Learning Outcomes in the Experimental Group

Based on image 3, it can be seen that as many as 6 learners are in the 75-77 interval with the middle value being 76, as many as 14 learners in the 78-80 interval with the middle value being 79, as many as 11 learners in the 81-83 interval with the middle value of 82, as many as 11 learners in the 84-86 interval with the middle value of 85, as many as 1 learner in the 87-89 interval with the middle value being 88, and as many as 2 learners in the 90-92 interval with the middle value being 91. It can be concluded that the highest score was obtained by 2 students who were in the interval 90-92 and the lowest score was obtained by 6 students who were in the interval 75-77.

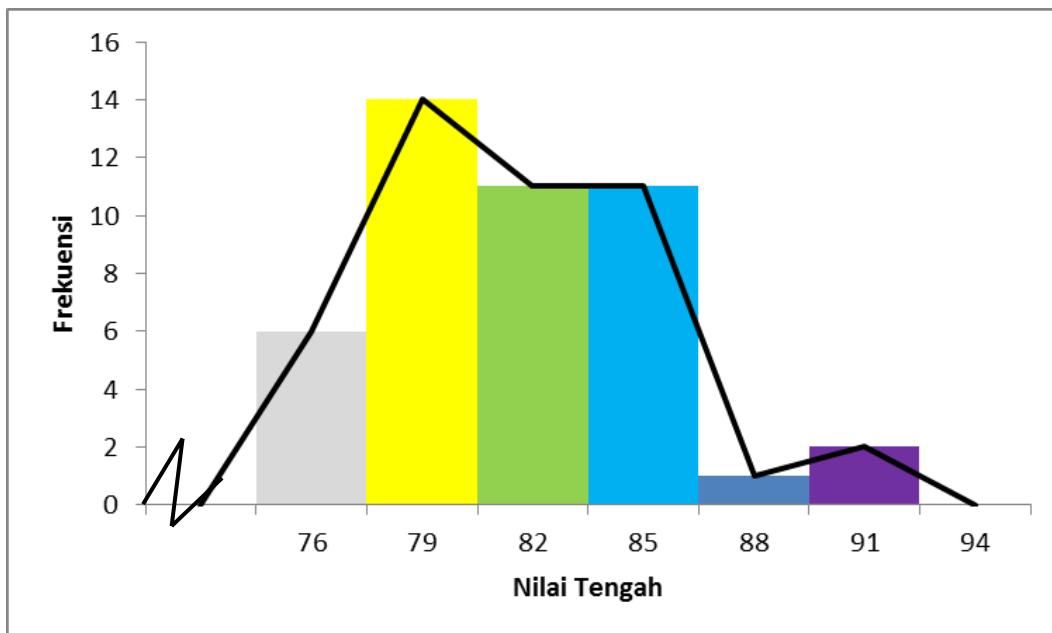


Image 3. Histogram and Polygon of Experimental Group Biology Learning Outcomes Data

Control Group Biology Learning Outcome Data

Based on image 4, it can be seen that as many as 7 students are in the 65-67 interval with a mean score of 66, as many as 8 students are in the 68-70 interval with a mean score of 69, as many as 18 students are in the 71-73 interval with a mean score of 72, as many as 7 students are in the 74-76 interval with a mean score of 75, as many as 4 students are in the 77-79 interval with a mean score of 78, as many as 2 students are in the 80-82 interval with a mean score of 81. It can be concluded that the highest score was obtained by 2 students who were in the 80-82 interval and the lowest score was obtained by 7 students who were in the 65-67 interval.

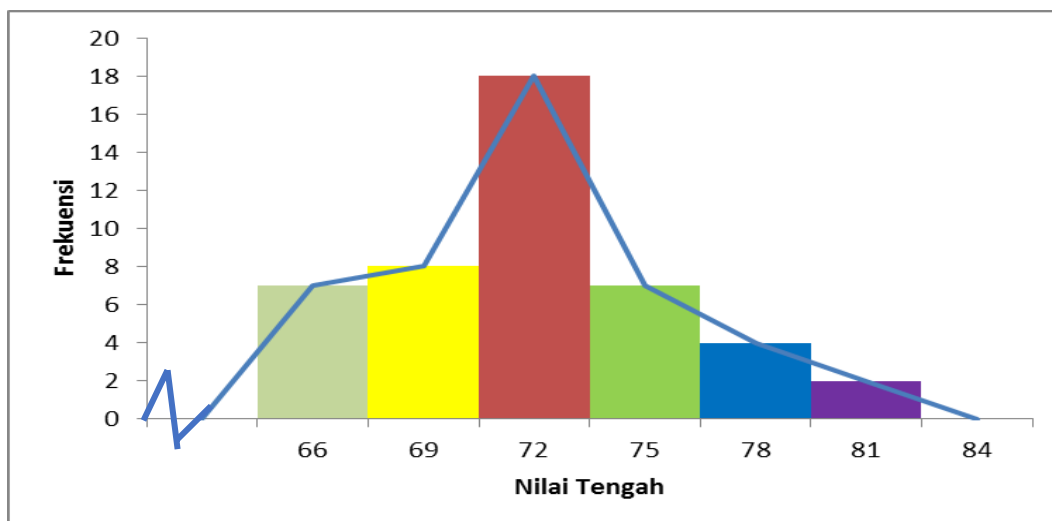


Image 4. Histogram and Polygon of Control Group Biology Learning Outcomes Data

Data Analysis of Research Results

In this study, hypothesis tests I and II were tested using t-tests and hypothesis test III was used manova test (Multivariate Analysis Of Variance). Manova is a statistical technique used simultaneously to export the relationship between categories of independent variables on two or more dependent variables.

Table 2. Results of t-test analysis

Group	Motivasion		Biology Learning Outcomes	
	Exprement	Control	Experiment	Control
Average	80,622	72,28	81,66	72,04
Variants	20,05	41,85	11,81	16,08
t count	7,135		12,277	
Table	1,66		1,66	
Interpretation	Significant		Significant	

The table above shows that $t \text{ count} > t \text{ table}$ then H_0 rejected and H_a accepted which means that: a) There is an activity effect between students who follow the inquiry learning strategy assisted by presentations and tiered questions and students who follow the X MIP learning model at SMA Negeri 2 Denpasar, b) There is an effect on biology learning outcomes between students who follow the presentation-assisted inquiry learning strategy and tiered questions and those who follow the conventional learning model for class X MIPA SMA Negeri 2 Denpasar. Based on the findings of [Rofik Hdayat's \(2017\)](#) research on "The Effect of Inquiry Learning Strategy on Learning Motivation in Social Studies History Class X SMK PGRI 1 Punggur in 2016/2017". The data analysis showed that there were differences in the motivation of students who followed the inquiry learning strategy, supported by presentations and graded questions, and students who followed conventional learning. The existence of differences in students' motivation proves that the learning strategy of inquiry assisted by presentations and tiered questions can influence learning motivation. The third

hypothesis test can be done using the MANOVA test. For this purpose, the multivariate test numbers are used as follows:

Table 3. Multivariate Test

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.999	38687,284 ^a	2.000	88.000	.000
	Wilks' Lambda	.001	38687,284 ^a	2.000	88.000	.000
	Hotelling's Trace	879.256	38687,284 ^a	2.000	88.000	.000
	Roy's Largest Root	879.256	38687,284 ^a	2.000	88.000	.000
Kelompok	Pillai's Trace	.759	138,572 ^a	2.000	88.000	.000
	Wilks' Lambda	.241	138,572 ^a	2.000	88.000	.000
	Hotelling's Trace	3.149	138,572 ^a	2.000	88.000	.000
	Roy's Largest Root	3.149	138,572 ^a	2.000	88.000	.000

In the variable line, namely learning, the significance results based on Table 3 test results are based on: *Pillai's Trace*, *Wilk's Lambda*, *Hotelling's Trace*, and *Roy's Root* shows a number of $0.000 < 0.005$, so the alternative hypothesis (H_a) is accepted and the null hypothesis (H_0) is rejected or there is a simultaneous difference in motivation and learning outcomes in biology between students who follow the inquiry learning strategy assisted by presentations and tiered questions with those who follow the conventional learning model of class X MIPA class SMA Negeri 2 Denpasar. The MANOVA test results in the Multivariate Tests table are based on the significance of Pilla's trace, Wilk's lambda, Hotelling's trace, and Roy's square root, which obtained a value of $0.000 < 0.05$. This shows that there is a simultaneous difference in the motivation and learning outcomes of biology students who follow the inquiry learning strategy supported by presentations and tiered questions with students who follow conventional learning models.

Furthermore, it can be seen that the average motivation and biology learning outcomes of the experimental group are higher than the average motivation and biology learning outcomes of the control group. The use of inquiry learning strategies assisted by presentations and tiered questions has a positive influence in increasing the motivation and learning outcomes of students' biology. This is because the learning strategy of presentation-assisted inquiry and tiered questions students can directly express and channel their opinions with real life and students will dare to try to solve difficult problems (Sanjaya, 2019). The courage of learners to answer, according to their own ideas or in their own way will provide an active and conducive classroom atmosphere. One of the learning strategies used by teachers is the inquiry learning strategy assisted by presentations and tiered questions. Thus, the learning strategy of presentation-assisted inquiry and tiered questions can foster students' motivation to learn and can be used to improve the learning process. improve students' biology learning outcomes. So, it can be concluded that there is a simultaneous influence of motivation and

biology learning outcomes between students who follow the presentation-assisted inquiry learning strategy and tiered questions with students who follow the conventional learning model of class X SMA Negeri 2 Denpasar.

CONCLUSION

Based on the results of the analysis and discussion above, it can be concluded that there is an effect of inquiry learning strategies assisted by presentations and tiered questions on the motivation and learning outcomes of students in class X MIPA SMA Negeri 2 Denpasar and there is a simultaneous effect of inquiry learning strategies assisted by presentations and tiered questions on the motivation and learning outcomes of students in class X MIPA SMA Negeri 2 Denpasar.

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