

The Influence of Guided Inquiry Learning and Achievement Motivation on Students' Creative Thinking Skills

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Received: 27 August 2024. Accepted: 10 September 2024. Published: 28 September 2024.

Abstract. This research is a true experimental research using a 2x2 factorial design. The aim of this research is to analyze the differences in creative thinking skills between students who are taught using guided inquiry learning and students who are taught using direct learning. This research was carried out by providing treatment in the form of guided inquiry learning in the experimental class and direct learning in the control class. The results of the research show that: (1) $F_{\text{count}} (10.37) > (4.35) F_{\text{table}}$, meaning that there are differences in the creative thinking skills of students who are taught with guided inquiry learning and students who are taught with direct learning, (2) $Q_{\text{count}} (8.07) > (4.2) Q_{\text{table}}$, meaning that in terms of high achievement motivation there are differences in the creative thinking skills of students who are taught by guided inquiry learning and students who are taught by direct learning, (3) $Q_{\text{count}} (5.23) > (4.2) Q_{\text{table}}$, meaning that in terms of low achievement motivation there is a difference in the creative thinking skills of students taught using guided inquiry learning and students taught using direct learning, (4) $F_{\text{count}} (1.98) < (4.35) F_{\text{table}}$, meaning that there is no interaction between the learning model and achievement motivation on the creative thinking skills of students at SMA Negeri 1 Mambi.

Keywords: guided inquiry learning, achievement motivation, creative thinking skills

1. Introduction

The rapid progress of technology and information is now felt in almost all areas of life, including education [1,2]. Education is an important aspect for the development of human resources because education is a vehicle or one of the instruments used not only to liberate humans from backwardness but also from ignorance and poverty. Education is also the starting point for the young generation to be ready to compete in the era of globalization and demands of the times [3,4]. In facing this modern era, new breakthroughs and innovations are needed in various fields, especially in the field of education, which is none other than the basic field for preparing the young generation who are ready to face and compete in the era of globalization. Innovation in the field of education can begin with the implementation of a curriculum [5,6].

A curriculum is a set or system of plans and arrangements regarding learning materials that can be guided in teaching and learning activities. The current curriculum in Indonesia includes the 2013 curriculum and an independent curriculum. Implementing an independent curriculum requires thorough preparation, so it is conducted in stages. Some schools have implemented an independent curriculum, while others continue to use the 2013 curriculum. Implementation of the 2013 curriculum is expected to produce productive, creative, and innovative students by developing attitudes, knowledge, and skills. The success of planning and implementing the 2013 curriculum depends on the implementation of learning by educators in the teaching and learning process.

Learning is essentially a process of interaction between teachers and students, and between students and other students, to achieve predetermined goals. Effective learning can be implemented by actively involving students, attracting attention, generating motivation, and providing services using various media. Choosing a learning method or strategy tailored to students' needs will create effective learning. The implementation of mature learning can produce effective learning, including physical learning. Physics learning will be easier to understand if it is not only limited to delivering material but is also carried out by developing knowledge but still under intensive teacher guidance [7].

Physics learning is learning about nature and phenomena or natural phenomena and all the interactions that occur therein [8,9]. In the beginning, physical science was limited to materials that could be observed by the five senses, but along with the development of technology, its scope also expanded to materials or phenomena that were abstract or invisible. The abstract nature of physics learning requires students not only to master concepts but also to be able to implement them in everyday life; therefore, it requires skill development in students.

One of the skills that need to be developed is creative thinking skills. Creative thinking skills refer to an individual's ability to look for new ways, strategies, ideas, or ideas to obtain a solution to a problem. Several indicate students' creative thinking skills are still not optimal. These factors come from the students and teachers themselves. Most of the students remained silent and pensive while participating in direct learning from the teacher. Desired creative thinking skills are difficult to achieve. This can be seen from the lack of creativity among students in analyzing or solving the problems given.

The learning management process based on the results of observations made at SMA Negeri 1 Mambi found that the process of implementing physics learning still used a direct learning model. Apart from that, several facts were also obtained, including (1) lack of student involvement during the learning process, (2) some students lacked an orientation to success, and (3) lack of student creativity in studying or solving the problems given. Several facts that have been stated can have an impact on the creative thinking skills of students at SMA Negeri 1 Mambi.

Students' creative thinking skills can be overcome by implementing innovative learning models that place more emphasis on the contributions and activeness in learning. One is the application of the guided inquiry learning model, which involves students finding answers to problems raised by the teacher and remaining under intensive guidance from the teacher [10]. In its implementation, students are involved in the investigation process, identifying concepts or methods and encouraging them find ways to solve the problems they face. The benefits of learning through guided inquiry learning are that everyone experiences their own learning process from start to finish, independence in learning, development of various skills, and the language and reading embedded in guided inquiry learning. The application of guided inquiry learning in hing and learning proprocesses effectively increases student learning outcomes [11,12].

Another factor that can influence the learning process and has an impact on students' creative thinking skills is their achievement motivation [13]. Achievement motivation is a person's tendency to try to achieve success, and has an orientation to achieve certain goals as best as possible. With motivation, students have enthusiasm and passion for their learning. This is in accordance with other research showing that students' achievement motivation has a positive influence on creative thinking skills [14,15].

The novelty of this research is that it introduces variations in the application of guided inquiry that are more effective and adaptive to students' needs, such as the use of technology to support the inquiry process and the integration of inquiry methods with other approaches such as project-based learning or collaborative learning to improve participants' creative thinking skills. Students and the use of instruments or evaluation methods that are more accurate in measuring the impact of guided inquiry learning on creative thinking skills.

Based on the explanations above, the role of the guided inquiry learning model is closely related to students' achievement motivation and creative thinking skills. The aims of this research were 1) to analyze overall differences in creative thinking skills between students taught using guided inquiry learning and students taught using direct learning, 2) to find differences in creative thinking skills between students taught using guided inquiry learning and participants who were taught by direct

learning on students who had high achievement motivation, 3) to find differences in creative thinking skills between students who were taught by guided inquiry learning and students who were taught by direct learning on students who had low achievement motivation, and 4) to analyze the interaction between guided inquiry learning and achievement motivation on creative thinking skills in students.

2. Method

This was a true experimental study using a 2×2 factorial design. This research involved two classes: an experimental class and a control class. The experimental class will be given treatment by implementing guided inquiry learning, whereas the control class will still be taught using direct learning (conventional learning). This design was used to examine the interaction between guided inquiry learning and achievement motivation in creative thinking skills. The research design is shown in table 1.

Table 1. Research design, A_1B_1 as High achieving motivation group taught with guided inquiry learning, A_2B_1 as High achieving motivation group taught by direct learning, A_1B_2 as Low achieving motivation group taught with guided inquiry learning, A_2B_2 as Low achieving motivation group taught by direct learning.

Achievement motovation (B)	Learning A	
	Guided Inquiry Learning (A1)	Direct Learning (A2)
High (B_1)	$[A_1B_1]$	$[A_2B_1]$
Low (B_2)	$[A_1B_2]$	$[A_2B_2]$
Σ	$[A_1B_1] + [A_1B_2]$	$[A_2B_1] + [A_2B_2]$

The research variables consist of 1) independent variables: guided inquiry learning and direct learning; 2) moderator variables: high and low achievement motivation; 3) dependent variable: creative thinking skills. Data collected in the research used an achievement motivation questionnaire which was prepared referring to indicators of trying to excel, completing tasks well, being rational in achieving success, liking hands, responsibility and feedback. Apart from that, data was also collected by testing creative thinking skills with reference to indicators a) fluency, namely the ability to produce a number of ideas and ideas, including generating many ideas or ideas in solving problems, providing many answers in answering a question and solving problems, b) flexibility, namely the ability to produce varied ideas, including providing various interpretations or descriptions of a problem, being able to solve a problem with different solutions and presenting a concept in different ways, c) originality, namely the ability to produce ideas or ideas that are relatively new and unique in answering a question and being able to find unusual combinations of ordinary elements and d) elaboration, namely the ability to develop or add ideas so that a more detailed idea is produced so that it can enrich an idea.

The data collection techniques used were achievement motivation questionnaires and creative thinking skills tests. Data collection on achievement motivation was carried out by giving questionnaires to students who were used as research samples. The questionnaire is structured based on indicators in the form of written questions with an answer choice format adapted from the Likers scale which consists of strongly agree, agree, disagree, disagree and strongly disagree. The statements on the questionnaire consist of positive statements and negative statements. Meanwhile, data on creative thinking skills was obtained by giving tests to students who were sampled in the research. The test is given after the learning process by applying guided inquiry learning and direct learning. The data collection steps are as follows:

- 1) Carrying out criteria validation tests on creative thinking test instruments and achievement motivation questionnaires consisting of expert validation tests, empirical validity tests and reliability tests.
- 2) Providing this achievement motivation questionnaire sheet was given to students to determine 4 groups of participants, namely 1) students with high achievement motivation who were taught using guided inquiry learning, 2) students with low achievement motivation who were taught using the guided inquiry learning model, 3) students with low achievement motivation who were taught using the guided inquiry learning model, 3) students with high achievement motivation who are taught

using direct learning, and 4) students with low achievement motivation who are taught using direct learning.

- 3) Carry out the learning process according to teaching materials that have been prepared using guided inquiry learning and expert validation has been carried out in the experimental class, namely class XI IPA 1. At the same time, the learning process is also carried out using direct learning in the control class, namely class.

The data analysis technique in this research is divided into two parts, namely data analysis related to the instruments that will be used in the research and analysis of data obtained during the research (descriptive and inferential). Instrument analysis consists of calculating validity and reliability. As for technical data analysis, research results are divided into two, namely 1) descriptive statistical analysis by calculating the average, standard deviation, maximum score, minimum score and data variance values; 2) inferential statistical analysis using a two-way analysis of variance (ANOVA) test, but previously a prerequisite test was carried out consisting of a normality test and a variance homogeneity test.

3. Result and Discussion

3.1. Two Way Anova Test

Hypothesis testing uses two-way (2x2) analysis of variance (Anava) with F test and significance level. Basic statistics of the two way anova test shown in table 2.

Table 2. Basic statistics of the two way anova test.

Achievement Motivation (B)		Learning Models (A)	
		Guided Inquiry Learning (A ₁)	Direct Learning (A ₂)
High (B ₁)	N	11	11
	ΣX	783	706
	ΣX ²	56317	46018
	\bar{X}	71,2	64,2
	S	7,27	8,01
	S ²	55,98	64,16
Low (B ₂)	N	10	10
	ΣX	635	560
	ΣX ²	40763	31650
	\bar{X}	63,5	56,0
	S	6,64	5,39
	S ²	44,09	29,05
Total	N	21	21
	ΣX	1418	1266
	ΣX ²	97080	77668
	\bar{X}	134,7	120,2
	S	13,91	13,4
	S ²	100,07	93,21

Table 2 uses the results of statistical analysis for learning using guided inquiry learning and direct learning using high and low achievement motivation as a reference. We can see that students who have high achievement motivation and are taught using guided inquiry learning are higher than those taught using direct learning. Likewise, students who have low achievement motivation and are taught using guided inquiry learning are higher than those taught using direct learning.

3.2. Anova Test Two Same Cell Lines

This analysis is used if an experiment has one dependent variable and two independent variables. The dependent variable in this research is creative thinking skills and the independent variables are learning models and achievement motivation.

This hypothesis testing aims to analyze whether there are differences in the influence of learning models in terms of students' achievement motivation on creative thinking skills and the interaction between learning models and achievement motivation. Hypothesis testing created a two-way Anova table using the SPSS program. Summary of variance analysis test results shown in table 3.

Table 3. Summary of variance analysis test results (ANOVA).

Source Variant	dF	F_{count}	F_{table}	Sig.
Model	1	10.37	4.35	0.003
Moderator	1	1.98	4.35	0.001
Model*Moderator	1	0.012	4.35	0.912

Table 3 presents several conclusions regarding the hypothesis which can be explained in detail as follows:

1) Grouping is based on the learning used, namely guided inquiry learning with direct learning.

Table 2 shows that $F_{count} \geq F_{table}$ and the significant value is smaller than 0.05 so it can be concluded that H_1 is accepted. This means that there are differences in creative thinking skills between students who are taught using guided inquiry learning and direct learning.

2) Interaction between learning models and achievement motivation

The fourth hypothesis is tested by analyzing the following pair of null hypothesis (H_0) and hypothesis (H_1). H_0 : There is no interaction between the learning model and achievement motivation on students' creative thinking skills. H_1 : There is an interaction between the learning model and achievement motivation on students' creative thinking skills.

Table 3 in the Model*Moderator row shows the interaction between learning models and achievement motivation in influencing students' creative thinking skills. Based on Table 4.4, the value $F_{count} < F_{table}$ at degrees of freedom $df = 1$. These results can be concluded that there is no interaction between the learning model (Guided Inquiry Learning and Direct Learning) and achievement motivation on students' creative thinking skills, so it can be said that H_0 is accepted. This can be shown in Figure 1.

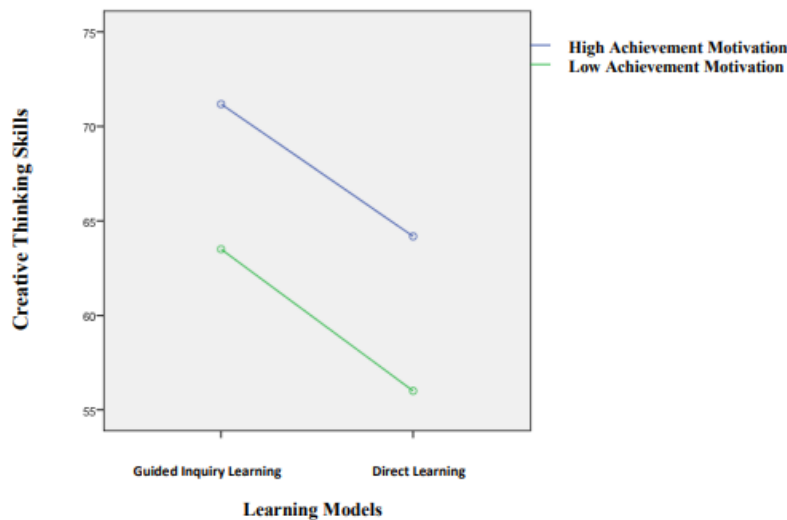


Figure 1 Interaction patterns of learning models with achievement motivation on creative thinking skills.

Figure 1 above shows that there is no visible pattern of intersection between high achievement motivation and low achievement motivation in guided inquiry learning and direct learning. This is because the average score of creative thinking skills taught using guided inquiry learning for the high achievement motivation and low achievement motivation groups is higher than the average score of creative thinking skills for students who have high and low achievement motivation in the same class.

taught by direct learning. The two lines in Figure 1 do not intersect each other so it can be concluded that there is no interaction between learning models with achievement motivation (high-low) and creative thinking skills, meaning that students who have achievement motivation (high and low) are suitable for both learning models. The absence of interaction between learning models and achievement motivation is possible because many factors influence the learning process.

3) Grouping based on high achievement motivation

Hypothesis 2 cannot be resolved by only testing F, because Table 3 produces an analysis of variance between the achievement motivation groups as a whole, namely the $F_{count} > F_{table}$ value which can be concluded that achievement motivation influences creative thinking skills, so the Tukey test is carried out to see differences in high achievement motivation. students who first start with the t test.

Table 4. Tukey test analysis in the high achievement motivation group of students.

Group	\bar{X}	n	RJKD	Q_{count}	Q_{table}	Criteria
Experiment	71,2	11	53,64	8,07	4,2	H_0 rejected
Control	64,2	11				

Table 4 shows that the $Q_{count} > Q_{table}$ value, so it can be concluded that $H(0)$ is rejected. This answers the second hypothesis, namely that students who have high achievement motivation, there are differences in creative thinking skills taught by guided inquiry learning and direct learning in class XI Science students.

4) Grouping based on low achievement motivation

Hypothesis 3 cannot be resolved by only testing F, because Table 2 produces a variance analysis between the achievement motivation groups as a whole, namely the $F_{count} > F_{table}$ value which can be concluded that achievement motivation influences creative thinking skills, so the Tukey test is carried out to see the difference in low achievement motivation. students who first start with the t test.

Table 5. Tukey test analysis in the low achievement motivation group of students.

Group	\bar{X}	n	RJKD	Q_{count}	Q_{table}	Criteria
Experiment	63,5	10	53,64	5,23	4,2	H_0 rejected
Control	56,0	10				

Table 5 shows that the $Q_{count} > Q_{table}$ value, so it can be concluded that $H(0)$ is rejected. This answers the third hypothesis, namely that students who have low achievement motivation, there are differences in creative thinking skills taught by guided inquiry learning and direct learning in class XI Science students.

3.3. Overall, Creative Thinking Skills For Students Taught Using Guided Inquiry Learning Are Higher Than Students Taught Using Direct Learning

Students' creative thinking skills for classes taught with guided inquiry learning show that the material on sound waves has improved compared to classes taught with direct learning. Where the average score of students using guided inquiry learning shows a greater value than students who are taught using direct learning.

Testing the first hypothesis based on Anava analysis shows $F_{count} \geq F_{table}$ so it can be concluded that H_0 is rejected or in other words H_1 is accepted. This means that overall, there are differences in creative thinking skills between students who are taught using guided inquiry learning and direct learning in class XI Science students. Students who were taught using guided inquiry learning scored higher on creative thinking skills compared to students who were taught using direct learning.

The significant difference between students who take part in learning using guided inquiry learning and students who are taught using direct learning is due to differences in treatment of the learning steps. Guided inquiry learning provides its own challenges for students to discover and build their own knowledge to understand problems in real life and develop students' ability to think creatively compared to direct learning. In direct learning, students only wait for information provided by the teacher rather

than actively looking for information themselves and are more likely to discuss things outside of the lesson if they are not supervised. In line with other research, it is stated that creative thinking skills in classes with project-based learning are better than conventional learning, this is proven by the difference in average scores in the two classes where project-based learning involves more active students in the learning process. So that it influences the improvement of students' creative thinking skills [16].

One way that educators can achieve successful learning for students to be more independent and able to think creatively is by implementing a learning model that is appropriate to the learning material. Learning that can improve students' creative thinking is guided inquiry learning. Guided inquiry learning is also one of the lessons that is emphasized and recommended in independent curriculum learning. Guided inquiry learning places more emphasis on the learning process so that it can improve creative thinking skills and have a positive influence as well as providing an active role and involving students directly [17,18].

In the learning process, the method used in guided inquiry learning is to provide an orientation or introduction to the subject matter that will be discussed. From the orientation given, students will try to understand the problem and will be challenged to find answers to several questions given. So that in the guided inquiry learning process, students will have higher creative thinking skills than in direct learning which tends to be more passive in the learning process.

The guided inquiry learning model has a significant influence on students' physics critical thinking skills, where in implementing the guided inquiry learning model, teachers give their students more opportunities to become problem solvers, scientists, historians, so that students become more active in doing various things. activities, collecting information, comparing, categorizing, analyzing, integrating, organizing material and making conclusions which will ultimately achieve better grades. According to research that has been conducted, it was found that the guided inquiry learning model has a positive influence on improving students' critical thinking. In learning activities in the experimental class, students who were taught using the guided inquiry learning model were more able to explore the material and discover concepts on their own, whereas in the control class students only received information from the teacher and learning tended to be monotonous [19,20].

3.4. *For Students Who Have High Achievement Motivation, There Is A Difference Between The Creative Thinking Skills Of Students Who Are Taught Using Guided Inquiry Learning And Students Who Are Taught Using Direct Learning.*

Testing the second hypothesis based on high achievement motivation obtained a value namely $Q_{\text{count}} > Q_{\text{table}}$ so it can be concluded that H_0 is rejected. This answers the second hypothesis, for high achievement motivation there are differences in the creative thinking skills of students who are taught using guided inquiry learning and direct learning. The difference in achievement motivation of students who are taught using guided inquiry learning and direct learning can also be seen from the initial state of students when starting the learning process which includes the desire to change behavior and success in learning. Motivation encourages someone to do something to achieve certain goals.

The application of guided inquiry learning for sound wave material is able to help students think creatively, critically and actively so they can solve a problem. Students who have high achievement motivation tend to have perseverance in learning, high enthusiasm, work hard, reward learning and have interesting activities in learning. This can be seen in the average score of creative thinking skills of students who have high achievement motivation in class XI IPA 1 which is taught using guided inquiry learning which is higher than in class Students who are taught using guided inquiry learning have higher creative thinking skills compared to students who are taught using direct learning. This means that if students have high achievement motivation in learning then this will be in line with high levels of creative thinking skills tests, and vice versa.

There is a positive influence of students' achievement motivation on improving creative thinking skills, with students' motivation having more enthusiasm and passion for achievement. The higher the student's motivation, the greater and more persistent the efforts made to obtain optimal results. Individuals who have high achievement motivation will be more able to think logically, systematically, critically and creatively, and vice versa. Motivation has an important role in learning success. Students who have high achievement motivation will certainly achieve better than students who have low

achievement motivation. The higher the student's motivation, the more active they will study, be disciplined, and not give up easily. On the other hand, no matter how good the learning facilities, learning tools and school conditions are, if they are not supported by inner achievement motivation, the results will not be optimal [21].

3.5. *For Students Who Have Low Achievement Motivation, There Are Differences In The Creative Thinking Skills Of Students Who Are Taught Using Guided Inquiry Learning And Students Who Are Taught Using Direct Learning.*

Testing the third hypothesis based on low achievement motivation obtained a value namely $Q_{\text{count}} > Q_{\text{tabel}}$ so it can be concluded that H_0 is rejected. This answers the third hypothesis, for low achievement motivation there is a difference between the creative thinking skills of students who are taught using guided inquiry learning and direct learning for students.

Students who were taught using guided inquiry learning with low achievement motivation obtained higher creative thinking skills scores compared to students who were taught using direct learning. This is caused by students who have low achievement motivation who do not have the desire from within to take part in learning, are less enthusiastic about learning, but guided inquiry learning requires independence and perseverance in learning so that it creates a positive influence on students.

If we often find students reluctant to do assignments or lazy to think, then achievement motivation is low. Where achievement motivation is an encouragement to achieve optimal results. If someone's achievement motivation is low then their creative thinking skills are also affected. Thus, increasing one's achievement motivation is very important to increase enthusiasm, confidence and self-confidence to be able to think creatively in achieving success. Students who have low motivation tend to be inactive in learning, less enthusiastic about learning and students expect more from the teacher to be able to solve problems that are considered difficult, which has an impact on their thinking skills.

Similar research states that achievement motivation is the driving force within oneself to carry out good actions and succeed with excellence. Meanwhile, low achievement motivation tends to hinder the learning process. Students who have high achievement motivation will be braver to explore lessons compared to those with low achievement motivation. Therefore, the teacher's role in determining the learning model and convincing students is very necessary so that they achieve the desired learning goals [22,23].

3.6. *There Is No Interaction Between The Learning Model And Achievement Motivation On Students' Creative Thinking Skills*

The fourth hypothesis of interaction effects with sources of variance in learning models and achievement motivation produces $F_{\text{count}} \leq F_{\text{table}}$ so that it can be concluded that H_0 is accepted or in other words H_1 is rejected. This means that students who are taught using the learning model have no interaction with students who have high or low achievement motivation. If we look at high achievement motivation, creative thinking skills in classes taught with project-based learning get higher scores than students taught with direct learning. The same thing also happened in the low achievement motivation group, where the creative thinking skills of the experimental class taught using guided inquiry learning obtained a higher score than the control class taught using direct learning.

This research was conducted to determine the influence of guided inquiry learning and direct learning as seen from the differences in achievement motivation on the creative thinking skills of class XI IPA students at SMAN 1 Mambi. From this research it is known that lessons with guided inquiry learning have an influence on students to further improve creative thinking skills in completing a project. The application of guided inquiry learning provides opportunities for students to build their own knowledge in solving problems and seeking various solutions and encourages creative thinking. This is what helps students build concepts constructively so they can overcome problems in learning.

Based on research conducted and statistical test results show that hypotheses 1 to 3 are proven. Meanwhile, the fourth hypothesis was not proven and stated that there was no interaction effect between the learning model and achievement motivation on the creative thinking skills of Class XI Science students at SMA Negeri 1 Mambi. The absence of interaction between the learning model and

achievement motivation on creative thinking skills shows that the learning model variable without the support of a moderator variable, namely achievement motivation, can still have a direct influence on students' creative thinking skills.

We can see in Figure 1 that the lines do not intersect. This shows that there is no interaction between the two even though the average creative thinking skills test score for the experimental class is higher than the control class. The absence of interaction between learning models and achievement motivation on students' creative thinking skills is thought to be caused by 1) the strong influence of each variable, 2) related to the time used in the research which was only carried out in 8 meetings, causing students to still be in the adjustment stage. with the application of learning used, 3) there are differences in the characteristics of students who of course give different responses to the learning implemented in class. This is reflected in the acquisition of high achievement motivation scores and low achievement motivation scores in each class.

4. Conclusion

Based on the results of research conducted on the influence of guided inquiry learning and achievement motivation on the creative thinking skills of students at SMAN 1 Mambi, it was concluded that 1) there are differences in creative thinking skills between students taught using guided inquiry learning and students taught using direct learning, 2) there are differences in creative thinking skills between students who have high achievement motivation who are taught with guided inquiry learning and students who are taught with direct learning, 3) there are differences in creative thinking skills between students who have low achievement motivation who are taught with guided inquiry learning and students who are taught by direct learning, 4) There is no interaction between guided inquiry learning and achievement motivation on students' creative thinking skills.

Acknowledgement

Researchers express their highest appreciation and thanks to Prof. Dr. Ir. Drs. Muhammad Arsyad, A.Md, MT., IPM, Dr. Khaeruddin, S.Pd., M.Pd, and Dr. Sri Astika Wahyuni, S.Pd., M.Pd as research instrument validator, as well as all Class XI IPA students at SMAN 1 Mambi as samples in this research.

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