



The Relationship Between Science Process Skills and Students' Creative Thinking Skills on Magnetism in Junior High School

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ABSTRAK

Pelajaran fisika tergolong mata pelajaran yang sulit dipahami, maka siswa perlu melakukan praktikum untuk memudahkan siswa memahami konsep suatu materi. Penelitian ini bertujuan untuk menganalisis hubungan keterampilan proses sains siswa dengan keterampilan berpikir kreatif siswa SMP pada materi magnetisme. Metode yang digunakan dalam penelitian ini adalah metode campuran. Penelitian ini menggunakan sampel sebanyak 40 orang yang berasal dari kelas VIII SMP. Teknik pengambilan sampel adalah Simple Random Sampling. Instrumen penelitian yang digunakan dalam penelitian ini adalah lembar observasi, angket dan lembar wawancara. Teknik analisis data yang digunakan adalah teknik analisis data kuantitatif dan kualitatif. Analisis data kuantitatif dilakukan dengan uji statistik deskriptif dan statistik inferensial. Hasil penelitian ini adalah persentase keterampilan proses sains siswa kelas VIII C sebesar 70% dengan kategori baik. Sedangkan pada kelas VIII F 75% berada pada kategori Baik. Dan persentase kemampuan berpikir kreatif siswa kelas VIII C sebesar 60% dengan kategori baik, sedangkan kelas VIII F sebesar 55,0% dengan kategori baik. Kesimpulan dari penelitian ini adalah terdapat hubungan yang signifikan antara keterampilan proses sains siswa dengan keterampilan berpikir kreatif siswa pada materi magnetisme kelas VIII SMP. Implikasi dari penelitian ini adalah bermanfaat bagi guru dan calon guru dalam upaya meningkatkan keterampilan proses sains dan keterampilan berpikir kreatif siswa. Dan penelitian ini dapat digunakan guru sebagai pedoman untuk mengevaluasi keterampilan proses sains dan kemampuan berpikir kreatif siswa.

ABSTRACT

Physics lessons are classified as difficult subjects, so students need to do practical work to make it easier for them to understand the material concept. This study aims to analyze the relationship between students' science process skills and junior high school students creative thinking skills in magnetism. The method used in this study is mixed. This study used a sample of 40 people from class VIII SMP. The sampling technique is Simple Random Sampling. The research instruments used in this study were observation sheets, questionnaires, and interview sheets. The data analysis technique used is quantitative and qualitative data analysis techniques. Quantitative data analysis was carried out using descriptive statistical tests and inferential statistics. This research results show that the percentage of students' science process skills in class VIII C is 70% in the good category. While in class VIII F 75% are in a Good category. Moreover, the percentage of students' creative thinking skills in class VIII C is 60% in the good category, while in class VIII F is 55.0% in the good category. This study concludes that there is a significant relationship between students' science process skills and students' creative thinking skills in class VIII SMP magnetism material. This research implies that it is helpful for teachers and prospective teachers to improve students' science processes and creative thinking skills. Moreover, this research can be used by teachers as a guide to evaluating students' science process skills and creative thinking abilities.

1. INTRODUCTION

Learning is a series of mental and physical activities to obtain a change in behavior as a result of an individual's experience in interaction with his environment involving cognitive, affective, and psychomotor aspects (Kural & Kocakulah, 2016; Ridwan & Awaluddin, 2019). Learning certainly cannot be separated from the teaching and learning process or what is called learning. Learning is a series of external events designed to support several internal learning processes in which there is a relationship between students and teachers to achieve a goal (Ariyanti & Zulaeha, 2017; Napitupulu, 2019). The objectives of learning are knowledge, skills, and attitudes that enable students to perform certain tasks

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and job functions in accordance with predetermined standards and can determine the expected outcomes and changes (Fatmawati, 2013; Hendratmoko et al., 2018). There are several kinds of learning, for example learning Physics.

Physics is a study of science that is formed and developed through a scientific process. Physics is a lesson that provides knowledge about natural phenomena and the universe empirically, logically, systematically and rationally to train thinking and reasoning, through the reasoning abilities of a person who continues to be trained so that his thinking power and knowledge will develop (Muslina et al., 2018; Rina Mirdayanti & Murni, 2017; Syiarah et al., 2021). Physics as a science requires understanding in creative thinking and the ability to solve and solve a problem (Suardana, 2012; Syarifah & Sumardi, 2015). Physics is considered difficult because learning physics still requires students to memorize abstract formulas so that students find it difficult to understand the material taught by the teacher (Fitriani et al., 2022; Putri et al., 2021; Sasono et al., 2017). Because physics lessons are classified as difficult subjects to understand, students need to do practicum to make it easier for students to understand the concept of a materi.

Practicum should not be done arbitrarily, so for that students must have science process skills. Science process skills (Skills) is a contextual activity, which aims to describe something with experimental procedures designed systematically to achieve learning objectives (Daud, 2018; Dewi et al., 2017).. Students' science process skills are very important skills developed by students, especially in the learning process because this can develop students' scientific attitudes and problem solving skills, so that they can form creative, innovative, critical and competitive personalities (Mutmainnah et al., 2019; Siswono, 2017). Science process skills not only measure the level of understanding or learning difficulties of students but also measure learning outcomes and to assist students in developing thinking patterns with aspects studied including: observing, classifying, making conclusions and communication (Demircioglu & Ucar, 2015; Rosalia et al., 2021). In addition to Science Process Skills, students also need to master higher order thinking skills or HOTS to help students in physics lessons.

HOTS (Higher Order Thinking Skill) or skill ability or higher order thinking concept is a concept of educational reform based on bloom's taxonomy which began in the early 21st century (Hanik et al., 2021; Kurniasih et al., 2020). This concept is incorporated into education to prepare human resources for the industrial revolution (Saraswati & Agustika, 2020; Widana, 2020). HOTS skills require students to develop ideas that give them new meanings and implications (Saraswati & Agustika, 2020; Syudirman & Saputra, 2020). High Order Thinking Skill (HOTS) is a complex thinking process ability that combines facts and ideas in the process of analyzing, evaluating to the creation stage in the form of providing an assessment of a learned fact and creating a solution to a problem (Astra et al., 2020; Hobri et al., 2018; P. M. S. Saraswati & Agustika, 2020). There are several indicators in the HOTS itself, including the ability to think creatively. Creative thinking ability is the ability to produce or develop something new or new ideas that lead to new insights, new approaches, or new ways of understanding things (Marliani, 2015; Ulandari et al., 2019). So it is important for students to have creative thinking skills so that students can respond to information and solve problems contained in the problems they face with creative solutions (Maya et al., 2019; Utami et al., 2020).

The research is in line with the research, in his research he examined how the influence of students' creative thinking skills and science process skills (Wijaya et al., 2014). However, what distinguishes this research from previous research is that the research conducted at the junior high school level, while the research conducted by Wijaya was at the high school level. In addition, the research methods used are also different. The purpose of this study was to analyze the relationship between students' science process skills and the ability to think creatively in Class VIII C and VIII F SMPIT Nurul Ilmi 1 in the Physics of Magnetism subject.. The urgency of this research is to help students and teachers understand the description of and the relationship between students' science process skills and creative thinking skills in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 on magnetism.

2. METHOD

The type of research used is a mixed method (Mix method) with a sequential explanatory design. The step in sequential explanatory research is that the researcher collects and analyzes quantitative data first, then followed by the collection and analysis of qualitative data (Sukowati et al., 2017). The sampling technique is Simple Random Sampling. Simple Random Sampling is a method of sampling by checking the state of the population list (population frame) to determine the interval distance. So in the process this method allows each population to have the opportunity to be used as a sample for reference in research (Nurdin et al., 2018). This study sets the IT Nurul Ilmi 1 SMP school as the population and class VIII C and VIII F students as research samples.

The research instrument used in this research is the Observation Sheet and Questionnaire as an instrument to obtain quantitative data and then an interview sheet to obtain qualitative data. The Likert scale used in this study is the strongly agree alternative (SS) with 5 points, agree (S) with 4 points, neutral (N) with 3 points, disagree (TS) with 2 points, and strongly disagree with 1. Science Process Skills Observation Sheet Grid showed in Table 1.

Table 1. Science Process Skills Observation Sheet Grid

No	Variable	Indikator	Question
1		Observation	1,2
2		Clarification	3,4
3		Communication	5,6
4		Measure	7
5		Prediction	8
6		Variable identification	9,10
7		Make a hypotesis	10
8	Science	Make graphics	11
9	Process Skills	Describe the relationship between variabel	12
10		Define variables operationally	13
11		Planning an investigation	14
12		Analyze investigation	15
13		Do experiments	16,17
14		Collect and analyze data	18
15		Compiling data table	19
16		Conclusion	20

(Wirayuda, 2022)

Table 2. Creative Thinking Ability Instrument Grid

Variable	Indikator	Question Item Number
Creative Thinking Skill	Smoothly thinking	1,2,
	Flexible thinking	3,4
	Original thinking	5
	Detail thinking	6
	Evaluate thinking	7
Number of Question Items		7

(Wirayuda, 2022)

Table 3. Variable Instrument Categories Science Process Skills and Creative Thinking Skills

Category	Variable Interval	
	Sciece Process Skills	Creative Thinking Skills
Very not good	20.0 – 35.0	7.00 – 12.25
Not good	35.1 – 50.0	12.26 – 17.50
Good	50.1 – 65.0	17.51 – 22.75
Very good	65.1 – 80.0	22.76 – 28.00

The data analysis technique in this research is quantitative and qualitative data analysis techniques. Quantitative data analysis was carried out with descriptive statistical tests and inferential statistics. Inferential statistics is divided into 2 parts, namely assumption test and hypothesis testing. The assumption test used is the normality test and linearity test. While the hypothesis test used is a correlation test to determine the relationship between the two variables. Qualitative data analysis based on Miles Huberman's research with narrative text. This research procedure begins with the distribution of questionnaires, collection of quantitative and cauldron data, data analysis, results and finally conclusions.

3. RESULT AND DISCUSSION

Result

The results of the descriptive test of students' science process skills in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 Physics subject matter of Magnetism. Based on data analysis the science

process skills of students in grades VIII C and VIII F at SMPIT Nurul ilmi 1 Jambi City in the subject of Physics, it was found that the highest dominant percentage in class VIII C was 70% with a good category. Then the highest dominant percentage in class VIII F is 75% in the Good category. So it can be said that the results of the description found in class VIII F Dominant is better than VIII C. Based on data analysis of results of students' creative thinking skill in class VIII C students at SMPIT Nurul Ilmi 1 Jambi City in the subject of Physics, it was found that the highest dominant percentage in class VIII C was 60% with a good category. Then the highest dominant percentage in class VIII F is 55.0% in the Good category. So it can be said that the results of the description found in class VIII C Dominant is better than VIII F. The results of the normality test of students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in Physics subject matter of Magnetism are shown in Table 4.

Table 4. The Results of the Normality Test of Students' Science Process Skills and Creative Thinking Abilities in Class VIII C and VIII F Students at SMPIT Nurul Ilmi 1 Physics Subject Matter of Magnetism

Class	Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
VIII C	Science process skills	.085	36	.200*	.874	36	.596
	Creative thinking skills	.142	36	.200	.852	36	.685
VIII F	Science process skills	.096	36	.200	.873	36	.725
	Creative thinking skills	.093	36	.200*	.864	36	.662

Based on the Table 4, the normality test of students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in the Physics subject matter of Magnetism obtained results based on the Kolmogorov-Smirnov test with a significance value > from 0.05, it can be concluded that the data is normally distributed. The description of the results for the linearity test of students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in the Physics subject matter of Magnetism is shown in the Table 5.

Table 5. Description of the Results for the Linearity Test of Students' Science Process Skills and Creative Thinking Abilities in Class VIII C and VIII F Students at SMPIT Nurul Ilmi 1 in Physics Subject Matter of Magnetism

Class	Variable	Kolmogorov Smirnova	Deviation from linearitas
		Sig.	Sig.
VIII C	Science process skills	0.021	0.027
	Creative thinking skills	0.022	0.029
VIII F	Science process skills	0.035	0.042
	Creative thinking skills	0.039	0.033

Based on the Table 5, the results obtained from the linearity test of students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in the Physics subject matter of Magnetism, namely the significance value < 0.05, it can be concluded that there is a linear relationship between students' science process skills. and the ability to think creatively in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in Physics subject matter of Magnetism. The results of the correlation test regarding the relationship between students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in Physics subject matter of Magnetism in Table 6.

Table 6. Correlation Test Results

Class	Variable	Pearson Correlation	Sig.(2-tailed)	N
VIII C and VIII F	Science process skills and Creative thinking skills	0,634	0,010	50

Based on the Table 6, it is obtained, the results of the correlation test are sig. (2-tailed) < 0.05, it can be concluded that there is a relationship between students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 Physics subject matter of Magnetism. Based on the interviews that have been conducted, it is known that the students' creative

thinking skills and science process skills are classified as good. One of the factors that make students' scientific process skills and creative thinking skills good is because the learning strategies used are interesting. This is known through an assessment that is in accordance with government assessment guidelines. Teachers are equipped with an understanding of creative thinking skills from the government and then implemented in learning. Barriers to students' creative thinking are found in differences in student understanding and also because students' learning interest is lacking.

Based on the interviews that have been conducted, it is also known that the students' science process skills are good. Judging from the practical ability supported by adequate laboratory facilities and optimal use in every science lesson. And also the student worksheets used have been adapted to assess science process skills. From the results of the interview, it is also known that there is a relationship between science process skills and creative thinking ability. Where it can be seen from good science process skills, there are good students' creative thinking abilities too. Good science process skills can be seen from the students' ability to do practical work. Students who are good at doing practicals tend to have good creativity.

Discussion

Based on the analysis of results of students' creative thinking abilities in class VIII C students at SMPIT Nurul Ilmi 1 Jambi City in the subject of Physics, it was found that the highest dominant percentage in class VIII C was 60% with a good category. Then the highest dominant percentage in class VIII F is 55.0% in the Good category. So it can be said that the results of the description found in class VIII C Dominant is better than VIII F. The Linearity test the results obtained from the linearity test of students' science process skills and creative thinking abilities, that there is a linear relationship between process skills students' science and creative thinking skills in Class VIII C and VIII F students at SMPIT Nurul Ilmi 1 in Physics subject matter of Magnetism. Based on the results of the correlation test, that there is a relationship between students' science process skills and creative thinking abilities in Class VIII C and VIII F students at SMPIT Nurul Science 1 Physics subject matter of Magnetism.

Based on the results of teacher interviews, it was found that there was a relationship between creative thinking skills and science process skills. Where, students who have low science process skills will automatically have low creative thinking skills. So it is necessary to increase the student's process skills. Students who have science process skills can use thoughts, reason, and actions efficiently and effectively to achieve specific results, including creativity (Khaerunnisa, 2017; Wahyuni et al., 2018). The students' abilities in question are the skills of observing, grouping, interpreting, predicting, asking questions, hypothesizing, planning experiments, applying concepts, communicating, and carrying out experiments (Ratunguri, 2016; Siswono, 2017; Suryani et al., 2019). Process skills are learning outcomes achieved by a person in the ability to carry out scientific work or research, communicate the results of scientific research and act scientifically (Saidaturrahmi et al., 2019; Siswono, 2017). Both in terms of practical facilities and in terms of learning methods. This statement is supported by research which states that learning facilities are all the needs needed by students in order to facilitate, expedite and support learning activities at school (Asih, 2017; Eze et al., 2018; Sulistyaningsih et al., 2018). In order to be more effective and efficient, students will be able to learn maximally and have satisfactory learning outcomes.

Science process skills involve cognitive or intellectual, manual, and social skills. Cognitive skills involve using science process skills, and students use their (Derlina & Afriyanti, 2016; Sumarti et al., 2018). Teaching science process skills to students means allowing them to do something, not just talk about science (Dari & Nasih, 2020; Hasanah et al., 2018). The purpose of science process skills is to increase learning motivation and student learning outcomes because by practicing science process skills, students are encouraged to participate actively and efficiently in learning (Tania & Murni, 2017; Yusuf et al., 2018). Second, simultaneously complete student learning outcomes, product skills, processes, and performance skills. Third, to deepen the concept of understanding and the facts they learn because, by training process skills, students try to find these concepts (Kusmayuda et al., 2013; Rosnaeni et al., 2018).

This study is in line with research which aims to determine the effectiveness of project-based learning models on science process skills and creative thinking abilities of Class X students of SMA N 1 Wonosegoro, Boyolali (Chasanah et al., 2016). However, what distinguishes the research conducted by Chasanah from this research is that it lies in different research methods and also different research objects. This study examines the relationship between science process skills and creative thinking skills. Meanwhile, the research conducted by Chasanah examines the effectiveness of project-based learning models in improving creative thinking skills as well as science process skills. This research is also in line with research which aims to see the relationship between science process skills and critical thinking skills of SMAN 12 Jambi City students on temperature and heat material (Fitria, 2020). But what distinguishes it is in the material, variables and research subjects used. This study examines the relationship between

science process skills and creative thinking skills, while Fitria's research examines critical thinking skills. and the research subjects are also at different levels. The subjects of this research are junior high school students while the research subjects conducted by Fitria are high school students.

This research is expected to have implications for the learning process, especially in the development of students' science process skills and students' creative thinking abilities. Which science process skills and also the ability to think creatively are very important skills possessed by students. This statement is accompanied by the statement which states that science process skills are very important for every student as a provision to use the scientific method in developing science and are expected to acquire new knowledge or develop existing knowledge (Fajariningtyas & Hidayat, 2020; Manu & Nomleni, 2018). This study certainly has shortcomings, where the limitations of this article only examine two variables and are limited to class VIII SMP only. Therefore, the researcher suggests conducting further research using different variables, subjects, school levels or data analysis techniques.

4. CONCLUSION

Based on the explanation above, the conclusion of this study is that the response of science process skills and students' creative thinking skills at SMP IT Nurul Ilmi 1 on magnetic material is still relatively low. It can be seen from the results of the questionnaire and also the interview with the science subject teacher. This is because the practicum process and the learning process carried out in the classroom are still not optimal. And from the research it can also be seen that there is a significant relationship between science process skills and students' creative thinking abilities at SMP IT Nurul Ilmi 1.

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