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Study of Correlation: Science Process Skills and Persistence Character of Middle School Students

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ABSTRAK

Keterampilan proses sains merupakan salah satu aspek penting dalam pembelajaran sains. Penelitian ini bertujuan untuk menganalisis hubungan antara keterampilan proses sains dengan karakter ketekunan siswa saat mengikuti proses pembelajaran. Penelitian ini menggunakan penelitian Mix Methods dengan menggabungkan penelitian kuantitatif dan kualitatif. Teknik pengumpulan data dalam penelitian ini menggunakan instrumen lembar observasi keterampilan proses ilmiah, angket karakter dan lembar wawancara. Teknik pengambilan sampel pada penelitian ini menggunakan cluster random sampling. Sampel dalam penelitian ini berjumlah 224 Siswa dan Pewawancara dengan 3 orang guru IPA dan siswa pada masing-masing sekolah. Teknik analisis data dalam penelitian ini menggunakan statistik deskriptif dan uji korelasi Pearson untuk data kuantitatif serta menggunakan metode Miles dan Huberman untuk analisis data kualitatif. Hasil penelitian ini adalah hubungan keterampilan proses sains dengan karakter ketekunan siswa di sekolah sebesar 0,784%. Kesimpulan dalam penelitian ini adalah keterampilan proses sains dan karakter ketekunan siswa rata-rata berkategori baik dan terdapat hubungan antara keterampilan proses sains dengan karakter ketekunan. Rekomendasi bagi penelitian selanjutnya adalah mengembangkan inovasi pembelajaran yang dapat bermanfaat untuk meningkatkan keterampilan sains dan ketekunan siswa dalam mempelajari sains.

ABSTRACT

Science process skills are one of the important aspects of science learning. This research aims to analyze the relationship between science process skills and the character of students' persistence when following the learning process. This study uses Mix Methods research by combining quantitative and qualitative research. Data collection techniques in this study use the instrument of the scientific process skills observation sheet, the character questionnaire and interview sheet. The sampling technique in this study uses cluster random sampling. The sample in this study totalled 224 Student and Interviewer with 3 Natural Sciences teachers and students in each school. Data analysis techniques in this study use descriptive statistics and Pearson correlation tests for quantitative data and use the Miles and Huberman methods for qualitative data analysis. The results of this research are that the relationship between science process skills and students' persistence character at school is 0.784%. The conclusion of this research is that the average student's science process skills and persistence character are categorized as good and there is a relationship between science process skills and perseverance character. Recommendations for further research are to develop learning innovations that can be useful to improve the skills of science and perseverance of students in learning science.

1. INTRODUCTION

The process of learning science in junior high school is learning that learns the nature of science regarding the natural surroundings and is carried out directly through an activity that is able to develop students' skills (Kholilah et al., 2020; Ramadhanti et al., 2022). However, in practice it is often not optimal due to factors from teachers, students, and learning tools. The Indonesian government is trying to deal with

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this problem by making a standard learning process in the classroom through the Independent Curriculum. In the independent curriculum the emphasis on science learning is inquiry-based learning, and the emphasis is on process skills and character emphasis applied in P5 (Project of Strengthening Pancasila Student Profiles) (Hutabarat et al., 2022; Pratycia et al., 2023; Sumanti & Ahmad, 2022). Science learning process standards are explained as criteria for implementing science learning in educational institutions in producing high quality graduate competencies (Lukum, 2015; Matondang et al., 2021; Wei, 2018). Learning activities are recommended to refer to inquiry learning. Inquiry-based learning is inseparable from experiments through practicum activities. Some students really liked practical activities and showed that these students had the ability to think critically and find interesting things from physics through their observations. During practicums in class and in the laboratory, students independently carry out practicums, use measuring instruments, and acquire the skills to take measurements correctly and carry out the correct processing of the results obtained (A. D. Kurniawan, Sinaga, et al., 2023; W. Kurniawan et al., 2019; Sulistri, 2019). Learning that involves process standards and science learning outcomes in the independent curriculum implemented by Indonesia, one of which requires students to improve science process skills.

Process skills have an important role that must be owned by every student because these skills can be used in everyday life. Science process skills consist of two types, namely basic and integrated science process skills (Darmaji et al., 2022; Indri et al., 2020; Ratnasari et al., 2018). Integrated science process skills and basic science process skills include observation, communication, classification, measuring, concluding, predicting, identifying variables, creating data tables, creating graphs, describing both variables, obtaining data, analyzing investigations, making hypotheses, defining operational variables, designing experiment and experiment (Chen et al., 2021; Lestari & Diana, 2018; Rezba et al., 2007). Science teachers who are able to develop students' process skills through laboratory activities based on science process skills greatly assist students in increasing enthusiasm for learning and are beneficial to students' intellectual development (D. Darmaji, Kurniawan, et al., 2022; A. D. Kurniawan, Wirayuda, et al., 2023; Setiya Rini et al., 2022). Through science process skills can improve the character of student perseverance.

The character of student persistence is very important in realizing the success of student learning. Diligence is a character that shows sincerity about everything that is being done (Astalini et al., 2018; Baturay, 2008; Kurniawan et al., 2019). Caring and giving full attention to an effort in the slightest thing also seems to be an inseparable side of a diligent person. Students who are diligent in learning will get goodness both from attitudes, characters that are useful for society and for their own academics (Setiya Rini et al., 2021; Simamora et al., 2020). Students who are diligent will get good learning outcomes.

Previous research which aimed to describe students' process skills in schools on thermodynamics material (Darmaji et al., 2018). Previous research aimed to describe the process skills of students in junior high school (Fitriani et al., 2021). Previous research aimed to examine students' integrated science process skills using the CLIS model (Sulistri, 2019). Previous research aimed to analyze science process skills in elementary schools using work example videos (Llussà et al., 2019). The previous research was conducted to measure students' science process skills in physics subjects (Maison, Astalini, et al., 2019). Research to determine the character of students in the learning process has been carried out in junior high schools (Fahlevi et al., 2021). Some of these studies examine science process skills and examine the general character of students in a school.

From previous research conducted by several researchers, it is known that students' science process skills and character need to be measured in order to make students ready to face changing times and equip students for a higher level of education. The variables that will be measured in this research are science process skills and the character of students' persistence in participating in learning. The novelty of this research is to determine the relationship between science process skills and character, especially the character of perseverance in learning science in three junior high schools at once. The urgency of this research is seen from the push for an independent curriculum which requires students to fulfill elements of process skills and learning outcomes. By training students' science process skills, their character of perseverance in learning activities will also increase.

2. METHOD

This research is a mixed method research. Mix method research is research that combines quantitative and qualitative research (Creswell & Creswell, 2018; Syahrial et al., 2022; Vebrianto et al., 2020). Quantitative data were obtained through observation sheets of science process skills and character persistence questionnaires. Meanwhile, qualitative data comes from interview sheets. The population is the whole object to be studied (Putri et al., 2021). The population in this study were all students of class VII at State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School

22 Jambi City. The sampling technique used is cluster random sampling. Cluster random sampling is the process of taking samples through groups where the group is entitled to be the sample (Astalini et al., 2023; Gay et al., 2012). The samples in this study are described in Table 1.

Table 1. Sample

School Name	Sample
State Junior High School 17 Jambi City	74 student
State Junior High School 19 Jambi City	75 student
State Junior High School 22 Jambi City	75 student
Totals	**224 student**

The data collection technique in this study consisted of observation sheets for science process skills, character persistence questionnaires and interview sheets. The observation sheet for science process skills was adopted from research (Rini, 2022). This instrument consists of 4 Likert scales consisting of Very Good (4), Good (3), Not Good (2), Very Bad (1) and consists of 25 statements. The grid of the science process skills observation sheet is show in Table 2.

Table 2. The Grid of Science Process Skills

Indicator	Number
Observation	1,2,3,4,5,6,7,8,9,10
Measure	11,12,13,14,15,16,17,18,19,20
Conclusion	21,22,23,24,25

Furthermore, the persistence character questionnaire consists of 30 statements with 4 Likert scales in the form of Very Good (4), Good (3), Not Good (2), Very Bad (1). The grid of the diligent character questionnaire is show in Table 3.

Table 3. The Grid of Perseverance Character

Indicator	Number
Persevere in facing the task	1,2,3,4,5,6,7,8,9,10
Tenacious face adversity	11,12,13,14,15,16,17,18,19,20
Show interest	21,22,23,24,25,26,27,28,29,30

The interview sheet instrument was adopted from the study (Rini, 2022) consists of 10 questions. The interview sheet lattice is show in Table 4.

Table 4. The Grid of interview

Indicator	Number Question
Attitudes of students in learning science	1, 2
Implementation of science process skill-based practicum activities in schools	3, 4, 5
Obstacles in implementing science process skill-based practicum activities	6
Student Persevere	7, 8
Students' show interest	9, 10

Data analysis techniques in this study, namely quantitative data were analysed using descriptive statistics and Pearson correlation test using IBM SPSS Version 22 and qualitative data were analysed using the Miles and Huberman method. Before carrying out a descriptive test, the researcher must ensure that the data is normal. The interval category of science processing skills is shown in Table 5.

Table 5. Category of student Science Processing Skills

Category	Interval Indicator		
	Observation	**Measure**	**Conclusion**
Very Not Good	10.0 – 17.5	10.0 – 17.5	4 – 8
Not Good	17.6 – 25.1	17.6 – 25.1	9 – 13
Good	25.2 – 32.7	25.2 – 32.7	14 – 18
Very Good	32.8 – 40.3	32.8 – 40.3	19 – 23

While, the category of interval perversion character is as show in Table 6.

Table 6. Category of Student Perseverance Character

Category	Interval Indicator		
	Persevere in facing the task	Tenacious face adversity	Show interest
Very Not Good	10.0 – 17.5	10.0 – 17.5	10.0 – 17.5
Not Good	17.6 – 25.1	17.6 – 25.1	17.6 – 25.1
Good	25.2 – 32.7	25.2 – 32.7	25.2 – 32.7
Very Good	32.8 – 40.3	32.8 – 40.3	32.8 – 40.3

The Pearson Correlation Test is useful for knowing the relationship between science process skills and diligent character. Before carrying out this test, the research must carry out an assumption test in the form of a normality test and a linearity test with a significance requirement of > 0.05. While the Pearson correlation test requirement is a significance value < 0.05. Miles and Huberman's method consists of three steps, namely data reduction, data presentation, drawing conclusions (Aldila & Rini, 2023; Miles & Huberman, 1994).

3. RESULT AND DISCUSSION

Result

After collecting data on science process skills and persistence characters at State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School 22 Jambi City, tests were carried out using IBM SPSS and the results obtained where descriptive statistics on students' science process skills is show in Table 7.

Table 7. The Result of Descriptive Statistics Test of Science Processing Skills

School	Indicator	Category (%)				Mean
		Very Not Good	Not Good	Good	Very Good	
State Junior High School 17 Jambi City	Observation	0.0	28.4	56.6	15	33.55
	Measure	7.3	18.7	60	14	22
	Conclusion	2.5	18.5	68.4	10.6	32
State Junior High School 19 Jambi City	Observation	0.0	16	44	40	34
	Measure	2.3	20	38.5	39.2	18
	Conclusion	0.3	17	59	76.3	30
State Junior High School 22 Jambi City	Observation	0.3	30	48.8	20.9	34
	Measure	5.7	18	62	14.3	20
	Conclusion	0.6	16.4	58	25	43

Based on Table 7 can be seen that the average science process skills at State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School 22 Jambi City have good grades. The science process skills of State Junior High School 17 Jambi City students in the observation indicator are dominant in the good category with a percentage of 56.6%, the measure indicator is dominant in the good category with a percentage of 60%, and the conclusion indicator is dominant in the good category with a percentage of 68.4%. The science process skills of State Junior High School 19 Jambi City students on the dominant observation indicator are in the good category with a percentage of 44%, the measure indicator is in the good category with a percentage of 39.2%, and the dominant conclusion indicator is in the very good category with a large percentage of 76.3%. Meanwhile, the students' science process skills at State Junior High School 22 Jambi City on the indicators of observation, measure, get conclusion were in the good category with the respective percentages being 48.8%, 62% and 58%. The result of perseverance character is show in Table 8.

Based on Table 8, it can be seen that the average persistence character at State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School 22 Jambi City is in the good category. The persistence of students of State Junior High School 17 Jambi City in the persevere in facing the task indicator is dominant in the good category with a percentage of 50%, the tenacious face adversity indicator is dominant in the good category with a percentage of 55%, and the show interest indicator is dominant in the good category with a percentage of 58%. The persistence of students of State

Junior High School 19 Jambi City on the dominant persevere in facing the task indicator is in the good category with a percentage of 43%, the tenacious face adversity indicator is in the good category with a percentage of 40%, and the dominant show interest indicator is in the very good category with a large percentage of 48.8%. Meanwhile, the persistence of students at State Junior High School 22 Jambi City on the persistent in facing the task indicator is dominant in the good category with a large percentage of 65%. The tenacious face adversity indicator has a good category with a percentage of 45% and the show interest indicator has a very good category with a percentage of 45%. The result of normality test is show in Table 9.

Table 8. The Result of Descriptive Statistics Test of Perseverance Character

School	Indicator	Category (%)				Mean
		Very Not Good	Not Good	Good	Very Good	
State Junior High School 17 Jambi City	Persevere in facing the task	1.8	21.2	50	27	30.82
	Tenacious face adversity	0.0	10	55	35	33.24
	Show interest	0.0	15	58	27	31.52
State Junior High School 19 Jambi City	Persevere in facing the task	0.0	30	43	27	34
	Tenacious face adversity	2.3	18.7	40	39	30
	Show interest	0.3	30	48.8	20.9	34
State Junior High School 22 Jambi City	Persevere in facing the task	5.3	15	65	14.7	28.55
	Tenacious face adversity	0.5	20.5	45	34	30
	Show interest	0.0	20	35	45	31.24

Table 9. The Result of Normality Test

Variable	Sig.
Science Processing Skills	0.200
Persistence Character	0.188

Based on Table 9, it shows that the significance value of science process skills and persistence character is more than 0.05. That is, the data on science process skills and persistence characters are normally distributed. The result of linearity test is show in Table 10.

Table 10. The Result of Linearity Test

Variable	Sig.
Science Processing Skills* Persistence Character	0.78

Based on Table 10, the results of the linearity test where the science process skills and persistence character variables are linear because the significance value shows more than 0.05. The result correlation test is show in Table 11.

Table 11. The Result Correlation Test of Science Process Skills and Persistence

Variable	N	Science process skills	Persistence Character
Science process skills	Pearson Correlation	1	0.784
	Sig. (2-tailed)		0.022
	N	224	224
Persistence Character	Pearson Correlation	0.784	1
	Sig. (2-tailed)	0.022	
	N	224	224

Based on Table 11 shows that there is a positive relationship between science process skills and persistence character. This is evidenced by the sig.(2-tailed) value obtained by a value of 0.022, which means that the value meets the requirements of a value less than 0.05.

Discussion

Practicum is a science experiment activity that is carried out directly. In practicum activities the steps are related to indicators of science process skills so that and through practicum activities can train

students' science process skills. Based on the results of descriptive statistical analysis of students' science process skills in schools in Jambi City, namely State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School 22 Jambi City had good grades (Darmaji Darmaji et al., 2019; Duda et al., 2019). The science process skills of students of State Junior High School 17 Jambi City are in the good category on the observation, measure and conclusion indicators with respective percentages of 56.6%, 60% and 68.4%. The science process skills of students of State Junior High School 19 Jambi City on the observation and measure indicators are dominant in the good category with a percentage of 44% and 39.2%, while the dominant conclusion indicator is in the very good category with a large percentage of 76.3%. The science process skills of students at State Junior High School 22 Jambi City on the indicators of observation, measure, conclusion are in the good category with the respective percentages being 48.8%, 62% and 58%.

In the process of practicum activities based on science process skills can train student perseverance. This persistence can be seen when students are observing and measuring in science experiments. Based on the descriptive statistical results of the persistence character at schools in Jambi City, it can be seen that the average persistence character at State Junior High School 17 Jambi City, State Junior High School 19 Jambi City and State Junior High School 22 Jambi City is in a good category. The persistence of students of State Junior High School 17 Jambi City in the persevere in facing the task indicator is dominant in the good category with a percentage of 50%, the tenacious face adversity indicator is dominant in the good category with a percentage of 55%, and the show interest indicator is dominant in the good category with a percentage of 58% (Nuswowati et al., 2020; Sunardi et al., 2023). The persistence of students of State Junior High School 19 Jambi City on the dominant persevere in facing the task indicator is in the good category with a percentage of 43%, the tenacious face adversity indicator is in the good category with a percentage of 40%, and the dominant show interest indicator is in the very good category with a large percentage of 48.8%. Meanwhile, the persistence of students at State Junior High School 22 Jambi City on the persistent in facing the task indicator is dominant in the good category with a large percentage of 65%. The tenacious face adversity indicator has a good category with a percentage of 45% and the show interest indicator has a very good category with a percentage of 45%. Next, the researcher conducted a hypothesis test in the form of a Pearson correlation test to find out the relationship or relationship between science process skills and student persistence. The data has been tested for normality and linearity tests and meets the requirements so that researchers can continue to test the correlation hypothesis.

Based on the Pearson correlation test results table, it shows that there is a positive relationship between science process skills and persistence character. This is evidenced by the sig.(2-tailed) value obtained by a value of 0.022, which means that the value meets the requirements of a value less than 0.05. Based on the Pearson correlation coefficient, a value of 0.784 was obtained. Based on previous study the Pearson correlation coefficient with a value of 0.784 means that the relationship between science process skills and persistence has a strong relationship (Sugiyono, 2018). This is reinforced by the results of qualitative data that teachers in schools in Jambi City have practicum activities based on science process skills "Teachers do practicum activities based on process skills but not all teachers do practicum activities in science learning." Then, students are interested in practicum activities where the teacher can see the persistence of students in learning science "With this practicum activity, of course the teacher can see the persistence of students in learning science, for example when they observe and also measure experiments."

There is previous research that is relevant to this research, namely research which identifies practicum activities in improving students' science process skills in junior high schools throughout the Bajubang District (Setiya Rini et al., 2022). Other research examines science process skills and critical thinking skills associated with gender (D. Darmaji, Astalini, et al., 2022). Furthermore, research conducted examines the impact of science process skills and critical thinking skills in urban and rural schools (A. D. Kurniawan, Wirayuda, et al., 2023). Other research discusses science process skills and motivation. In addition, there is previous research related to the persistence variable (Maison, Darmaji, et al., 2019). Other research examines the implementation of character education in schools, the inculcation of character education in schools (Amazona, 2016; Salsabilah et al., 2020).

Based on some of these studies, there has been research that discusses the topic of science process skills and character, but there is no research that specifically addresses the character of perseverance. In addition, there has been no research looking at the relationship between science process skills and persistence character. So that the novelty in this study is that this research examines these two variables, namely combining science process skills and perseverance characters.

This study analyzes the science process skills and persistence character in three schools at once and looks at the relationship between science process skills and persistence character. The implication of this research is that teachers know the level of their students' science process skills in the learning process. Teachers can also know that the character of students' persistence is related to their students' science

process skills. This research is limited by 2 variables, namely science process skills and perseverance character. So, recommendations that can be given for further research are that variables can be added and research objectives changed so that the results obtained are more recent and useful for students, teachers and schools.

4. CONCLUSION

Based on the research results, it can be concluded that the science process skills and persistence of students in Jambi City have an average of good categories. Apart from that, after the analysis was carried out, it was discovered that there was a strong relationship between science process skills and the character of perseverance. Suggestions for further research are to examine science process skills and perseverance characteristics with different and more recent indicators.

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