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Relationship of Science Process Skills on Critical Thinking Ability Review By Gender In Madrasah Aliyah

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Abstract. Science process skills are very important to be mastered by students to help improve critical thinking skills. The purpose of this study was to determine whether there is a relationship between science process skills and critical thinking skills in terms of gender. This type of research used is an experiment with a quantitative research approach. The sampling technique in this study was a simple random sampling technique with a sample size of 50 students. The instruments used in this study were observation sheets of science process skills and critical thinking skills test questions. The data analysis technique used is descriptive statistical analysis and inferential statistics. Based on the results of the correlation test that has been carried out, the Pearson correlation value is 0.648, which means that there is a strong relationship between science process skills and students' thinking skills. This research can be used as a guideline for scientific process skills research on critical thinking skills in the future. The update in this research is the relationship between science process skills and critical thinking skills based on gender.
Keywords: Science Process Skills, Critical Thinking, Gender, Practicum

Introduction

Education is one of the important things in a country. Education is the spearhead in the development of human resources, therefore education must play an active role in improving the quality and quantity of students' mindsets (Zuhelmi et al., 2017; Bati et al., 2018; Utama et al., 2018). Basically education is a conscious effort to create a superior generation by guiding and facilitating them (Suwartini, 2017; Ratnawati et al., 2019; Mustari et al., 2020). Based on the level of education in Indonesia, one of the subjects studied is physics (Ervina et al., 2016; Setiawati & Jatmiko, 2018; Putra & Wiza, 2019).

One of the branches of science is physics (Aji et al., 2019; Nurhasanah et al., 2020). Physics is a knowledge that cannot be separated in everyday life (Maulidar et al., 2016; Rauziani et al., 2016; Sastriani & Abdul, 2016; Maison et al., 2018). Physics is basically interesting to study because it can study the symptoms and phenomena that occur in the universe (Wirda et al., 2015; Asmi et al., 2017; Husnah, 2017). The purpose of learning physics is to get a direct understanding of various facts, solve problems on an object and have a scientific attitude that is shown in everyday life (Kahar, 2018; Sharfina et al., 2017; Dewi & Afrizon, 2020; Susanti et al., 2020). The low value of students in learning physics is because most students only memorize theories, laws of physics and do not understand

the concepts that have been conveyed by the teacher (Anwar et al., 2017; Affandy et al., 2019; Fenditasari et al., 2020).

The teaching and learning process of physics can be done through a process skills approach. Process skills that can be developed to understand science are science process skills (Soraya et al., 2016; Asmi et al., 2017; Yunianti et al., 2019). Science Process Skills (KPS) is the ability of students to apply scientific models in understanding, developing and discovering knowledge (Wirda et al., 2015; Sari, 2016; Darmaji et al., 2018). These science process skills can be developed through direct experience that students go through in order to form a learning experience so that with this students will live the process experienced more easily (Tantia et al., 2013; siti nur Lestari et al., 2017; Hayati et al., 2019; Irmi et al., 2019). Science process skills consist of two, namely basic and integrated science process skills. These science process skills can help develop students' critical thinking skills.

Thinking skills are one of the abilities that need to be developed, explored to face challenges, one of which is critical thinking (Fithriani et al., 2016; Isa et al., 2017; Nuryanti et al., 2018; Susilowati et al., 2019). The word critical thinking means understanding things that are around and analyzing students' thinking processes to act or do something (Duran & Dokme, 2016; Sumarna et al., 2017; Marfu'i et al., 2019; Sinurat et al., 2020). Critical thinking is usually described as the use of a cognitive skill or strategy that increases the likelihood of a desired outcome (Hyytinen et al., 2014; Iman et al., 2017; Saminan et al., 2016; Sujanem et al., 2020). In analyzing or doing something to make a decision, someone needs reliable facts and evidence (Putri et al., 2016). Someone who has the ability to think critically will be able to solve problems well because they will study the problem thoroughly so that they are able to produce solutions with consideration (Thomas, 2011; Ritdamaya & Suhandi, 2016; Syaribuddin et al., 2016; Utami & Aznam, 2020). One of the factors causing low critical thinking skills is passive learning because it uses the lecture method and is not related to real life (Bustami et al., 2018).

Science process skills can be trained with practical activities (Sarlivanti et al., 2014; Suryaningsih, 2017; Kustijono et al., 2018; Satriani & Hardiyanti, 2020). The implementation of practicum in learning activities is one of the means to actively and optimally involve students in the learning process (Emda, 2017; Firmansyah et al., 2020; Nuswowati et al., 2020). This practicum activity also applies scientific methods during learning activities, this shows that learning is not only in the form of teaching or delivering material but also experiments are needed to prove the concepts obtained (Kruit et al., 2018; Yolanda, 2019; Zainuddin et al., 2021).

Gender difference is one of the diversity that distinguishes aspects of science process skills and critical thinking between men and women (Pambudiono et al., 2015; Budi, 2017; Gasila et al., 2019). Gender or gender is a characteristic of men and women formed in society (Fibrianto, 2018; Fitriani et al., 2015; Barnas & Ridwan, 2019; Rosa, 2017). In the world of education there is gender discrimination that affects the experience during education.

The questions from this research are based on the background that has been described, namely:

1. How are students' science process skills and critical thinking at MAN 5 Batanghari?
2. Is there a relationship between science process skills and critical thinking at MAN 5 Batanghari?

Methods

The type of research used by the researcher is quantitative research with the type of experimental research. Quantitative research is research related to statistical measures whose data are in the form of numbers (Gumilang, 2016). This quantitative research is one type of research whose specifications are systematic and structured. This quantitative research is used to examine a particular population or sample with the aim of testing the hypothesis that has been set by the researcher. While the experimental method is a method used by conducting observations or experiments directly. The research data were obtained from the critical thinking skill observation sheet and the critical thinking ability test sheet on electromagnetic induction material.

The instruments used in this study were observation sheets and critical thinking ability test questions. Research instrument is a tool used by researchers to help collect research data in the field (Adib, 2015). The science process skill observation sheet is used with the aim of knowing and observing student activities during practical activities(Juhji, 2016). Science process skills are divided into two types, namely basic and integrated science process skills (Zahroh et al., 2017). Science Process Skills (KPS) is the ability of students to apply scientific models in understanding, developing and discovering knowledge (Sari, 2016). Basic science process skills consist of indicators of observing, classifying, communicating, measuring, inferring and predicting. Meanwhile, integrated science process skills consist of indicators identifying variables, creating data tables, making graphs, describing relationships between variables, obtaining and processing data, analyzing investigations, making hypotheses, describing variables operationally, designing experiments and conducting experiments. In this study, researchers conducted research on basic and integrated process skills. In the basic science process skills studied, namely the indicators of observing, classifying,

Table 1. Science Process Skills Assessment Grid

Types of Science Process Skills	Indicator Science Process Skills	Many Statements
Basic science process skills	Observe	8
	Classify	6
	Communicating	7
	Conclude	9
Integrated science process skills	Identifying variables	3
	Doing an experiment	5

The science process skill score was calculated using a Likert scale consisting of four categories, namely 1 = not good (TB), 2 = quite good (CB), 3 = good (B) and 4 = very good (SB). This science process skill score is used for the purpose of assessing student

activities or activities during practicum activities. While the critical thinking ability test questions are used with the aim of knowing student learning outcomes after the practicum activities are completed (Hidayati, 2016). This test instrument uses a question sheet in the form of a short entry question with a total of 5 questions. The test questions are given to students after the practicum activities are completed. This test question is used to determine the extent to which students understand the practical material that has been implemented.

This research was conducted at MAN 5 Batanghari. The subject of this research is class XII at MAN 5 Batanghari while the object of this research is science process skills and critical thinking skills. The population in this study were students at MAN 5 Batanghari. Population is the whole unit or individual within the scope to be studied (Martono & Wagiran, 2016). While the research sample to be studied is class XII MAN 5 Batanghari which consists of 50 students. The sample is part of a population (Rahmaniar et al., 2015; Angrasari, 2016). The sampling technique in this research is using the random sampling technique. Simple random sampling technique is a random sampling technique and there are several criteria used in this technique, namely schools accredited A and class XII students who have studied physics of electromagnetic induction material.

The data analysis technique used to process the data obtained in this study is using descriptive data analysis techniques and inferential statistical analysis techniques. Descriptive statistics is a series of techniques that include data collection techniques, data presentation, and data summarization. Descriptive statistics relate to the presentation of images and calculations to summarize and characterize data (Gibbons & Chakraborti, 2013). This descriptive statistic is used to obtain the mean, median, mode, minimum and maximum values of the data. This descriptive analysis technique was carried out to describe the research results of science process skills and students' critical thinking skills.

The next step after the descriptive analysis is done, then the next step is to test the data using inferential statistics. This inferential statistical analysis technique is used to find out whether there is an influence of science process skills on critical thinking skills in terms of gender. Inferential statistics are statistics used to analyze sample data and the results will be concluded for the population from that origin (Eldanto et al., 2018). In this inferential statistic, two tests will be carried out, namely the assumption test and the hypothesis test. The assumption test that will be used in this research is the normality test and linearity test. The normality test was carried out with the aim of knowing whether the research data obtained were normally distributed or not (Nuryadi et al., 2019). For the decision-making requirements in this normality test, namely by looking at the significance value. If the significance value > 0.05 then the data is normally distributed and vice versa. After the normality test is carried out, the next step is to perform a linearity test. The linearity test was carried out with the aim of knowing whether the data obtained was linear or not. For the decision-making requirements on the linearity test, namely by looking at the significance value. If the significance value of the data obtained is > 0.05, then the data has a linear relationship. After testing the assumptions, the next test is hypothesis testing. The hypothesis test used in this study is the Pearson correlation test. This correlation test was conducted to see whether there was an effect of science process skills on critical thinking

skills. The decision-making requirement in the Pearson correlation test is that if the significance value is <0.05, the data is said to have an influence between the x variable and the y variable. The data collection procedure in this study can briefly be seen in the diagram that has been presented below:

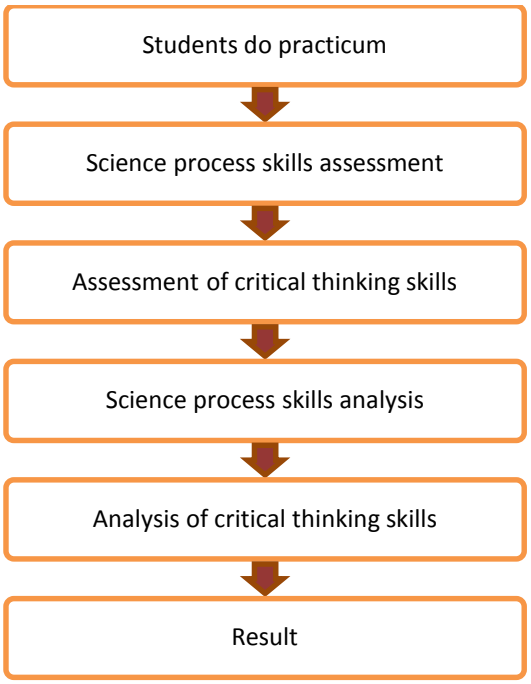

Figure 1. Data collection procedure

Results and Discussion

Science process skills are one of the skills that must be mastered by students with the aim of helping develop students' critical thinking skills. This research was conducted in class XII of MAN 5 Batanghari, where the results of the data to be studied were science process skills and critical thinking skills. The test was carried out in class A and class B with indicators of science process skills being studied, namely observing, classifying, communicating, concluding, making variables and conducting experiments which were reviewed based on gender. Meanwhile, the question of critical thinking skills on electromagnetic induction material is also carried out in class A and class B which are reviewed based on gender. Therefore, what needs to be done is to test the data with descriptive analysis tests and inferential tests. In this descriptive statistical analysis, the ways of presenting data can be in the form of tables or diagrams, determining the mean, median, mode, minimum and maximum values and looking at the percentage. As for the inferential test, it is done by testing assumptions and testing hypotheses. The assumption test is carried out by conducting a normality test and a linearity test where the normality test is to see whether the resulting data is normal or not, while the linearity test is to see whether the resulting data is linear or non-linear. Meanwhile, to test the hypothesis, the Pearson correlation test was conducted to see whether there was a relationship between science process skills and critical thinking skills.

The results of descriptive statistical data analysis of science process skills indicators observing in class A are:

Table 2. Description of Science Process Skills Observing Indicators in Class A

Gender	Interval	Catergory	F	%	Mean	Median	Mode	Min	Max
Male	8-14	Not good							
	15-21	Pretty good	2	18.8	24.00	24.00	24.00	17,00	29,00
	22-28	Good	8	72.2					
	29-35	Very good	1	9					
Female	8-14	Not good							
	15-21	Pretty good	2	13.3	24.46	25.00	26.00	21.00	28.00
	22-28	Good	13	86.6					
	29-35	Very good							

Based on the data above, it can be seen that the science process skills of male students in class A on the observing indicator are in the good category with a percentage of 72.2% and a mean value of 24.00, median value 24.00, mode value 24.00, minimum value 17 ,00 and the maximum value is 29.00. While the science process skills of female students in class A are also included in the good category with a percentage of 86.6% and the mean value obtained is 24.46, the median value is 25.00, the mode value is 26.00, the minimum value is 21.00 and the maximum value is 28.00.

The data analysis table for the description of science process skills in class B on the observing indicators, namely:

Table 3. Description of Science Process Skills Indicator Observing In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	8-14	Not good							
	15-21	Pretty good	2	22.2	23.77	23.00	26.00	18.00	32.00
	22-28	Good	6	66.6					
	29-35	Very good	1	11.1					
Female	8-14	Not good							
	15-21	Pretty good	4	28.57	24.07	25.00	23.00	18.00	29,00
	22-28	Good	9	64.28					
	29-35	Very good	1	7.14					

Based on the data above, it can be seen that the science process skills of male students in class B on the observing indicator are included in the good category with a

percentage of 66.66% and the mean value obtained is 23.77, the median value is 23.00, the mode value is 26, 00 the minimum value is 18.00 and the maximum value is 32.00. While the process skills of female students in class B are in the rising category with a percentage of 64.28% and the mean value obtained is 24.07, the median value is 25.00, the mode value is 23.00, the minimum value is 18.00 and the maximum value is 29.00.

The results of the descriptive analysis of class A science process skills on classifying indicators are:

Table 4. Description of Science Process Skills Indicator Classifying In Class A

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	4-8.5	Not good							
	8.6-13.1	Pretty good	2	18.18	16.36	17,00	17,00	13.00	20.00
	13.2-17.7	Good	7	63.63					
	17.8-22.3	Very good	2	18.18					
Female	4-8.5	Not good							
	8.6-13.1	Pretty good							
	13.2-17.7	Good	7	46.66	17.26	18.00	18.00	14.00	20.00
	17.8-22.3	Very good	8	53.33					

Based on the table above, it can be seen that the science process skills of male students in class A on the indicators of classifying are in the good category with percentages and the mean value obtained is 16.36, the median value is 18.00, the mode value is 17.00, the minimum value is 13.00. and a maximum value of 20.00. While the science process skills of female students in class A are also in the good category with the percentage and mean value obtained which is 17.25, the median value is 18.00, the mode value is 18.00, the minimum value is 14.00 and the maximum value is 20.00.

The results of the descriptive analysis of science process skills in class B on classifying indicators can be seen in the table below, namely :

Table 5. Description of Science Process Skills Indicator Classifying In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	4-8.5	Not good							
	8.6-13.1	Pretty good							
	13.2-17.7	Good	6	75	17.55	16.00	16.00	15.00	24.00
	17.8-22.3	Very good	2	25					
Female	4-8.5	Not good			18.28	18.00	18.00	16.00	20.00

	8.6-13.1	Pretty good		
	13.2-17.7	Good	4	28.57
	17.8-22.3	Very good	10	71.42

Based on the table above, it can be seen that the science process skills of male students in class B are in the good category with a percentage of 75% and the mean value obtained is 17.55, the median value is 16.00, the mode value is 16.00, the minimum value is 15, 00 and the maximum value is 24.00. While the science process skills of female students are in the very good category with a percentage of 71.42% and the mean value obtained is 18.28, the mean value is 18.00, the mode value is 18.00, the minimum value is 16.00 and the maximum value is 20.00.

The results of the descriptive analysis of class A science process skills on communicating indicators can be seen in the table below, namely :

Table 6. Description of Science Process Skills Indicator Communicating In Class A

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	7-12.25	Not good	1	11.11	17.36	17,00	14.00	12.00	24.00
	12.26-17.51	Pretty good	5	55.55					
	17.52-22.77	Good	4	44.44					
	22.78-28.03	Very good	1	11.11					
Female	7-12.25	Not good			18.00	18.00	19.00	14.00	23.00
	12.26-17.51	Pretty good	7	46.66					
	17.52-22.77	Good	6	40					
	22.78-28.03	Very good	2	13.33					

Based on the table above, it can be seen that the science process skills of male students in class A on the communicating indicators are in the fairly good category with a percentage of 55.55% and the mean value obtained is 17.36, the median value is 17.00, the mode value is 14, 00 the minimum value is 14.00 and the maximum value is 24.00. While the science process skills of female students are in the good category with a percentage of 40% and the mean value obtained is 18.00, the median value is 18.00, the mode value is 19.00, the minimum value is 14.00 and the maximum value is 23.00.

The results of the descriptive analysis of science process skills in class B on communicating indicators can be seen in the table below, namely:

Table 7. Description of Science Process Skills Indicator Communicating In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	7-12.25	Not good			16.11	16.00	13.00	13.00	21.00

	12.26-17.51	Pretty good	7	77.7					
	17.52-22.77	Good	2	22.2					
	22.78-28.03	Very good							
Female	7-12.25	Not good							
	12.26-17.51	Pretty good	6	42.85	18.28	18.00	21.00	15.00	21.00
	17.52-22.77	Good	8	57.14					
	22.78-28.03	Very good							

Based on the table above, it can be seen that the science process skills of male students in class B on the communicating indicators are in a fairly good category with a percentage of 77.77% and the mean value obtained is 16.11, the median value is 16.00, the mode value is 13. ,00 the minimum value is 13.00 and the maximum value is 21.00. While the science process skills of female students are in the good category with a percentage of 57.14% and the mean value obtained is 18.28, the median value is 18.00, the mode value is 21.00, the minimum value is 15.00 and the maximum value is 21. 00.

The results of the descriptive analysis of class A science process skills on the indicators concluded can be seen in the table below, namely:

Table 8. Description of Science Process Skills Indicator Concluding In Class A

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	9-15.75	Not good							
	15.76-22.51	Pretty good	7	63.63	21.72	21.00	20.00	19.00	26.00
	22.52-29.27	Good	4	36.36					
	29.28-36.03	Very good							
Female	9-15.75	Not good							
	15.76-22.51	Pretty good	6	40	23.60	25.00	26.00	27,00	29,00
	22.52-29.27	Good	9	60					
	29.28-36.03	Very good							

Based on the table above, it can be seen that the science process skills of male students in class A on the indicators conclude that they are in a fairly good category with a percentage of 63.63% and the mean value obtained is 21.72, the median value is 21.00, the mode value is 20, 00 the minimum value is 19.00 and the maximum value is 26.00. While the science process skills of female students are in the good category with a percentage of 60% and the mean value obtained is 23.60, the median value is 25.00, the mode value is 26.00, the minimum value is 27.00 and the maximum value is 29.00.

The results of the descriptive analysis of science process skills in class B on the indicators concluded can be seen in the table below, namely:

Table 9. Description of Science Process Skills Indicator Classifying In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	9-15.75	Not good							
	15.76-22.51	Pretty good	1	11.11	25,11	24.00	23.00	21.00	30.00
	22.52-29.27	Good	7	77.77					
	29.28-36.03	Very good	1	11.11					
Female	9-15.75	Not good							
	15.76-22.51	Pretty good	5	35.71	24.00	24.00	21.00	18.00	30.00
	22.52-29.27	Good	8	57.14					
	29.28-36.03	Very good	1	7.14					

Based on the table above, it can be seen that the science process skills of male students in class B are in the good category with a percentage of 77.77% and the mean value obtained is 25.11, the median value is 24.00, the mode value is 23.00, the minimum value is 23.00. 21.00 and a maximum value of 30.00. While the science process skills of female students are also in the good category with a percentage of 57.14% and the mean value obtained is 24.00, the median value is 24.00, the mode value is 21.00, the minimum value is 18.00 and the maximum value is 30.00.

The results of data analysis of class A science process skills on indicators identifying variables can be seen in the table below, namely:

Table 10. Description of Science Process Skills Indicators Identifying Variables In Class A

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	3-5.25	Not good							
	5.26-7.51	Pretty good			9.27	9.00	8.00	8.00	12.00
	7.52-9.77	Good	7	63.63					
	9.78-12.03	Very good	4	36.36					
Female	3-5.25	Not good	2	13.33					
	5.26-7.51	Pretty good	2	13.33	7.93	8.00	8.00	3.00	10.00
	7.52-9.77	Good	8	53.33					
	9.78-12.03	Very good	3	20					

Based on the table above, it can be seen that the science process skills of male students in class A are in the good category with a percentage of 63.63 and the mean value obtained is 9.27, the median value is 9.00, the mosud value is 8.00, the minimum value is

8.00. 8.00 and a maximum value of 12.00. While the science process skills of female students are in a fairly good category with a percentage of 13.33 and the median value obtained is 7.93, the median value is 8.00, the mode value is 8.00, the minimum value is 3.00 and the maximum value is 10.00.

The results of the descriptive analysis of class B science process skills on indicators identifying variables can be seen in the table below, namely:

Table 11. Description of Science Process Skills Indicators Identify Variables In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	3-5.25	Not good	2	22.22	8.77	10.00	10.00	3.00	12.00
	5.26-7.51	Pretty good							
	7.52-9.77	Good	1	11.11					
	9.78-12.03	Very good	6	66.66					
Female	3-5.25	Not good	1	7.14	7.57	7.50	6.00	4.00	11.00
	5.26-7.51	Pretty good	6	42.85					
	7.52-9.77	Good	5	35.71					
	9.78-12.03	Very good	2	14.28					

Based on the table above, it can be seen that the science process skills of male students in class B on the indicators of making variables are in the good category with a percentage of 11.11% and the mean value obtained is 8.77, the median value is 10.00, the mode value is 10, 00 the minimum value is 3.00 and the maximum value is 12.00. While the science process skills of female students are also in the good category with a percentage of 35.71% and the mean value obtained is 7.57, the median value is 7.50, the mode value is 6.00, the minimum value is 4.00 and the maximum value is 11.00.

The results of the descriptive analysis of class A science process skills on the indicators of conducting experiments can be seen in the table below, namely:

Table 12. Description of Science Process Skills Indicators Conducting Experiments In Class A

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	5,00-8.75	Not good			14.45	14.00	13.00	10.00	18.00
	8.76-12.51	Pretty good	1	9					
	12.52-16.27	Good	8	72.72					
	16.28-20.03	Very good	2	18.18					
Female	5,00-8.75	Not good			12.06	12.00	10.00	9.00	15.00
	8.76-12.51	Pretty good	9	60					

	12.52-16.27	Good	6	40					
	16.28-20.03	Very good							

Based on the table above, it can be seen that the science process skills of male students in class A on the indicators of conducting experiments are in the good category with a percentage of 72.72% and the mean value obtained is 14.45, the median value is 14.00, the mode value is 13.00, the minimum value is 10.00 and the maximum value is 18.00. While the science process skills of female students are in the pretty good category 60% with a percentage of and the mean value obtained is 12.05, the median value is 12.00, the mode value is 10.00, the minimum value is 9.00 and the maximum value is 15.00.

The results of the descriptive analysis of class B science process skills on the indicators of conducting experiments can be seen in the table below, namely:

Table 13. Description of Science Process Skills Indicators Conducting Experiments In Class B

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	5,00-8.75	Not good	1	11.11	12.77	13.00	15.00	8.00	19.00
	8.76-12.51	Pretty good	3	33.33					
	12.52-16.27	Good	4	44.44					
	16.28-20.03	Very good	1	11.11					
Female	5,00-8.75	Not good	1	7.14	12.21	12.00	10.00	8.00	17,00
	8.76-12.51	Pretty good	7	50					
	12.52-16.27	Good	4	28.57					
	16.28-20.03	Very good	2	14.28					

Based on the table above, it can be seen that the science process skills of male students in class B are in the good category with a percentage of 44.44% and the median value obtained is 12.77, the median value is 13.00, the mode value is 15.00, the minimum value is 8.00 and the maximum value is 19.00. While the science process skills of female students are in a fairly good category with a percentage of 50% and the mean value obtained is 12.21, the median value is 12.00, the mode value is 10.00, the minimum value is 8.00 and the maximum value is 17.00.

The results of the data analysis of the critical thinking skills of class XII students of MAN 5 Batanghari can be seen in table 14.

Table 14. Description of Class A Students' Critical Thinking Skills

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	0.0-5.0	Not Critical			12.63	13.00	13.00	11.00	15.00
	5.5-10.0	Pretty Critical							

	10.5-15.0	Critical	11	100					
	15.5-20.0	Very Critical							
Female	0.0-5.0	Not Critical							
	5.5-10.0	Pretty Critical							
	10.5-15.0	Critical	13	86.66	14.33	15.00	15.00	12.00	16.00
	15.5-20.0	Very Critical	2	13.33					

Based on the table above, it can be seen that the critical thinking ability of male students in class A is in the critical category with a percentage of 100% and the mean value of 12.63, the median value of 13.00, the mode value of 13.00, the minimum value of 11.00 and a maximum value of 15.00. While the critical thinking ability of female students is also in the critical category with a percentage of 86.66% and the mean value obtained is 14.33, the median value is 15.00, the mode value is 15.00, the minimum value is 12.00 and the maximum value is 16.00.

The results of the descriptive analysis of critical thinking skills in class B can be seen in table 15.

Table 15. Description of Class A Students' Critical Thinking Skills

Gender	Interval	Category	F	%	Mean	Median	Mode	Min	Max
Male	0.0-5.0	Not Critical							
	5.5-10.0	Pretty Critical							
	10.5-15.0	Critical	7	77.77	13.66	13.00	13.00	11.00	17.00
	15.5-20.0	Very Critical	2	22.22					
Female	0.0-5.0	Not Critical							
	5.5-10.0	Pretty Critical							
	10.5-15.0	Critical	11	78.57	13.28	13.00	12.00	12.00	16.00
	15.5-20.0	Very Critical	3	21.42					

Based on the table above, it can be seen that the critical thinking ability of male students in class B is in the critical category with a percentage of 77.77% and the mean value obtained is 13.66, the median value is 13.00, the mode value is 12.00, the minimum value is 11 .00 and a maximum value of 17.00. While the critical thinking ability of female students is also in the critical category with a percentage of 78.57% and the mean value obtained is 13.28, the median value is 13.00, the mode value is 12.00, the minimum value is 12.00 and the maximum value is 16.00.

After the descriptive analysis test, the next step that must be done is the inferential statistical test. Inferential statistics is a test used to analyze sample data and the results of the data will be concluded for the population from which it was taken (Cahyaningrum et al., 2018). There are two inferential statistical tests used, namely the assumption test and

the hypothesis test. The assumption test to be carried out is the normality and linearity test, where this test aims to see whether the data we use are normally and linearly distributed.

Table 16. Normality Test

	Significance	Kolmogorov-Smirnov	Distribute
Science Process Skills			
Class A	0.549	0.797	Normal
Class B	0.694	0.710	Normal
Critical Thinking Ability			
Class A	0.387	0.904	Normal
Class B	0.109	1,206	Normal

Based on table 13, it can be seen that the normality test for science process skills in class A has a significance value of 0.549 and Kolgomorov Smirnov's 0.797 while in class B with a significance value of 0.694 and Kolgomorov-Smirnov's 0.710. While the normality test for critical thinking skills in class A has a significance value of 0.397 and kolgomorov-smirnov of 0.904, while the critical thinking ability in class B has a significance value of 0.109 and kolgomorov-amirnov of 1.206. . Normality test is a test conducted to determine whether the data we use is normally distributed or not by looking at the significance value. The requirement of the normality test is that the significance value must be greater than 0.05.

The linearity test on science process skills and critical thinking skills can be seen in table 17.

Table 17. Linearity Test

		Sum of Square	Mean Square	F	Sig.
KPS *KBK	Deviation from Linearity	339,666	67.93	1,676	0.162

Based on table 14, it can be seen that the Sum of Square value is 339.666, the Mean Square value is 67.93 and F is 1.676 and the significance value is 0.162. The conditions that must be met in the linearity test are that the significance value obtained must be greater than 0.05. So, based on the results of the significance value obtained, science process skills and critical thinking skills have a linear relationship.

The next step after testing the assumptions will be continued with hypothesis testing in the form of a Pearson correlation test to find out whether there is an influence of science process skills on critical thinking skills at MAN 5 Batanghari.

The Pearson correlation test of science process skills on critical thinking can be seen in table 18 below:

Table 18. Pearson Correlation Test

		Science Process Skills	Critical Thinking Ability
Science Process Skills	Pearson correlation Sig.(2-tailed)	1	0.648 0.000
Critical Thinking Ability	Pearson correlation Sig.(2-tailed)	0.648 0.000	1

Based on the table above, it can be seen that science process skills to critical thinking skills have a significance value of 0.000. The requirement of the Pearson correlation test is that the significance value of the data obtained must be less than 0.05. The table shows that the Pearson correlation value is 0.648, so the relationship between science process skills on critical thinking has a strong relationship.

Based on the results obtained from each test that has been carried out, it is known that the science process skills between female gender and male gender in class A and class B are almost entirely in the good category in every indicator of basic and integrated science process skills but are more dominant to the male gender. Science process skills are important for students to develop the knowledge or information that students already have.

In the indicators observed both male and female gender are in the good category. The indicator of observing is one of the basic science process skills that must be mastered by students in order to be able to develop other science process skills (Mahmudah, 2017; Zahroh et al., 2017). In addition, observing is the process of identifying the characteristics of an object using the senses, matching the results of observations that have been made with the descriptions that have been given and identifying the characteristics of the objects being observed (Agustina & Saputra, 2016; Mahmudah, 2017). Observation skills are carried out by using the senses, namely the sense of sight, the sense of taste, the sense of hearing, the sense of smell and the sense of touch (Oviana, 2013; Khotimah et al., 2019). This observing indicator is very important to be mastered by students because it can make students more independent in building their knowledge and giving meaning through direct experience carried out by students to observe the state of the surrounding environment.

Next is the indicator to classify. In this indicator, both male gender and female gender are almost entirely in the good category, but the female gender in class B is in the very good category. The classifying indicator is one indicator of basic process skills that are important for students to master in order to be able to develop other scientific processes (Zahroh et al., 2017; Gasila et al., 2019). Classifying indicators are one of the processes to carry out the arrangement and similarities of an object being observed and contrast it with the characteristics of an object (MY Lestari & Diana, 2018). Classifying can also be said to group and sort an object based on certain categories (R. Susanti, 2013).

Furthermore, for indicators to communicate there are quite specific differences between male gender and female gender. The indicator of communicating the gender of men in class B is in the fairly good category, while the gender of women in class A and class B is in the good category. Communicating indicators are indicators that contain the process of how students convey the observed results clearly and systematically (Mahmudah, 2017; Zahroh et al., 2017). Communicating also means the ability of students to tell the process of finding answers and their findings, opinions or ideas and problem solving that students get from research that has been done (R. Susanti, 2013). In addition, communicating can also mean expressing opinions from the results of other process skills both orally and in writing (Aulia et al., 2018). These communication skills include the

following, namely expressing ideas and carefully examining the use of data from the five senses of an object or event observed in the environment.

Next is the science process skills on the indicator concludes. The indicator concludes that both male gender and female gender in each class are in the good category. Concluding is an activity that students do by concluding experimental data and facts around them (Hamadi et al., 2018; Yuanita, 2018). The ability of students to conclude the results of the practicum that has been carried out is very dependent on the level of student understanding of the objectives of the practicum implemented (Wasilah, 2012).

Next is for the indicator to identify the variable. Identifying variables is one indicator of integrated science process skills. Integrated science process skills are a progressive form of basic science process skills (Nuzulia et al., 2017). Variable is a qualitative or quantitative unit that can vary or change in a certain situation (Mahmudah, 2017). Identifying variables aims so that students are able to identify all the variables used when the practicum is carried out. The indicator identifies the variables, both male gender and female gender are in good category.

The last indicator to be tested is the indicator of conducting an experiment. The indicator of conducting experiments is one indicator of integrated science process skills. This indicator is an important indicator because it is a learning process carried out by students to conduct experiments. Conducting an experiment or experiment is a detailed activity that is planned to produce data in answering a problem or testing a hypothesis (Mahmudah, 2017; Wirdawati, 2017). The indicator of conducting this experiment aims to provide students with direct learning experiences and prove for themselves what they already know (Hamdani et al., 2019).

So based on the results obtained based on the tests that have been carried out that there are differences in science process skills from both male and female gender. The results of this study are science process skills in male gender are superior to female science process skills. This is in accordance with the statement (Gasila et al., 2019) that male students have better science process skills than female students. This is because male students are superior in science and mathematics, making it easier for male students during practicum activities (Fatimah, 2017).

Next is to see the critical thinking skills between male gender and female gender in class A and class B. Critical thinking is usually described as the use of a cognitive skill or strategy that increases the likelihood of a desired outcome (Sujanem et al., 2020). The results of the study stated that there was no significant difference between female gender and male gender because based on the results of tests that had been carried out, the critical thinking abilities of each gender were in the good category. Both male and female students are able to provide analytical analysis on the explanation of the answers given. In addition, female students and male students are able to express facts in solving a given problem. Based on research conducted (Budi, 2017; Hayudiyani et al., 2017) also said that there was no difference in critical thinking skills between female and male gender.

Apart from the role of gender in the differences in science process skills and critical thinking skills between female and male gender in MAN 5 Batanghari both in class A and class B because of differences in learning styles and learning motivations of each class.To develop science process skills and critical thinking, students are expected to have a good learning style because with a good learning style students can carry out tasks in terms of observing the symptoms to be studied in the learning process (Syofyan & Yuliati, 2017; Susilawati et al., 2019). Learning style is a way that is done by students to make it easier for them to receive and process information obtained during the learning process (Hernawati & Hardin, 2019). Apart from differences in learning styles and lack of student motivation, another cause is student inactivity during practicum activities. Activeness in practicum activities is very important so that students are more enthusiastic in learning

and are more active in asking questions during practicum activities (Nisa, 2017; Wibowo, 2016).

Therefore it is necessary toimproving students' science process skills to help improve students' critical thinking skills. To help improve science process skills, they need to be trained with practicum-based learning activities (Suryaningsih, 2017). Practical activity is a learning activity that is carried out directly using certain skills (Emda, 2017). This practicum activity applies the scientific method, this shows that learning is not only in the form of delivering material but an experiment is needed to prove the concepts obtained (Kruit et al., 2018). The advantage of holding this practicum activity is to train students' scientific process skills and develop students' scientific attitudes (Fransiska et al., 2018; Inscription, 2018). With practicum activities, it is also very important because it can help students to improve their science process skills and students' critical thinking skills (Hamidah et al., 2014; Rahayu & Eliyarti, 2019).

The novelty of this research can be seen from how researchers use the gender variable as a separator to see science process skills and critical thinking skills. As we know that gender differences are factors that affect science process skills and students' critical thinking skills (Pambudiono et al., 2015; Gasila et al., 2019).

Researchers hope for further research to examine science process skills that are more varied on indicators that are not discussed in this study. Likewise with students' critical thinking skills, the research hopes to be further deepened for further research by increasing the number of questions and increasing the difficulty of the questions used to examine students' critical thinking skills. In addition, the use of practicum time should be maximized in order to hone students' science process skills and strengthen students' critical thinking skills.

Conclusion

The relationship between science process skills and students' critical thinking skills on electromagnetic induction material in terms of gender differences based on research conducted at MAN 5 Batanghari stated that the science process skills of male students in each class were superior to female students and the ability to think critically are in the good category in each class, both male and female. This is also supported by the results of inferential statistical data through the Pearson correlation test with a value obtained of 0.648 so it can be concluded that there is a strong relationship between science process skills and critical thinking skills.

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