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Rural Student Analysis : Correlation Science Process Skills and Critical Thinking at a State Senior High School in Jambi Province

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Abstract: Science process skills and critical thinking skills are skills and abilities that must be possessed by students. So the purpose of this study is to determine the science process skills and students' critical thinking skills in the physics learning process in terms of female gender and male gender. In addition, the purpose of this study is to see how the differences and the relationship between science process skills and students' critical thinking skills are. This type of research is quantitative research with an experimental research design. The population of this study itself is the students of SMAN 6 Batanghari with a total sample of 101 people from class XII IPA1, XII IPA 2 and XII IPA 3. The sample selection technique used is total sampling technique. The instruments used in this study were observation sheets and critical thinking test instruments and interest questionnaire. The data analysis technique used is descriptive statistics and inferential statistics, Correlation hypothesis testing. The results of this study are both science process skills and students' critical thinking skills are in the good category. However, the dominant gender is women who are in the good category with a percentage of 57.6% and men in the good category with a percentage of 51.9%. Meanwhile, for students' critical thinking skills, women were in a good category with a percentage of 59.8 and men in a good category with a percentage of 47.3. There are differences in science process skills and critical thinking skills between men and women. And there is a relationship of 0.357 between science process skills and students' critical thinking skills.

Abstrak: *Keterampilan proses sains dan keterampilan berpikir kritis merupakan keterampilan dan kemampuan yang harus dimiliki oleh siswa. Maka tujuan dari penelitian ini adalah untuk mengetahui keterampilan proses sains dan keterampilan berpikir kritis siswa dalam proses pembelajaran fisika ditinjau dari jenis kelamin perempuan dan jenis kelamin laki-laki. Selain itu, tujuan dari penelitian ini adalah untuk melihat bagaimana perbedaan dan hubungan antara keterampilan proses sains dengan keterampilan berpikir kritis siswa. Jenis penelitian ini adalah penelitian kuantitatif dengan desain penelitian eksperimen. Populasi dari penelitian ini sendiri adalah siswa SMAN 6 Batanghari dengan jumlah sampel 101 orang dari kelas XII IPA1, XII IPA 2 dan XII IPA 3. Teknik pemilihan sampel yang digunakan adalah total sampling. Instrumen yang digunakan dalam penelitian ini adalah lembar observasi dan instrumen tes*

berpikir kritis dan angket minat belajar. Teknik analisis data yang digunakan adalah statistik deskriptif dan statistik inferensial, pengujian hipotesis korelasi. Hasil penelitian ini keterampilan proses sains dan keterampilan berpikir kritis siswa berada pada kategori baik. Namun jenis kelamin yang dominan adalah perempuan yang berada pada kategori baik dengan persentase 57,6% dan laki-laki dalam kategori baik dengan persentase 51,9%. Sedangkan untuk kemampuan berpikir kritis siswa, perempuan berada pada kategori baik dengan persentase 59,8 dan laki-laki dalam kategori baik dengan persentase 47,3. Ada perbedaan keterampilan proses sains dan keterampilan berpikir kritis antara pria dan wanita. Dan terdapat hubungan sebesar 0,357 antara keterampilan proses sains dengan keterampilan berpikir kritis siswa.

Keywords: *Science Process Skills, Critical Thinking, Correlations, Gender, Interest*

INTRODUCTION

Education is a conscious effort taken by every individual to improve and develop the quality of human resources (Astiti et al., 2017; Made et al., 2017). Quality human resources can advance a country and ensure the sustainability of individual lives(Ardana & Putra, 2017; Asrial et al., 2020). Therefore, education becomes a very important thing to be taken by every individual.

One of the sciences learned through education is physics. Physics is a science that can explain natural phenomena and interactions that occur in nature through observation(Maiyena & Haris, 2017; Setia et al., 2017; Taqwa et al., 2019). In addition, physics is also a science that must be mastered by students in the 21st century(Karelina & Etkina, 2007; Rokhmah et al., 2017). In studying physics, it takes a thinking ability to be able to analyze the problems that occur. The thinking ability that must be mastered by students in studying physics is the ability to think critically(Haniah et al., 2020; Sholihah & Lastariwati, 2020).

Critical thinking ability is an ability that consists of non-cognitive and cognitive abilities which are defined as intellectual discipline processes that are carried out actively and skillfully in conceptualizing, applying, analyzing, and evaluating logical statements made in making decisions. (McPeck, 1990; Halpern, 2003; Watson & Glaser, 2008; Canziani & Tullar, 2017; Shaw et al., 2019). Critical thinking ability is also defined as the ability to be able to analyze an argument so that a good argument or a bad argument is obtained(Facione, 2000; Giancarlo & Facione., 2001; Pithers & Soden, 2000). However, the reality in the field is that the critical thinking skills possessed by students are still relatively low. This is because students still do not believe in themselves in expressing their opinions about a problem(Denny et al., 2020; Malik et al., 2017). Thus, it is necessary to improve critical thinking skills in the learning process.

One alternative that can be used to improve critical thinking skills is practicum-based learning. Besides being able to improve critical thinking skills, practicum can also improve science process skills. Science process skills are also skills that are mastered by students in the 2013 curriculum, especially in facing the 21st century. Science process skills are skills that refer to understanding cognitive aspects(Ambross et al., 2014). Science process skills can encourage students to be able to develop the knowledge they get(Darmaji et al., 2018). Science process skills consist of two parts, namely basic science process skills and integrated science process skills. Basic science process skills consist of indicators of observing, classifying, measuring, predicting and concluding. Meanwhile, integrated science process skills consist of indicators, identifying variables, creating tables, making graphs, identifying relationships, between variables, data collection and processing, research analysis, hy-

pothesis formation, operationally identifying variables, designing experiments, and conducting experiments.(Florencia et al., 2014; Mokiwa, 2014; Durmaz & Mutlu, 2016; Wallace & Coffey, 2019; Mutlu, 2020). Therefore, science process skills are very important skills to be mastered because they can grow students' thinking broadly, cognitively, critically, and can solve a problem.

Besides being able to improve critical thinking skills and science process skills, practicum activities can also foster student interest in learning. Interest is a feeling of liking and feeling of interest in something without any encouragement in it(Pasaribu, 2017). Interest plays a role in learning activities, this is because interest can encourage students to learn and produce good achievements(Hude & Rohmah, 2017). The indicators that show that someone has an interest are showing feelings of pleasure, paying attention, having high awareness, and having high curiosity. For this reason, practicum activities are an alternative that can be used to increase interest in learning, critical thinking skills and science process skills.

Based on the description above, it is known that there is a relationship between the variables of critical thinking ability and science process skills. This is because to grow students' critical thinking skills, it is necessary to have a learning process that can maximize students' thinking processes in finding physics concepts. One way is to improve students' science process skills(Nasution, 2018). This is supported by research by(Haryono, 2006) which explains that learning centered on science process skills is a skill that can improve and encourage students to have critical thinking skills(Haryono, 2006; Nasution, 2018). So that there is a need for practicum-based learning in order to improve science process skills and students' thinking skills.

The questions to be answered in this research are:

1. How are students' science process skills in terms of gender?
2. How are students' critical thinking skills in terms of gender?
3. Is there a relationship and difference between science process skills and critical thinking skills in terms of gender?
4. How is the student's interest in learning physics?

METHOD

This research is a type of quantitative research with a correlational research design. Quantitative research is research that produces data in the form of numbers that can be generalized in the form of an overview of the observed phenomena(Creswell, 2014).

The population is all research objects that are analyzed and concluded to be used as research samples (Arisantiani et al., 2017; Astiti et al., 2017). The population used in this study were all students of class XII IPA at SMAN 6 Batanghari with a total of 101 students. The sample used in this study is the same as the total population, namely all students of class XII IPA with a total of 101 students. so that the sampling technique used in this study is total sampling.

The instruments or measuring instruments used in this study were in the form of observation sheets for science process skills, critical thinking ability test instruments, and a learning interest questionnaire. The observation sheet is used to find out or observe the activities of students when doing practicum(Astuti & Mustadi, 2014; Israel et al., 2016; Rahmawati & Mahmudi, 2014). While the critical thinking ability essay test instrument is used to determine student learning outcomes after doing practicum(Ayuni et al., 2017; Handika & Wangid, 2013; Istiyono, 2020). The test instrument used consisted of five essay questions with direct current material. The test instrument is given to students after students do practicum. For student learning interest questionnaires are used to see how students' interest in learning physics.

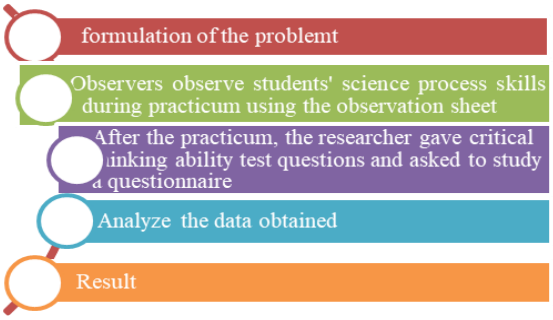
The data collection technique was carried out by students doing practicum and then observers assessing students' science process skills by using scientific process skills observation instruments. After completing the practicum, the next step the researcher gave a critical thinking test question and contin-

ued by distributing student interest questionnaires. so that the data obtained in this study were derived from the instrument of observation sheets, tests of critical thinking skills and questionnaires of interest in learning.

The data analysis techniques used in this research are descriptive statistics and inferential statistics. Descriptive analysis technique is used to describe a variable under study(Anindyta & Suwarjo, 2014; Quintela-del-río & Francisco-fernández, 2016; Wyatt et al., 2017). The statistics used are the mean, median, maximum and minimum values(Mariana & Zubaida, 2015; Marquezin et al., 2016). For inferential statistical analysis, correlational test and ANOVA. test were used(Arisantiani et al., 2017; Darmaji et al., 2020). Before conducting the inferential test, the first step of the researcher conducted a prerequisite test in the form of a normality test and a homogeneity test and then continued with a correlation test and ANOVA test.

The research design conducted by the researcher is as follows:

Figure 1. Research Flowchart



The intervals and categories of science process skills, critical thinking skills, and student interest in learning are as follows.

Table 1. Categories of Science Process Skills

Science Process Skills		
Indicator	Hose	Category
Observe	6.00-10.50	Not so good
	10.51-1.00	Not good
	15.01-19.50	Good
	19.51-24.00	Very well
Measuring	5.00-8.75	Not so good
	8.76-12.50	Not good
	12.51-16.25	Good
	16.26-20.00	Very well
Conclude	4.00-7.00	Not so good
	7.01-10.00	Not good
	10.01-13.00	Good
	13.01-16.00	Very well
Designing experiments	6.00-10.50	Not so good
	10.51-15.00	Not good
	15.01-19.50	Good
	19.51-24.00	Very well
Test	12.00-21.00	Not so good
	21.01-30.00	Not good
	30.01-39.00	Good
	39.01-48.00	Very well
Create a table	3.00-5.25	Not so good
	5.26-7.50	Not good
	7.51-9.75	Good
	9.76-12.00	Very well

Table.2 Categories of Critical Thinking

Critical thinking	
Hose	Category
0.00-5.00	Not so good

5.50-10.00	Not good
10.50-15.00	Good
15.50-20.00	Very well

Table 3. Categories of Learning Interest

interval	Category
16.0-28.0	Not very good
28.1-40.0	Not good
40.1-52.0	Good
52.1-64.0	Very good

RESULTS AND DISCUSSION

Research on science process skills has been carried out by Darmaji, et al (2018) with the observed indicators including observation, classification, making hypotheses, relationships between variables, planning experiments, measuring, obtaining and processing data, experimental analysis, communication, and conclusions with results. research shows that there are still many students who have not mastered science process skills. While research on critical thinking skills has also been carried out by Nuryanti, et.al (2018) with research results showing that students' critical thinking skills are still low. For this reason, this study complements previous research, namely reviewing the relationship between science process skills and critical thinking skills and analyzing student learning interests. The following is a description of the science process skills of class XII IPA 1 students,

1. Science Process Skills for Class XII IPA 1, XII IPA 2, XII IPA 3 in terms of gender differences

   Science process skills are one of the skills that must be mastered and possessed by students in accordance with the 2013 curriculum. The science process skills studied in this study include indicators of observing, measuring, concluding, designing experiments, and making tables.

Table 4. is a description of science process skills on observing indicators

IPA class 1						
Gender	Hose	F	%	Category	mean	median
Woman	6.00-10.50	0	0	Not so good	15.47	16.00
	10.51-1.00	8	47.1	Not good		
	15.01-19.50	9	52.9	Good		
	19.51-24.00	0	0	Very well		
Man	6.00-10.50	0	0	Not so good	17.07	18.00
	10.51-1.00	3	21.4	Not good		
	15.01-19.50	8	57.1	Good		
	19.51-24.00	3	21.4	Very well		
Science Class 2						
Gender	Hose	F	%	Category		
Woman	6.00-10.50	1	0.3	Not so good	18.31	18.00
	10.51-1.00	3	18.8	Not good		
	15.01-19.50	9	56.3	Good		
	19.51-24.00	3	18.8	Very well		
Man	6.00-10.50	1	5.6	Not so good	12.94	13.00
	10.51-1.00	0	0	Not good		
	15.01-19.50	17	94.4	Good		
	19.51-24.00	0	0	Very well		
IPA class 3						
Gender	Hose	F	%	Category		
Woman	6.00-10.50	0	0	Not so good	16.05	16.00
	10.51-1.00	8	24.3	Not good		

	15.01-19.50	10	70.4	Good		
	19.51-24.00	1	18.8	Very well		
	6.00-10.50	1	5.9	Not so good	12.88	13.00
Man	10.51-1.00	14	82.4	Not good		
	15.01-19.50	2	11.8	Good		
	19.51-24.00	0	0	Very well		

Based on the table presented, the results of the study indicate that the indicators observed indicate that the female sex in science class 1 is in the good category with a percentage of 52.9% with an average value of 15.47 and a median of 16.00. For science class 2, women are in the good category with a percentage of 56.3% with a mean value of 18.31 and a median of 18.00. Meanwhile, for science class 3, girls are in the good category with a percentage of 70.4% with an average value of 16.05 and a median of 16.00.

For the male gender, the IPA class 1 results were in good category with a percentage of 57.1 and a mean value of 17.07 and a median of 18.00. In class IPA 2, good results were obtained with the percentage of males being 94.4% with an average value of 12.94 and a median of 13.00. Meanwhile, for science class 3 the results were not good with a percentage of 82.4% and an average value of 12.88 and a median of 13.00. Based on the results obtained on the observed indicators, both female and male sex in class XII IPA 1, XII IPA 2, and XII IPA 3 are in the good category.

a. Measure

The following is presented in Table 5 which is an overview of the intervals and categories indicators of science process skills for class XII IPA 1, XII IPA 2 and XII IPA 3 in terms of gender differences.

Table 5. Description of Science Process Skills Indicator Measuring

IPA class 1					mean	median
Gender	Hose	F	%	Category		
	5.00-8.75	0	0	Very Not Good	13.32	14.00
Woman	8.76-12.50	5	29.4	Not good		
	12.51-16.25	12	70.6	Good		
	16.26-20.00	0	0	Very good		
	5.00-8.75	0	0	Very Not Good	13.14	13.00
	8.76-12.50	5	35.7	Not good		
Man	12.51-16.25	9	64.3	Good		
	16.26-20.00	0	0	Very good		
Science Class 2						
Gender	Hose	F	%	Category		
	5.00-8.75	1	6.3	Very Not Good	14.6	15.00
Woman	8.76-12.50	3	18.8	Not good		
	12.51-16.25	4	25.0	Good		
	16.26-20.00	8	50.0	Very good		
	5.00-8.75	3	16.7	Very Not Good	11.72	12.00
Man	8.76-12.50	6	33.3	Not good		
	12.51-16.25	9	50.0	Good		
	16.26-20.00	0	0	Very good		
IPA class 3						
Gender	Hose	F	%	Category		
Woman	5.00-8.75	0	0	Very Not Good	17.00	17.00
	8.76-12.50	8	24.3	Not good		
	12.51-16.25	10	70.4	Good		
	16.26-20.00	1	18.8	Very good		
Man	5.00-8.75	1	5.9	Very Not Good	12.35	12.00

8.76-12.50	14	82.4	Not good
12.51-16.25	2	11.8	Good
16.26-20.00	0	0	Very good

Based on table 5, the female gender in measuring skills in science class 1 is in the good category with a percentage of 70.6% and a mean value of 13.32 and a median of 14.00. For science class 2 the skill of measuring female gender is in the very good category with a percentage of 50% with a mean value of 14.6 and a median of 15.00. In science class 3, the female gender was in the very good category with a percentage of 68.4% and an average value of 17.00 and a median of 17.00. The male gender in science class 1 obtained good results with a percentage of 64.3% and an average value of 13.14 with a median of 13.00. For male students in science class 2 obtained a good category with a percentage of 50% and an average value of 11.72 with a median of 12.00. Meanwhile, for men in science class 3 the results were not good with a percentage of 52.9% and a mean value of 12.35 and a median of 12.00.

b. Conclude

Furthermore, Table 6 is a table description of the category of science process skills on the concluding indicators for students of class XII IPA 1, XII IPA 2, and XII IPA 3 in terms of gender differences

Table 6. Description of Science Process Skills Indicator Concluding

Gender	Hose	F	%	Category	mean	median
Woman	4.00-7.00	2	11.8	Very Not Good	10.76	12.00
	7.01-10.00	4	23.5	Not good		
	10.01-13.00	10	58.8	Good		
	13.01-16.00	1	5.9	Very good		
Man	4.00-7.00	1	7.1	Very Not Good		
	7.01-10.00	4	28.6	Not good	10.78	11.00
	10.01-13.00	8	57.1	Good		
	13.01-16.00	1	7.1	Very good		
Science Class 2						
Gender	Hose	F	%	Category		
Woman	4.00-7.00	2	7.7	Very Not Good	11.18	11.00
	7.01-10.00	3	11.5	Not good		
	10.01-13.00	8	30.8	Good		
	13.01-16.00	3	11.5	Very good		
Man	4.00-7.00	3	16.7	Very Not Good	10.33	11.00
	7.01-10.00	4	22.2	Not good		
	10.01-13.00	11	61.1	Good		
	13.01-16.00	0	0	Very good		
IPA class 3						
Gender	Hose	F	%	Category		
Woman	4.00-7.00	1	5.3	Very Not Good	12.63	13.00
	7.01-10.00	2	10.5	Not good		
	10.01-13.00	9	44.1	Good		
	13.01-16.00	8	40.1	Very good		
Man	4.00-7.00	2	11.8	Very Not Good	10.41	11.00
	7.01-10.00	6	35.3	Not good		
	10.01-13.00	7	41.2	Good		
	13.01-16.00	2	11.8	Very good		

Based on table 6, the results show that women in science class 1 have a good conclusion indicator category with a percentage of 59.8% and a mean value of 10.76 and a median of 12.00. Meanwhile, for women in class XII

IPA 2, the results showed that the indicators concluded that they were categorized as good with a percentage of 30.8%, an average value of 11.18 and a median value of 11.00. And for class XII IPA 3 women are also in the good category with a percentage of 44.1%, an average of 12.63 and a median of 13.00. The male gender in science class 1 obtained good results with a percentage of 57.1%, the mean value of 10.78 and the median of 11.00. For men in science class 2, the good category was obtained with a percentage of 61.1%, a mean value of 10.33 and a median of 11.00. Meanwhile, for men in science class 3 the results are not good with a percentage of 52.9%, the mean value is 10.41 and the median is 11.00.

c. Designing Experiments

Table 7 is a table of the results of the description of science process skills on the indicators of designing experiments for students of class XII IPA 1, XII IPA 2 and XII IPA 3 in terms of gender differences. The results are presented as follows.

Table 7. Description of Science Process Skills Indicators Designing ExperimentsIPA class 1

Gender	Hose	F	%	Category	mean	median
Woman	6.00-10.50	1	5.9	Very Not Good	15.17	15.00
	10.51-15.00	8	47.0	Not good		
	15.01-19.50	9	47.1	Good		
	19.51-24.00	0	0	Very good		
Man	6.00-10.50	2	14.3	Very Not Good	13.50	14.00
	10.51-15.00	8	57.1	Not good		
	15.01-19.50	4	28.6	Good		
	19.51-24.00	0	0	Very good		
Science Class 2						
Gender	Hose	F	%	Category		
Woman	6.00-10.50	0	0	Very Not Good	16.68	17.50
	10.51-15.00	1	6.3	Not good		
	15.01-19.50	11	73.1	Good		
	19.51-24.00	4	20.6	Very good		
Man	6.00-10.50	4	22.2	Very Not Good	12.16	12.00
	10.51-15.00	10	55.6	Not good		
	15.01-19.50	4	22.2	Good		
	19.51-24.00	0	0	Very good		
IPA class 3						
Gender	Hose	F	%	Category		
Woman	6.00-10.50	1	5.3	Very Not Good	16.26	16.00
	10.51-15.00	6	31.6	Not good		
	15.01-19.50	10	52.6	Good		
	19.51-24.00	2	10.5	Very good		
Man	6.00-10.50	6	35.3	Very Not Good	13.64	13.00
	10.51-15.00	10	58.8	Not good		
	15.01-19.50	1	5.9	Good		
	19.51-24.00	0	0	Very good		

in table 8. Based on table 8, it is known that the data on female sex in science class 1 is in the good category with a percentage of 47.1% and a mean value of 15.17 and a median of 15.00. For women in science class 2, the good category was obtained with the results of 73.1% with an average value of 16.68 and a median of 17.50. Meanwhile, for female science class 3, good results were obtained with a percentage of 52.6% with a mean value of 16.26 and a median of 16.00.

For the male gender, the IPA class 1 results in the poor category with a percentage of 57.1% and a mean value of 13.50 and a median of 14.00. For men in science class 2 the category is not good with a percentage of 55.6% and a mean value of 12.16 and a median of 12.00. Meanwhile for men in science class 3 the results are not good with a percentage of 58.8% and a mean value of 13.64 and a median of 13.00.

d. Doing Experiments

Furthermore, table 11 is presented which is a description table of the science process skills indices conducting experiments on students of class XII IPA 1, XII IPA 2, and XII IPA 3.

Table 11. Description of Science Process Skills Indicators of Conducting Experiments

IPA Class 1						
Gender	Interval	F	%	Category	mean	median
female	4.00-7.00	0	0	Not Very Good	11.00	11.00
	7.01-10.00	7	41.2	Not Good		
	10.01-13.00	9	52.9	Good		
	13.01-16.00	1	5.9	Very Good		
Male	4.00-7.00	2	14.3	Not Very Good	9.64	10.00
	7.01-10.00	4	28.6	Not Good		
	10.01-13.00	8	57.1	good		
	13.01-16.00	0	0	Very Good		
IPA Class 2						
Gender	Interval	F	%	Category		
female	4.00-7.00	3	15.8	Not Very Good	11.68	13.00
	7.01-10.00	2	10.5	Not Good		
	10.01-13.00	10	52.6	Good		
	13.01-16.00	4	21.1	Very Good		
Male	4.00-7.00	2	11.1	Not Very Good	9.55	10.00
	7.01-10.00	11	61.1	Not Good		
	10.01-13.00	3	16.7	good		
	13.01-16.00	2	11.1	Very Good		
IPA Class 3						
Gender	Interval	F	%	Category		
female	4.00-7.00	1	5.3	Not Very Good	11.21	11.00
	7.01-10.00	5	26.3	Not Good		
	10.01-13.00	12	63.2	Good		
	13.01-16.00	1	5.3	Very Good		
Male	4.00-7.00	3	17.6	Not Very Good	9.29	9.00
	7.01-10.00	11	64.7	Not Good		
	10.01-13.00	2	11.8	Good		
	13.01-16.00	1	5.9	Very Good		

Based on table 11 results of class students IPA 1 female is in the good category with a percentage of 52.9% with a mean value of 11.00 and a median of 11.00. IPA class 2 female students get the results; which is good with a percentage of 52.6% and an average value of 11.68 and a median of 13.00. While the IPA 3 women are also included in the good category with a percentage of 63.2% with an average value of 11.21 and a median of 11.00. Male science class 1 is in the good category with a percentage of 57.1% and a mean of 9.64 and a median of 10.00. For men in science class 2 the results were not good with a percentage of 61.1% with an average value of 9.55 and a median of 10.00. Meanwhile, for IPA class 3 the results are not good with p percentage 64.7% and mean 9.29 and median 9.00

e. Creating Tables

Table 12 is a table of categories of indicators for science process skills in making experimental tables for students of class XII IPA 1, XII IPA 2, and XII IPA 3 in terms of gender.

Table 12. Description of Science Process Skills Indicator Making Table

IPA Class 1						
Gender	interval	F	%	Category	mean	median
female	4.00-7.00	0	0	Not Very Good	11.58	11.00
	7.01-10.00	3	17.6	Not Good		
	10.01-13.00	12	70.6	good		
	13.01-16.00	2	11.8	Very Good		
Male	4.00-7.00	4	28.6	Not Very Good	9.64	10.50
	7.01-10.00	3	21.4	Not Good		
	10.01-13.00	7	50.0	good		
	13.01-16.00	0	0	Very Good		
Science Class 2						
Gender	interval	F	%	Category		
female	4.00-7.00	2	10.5	Not Very Good	11.43	12.00
	7.01-10.00	2	10.5	Not Good		
	10.01-13.00	12	63.2	good		
	13.01-16.00	3	15.8	Very Good		
Male	4.00-7.00	3	16.7	Not Very Good	9.72	10.50
	7.01-10.00	6	33.3	Not Good		
	10.01-13.00	9	50.0	good		
	13.01-16.00	0	0	Very Good		
IPA class 3						
Gender	interval	F	%	Category		
female	4.00-7.00	1	5.3	Not Very Good	11.68	11.00
	7.01-10.00	3	15.8	Not Good		
	10.01-13.00	11	57.9	good		
	13.01-16.00	4	21.1	Very Good		
Male	4.00-7.00	2	11.8	Not Very Good	9.88	10.00
	7.01-10.00	6	35.3	Not Good		
	10.01-13.00	7	41.2	good		
	13.01-16.00	2	11.8	Very Good		

Based on table 12, the results of the female science class 1 students are in the good category with a percentage of 70.6% with a mean value of 11.58 and a median of 11.00. The female students of science class 2 got good results with a percentage of 63.2% and a mean value of 11.43 with a median of 12.00. Meanwhile, women in science class 3 are also in the good category with a percentage of 57.9% with a mean value of 11.68 and a median of 11.00.

Boys in science class 1 are in the good category with a percentage of 50% and an average of 9.64 and a median of 10.50. For men in science class 2 the results are not good with a percentage of 50% with an average value of 9.72 with a median of 10.50.

Meanwhile, for science class 3, good results were also obtained with a percentage of 41.2% and a mean value of 9.88 and a median of 10.00.

After describing students' science process skills in terms of gender differences, the researchers then described students' critical thinking skills in terms of gender differences.

2. Description of Critical Thinking Ability of Class XII IPA 1, XII IPA 2, and XII IPA 3 students, in terms of gender differences

Critical thinking ability is an ability that must be possessed by students. Critical thinking ability is the ability to

be able to analyze problems and provide solutions to problems. The following table 13 is a description of the critical thinking skills of students in class XII IPA 1, XII IPA 2, and XII IPA 3 in terms of gender differences.

Table 13. Description of Critical Thinking Ability of Class XII IPA 1, XII IPA 2 and XII IPA 3 students in terms of gender differences

IPA Class 1						
Gender	interval	F	%	Category	mean	median
female	0.0-5.0	0	0	Not Very Good	14.82	15.00
	5.5-10.0	0	0	Not Good		
	10.5-15.0	12	70.6	good		
	15.5-20.0	5	29.4	Very Good		
Male	0.0-5.0	0	0	Not Very Good	11.78	12.00
	5.5-10.0	2	14.3	Not Good		
	10.5-15.0	12	85.7	good		
	15.5-20.0	0	0	Very Good		
IPA Class 2						
Gender	interval	F	%	Category		
female	0.0-5.0	0	0	Not Very Good	13.12	13.59
	5.5-10.0	3	18.8	Not Good		
	10.5-15.0	9	56.3	good		
	15.5-20.0	4	25.0	Very Good		
Male	0.0-5.0	0	0	Not Very Good	10.33	10.50
	5.5-10.0	8	43.7	Not Good		
	10.5-15.0	9	56.3	good		
	15.5-20.0	0	0	Very Good		
IPA Class 3						
Gender	interval	F	%	Category		
female	0.0-5.0	0	0	Not Very Good	11.00	11.00
	5.5-10.0	8	42.1	Not Good		
	10.5-15.0	10	52.6	good		
	15.5-20.0	1	5.3	Very Good		
Male	0.0-5.0	0	0	Not Very Good	9.11	9.00
	5.5-10.0	15	88.2	Not Good		
	10.5-15.0	2	11.8	good		
	15.5-20.0	0	0	Very Good		

Table 13 is a description table of students' critical thinking skills in class XII IPA 1, XII IPA 2, XII IPA 3. Based on the table, it is known that in class science 1, the female gender is in the good category with a percentage of 70.6% and a mean value of 14.82, median 15.00. For female gender, science class 2 is in the good category with a percentage of 56.3% and a mean value of 13.12, median of 13.50. The gender of women in science class 3 is also included in the good category with a percentage of 52.6% and a mean of 11.00, median of 11.00.

The male gender in science class 1 is in the good category with a percentage of 85.7% and a mean value of 11.78, median of 12.00. Science class 2 is in the good category with a percentage of 56.3% and a mean value of 10.33, median of 10.50. While the science class 3 is in the bad category with a percentage of 88.2% and an average value of 9.11, median 9.00.

3. Relationship between Science Process Skills and Critical Thinking Ability

To see the relationship between science process skills and students' critical thinking skills, the researchers used inferential statistics here. Inferential

statistics are divided into prerequisite tests and hypothesis testing. The prerequisite test used is the normality test and homogeneity test. While the hypothesis test used is a correlation test. In the following, the results of the inferential statistics of the normality test of data on science process skills and students' critical thinking skills are presented.

Table 14. SPS & CT . Normality Test

Indicator	class	Shapiro-Wilk Statistics	df	Sig.
SPS	IPA 1	.945	31	.381
	IPA 2	.969	34	.817
	IPA 3	.954	36	.434
CT	IPA 1	.181	31	.200
	IPA 2	.186	34	.098
	IPA 3	.201	36	068

Based on table 14, it is known that the normality test of students' science process skills in science class 1 is 0.381, in science class 2 is 0.817 and in science class 3 is 0.434. Meanwhile, for the ability to think critically, the IPA 1 class is 0.200, the IPA 2 class is 0.098 and the IPA 3 class is 0.068.

Based on these results, the data can be said to be normal because the significance value obtained is greater than 0.05.

After conducting the normality test, the prerequisite that must be met is that the data must be homogeneous. To find out whether the data is homogeneous or not, the researchers conducted a homogeneity test. The following table 15 is a test of the homogeneity of science process skills and critical thinking skills of class XII science students.

Table 15. SPS & CT Homo Homogeneity Test

Gender	Levena Statistics	df1	df2	Sig.
SPS	2,670	2	99	.079
CT	.441	2	99	.646

Based on table 15 presented, it is known that the SPS & CT data are homogeneous. This can be seen from the significance value of SPS & CT. For SPS the score is 0.079 and CT is 0.646. From these results it can be seen that the significance value is greater than 0.05, so the data can be said to be homogeneous.

Then, to answer the research objectives, the researchers tested the hypothesis, namely the correlation test. Correlation test is an inferential statistic that is used to determine the relationship between variables. The following table presents the correlation test for SPS & CT variables.

Table 16. Correlation Test

Correlations

		KPS	CT
SPS	Pearson Correlation	1	.657**
	Sig. (2-tailed)		.000
	N	101	101
CT	Pearson Correlation	.657**	1
	Sig. (2-tailed)	.000	
	N	101	101

**. Correlation is significant at the 0.01 level (2-tailed).

Based on table 16 that has been presented, it is known that there is a relationship between science process skills and students' critical thinking skills. This can be seen from the significance value obtained between science process skills and critical thinking skills which is 0.000 less than 0.05. Meanwhile, if viewed from the Pearson correlation value, it is known that the relationship between science process skills and critical thinking skills is a strong relationship. This is because it can be seen that the Pearson correlation value is

0.657. Furthermore, to answer the third goal, namely knowing students' interest in learning, the researchers conducted a description test to see students' interest in learning in their eyes physics. The description test of learning interest is presented in table 17.

Table 17. Description of Student Interests

IPA Class 1						
Gender	interval	F	%	Category	mean	median
female	16.0-28.0	0	0.0	Not Very Good	53.23	53.00
	28.1-40.0	0	0.0	Not Good		
	40.1-52.0	7	41.2	good		
	52.1-64.0	10	58.8	Very Good		
Male	16.0-28.0	4	28.6	Not Very Good	50.42	49.50
	28.1-40.0	3	21.4	Not Good		
	40.1-52.0	7	50.0	good		
	52.1-64.0	0	0	Very Good		
Science Class 2						
Gender	interval	F	%	Category		
female	16.0-28.0	0	0.0	Not Very Good	49.52	49.00
	28.1-40.0	0	0.0	Not Good		
	40.1-52.0	14	76.2	good		
	52.1-64.0	5	23.8	Very Good		
Male	16.0-28.0	0	0.0	Not Very Good	49.22	51.00
	28.1-40.0	0	0.0	Not Good		
	40.1-52.0	15	83.3	good		
	52.1-64.0	3	16.7	Very Good		
IPA class 3						
Gender	Interval	F	%	Category		
female	16.0-28.0	0	0.0	Not Very Good	47.31	47.00
	28.1-40.0	0	0.0	Not Good		
	40.1-52.0	16	84.2	good		
	52.1-64.0	3	15.8	Very Good		
Male	16.0-28.0	0	0.0	Not Very Good	46.17	45.00
	28.1-40.0	1	5.9	Not Good		
	40.1-52.0	15	88.2	good		
	52.1-64.0	1	5.9	Very Good		

Based on table 17, it is known that the study requests of female students in class XII IPA 1 are in the very good category with a percentage of 58.8% and a mean of 53.23, a median of 53.00. For class XII IPA 2 women are in the good category with a percentage of 76.2, an average value of 49.52 and a media value of 49.00. Meanwhile, women in class XII IPA 3 are also in the good category with a percentage of 84.2%, a mean value of 47.31 and a median of 47.00.

For men in IPA 1 with a percentage of 50.00% are in the good category with a mean value of 50.42 and a median of 49.50. if seen, men in science class 2 are also in the good category with a percentage of 83.3%. while for men in IPA 3 are in the good category with a percentage gain of 88.2%.

Based on the output obtained, it is known that the science process skills between the female gender and the male gender are almost entirely in the good category. But the majority gender is women who are in the good category. On the indicators observe, measure. Concluding, & creating a table both the female gender and the male gender are in the good category. But in the indicators of designing experiments & conducting experiments, the female gender is mostly good while the male gender is not good. In the indicators observed, both women and men were in the good category. This is because observing is a basic indicator that every stu-

dent must have so that students can develop other science process skills. Based on Mahmudah, (2017) observation skills are skills that designate the five tools found in each student as sight, touch, taste, smell & hearing. Observation skills embody basic knowledge that can give good results to students, because by seeing students they can relate to continuous experience by allocating the principles they know and can help students to be independent in solving a case and be able to think critically and think creatively (Downing & Gifford, 1996; Ango, 2002; Darmaji et al., 2019). So that supervising activities are very important for students to master because they can provide more meaningful lessons, because students are guided further to monitor events that occur in their environment. Furthermore, for measurement indicators, female gender and male sex appearance are also included in the good category. Measuring skills also emphasize the basic skills of science process skills, therefore measuring skills must be mastered by students so that students can share other skills. Based on (Mutmainnah et al., 2019) measuring skills are skills used by students in using the senses in the laboratory. The more often students use certain senses, the more skilled students are at taking measurements (Hamdiyati & Kusnadi, 2007). So that the part in doing practicum students are required to be able to measure the variables available in the experiment. Furthermore, for measurement indicators, female gender and male gender are also included in the good group. Measuring skills also provide basic skills, therefore measuring skills must be mastered by students so that students can share other skills.

The indicator concludes that male & female are in the good category. Conclusion skills are very crucial to be mastered by students because they are basic skills. Conclusion skills are skills that must be possessed by students because they are skills that indicate the development of students' abilities to be able to draw conclusions and students can find out what the experimental outputs are. (Nurhasanah, 2016; Hernawati et al., 2018; Jumania et al., 2019).

The skill of forming a table is the intelligence of the part in displaying information in an easy-to-understand way & in the form of tables or graphs (Mahmudah, 2017). Table-making skills are process skills that include actions such as sketching data, writing graphs, & analyzing data (Hernawati et al., 2018). So that students must master the skills of making tables. Furthermore, on the indicators we experimented & carried out experiments, various sexes were in the good group while the male sex was in the bad group. Experimental design skills are skills in choosing the senses/materials used and skills in choosing what variables to measure (Maheasy, 2017). Elsewhere, our ability to prepare experiments is a skill that can be improved by doing experiments & skills such as which are very important in conducting experiments because we can conduct experiments students can choose their senses & materials and choose what variables to measure (Akani, 2015; Jumania et al., 2019; Ratnasari et al., 2018). Though the ability to conduct experiments makes intelligence has many benefits. This is because the ability to conduct experiments connects the experience gained by students in accordance with the practical activities obtained in accordance with the book. (Ismirianti et al., 2016). Experimental skills are skills that aim to test ideas based on facts, concepts, and principles according to science (Abruscato, 1995; Hernawati et al. , 2018). So that the ability to do experiments is very important for students to master. So based on the output, it was found that the disparity in science process skills was still hidden between female and male sex appearances. The result of this analysis is that science process skills are superior according to female gender than male gender.This is synchronous using statements (Mawarsari et al., 2016; Hamdani, 2017; Yuliskurniawati et al., 2019) which state that female students have better achievement of process skills than male students. The results of this study are also synchronized using research (Zeidan & Jayosi, 2015; Hamdani, 2017) which states that the

science process skills possessed by female students are superior to male students. This is because students who prefer practicum activities are female students (Hadi & Ibnu, 2015). Thus, it was found the effect of gender on students' science process skills. Furthermore, for a critical analysis between female and male gender, there is still a significant disparity. The results of this analysis say that the female gender is superior to the male gender. This research is synchronous using research findings (Cahyono, 2017) Which states that the female gender variance is superior according to the male gender variety. This is because students have intellectual fragments that operate more aggressively in the field of using language functions, as a result, girls are superior to men (Anggoro & Bambang, 2016; Cahyono, 2017; Hidayanti et al., 2020). On the other hand, Crawford (2005) states that female students have better and more reliable questioning abilities than male students, which means that female students have much better critical intelligence than male students. So that gender has an effect on the critical intelligence of students. It is appropriate to use research (Leach & Bagus, 2011) which reveals that gender can significantly influence the homogeneity of critical intelligence of students. In addition, because the disparity in science process skills & critical thinking skills in each child is the disparity in the activities of students in the teaching process through a practical agenda. So that the practicum agenda realizes a very crucial agenda for students to be able to improve their scientific process skills and students' critical thinking skills. Science process skills & students' critical thinking skills hold a very close association with each other. Students who have high scientific process skills will also have high critical thinking skills. Conversely, if students have low scientific process skills, it will result in low critical thinking skills. So that the low science process skills will make students' learning outcomes low. This is commensurate with the analysis which says that the impact of low science process skills on students is less than optimal student learning outcomes (Kurniawati et al., 2016; Syafriyansyah et al., 2013. Thus, it is necessary to improve science process skills so that the critical intelligence of students is also high. To improve students' science process skills, it is necessary to carry out meaningful learning through exclusive experiences or using practicum-based learning (Ekene, 2011; Murni, 2018; Wahyuni et al., 2020). Practicum is a learning process based on exclusive experience & a learning process that uses certain skills. The advantage according to practical activities is that students can share scientific ways of thinking. So that practicum is a very crucial activity in improving science process skills & students' critical thinking skills.

In addition to the different science process skills and critical thinking abilities of male and female students, the interest in learning between male and female genders is also different. Interest in learning is an activity that is carried out by someone in the learning process using feelings of pleasure without being coerced by others. Differences in learning interest of men and women are not too significant. The difference occurs becauseEach student has different abilities and difficulties with different levels.

CONCLUSION

Based on the research results that have been obtained, it is concluded that there are differences in students' science process skills and critical thinking skills in terms of female and male gender. The results of this study indicate that the female gender has higher scientific process skills and critical thinking skills than the male gender. This is because the female gender has a high curiosity and has a better ability to ask questions than male students. The more students' science process skills increase, the higher students' critical thinking abilities. On the other hand, the lower the students' science process skills, the lower the students' critical thinking skills. so it can be said that science process skills and critical thinking skills have a close relationship. In addition, interest in learning

between male and female students has a not too significant difference.

The limitation of this research is that it does not examine all aspects (16 indicators) of science process skills. This study only examines 6 aspects of science process skills.

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