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Gender differences: Students' science process skills based on gender homogeneous class

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Abstract: This study was aimed to describe the ability of students' science process skills based on indicators, and to find out the significance in students' science process skills based on gender homogeneous classes. This is qualitative research with descriptive and inferential statistical approaches. This research was conducted at SMPN 9 Muaro Jambi with a population of all eighth-grade students, and the research sample was 60 students. Determination of the sample was done by random sampling. The whole sample was divided into two groups based on their gender. The instrument used in this study was a science process skill observation sheet. The data were then analyzed using descriptive statistics. The results obtained by the science process skills of the students are in the good category based on basic and integrated science process skills. The value is greater than 50% on each indicator. There is no significant differences between the science process skills of male and female students.

Keywords: *genre, science process skill, homogeneous class*

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INTRODUCTION

Education in the era of modernization is now one of the main benchmarks of a nation is said to be a nation that has high welfare, because education has a very important role in improving human resources. Education in national development is part of the development of Human Resources that occupies a strategic position and basic capital in realizing an advanced and independent nation (Ulya, 2018; Darmaji, Kurniawan, & Irdiyanti, 2019; Wirayuda, Wandai, & Ginting, 2021). Education is a very important and absolute activity in human life and cannot be separated from human life it self (Astalini, Kurniawan, & Putri, 2018; Asrial, Syahrial, Kurniawan, & Septiasari, 2019; Fatonah, Wirayuda, Wibisono, & Sakahuni, 2020). Quality education will produce quality human resources as well, and quality human resources will be able to face life's challenges and proactively capable of adapting to changing times, especially in the current modernization era. Education is obtained through learning activities in schools.

Science is a subject that is directed to find out and do so that it can help students to gain a deeper understanding and discovery process about the natural surroundings (Henikusniati, 2018; Sitorus, Siswandari, & Kristiani, 2019). Science learning plays an important role in instilling students' understanding of the development of Science and Technology because through science learning educators can develop thinking skills, arouse curiosity, motivation and interest of students about Science and Technology (Jamaluddin, Jufri, Ramdani, & Azizah, 2019; Darmaji, Kurniawan, & Astalini, 2020). Science as a process includes the process skills and scientific attitudes needed to acquire and develop knowledge (Astalini,

Kurniawan, Sumaryanti, & Effendi, 2019; Puspita, 2019). The purpose of learning science in the 2013 curriculum is expected to be a means to train students to master science concepts and principles, have scientific skills, and have science process skills to investigate the natural surroundings so that science achievement increases (Wirayuda, Darmaji, & Kurniawan, 2022; Rizal, 2019; Maharani, Taufik, Ayub, & Rokhmat, 2020). Science learning is an important lesson for acquiring and developing knowledge and having science process skills.

Science process skills are students' skills in understanding, developing and empowering their learning process to find knowledge so that learning science is not only known but understood (Rizal, 2019; Mahdian, Almubarak, & Hikmah, 2019). Science process skills are very important for each individual, so they need to be developed with the aim of providing opportunities for students to make discoveries so that students can solve science problems (Novitasari, Ilyas, & Amanah, 2017; Yanti, 2020; Panuluh, Dian, & Dwi, 2020). Science process skills are a tool that can be used to develop students' knowledge (Darmaji et al., 2020; Aldila & Sains, 2021). The development of science process skills in schools is still being ruled out, one of the descriptions that is still being ruled out is the neglect of the development of science process skills in the assessment process (Suhada, 2017; Rizal & Suhandi, 2017).

Science process skills consist of two skills, namely basic science process skills and integrated science process skills. Basic science process skills are the foundation for students to be able to master integrated science process skills (Nurfitriani, Wulan, & Anggraeni, 2018). Basic science process skills include observing, classifying, predicting, measuring, inferring, and communicating (Rezba, Sprague, Donnough, & Matkins, 2007; Sujarwanto & Putra, 2018). integrated science process skills consist of skills to identify and define variables, collect and process data, create tables and graphs, describe relationships between variables, interpret data, design materials, collect data, formulate hypotheses, and design investigations (Mahmudah, Makiyah, & Sulistyaningsih, 2019). In this study, the basic science process skills used are observing, classifying, predicting, measuring, concluding. As for the integrated science process skills, researchers use collecting and processing data, making tables and graphs, interpreting data, designing materials, taking data, formulating hypotheses, designing investigations. Science process skills are part of cognitive thinking skills. Cognitive skills are involved because by doing process skills students use their minds (Mahmudah et al., 2019).

Gender schema theory is the most widely accepted cognitive theory of the sexes, stating that gender stereotypes emerge as children gradually develop gender schemas, what is gender appropriate, and gender is inappropriate in their culture (Diego, Nur, & Suprapto, 2020). Gender is the process of articulating or symbolizing behaviors and phenomena that have long existed and existed amid human life (Thoriquttyas & Rohmawati, 2018; Nafi'ah, Wahyu, & Utami, 2017). Gender has become a fairly warm conversation, it can even become a very interesting issue, the term gender refers to the fundamental aspects of socio-cultural life between a man and a woman to find out information (Nadira, Tawil, & Arsyad, 2020; Muliadi, 2020; Fernando, Permana, Zarkasih, & Ilhami, 2021). Special schools separate classes based on gender (gender homogeneous classes), while public schools mix genders in one class (gender heterogeneous classes) (Afriana, Permanasari, & Fitriani., 2016). Of the many studies on gender, only few have tried to link the influence of the factors of gender inequality (Darmaji et al., 2019). Therefore, it can be said that gender

is defined as a social concept that distinguishes (in the sense of: choosing or separating) roles between men and women.

Based on the results of a preliminary study at one of junior high school on science learning activities, information was obtained that: There is no measurement to determine the ability of students' science process skills; There is no measurement of students' science process skills based on indicators; There is no measurement to determine differences in the science process skills of class students based on gender (gender homogeneous class). Based on this, researchers are interested in conducting research to find out; Description of students' science process skills; Describe students' science process skills based on indicators of science process skills; Are there any differences in the science process skills of class VIII students based on gender (gender homogeneous class) at SMPN 9 Muaro Jambi.

METHOD

This study employed a quantitative descriptive research method with a descriptive observational research design. As for this study, the variables that will be examined are the science process skills variable obtained through the assessment of the observation sheet. The population in this study were all eighth grade students of SMP Negeri 9 Sungai Gelam, Muaro Jambi Regency, for the 2020/2021 academic year which consisted of 7 classes. The sample in this study was 60 of 8th grade students (28 male students and 32 female students). Determination of the sample is done by random sampling / probability sampling. The whole sample was divided into two groups, namely male students and female students. In this study, the quantitative data used were data on students' science process skills, while the acquisition of data on science process skills researchers used an instrument of science process skills observation sheet with a grid which is presented in Table 1.

Table 1
Student's Science Process Skills Assessment Grid

Types	Science Process Skill	Many Statements
Basic science process skills	Observation	4
	classification	1
	Measure	1
Integrated science process skills	Set up an experiment	4
	Do an experiment	2
	Comping table	2
	Acquire and process data	2

The science process skill scores given to students consisted of four categories, namely 1 = not good (NG), 2 = enough (E), 3 = good (G), and 4 = very good (VG). The category range is used to see the category of science process skills that students have based on the grades or scores obtained. The range of values for the assessment of science process skills obtained by students is presented in Table 2.

The data processing technique used is descriptive statistics, as explained (Nasution, 2017) that descriptive statistics are used to describe or provide information on conditions

Table 2
Category range science process skills assessment

Types	Indicators	Value Range			
		NG	E	G	VG
Basic science process skills	Observation	4-7	7.01-10	10.01-13	13.01-16
	Classification	1-1.75	1.76-2.5	2.51-3.25	3.36-4
	Measure	1-1.75	1.76-2.5	2.51-3.25	3.36-4
Integrated science process skills	Set up an experiment	4-7	7.01-10	10.01-13	13.01-16
	Do an experiment	2-3.5	3.51-5	5.01-6.5	6.51-8
	Comping table	2-3.5	3.51-5	5.01-6.5	6.51-8
	Acquire and process data	2-3.5	3.51-5	5.01-6.5	6.51-8

or problems using data. In the descriptive analysis, the mean, median, mode, and standard deviation values (Siyoto & Sodik, 2015). The mean is the total score of the frequency distribution divided by the number of data (Winarsunu, 2017). The median is a number that lies in the middle of a frequency distribution (Jaya, 2010). The mode can be used to analyze the phenomenon that occurs the most or is used the most (Husna & Suryana, 2017). The basis for calculating the standard deviation is the desire to know the diversity of a data group.

Data were analyzed using descriptive statistical analysis. Data were analyzed with the help of IBM SPSS Statistics 25 Software. Data will be homogeneous if the Sig value obtained is more than 0.05 (Sig > 0.05). After the data is said to be homogeneous, then the final analysis test can be carried out. The data collection procedure in this study begins with the initial activity, namely the students doing the liquid pressure practicum, when the students are doing the research practicum, the team is assisted by the team observing the students' science process skills using observation sheets. Furthermore, the researchers analyzed the data using SPSS 25, using descriptive statistical tests. The quantitative data presented used descriptive statistics and inferential statistics.

FINDINGS AND DISCUSSION

The research was conducted to examine the basic science process skills and integrated science process skills of students on the material of liquid pressure. The results of observations on students' basic KPS mastery on the material of liquid pressure are shown in Table 3.

Table 3 shows that the results of the basic science process skills of male students on the material of liquid pressure are in the good category with a percentage of 57.1% or as many as 16 of 28 male students. While the results of the basic science process skills of female students on the liquid pressure material are in the good category with a percentage of 56.3% or as many as 18 of 32 female students are in the good category. The average score on these basic science process skills is 15.68 and the median is 17.00. The minimum score obtained by students is 11 with the maximum score obtained is 18 for female students. The average score on the basic science process skills of male students was 15.42 and the median was 17.00. The minimum score obtained by students is 12.00 with the maximum score obtained is 18.00 for female students.

Table 3
Results of the assessment of basic science process skills

Gender	Value Range	Basic Science Process Skills	F	%	Mean	Median	Min	Max
Famale	19.51-24	Very good	0	0	15.68	16.00	11.00	18.00
	15.01-19.5	Good	18	56.3				
	10.51-15	Enough	14	43.8				
	6-10.5	Not good	0	0				
Male	19.51-24	Very good	0	0	15.42	17.00	12.00	18.00
	15.01-19.5	Good	16	57.1				
	10.51-15	Enough	12	42.9				
	6-10.5	Not good	0	0				

After conducting an assessment of basic science process skills as a whole, the researchers then conducted an assessment of science process skills based on each indicator. For basic science process skills on each indicator according to gender, it can be seen in Table 4.

Table 4
Mastery of students' basic KPS by gender on each

Gender	Basic Science Process Skills Indicators	Kategori			
		NG (%)	E (%)	G (%)	VG (%)
Male	Observation	6.3	31.3	62.5	0
	Classification	12,5	31.3	50.00	5.3
	Measure	6.3	18.8	68,8	6.3
Famale	Observation	7.1	28.6	64.3	0
	Classification	14.3	28.6	50.0	7.1
	Measure	7.1	21.4	64.3	7.1

After knowing the basic science process skills, the next step is to know the integrated science process skills. for the integrated science process skills of SMPN 9 Muaro Jambi students can be seen in Table 5. For integrated science process skills in each indicator according to gender, namely integrated science process skills based on gender can be seen in Table 6.

Table 6 states that female students' integrated science process skills in each indicator, on the indicator of designing experiments and conducting experiments. To be able to use path analysis in the T-test, it is necessary to carry out statistical prerequisite testing procedures on the data first. If all requirements are met, it can be continued with path analysis. Testing requirements analysis through 2 (two) stages, namely: Normality Test, and Homogeneity Test.

Table 5
Results of integrated science process skills assessment

Gender	Value Range	Integrated Science Process Skills	F	%	Mean	Median	Min	Max
Fimale	32,51-40	Very good	0	0	26.81	27.00	23,00	31,00
	25,01-32,5	Good	22	68.8				
	17,51-25	Enough	10	31.3				
	10-17,5	Not good	0	0				
Male	32,51-40	Very good	0	0	26.64	27.00	23,00	29,00
	25,01-32,5	Good	18	64.3				
	17,51-25	Enough	10	35.7				
	10-17,5	Not good	0	0				

Table 6
Mastery of integrated KPS female students on each indicator

Gender	Integrated Science Process Skills	Category			
		NG (%)	E (%)	G (%)	VG (%)
Fimale	Set up an experiment	6.3	43.8	50.00	0
	Do an experiment	0	50.00	50.00	0
	Comping table	12.5	31.3	56.3	0
	Acquire and process data	12.5	12.5	62.5	12.5
Male	Set up an experiment	7.1	42.9	50.00	0
	Do an experiment	0	50.0	50.00	0
	Comping table	0	50.0	50.00	0
	Acquire and process data	0	42.9	42.9	14.3

Testing the normality requirements of each variable is carried out with the aim of knowing whether the distribution of data from each variable does not deviate from the characteristics of data that are normally distributed. The results of the normality test which can be seen in table 9 using the tests of normality spss 25, based on the table in accordance with the decision making reference, namely the data can be said to be normality if the data significance value is greater than 0.005. Based on the basis for making the decision, the data is called the norm, because the significance value of the data = 0.017, Which is greater than the minimum value of the data significance.

After carrying out the normality test and the data is said to be normal, then proceed with the last requirement that must be met in conducting the t analysis. Testing the homogeneity requirements of each variable is carried out with the aim of knowing whether the data obtained and used by researchers are homogeneous or not. The results of the homogeneity test using the test of homogeneity of variances spss 25 which can be seen in table 10, based on the table in accordance with the decision-making reference, namely the data can be said to be homogeneous if the data significance value is greater than 0.005. Based on the basis

for making the decision, the data is said to be homogeneous, because the significance value of the data = 0.093, Which is greater than the minimum value of data significance.

After the data was tested, namely by normality and homogeneity tests, and it was proven that the data were normally distributed and homogeneous, then a t-test was carried out to determine whether the data on science process skills obtained by researchers had differences between the male and female groups.

The results of the partial T test obtained through the independent test sample test spss 25, it was found that there was no difference in the average science process skills of male students and female students' science process skills. These results are based on the basis of decision making, namely if the significance value is greater than 0.005 then there is no difference or there is a similarity in the variance of the science process skills of male students and female students, because the significance value of this study was 0.870 for female students and 0.879 for male students. male which means greater than the significance value.

Science process skills are activities that students carry out scientific investigations that allow the acquisition of scientific knowledge, in order to develop an understanding of scientific concepts to support subsequent abilities, these skills are needed and possessed by students to face competition between humans in the era of globalization (Janah & Widodo, 2018; Nugraha, Suyitno, & Susilaningsih, 2017; Darmaji, Kurniawan, Parasdila, & Irdianti, 2018). Science process skills are used as activities to improve students' psychomotor aspects. This study involved 60 students from class VIII at one of junior high school. This research was conducted based on 3 indicators of basic science process skills and 4 integrated indicators of students. The total number of statements on the student's basic and integrated science process skills observation sheet consists of 16 statements.

The overall results of the students' science process skills were in the good category, namely 56.3% for female students and 57.1% for female students in basic science process skills, and in integrated science process skills, which was 68.8% for female students. and 64.3% for male students and included in the good category. According to Siswono (2017) students' science process skills affect students' mastery of physics concepts, because science process skills affect students' mastery of physics concepts. This is influenced by each indicator of science process skills that are able to develop and improve students' cognitive, psychomotor, and affective aspects. this study is in line with research (Nurqolbi, Riyanto, & Lestari, 2019).

Science process skills are divided into two skills, namely basic science process skills and integrated science process skills. basic science process skills, namely scientific activities that include: observing (observing) namely looking for a picture or information about the object of research through the senses; communicating observational data in various forms such as: pictures, charts, tables, graphs, writings, and others; classify (classification) to make it easier to identify a problem; interpreting data, namely giving meaning to a phenomenon/event based on other events; predicting, i.e. estimating events based on previous events and applicable laws; concluding that they are not maximally honed (Fiteriani, 2017; Suryaningsih, 2017). This study uses indicators of basic science process skills, namely indicators of observation, classification, and measurement.

This research notes that basic science process skills get results into the good category of basic science process skills for male students and female students, this can be seen from the results of the analysis that get a percentage of 56.3% for female students and 57.1% for male students. With the development of basic science process skills, it will be easier for students

to develop integrated science process skills (Ulmiah, Andriani, & Fathurohman, 2016). The integrated science process skills possessed by students can be viewed from each question on the test instrument that has been given (Jannah, Prastowo, & Subiki, 2018). Integrated science process skills include formulating problems, formulating hypotheses, identifying and defining variables, planning and conducting investigations, obtaining and presenting data, analyzing data, and formulating conclusions (Sudiarman, Soegimin, & Susantini, 2015). Learning theory without doing practicum makes students' integrated science process skills untrained (Hariningwang & Fitrihidajati, 2020).

The renewal of this research can be seen from how researchers use gender variables as a separator for students' science process skills. Weaknesses and recommendations in this study are the number of subjects or samples used in the study are distinguished by gender, while the study by Susanto and Erman (2018) only measured in general, does not distinguish between gender and indicators, but in this study includes a pretest and posttest to see the results of the science process skills. For further research, the researcher suggests adding a pretest and posttest. Furthermore, other variables should be added in the research on science process skills so that they can be analyzed for relationships and their effects on other indicators and make them more complex.

This research is expected to be a benchmark for teachers to see students' scientific process abilities so that in teaching and learning activities teachers can adjust students' needs by varying learning methods and models so that learning that takes place in schools can improve students' science process skills.

CONCLUSION

After discusiing the findings to the relevant theories and literature, it can be concluded that: The science process skills obtained by male students in this study were dominantly in the good category based on basic science process skills and integrated science process skills, for female students the basic and integrated science process skills were in the good category; Students' science process skills based on indicators of basic and integrated science process skills. Conducting experiments, obtaining and processing data, and compiling tables are categorized as good because they get a value greater than half of each indicator; In this study, there were no differences or similarities in the average science process skills of male students and female students' science process skills. Science process skills should be trained effectively in the junior high school both for male of female students.

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