Science Process Skills Analysis of Junior High School Students in South Sumatera Using Test Basic of Process Skill (BAPS)

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Abstract: Basic Science Process Skills (BAPS) are some of the scientific skills used to obtain, process, build and apply scientific theories. Basic science process skills are not only useful in learning science but also for students' daily lives. Therefore, it is very important to master science process skills from the age of teenagers who are in the Junior High School phase. This analysis aims to obtain a profile description of the basic science process skills of Junior High School students. The research method used is descriptive method with research subjects as many as five Junior High Schools in South Sumatra Province as many as 505 students as samples. The data collection technique used is a test technique using 25 questions about the basic ability test of the science process. The data were obtained directly from the VIII grade Junior High School students, after the data were recapitulated and then analyzed by simple statistical analysis. Based on the results of the research that has been carried out, it can be seen that the BAPS ability in junior high schools in South Sumatra Province as a whole is in the medium category, which has a percentage for the overall indicator is 56%. which are 72.3 and 61.12, respectively, so that there is a gender effect on the BAPS ability of junior high school students in South Sumatra Province. Science process skills of junior high school students in South Sumatra Province are based on each indicator, the indicator that has the highest value is the predictive indicator with a percentage of 69% in the medium category and the lowest science process skill indicator is the observing indicator with a percentage of 41.3% in the low category, for science process skills on indicators of concluding and communicating have a percentage of 59.5% and 64.6% respectively in the medium category, science process skills for classifying indicators have a percentage value of 48.9% in the low category.

Keywords: BAPS; Science Process Skills; Junior High School; South Sumatra

Introduction

Each science has specific characteristics that distinguish it from other sciences. Natural Sciences is one of the main branches of science which generally includes 3 basic fields of science, namely biology, physics and chemistry, which emerged and developed through the steps of observation, problem formulation, hypothesis formulation, hypothesis testing through experiments, drawing conclusions and discoveries of theories and concepts (Ahmad et al., 2019; Anggereini et al., 2019). Natural Science is one of the subjects at the Junior High School level which is related to how to find out about nature systematically and using the scientific method (Handayani et al., 2017; Syazali et al., 2021). In learning activities, there are many approaches, methods and skills that can be applied in the learning process to improve student learning outcomes. One of the skills that can be applied in learning activities is science process skills (Maison et al., 2020).

Science process skills are one of the skills that train students' thinking skills. Science process skills are all abilities needed to acquire, develop, and apply scientific concepts, principles, laws and theories in the form of mental, physical, and social abilities. According to (Ahmad et al., 2019) that process skills are skills obtained from training in basic mental, physical, and social abilities as drivers of higher abilities. Fundamental

abilities that have been developed and have been trained will eventually become a skill. Science process skills can not only be applied in the learning process in the classroom, but also become a provision in solving problems in everyday life (Permanasari & Hamidah, 2013). So, science process skills are scientific skills that can be used in scientific activities to find something, which includes basic science process skills and integrated science process skills. One alternative that can make students more active in learning activities and give attention to a comfortable and pleasant atmosphere and is closely related to the development of students' science process skills is to use a scientific approach (Rafiah et al., 2018; Rahayu & Angg, 2017).

In addition, in learning, it is also known that there are differences in student learning outcomes in regional schools and schools in urban areas, especially in learning science (Ariska, 2015; Ariska et al., 2021). In addition to circumstances and facilities, differences in learning outcomes are also visible between male and female students. Students consisting of boys and girls certainly have different characteristics both physiologically and psychologically. Physiologically, the difference is related to physical differences, the five senses and so on. While psychologically, the difference is related to interests, level of intelligence, talent, motivation, cognitive abilities and so on. Where all this will affect the process and learning outcomes (Asih & Imami, 2021; Rahayu & Angg, 2017). In studying science, the effect of gender differences can be seen where the science learning achievement of female students with BAPS is lower than that of male students, female students have more control over everything related to health and environmental issues, while male students with spatial skills are superior. in mathematics, physics and chemistry (Rahayu & Angg, 2017). Men use logic better than women in solving existing formulas. This causes at the age of 11 years and over the calculation skills related to measurement and science, male students are much better than female students (Darmaji et al., 2018; Priyambodo et al., 2022; Sunyono & Meristin, 2018; Sunyono & Sudjarwo, 2018).

In addition, the ways of thinking of men and women are different, men are more analytical and more flexible than women. Science process skills are grouped into two, namely basic science process skills and integrated science process skills. Basic science process skills provide a foundation for learning integrated science process skills (Gasila et al., 2019). These basic science process skills include observing, measuring, inferring, grouping or classifying, predicting and communicating (Ratamun & Osman, 2018). In this study, the researcher only discussed basic science process skills because this research was conducted at the Junior Hig School level. Basic science process skills will be useful for mastery of integrated/integrated science

process skills. Integrated science process skills are very important when they are at a higher level of education, so it is important for students to master basic science process skills before learning integrated science process skills (Fuad et al., 2017; Ramdiah & Corebima, 2014).

Method

This research was conducted in a Junior High School in the Province of South Sumatra involving as many as 505 students. The research method used is descriptive method, in the form of survey studies. The population in this study were Junior High Schools in the province of South Sumatra, with samples of SMP Negeri 1 Palembang, SMP Negeri 2 Sembawa, SMP Negeri 2 Pagaralam, SMP Muhamamdiyah Tubohan OKU and SMP Srijaya Negara Palembang, the samples were taken by random sampling technique. The research instrument used in this study is the BAPS test in the form of multiplechoice questions consisting of 25 questions containing several indicators of students' science process skills, which include: observing, predicting, communicating, classifying, and concluding. The percentage calculation is then categorized with the following criteria (Kartimi et al., 2013; S. Rahayu et al., 2021):

Table.1 BAPS Assessment Categories

Value Criteria	BAPS Criteria
≥85	Very Good
70-85	Good
55-70	modarete
40-55	Bad
≥ 40	Very Bad

Then the final value data obtained were analyzed with descriptive statistics to find the average value with the equation (Putri et al., 2021; Rauf et al., 2013), as Equation 1.

$$\text{Percentage} = \frac{\sum xi}{n} \, x \, 100\% \qquad (1)$$

Furthermore, the data on the average value of the Junior High School's BAPS in the Province of South Sumatra is processed into standard deviation data with the equation (Samsudin, 2020) as Equation 2.

$$SD = \sqrt{\frac{\sum (Xi - \bar{x})^2}{(n-1)}} \qquad (2)$$

The average BAPS value of SMP in South Sumatra Province for each indicator is presented in Table 2.

Table 2. Categories of Students' Science Process Skills (Rejeki et al., 2020)

Value (%)	BAPS Criteria
0-25	Very Low
26-50	Low
51-75	Average
76-100	High

Result and Discussion

The average BAPS value of Junior Hihg School in South Sumatra Province for each indicator is presented in Table 3.

Table 3. Student BAPS Score for Each Indicator

BAPS Indicator	Percentage	Category
Observating	0.413	Low
Predicting	0.691	Average
Concluding	0.595	Average
Communicating	0.646	Average
Classify	0.489	Low
Total	0.567	Average

Based on Table 2 above, it can be seen that the value of science process skills can be seen which has the highest value for all indicators, namely the predictive indicator with a percentage value of 69% in the medium category. Similar findings were also expressed by Kartimi et al (2013) which stated that the highest aspect of students' science process skills was in the predicting aspect and Nurhasannah's (2016) findings also showed that the predicting aspect had the highest score with a very good category. Then the science process skills of students who have the lowest value of all indicators, namely the indicator of classifying and observing with a percentage value of 41% and 49% in the low category, for science process skills on the indicators of concluding and communicating have an average value of 59 % and 64% with medium category. From the data above, it can be seen that the indicator that has the highest value is the predictive indicator, the importance of science process skills for predicting indicators in the teaching and learning process in the classroom, that is, students will be easy to analyze possible solutions to each problem they have, so that in this aspect students will use their power. reason to get answers to the problems at hand. This is in accordance with Nurhasannah (2016) that predicting indicators are basic scientific skills that must be possessed by students to process all existing problems properly (Boujaoude & Attieh, 2008). Students must be able to use all their five senses including seeing, hearing, feeling, tasting and smelling. In learning activities students will be required to interact directly with real objects or events, so that students can more easily predict the solutions they have to face in solving problems that arise around them. The average BAPS scores of South

Sumatra Province Junior High School students by gender are presented in Table 4.

Table 4. Science Process Skills Level of SMP/MTs Students in South Sumatra Province by Gender.

BAPS's Indicator	Male		Famale	
	Avg	Cat.	Avg	Cat.
Observating	53.1	Bad	49.8	Bad
Predicting	79.7	Good	73.2	Good
Concluding	72.7	Good	67.6	Moderate
Communicating	78.5	Good	63.6	Moderate
Classify	77.5	Good	51.4	Bad
Average	72.3		61.12	
Category	Good		Moderate	

Based on Table 4, it can be seen that the BAPS of male and female students in each aspect of the BAPS has a different percentage. Likewise, the achievement of categories between men and women is also different. Both male and female students have BAPS in the good category for the predictive aspect and both have BAPS in the poor category on the observing indicator. Meanwhile, the indicators for concluding, communicating and classifying are in the good category for male students. However, different things are shown for the results of this indicator for female students who are in the sufficient category, which has an average score for the concluding indicator of 67.6 and the communicating indicator of 63.6. Thus, it can be seen that male students have better BAPS skills than female students. With each student having an average for the overall BAPS indicator is 72.3 for male students who are in the good category while for female students it is 61.12 which is in the sufficient category. This shows that there is an influence of gender on differences in student BAPS levels in South Sumatra Province.
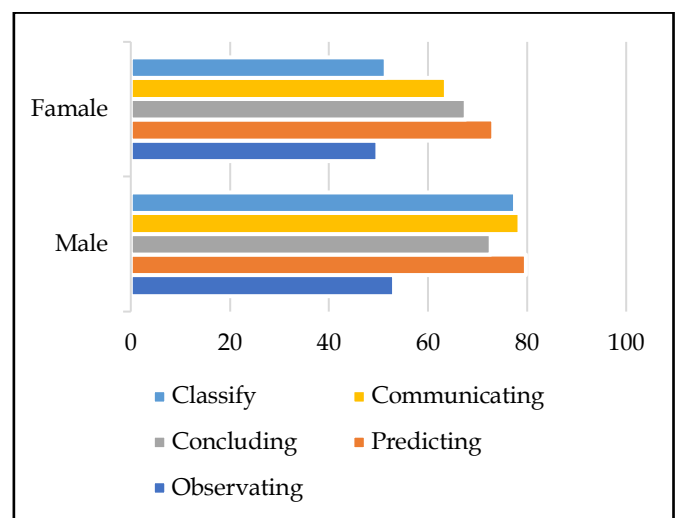

Figure 1. Graph of student BAPS in each indicator by gender

Thus, we need a learning process that is able to grow and develop students' BAPS, where teachers are

required to be able to design and create a science learning process that is able to develop their students' BAPS. So that both basic BAPS and integrated BAPS students can be improved. This is in accordance with the opinion of Amnie et al. (2014) which states that process skills need to be developed through direct experiences as learning experiences. Because through direct experience, one can better appreciate the process or activity that is being carried out.

Science process skills based on gender in SMP in South Sumatra Province, male gender has a higher average score than female gender with an average score of 72.3, while female gender has an average score of 61.12 for female gender. The indicator that has the highest score is the predictive indicator with an average value of 79.7 for male students while for female gender it is 73.2. Overall, the science process skills of junior high school students in South Sumatra Province are categorized as adequate. In studying science, the effect of gender differences can be seen where the science learning achievement of female students with BAPS is lower than that of male students, female students have more control over everything related to health and environmental issues, while male students with spatial skills are superior in mathematics, physics and chemistry (Amnie et al., 2014; Rauf et al., 2013; Yuliati, 2016). Thus, we need a learning process that is able to grow and develop students' BAPS, where teachers are required to be able to design and create a science learning process that is able to develop their students' BAPS. So that basic BAPS can be improved. This is in accordance with the opinion of Rejeki et al., (2020) which states that process skills need to be developed through direct experiences as learning experiences. Because through direct experience, one can better appreciate the process or activity that is being carried out. The average BAPS of junior high school students in South Sumatra Province based on school accreditation is presented in Table 5.

Table 5. Science Process Skills for Junior Hihg School Students in South Sumatra Province Based on School Accreditation

BAPS's Indicator	School Accreditation			
	A	Category	B	Category
Observating	74.1	Good	45.8	Bad
Predicting	88.7	Very Good	69.2	Moderate
Concluding	76.7	Good	63.6	Moderate
Communicating	83.5	Good	65.6	Moderate
Classify	79.5	Good	46.4	Bad
Average	80.5	Good	58.12	Moderate

Based on Table 4, it can be seen that from the research data obtained, the science process skills of students in SMP, South Sumatra Province, the highest value of science process skills is owned by schools that have A accreditation with an average score of 80.5 in the good category, and the lowest science process skills are owned by schools with B accreditation with an average score of 58.12 with sufficient category. These students' science process skills require teachers to be able to develop, design and create a science learning process that is able to develop students' BAPS. According to Ward & Lee, (2002) one alternative that can make students more active in learning activities and pay attention to a comfortable and pleasant atmosphere and is closely related to the development of students' science process skills is to use a scientific approach.
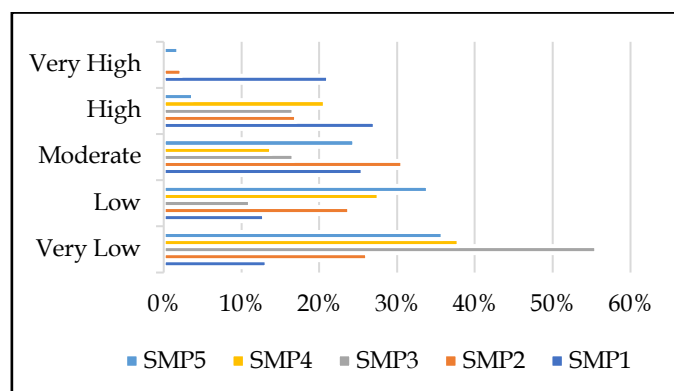

Figure 2. Graph of BAPS Percentage of Junior High School Students in South Sumatra

Table 6. Student BAPS Profile of Each Junior High School in South Sumatra Province

School Name	Very Low	%	Low	%	Moderate	%	High	%	Very High	%	BAPS's Student BAPS's Average
SMP1	42	0.13	41	0.12	81	0.25	86	0.27	67	0.21	63.0
SMP2	23	0.26	21	0.23	27	0.31	15	0.17	2	0.02	54.0
SMP3	10	0.55	2	0.11	3	0.16	3	0.16	0	0.00	47.0
SMP4	11	0.37	8	0.27	4	0.13	6	0.21	0	0.00	51.0
SMP5	19	0.35	18	0.33	13	0.24	2	0.03	1	0.01	48.0
Total	105		90		128		112		70		52.6

Based on Table 6, it can be seen that there are 5 (five) Junior High Schools that have different BAPS average scores, even though the BAPS average scores are almost close to each other. There is only one school that has moderate criteria (enough) for the other four schools are in the BAPS criteria that are not good. The results of the

overall BAPS percentage of junior high school students can be seen in Figure 4.

Based on Table 6 and Figure 2, it can be seen that the highest number of students have a very low BAPS category, as well as when viewed from the average student BAPS score which only reaches 52.6 with a low overall category of students. Thus, overall, it can be concluded that the BAPS of Junior High School students in South Sumatra is still low or not good. The graph of the average BAPS score for each Junior High School in South Sumatra Province is described in Figure 3.
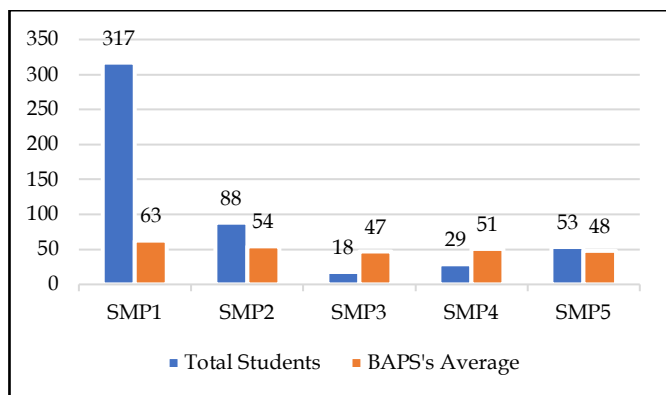

Figure 3. Graph of Average BAPS Score for Each School

This is in line with the results of research by Sukarno, Permanasari, and Hamidah (2013) which stated that the low BAPS of students was caused by many factors, including 1) the low ability of teachers' BAPS; 2) lack of teaching materials that develop and improve students' BAPS; 3) lack of guidance in developing BAPS-based assessment tools for both teachers and students. Whereas according to Darmaji et al., (2018); Priyambodo et al., (2022); Ratamun & Osman, (2018); Ward & Lee, (2002) that science process skills are one of the most frequently used thinking skills, in addition Syazali et al., (2021) emphasizes that individuals who cannot use BAPS will experience difficulties in everyday life. This shows how important science process skills are to be developed and possessed by every student in Junior High School.

Based on Table 7, the next analysis is to analyze the students' correct answers and group them into each BAPS indicator. To find out the extent to which the BAPS of SMP South Sumatra Province students for each BAPS indicator can be seen in Table 7.

Table 7. Profile of Each Student BAPS Indicator

BAPS's Indicator	Correct Amount	(%)	Category
Observating	1043	41	Low
Predicting	1746	69	Moderate
Concluding	1504	59	Moderate
Communicating	1632	64	Moderate
Classify	1235	49	Low
Average	1432	52	Low

Based on Table 7, it can be seen that of the five indicators of BAPS tested in the test questions, there are only five indicators that appear in the medium category and the rest are in the low category. Student BAPS indicators that appear in the medium category are predicting, concluding and communicating. Meanwhile, the aspects of students' BAPS that appear in the low category are observing and classifying indicator.
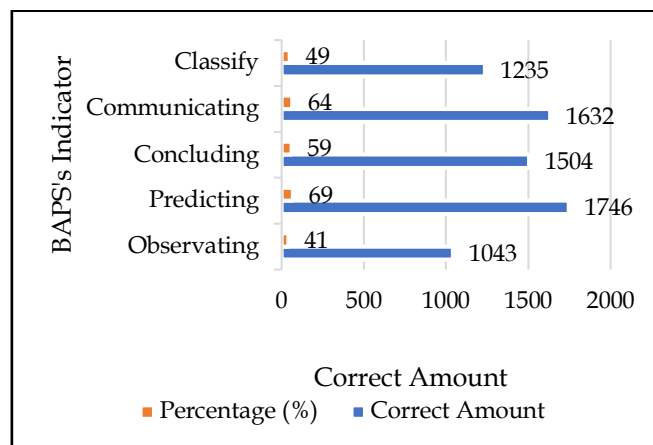

Figure 4. Student Graph for Each BAPS's Indicator School

This shows that the BAPS of Junior High School (SMP) students for each indicator is generally in the low category, where on average students are only able to answer correctly as much as 52% of each BAPS indicator tested. Based on the data above, it can be seen that the BAPS of students in the basic BAPS is still low. This strengthens the research results of Ahmad et al., (2019); Maison et al., (2020) which state that the science process skills of junior high school students in Jambi in the skills of making conclusions, observing, predicting, measuring and classifying are still low.

Conclusion

Based on the description and data processing of the Basic Science Process Skills of Junior High School Students in South Sumatra Province, it can be concluded that in general the science process skills of junior high school students can be concluded that the science process skills of junior high school students in South Sumatra Province are based on each indicator, the indicator that has the highest value is the predictive indicator. the percentage of 69% in the medium category and for the indicator of the lowest science process skills, namely the observing indicator with the percentage of students at 41% in the low category, for the science process skills in the concluding and communicating indicator the percentages are 59% and 64%, respectively. both are in the moderate category. Meanwhile, the indicator classifying has a percentage value of 49% in the low category. The science process skills of junior high

school students in South Sumatra Province are based on gender, for female gender has an average score of 61.12 and for male gender has an average score of 72.3. This data shows that the basic science process skills of male students are better than female students, especially on indicators of communicating and classifying. Overall, the basic science process skills of junior high school students in South Sumatra Province are in the medium category. The science process skills of junior high school students in South Sumatra Province are based on school accreditation, for all indicators of the value of science process skills with schools that have A accreditation have an average score of 80.5 in the good category, science process skills for schools that have B accreditation have an average score -average 58.12 with low category.

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