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Science process skills of prospective science teachers' in practicum activity at the laboratory

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Abstract: This research aims to determine the prospective science teachers' mastery level of science process skills (SPS), the mastery level of SPS indicators, and the prospective science teachers' mastery level of SPS based on gender. This study used a descriptive method with a quantitative approach. Purposive sampling techniques are used and obtain 23 prospective science teachers during the last two years at the Universitas Negeri Manado. The research instrument used interview guidelines and observation sheets. The results showed (1) the prospective science teachers' mastery level of SPS in practicum activity at the laboratory is 80% categorized as sufficient; (2) the mastery level of SPS indicators by prospective science teachers: classifying 87% categorized as good, observing 86% categorized as good, asking questions 82% categorized as sufficient, experimenting 81% categorized as sufficient, planning an experiment 79% categorized as sufficient, interpreting data 77% categorized as sufficient, and communicating 70% categorized as very poor; (3) based on gender, the mastery level of the SPS by prospective female science teachers (83%) is higher than prospective male science teachers (73%). The findings are useful for science education lecturers to direct their laboratory teaching for prospective science teachers to master science process skills.
Keywords: science process skills, prospective science teachers, practicum, laboratory

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INTRODUCTION

Science or natural science is formed and developed through a scientific process (Hamadi et al., 2018). Generally, the conventional science learning process relies on thinking (minds-on), so science is limited only to a collection of knowledge (a body of knowledge). These conditions give students good abilities in mastering science concepts, but only some or even acquiring process skills. In fact, we need science process skills to carry out the scientific method (Hardianti & Kuswanto, 2017). On the other hand, learning through practical activities (practical work) promotes students to think (mind-on) and be hands-on (Dewati, 2015). In other words, the learning process of practical activities can make students perform complex procedures while thinking about scientific concepts.

Science process skills are part of the thinking skills scientists, teachers, and students use when learning science (Turiman et al., 2012). Scientists are used science process skills to carry out investigations and explorations. They will only play a role in science activities such as investigation and interpretation with an excellent scientific understanding. Prayitno et al. (2017) stated that the scientific process occurs when scientists possess the skills of scientific work to find a scientific product. Science process skills are one of the main goals to be achieved in science education because these skills are utilized not only by scientists but also by everyone to become science literate (Gultepe, 2016). Through science process skills, students are expected to be able to carry out the steps of the scientific method to acquire new knowledge or develop their existing knowledge. It aligns with constructivist learning theory, which explains that the learner actively constructs knowledge based on experience (Narayan et al., 2013).

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Science process skills are divided into two categories: basic and integrated skills (Silay & Çelik, 2013; Gultepe, 2016; Darmaji et al., 2019; Harahap et al., 2019). Basic process skills include observing, inferring, measuring, communicating, classifying, predicting, using space-time relationships, and using numbers. Integrated process skills include controlling variables, operationally defining, formulating hypotheses, formulating models, interpreting data, and experimenting. As the name implies, basic science process skills are the basis for integrated process skills. On the other hand, integrated process skills must be learned and taught after basic science process skills. In line with Rauf et al. (2013), basic science process skills are a prerequisite for integrated process skills, while integrated process skills are advanced skills helpful in solving problems or conducting science experiments.

In science learning, how knowledge is obtained is more important than just studying the subject matter (Silay & Çelik, 2013). The most significant goal of education should be teaching students how knowledge is acquired and processed. Teaching science process skills is emphasized to achieve these goals. Chabalengula et al. (2012) stated that science teachers must have the knowledge and understanding to teach and be proficient in science process skills. Thus, prospective science teachers must first learn and carry out each stage to have a strong conceptual understanding of science process skills and be skilled when guiding their students later.

Science process skills are skills and techniques scientists use in the laboratory to find new scientific information (Lepiyanto, 2014). Gultepe (2016), through his research, reveals that science process skills can only be acquired effectively through laboratory activities when teachers and students are involved. Agustian (2020) states that, ideally, a science laboratory can be a means to achieve teaching goals related to specific practical skills. Thus, practicum activity at the laboratory can be an excellent way to develop science process skills. Besides, learning activities in the laboratory play an essential role in studying biology, chemistry, and physics (Shana & Abulibdeh, 2020).

The General Biology II course consists of two credits for theory and one credit for practicum (Science Education Department Catalog, 2021). Interviews conducted by the researchers with the lecturers of the General Biology II course succeeded in revealing several facts, namely (1) most of the assessments focused on cognitive abilities and did not assess students' psychomotor skills; (2) the lecturer had never assessed the science process skills of prospective science teachers; and (3) practicum activities in previous years were only carried out twice, namely once in the laboratory and once outdoors. Rahayu (2020) states that the assessment of learning outcomes only focuses on the cognitive domain due to the assumption that cognitive is related to a person's ability to master the content of teaching materials. Adams (2015) also states that the most common usage of Bloom's taxonomy focuses on cognitive skills rather than psychomotor or affective skills. We all know that the learning objectives are not only about the cognitive domain but also the affective and psychomotor domains (Rao, 2020). Begam & Tholappan (2018) stated that assessing students' performance in the courses is vital in producing graduates who can integrate the theory and practice of the learned courses in higher education programs. The interview results also inform us that practicum activities in the laboratory still need to be carried out. The lecturer revealed that the reason for this was the limited tools and materials in the laboratory. It aligns with Hamadi et al.'s (2018) research, which reveals that the mastery of science process skills has yet to be maximized due to laboratory limitations. This condition will undoubtedly impact prospective science teachers' mastery of science process skills.

Science process skills must be trained at the university level, especially for those who become science teachers. Af'idayani et al. (2018) stated that teachers still need to be aware of the importance of science process skills in learning. Prospective teachers must understand science process skills because they are essential in science learning (Rauf et al., 2013). Science teachers are expected to be able to prepare practicum-based learning and assess their students' science process skills. To expect students in science classrooms to have good science process skills, prospective science teachers must also have a good mastery of process skills. Agustina & Saputra (2016) stated that science process skills need to be trained for prospective teacher students to have experience learning that develops science process skills. In addition, training and developing science process skills in students will benefit them as a process to build knowledge in learning (Lestari & Diana, 2018). Thus, prospective science teachers' science process skills are important to know before they legally become teachers.

Prospective science teachers can obtain science process skills through theoretical lectures and practical activities (Hamdani, 2017). Research by Idris et al. (2022) on strategies used to enhance students' mastery of science process skills reported that of the 22 selected research articles, only three suggested practicum activities in the laboratory be the way to improve mastery of science process skills. Their results provide information that research on prospective science teachers' science process skills in practical laboratory activities is still lacking and needs to be investigated more. On the other hand, Seery et al. (2017) stated that direct assessment of skills during laboratory learning is still underreported. Therefore, this study aims to determine: (1) the prospective science teachers' mastery level of science process skills in practicum activity at the laboratory; (2) the mastery level of science process skills indicators; and (3) the prospective science teacher's mastery level of science process skills based on gender. The results of this study serve as a reference for lecturers in the field of education at the university level to plan and implement learning strategies that can improve the science process skills of prospective students for science, biology, chemistry, and physics teachers, especially in practicum activity at the laboratory settings.

METHOD

This study uses a descriptive method with a quantitative approach (quantitative descriptive). We conducted this research in the last two academic years at the Integrated Sciences Laboratory at Universitas Negeri Manado. Sampling used a purposive sampling technique, and the selected sample was contracting the General Biology II course in the undergraduate Science Education study program in the 2020/2021 and 2021/2022 academic years. The total number of students who attended the course was 23, comprising seven males and sixteen females as research subjects. We used observation and interviews as data collection techniques. The research instruments used were interview guidelines and observation sheets as performance assessments.

The research procedure comprises six stages: pre-survey, literature review, observation, interviews, data processing, and conclusion. We carried out pre-survey activities by interviewing subject lecturers. The literature review is carried out in international and national journals and proceedings. Observations are carried out during practical activities in the laboratory using observation sheets. Interviews were conducted after the observation and data processing activities were carried out. Finally, drawing conclusions based on the results of data processing.

Data on the science process skills of prospective science teachers were obtained using observation sheets as performance assessments. The feasibility of the observation sheets was determined through a construct validity test by 3 validators, namely two expert lecturers and a course lecturer. The results of the observation sheet validation showed a score of 3.67 (valid), so the observation sheets were declared fit for use.

The observer filled out the observation sheet to determine the mastery score of science process skills indicators based on five score criteria, i.e., excellent as able to do tasks properly without assistance (score 4), good as able to perform tasks with little assistance (score 3), sufficient as able to do tasks with medium assistance (score 2), poor as able to perform tasks with many assistance (score 1), and very poor as unable to perform tasks at all (score 0). Observations were carried out directly by three observers on three titles of practicum activities, namely the anatomy of the male animal reproductive system, the anatomy of the female animal's reproductive system, and the anatomy of the animal digestive system. We also conducted interviews after practicum activities to obtain supporting data about the responses of prospective science teachers to practicum activities at the laboratory.

A descriptive statistical technique was used as a data analysis technique. The data analysis aims to obtain the percentage of prospective science teachers' mastery of science process skills. The calculation of the percentage of science process skills using equation 1 (Purwanto, 2013).

$$P_{sps} = \frac{R}{MS} \times 100 \tag{1}$$

where P_{sps} is the percentage of each indicator of science process skills, R is the score of acquisition on each indicator of science process skills, and MS is the maximum score on each science process skill indicator.

The percentage score obtained is then interpreted into the mastery level of the science process skills category. The mastery level of science process skills for prospective science teachers and science process skills indicators is divided into five categories: excellent, good, sufficient, poor, and very poor. The determination of five categories of science process skills is based on the categorization norm by Azwar (2021). The range of criteria for one research score can differ from other research because it adjusts to the number of subjects. The range of scores for the interpretation to the category mastery level of science process skills is shown in Table 1.

Table 1. Norms Categorization and Interpretation of Science Process Skills Mastery Level

Scoring Criteria	Interpretation for Prospective Science Teachers	Interpretation for Science Process Skills Indicators	Category
$X_{\text{items}} \geq \bar{x} + 1{,}5\ \sigma$	≥ 99	≥ 89	Excellent
$\bar{x} + 0{,}5\ \sigma < X_{\text{items}} \leq \bar{x} + 1{,}5\ \sigma$	86 – 99	83 – 89	Good
$\bar{x} - 0{,}5\ \sigma < X_{\text{items}} \leq \bar{x} + 0{,}5\ \sigma$	73 – 86	77 – 83	Sufficient
$\bar{x} - 1{,}5\ \sigma < X_{\text{items}} \leq \bar{x} - 0{,}5\ \sigma$	60 – 73	71 – 77	Poor
$\bar{x} - 1{,}5\ \sigma \leq X_{\text{items}}$	≤ 60	≤ 71	Very Poor

where $\bar{x}$ is the average score of the percentage of science process skills for all students or indicator, X_{items} is science process skill score for each student/indicator, and σ is standard deviation.

RESULTS AND DISCUSSION

We obtained the study's results on the mastery level of science process skills through direct observation during practical activities at the Integrated Science Laboratory, Universitas Negeri Manado. Three observers made observations in three practicum groups using observation sheets as performance assessment sheets. Performance assessment is carried out by observing student activities in carrying out an activity (Pratama & Rosana, 2016). Before making observations, the three observers were given instructions and taught how to fill out the observation sheet. The observation process is carried out without disturbing the ongoing practicum activities. The score given by the observer is then converted into percentage form.

In this study, we used inquiry-based learning as a learning model to facilitate practicum activity. Practicum can be interpreted as a series of activities that allow students to apply skills or practice something (Suryaningsih, 2017). One way that can be sought to improve science process skills is to use inquiry-based learning in laboratory activities (Riera & Bautista, 2021). They further explained that inquiry-based laboratory activities enhance students' abilities and skills, such as asking scientific questions, formulating hypotheses, designing and conducting scientific investigations, developing scientific explanations, and defending scientific arguments. The inquiry-based learning model is one of the learning models characteristic of being student-centered, which can improve science process skills (Navy et al., 2021). In student-centered learning settings, students are expected to be more dominant in carrying out activities and being responsible during the learning process to construct knowledge for themselves (Baeten et al., 2016). In line with this statement, the results of research by Kol & Yaman (2022) found that student-centered teaching practices in science education have a stronger influence on developing students' scientific process skills than teacher-centered learning practices. Furthermore, they revealed that student-centered approaches in which SPS is measured positively affect science lessons compared with traditional methods.

Science process skills include physical and mental skills used by researchers to discover new knowledge (Juniar et al., 2021). Science process skills are needed to support practical laboratory activities (Lumbantoruan et al., 2019). Science process skills assessed in this study include basic skills and integrated skills. The basic science process skills we focus on to assess are observing, asking questions, planning an experiment, classifying, and communicating. The integrated science process skills we focus on are experimenting and interpreting data.

Prospective Science Teachers' Mastery Level of Science Process Skills

In this study, the results of assessing the science process skills of prospective science teachers in practicum activity at the laboratory are shown in Table 2.

Table 2. Percentage of Prospective Science Teachers' Mastery of Science Process Skills

Academic Year	Students Attending the Course	Average Score	Percentage (%)	Category
2021/2022	14	3,18	80	Sufficient
2020/2021	9	3,22	80	Sufficient

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Data from observations regarding the science process skills of prospective science teachers in practicum activity at the laboratory shows 80% as the average percentage of the whole sample. If referring to the category interpretation criteria in Table 1, the percentage obtained shows that prospective science teachers' mastery of science process skills is in the sufficient category. The prospective science teacher who achieved the highest percentage of science process skills is MR, with an acquisition of 97% in the good category. In comparison, the prospective science teacher who obtained the lowest percentage is IGY, with 52% in the very poor category. This finding aligns with previous research by Aktaş & Ceylan (2016), which found that pre-service science teachers' mastery of science process skills was moderate.

Based on interviews that the researcher conducted with prospective science teachers who obtained the highest percentage, we found that he had much experience doing practical work on biology subjects in the laboratory when he was still in high school. Lumbantoruan et al. (2019) wrote that good mastery of science process skills could be seen through student performance when conducting research in the laboratory. On the other hand, the prospective science teacher with the lowest percentage stated that he felt stiff and dominantly passive when carrying out practical activities because he lacked practical experience in laboratories at the previous level of education at senior high school. He further informed us that this was probably due to the lack of tools and materials needed at that time. Tanti et al. (2020) stated that students who are passive during practicum tend to be confused about what to do even though a practicum guide has been provided for them. Learning activities in the laboratory play an important role and characterize science learning (Ranawake & Wilson, 2016). A similar opinion by Shana & Abulibdeh (2020) states that learning activities in the laboratory are essential for studying science. However, one of the problems often faced is the lack of tools and materials needed for experiments.

The percentage of mastery level in the five science process skills category can be seen in the Figure 1.

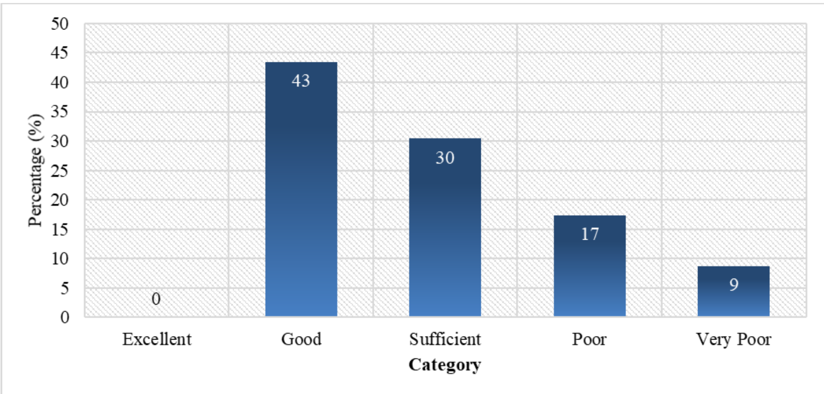

Figure 1. Percentage of Mastery Level in The Science Process Skills Categories

Figure 1 show the percentage in the excellent category is 0%, the good category is 43%, the sufficient category is 30%, the poor category is 17%, and the very poor category is 9%. Saban et al. (2019) stated that teachers are essential stakeholders for students to develop science process skills. Identifying the science process skills of prospective teachers is important to provide an overview of their science process skills so that the lecturers of the subject can carry out recommendations for improving the implementation in future learning (Asy'ari & Fitriani, 2019).

In this study, the researcher also interviewed prospective science teachers after the practicum to support the primary data from the observation sheet. Sugiyono (2015) states that interviews are used to collect data if the researcher intends to know things more deeply than the respondents. Interviews were structured based on a list of questions we had prepared in advance. A total of four questions regarding the response of science teachers to practicum activity at the laboratory have been asked. Five prospective science teachers became respondents, comprising three representatives from each group, one with the highest percentage score and one with the lowest percentage score.

The results of interviews regarding the response of prospective science teachers to practicum activity at the laboratory revealed: (1) prospective science teachers felt happy and interested when doing practicals in the laboratory because they had direct and authentic experience with lecture material; (2) prospective science teachers are motivated to learn because the questions that arise at the beginning of

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learning can be answered through practical activities and the learning process is more interesting than study at the classroom; (3) prospective science teachers find it helpful to understand lecture material through practicum activity because the observations made are on real objects; and 4) prospective science teachers experience obstacles/difficulties during practicum because there are group members who do not have practical experience in the laboratory, so they are not careful when using practical tools and materials.

Mastery Level of Science Process Skills Indicators

Research data regarding the mastery level of science process skill indicators in practicum activity at the laboratory are shown in Table 3.

Table 3. Mastery Level of Science Process Skills Indicators

Types of Science Process Skills	Indicator	Average score	Percentage (%)	Category
Basic	Observing	3,43	86	Good
	Asking questions	3,29	82	Sufficient
	Planning an experiment	3,16	79	Sufficient
	Classifying	3,48	87	Good
	Communicating	2,78	70	Very Poor
Integrated	Experimenting	3,25	81	Sufficient
	Interpreting data	3,07	77	Sufficient

Data processing results show prospective science teachers' mastery of science process skills indicators differs. Seven indicators of science process skills are assessed in practicum activity at the laboratory in the General Biology II course. Science process skills indicators included in the good category are observing (86%) and classifying (87%). In the sufficient category, there are four indicators of science process skills, namely asking questions (82%), planning an experiment (79%), experimenting (81%), and interpreting data (77%). Communicating (70%) is the only indicator of science process skills in the very poor category. Thus, observing is the highest indicator of science process skills, while communicating is the lowest indicator. In addition, no indicators of science process skills are included in the excellent and poor categories. Rusmini et al. (2021) stated that there should be an effort to train the science process skills of prospective teachers so that teachers who have mastered science process skills can produce well.

The observing indicator obtains a percentage of 86% and is categorized as good. This result shows that prospective science teachers are skilled at observing the studied object. Fadhilah & Yenti (2019) revealed that observing skills are activities of choosing facts that are relevant to a particular task on the things being observed or choosing facts to interpret certain events through responses to various objects and natural events using the five senses. We observe objects and events using all five senses to learn about the world around us, including scientific phenomena. Panjaitan et al. (2018) state that teachers can develop their students' science process skills through laboratory activities so that direct and real interactions occur using the five senses. The more senses we use, the more complete and comprehensive information we can obtain on the object being observed (Zai & Ishafit, 2019). Indicators of observing appear when students observe the anatomical structure of the organs in the animal's body. At the time of observation, all students looked very enthusiastic and active. The results of our study are in accordance with the results by Darmaji et al. (2019), which found that observing is an indicator of science process skills that is most mastered by prospective physics teachers, with 83% gains categorized as very good.

The asking questions indicator gets a percentage of 82% and belongs to the sufficient category. This indicator obtained a moderate percentage because students actively asked questions during learning, planning experiments and discussions, and presentations. However, some students still needed help to speak up to ask questions. Pedrosa-de-Jesus, Leite, and Watts (2016) stated that the student's questions were expected to reflect their curiosity, reasoning, doubts, and difficulties they might experience. The observations showed that each student could ask at least one question about the background of the objectives and experimental plans. Suryaningsih (2017) states that the form of questions is good if it demands answers they can obtain through thought processes or practical activities. In line with this, the questions in this study are closely related to the practicum objectives carried out so that prospective science teachers can obtain the expected

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answers through practicum as practical work. A similar study by Lestari & Diana (2018) showed that the indicator of asking questions for prospective physics teachers scored 62% and was categorized as poor. It is different from the results of research by Rahayu (2020), which shows that the asking skills of prospective chemistry teachers in the practical basics of analytical chemistry are 55% with sufficient category.

The planning experiment indicator obtained a percentage of 79% and was classified into the sufficient category. During practicum activities, each group of students is asked to determine the purpose, write down the tools and materials to be used, determine what things will be observed, measured, and recorded, and must be able to make their practicum work steps. They should do it because science process skills focus on the ability of students to discover the knowledge they have learned for themselves so that learning can be more meaningful to them (Darmaji et al., 2019; Rusmini et al., 2021). The observations on the indicators for planning experiments showed that all groups had correctly written the practicum objectives, tools, and materials. However, the practicum work steps they had written needed to be completed. In addition, some pre-defined tools are also not visible at which work steps. Our findings align with the research results by Setiawan & Sugiyanto (2020), which found that the science teachers' experimental planning skills indicator scored 60% in the sufficient category. Lestari and Diana (2018) also reported that the ability to plan experiments for prospective physics teachers was in a good category (77%).

The classifying indicator obtaining a percentage of 87% is included in the good category. Classifying is an activity of relating objects and events according to their properties or attributes (Zeidan & Jayosi, 2015). Classifying is based on recognizable patterns and observed similarities and differences (Widdina et al., 2018). During practicum activities, students classify various types of organs based on anatomical characteristics by recording their observations into a table of designed observations. Lumbantoruan et al. (2019) stated that the success of students doing classification could be seen in the experimental data table they made. This indicator is included in the good category because students have studied topics related to the title of the practicum carried out to classify the observed objects based on similarities, differences, and functions. When conducting experiments, students could distinguish and separate the organs that were the observation target from those that were not. This finding contributes in response to research by Darmaji et al. (2019), who reported that prospective physics teachers got an average score of 84 (concave lens practicum activities) and 80 (convex lens practicum activities) on the skill indicator to classify it as included in the good category. On the other hand, research by Rahayu (2020) reports that prospective chemistry teachers get a score of 60.00% with a sufficient category on the indicators of classifying skills in the basic practicum of analytical chemistry.

The communicating indicator has a percentage of 70% and is included in the very poor category. Özden & Yenice (2022) state that communication skills include communicating orally and in writing and using mathematical symbols, graphs, tables, and figures appropriately to communicate research findings. At the end of the practicum activity, students are asked to present the results of their observations when conducting experiments and submit practicum reports. After completing the experiment, the students in their respective groups discussed and shared what they knew with each other verbally. The group discussion results were then presented in front of the class and allowed for a question-and-answer session. In this case, students must be able to communicate and share what they observe and know with others. In addition, students are also required to make a practicum report with a predetermined collection time limit. The same treatment by Agustina & Saputra (2016) reported that the good communication skills measured are communication skills in writing, namely through reports. The low percentage of communication indicators was because, during group presentations, not all group members spoke and answered and responded to questions during the discussion. Another reason is collecting practicum reports; five students were late submitting, while six did not. Our findings are the same as the results of research by Setiawan and Sugiyanto (2020), who reported that science teachers obtained a percentage of 18% on the communicating indicator, so they were included in the very poor category. Hasyim (2018) found that communicating skills are science process skills that prospective physics teacher students less master.

The experimenting indicator obtained a percentage of 81% and was included in the sufficient category. Inayah et al. (2020) stated that practicum activities have a crucial role in achieving the

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goals of science education, one of which can develop basic skills in conducting experiments. Zeidan & Jayosi (2015) stated that through this activity, we could interpret and present results in a report that others can follow to replicate the experiment. Experiments are carried out based on the work steps made by the previous group when planning the experiment. When conducting experiments, most of the students in the group seemed able to use tools correctly, utilize materials appropriately, and carry out practicum according to the work steps. However, the observations revealed that not all students followed the work steps, so one group took longer to complete the practicum compared to other groups. Our study's results align with research by Lestari & Diana (2018), which reported that based on observations, prospective physics teachers obtained a percentage of 73% on the indicators of experimenting so that they were included in the sufficient category. Similar research by Kruea-I, et al. (2015) also revealed that prospective science teachers scored 76% on the experimenting indicator, so they were included in the good category.

The interpreting data indicator obtained a percentage of 77% and was included in the sufficient category. Data interpretation is organizing and drawing conclusions based on that data (Hamdani, 2017). Data interpretation aims to describe an investigation, obtain results/data, and identify a graph representing the data (Adlim et al., 2018). Students are asked to interpret data from observations from experimental activities in this indicator. Students in each group were asked to make a relationship between the observed organs and make conclusions based on the results of their experiments. Our study's results align with previous research by Lestari & Diana (2018), which found that the interpretation ability of prospective physics teachers scored 70% in the sufficient category. In addition, Rahayu (2020) also reported that prospective chemistry teachers scored 54% in the sufficient category on the indicator of interpreting data skills.

Mastery Level of Science Process Skills Based on Gender

This research also resulted in mastery of science process skills for science teacher candidates based on gender which can be seen in Figure 2.

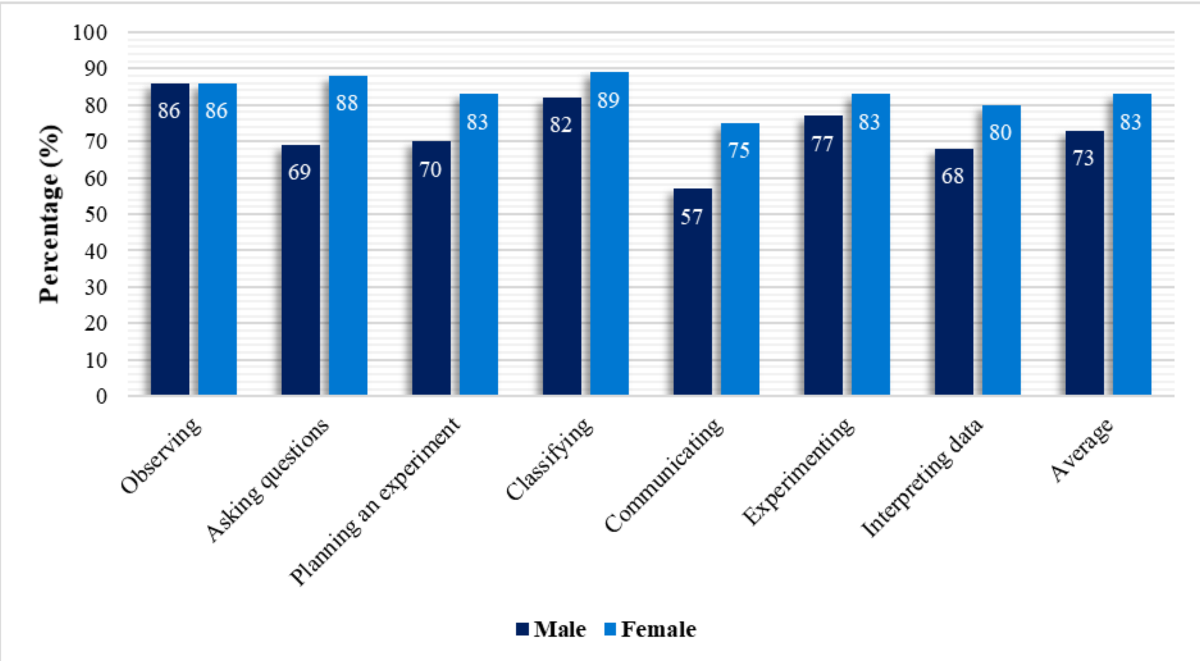

Figure 2. Prospective Science Teachers' Mastery Level of Science Process Skills Based on Gender

The sample in this study amounted to 23 students consisting of seven males (30%) and sixteen females (70%). Research data regarding the prospective science teachers' mastery level of science process skills based on gender is shown in Figure 2. Data processing results show that prospective female science teachers have more control over the indicators of science process skills than prospective male science teachers. These indicators are asking questions 88%, planning an experiment 83%,

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classifying 89%, communicating 75%, experimenting 83%, and interpreting data 80%. Only one indicator of science process skills has an equal mastery level, namely observing 86%.

Figure 2 shows that the average percentage of science process skills for males is 73%, while for the female is 83%. Thus, statistically descriptive, there is a difference in the average percentage of science process skills between males and females. Darmaji et al. (2022) stated that female students have better science process skills than male students because they are more enthusiastic with highly curiosity when doing practicum activities. However, this percentage indicates no significant difference between the science process skills of males and females. Widdina et al. (2018) stated that both male and female students have almost the same ability of science process skills because they experience the learning process in the same class and time. Our findings align with Hamdani's (2017) research, which found no difference in the mastery of science process skills between male and female physics teacher candidates.

CONCLUSION

The results of the research that have been obtained show: that first, the prospective science teachers' mastery level of science process skills in practicum activity at the laboratory is 80%, which is included in the sufficient category. Second, the mastery level of science process skills indicator by prospective science teachers, namely classifying 87% categorized as good, observing 86% categorized as good, asking questions 82% categorized as sufficient, experimenting 81% categorized as sufficient, planning an experiment 79% categorized as sufficient, interpreting data 77% categorized as sufficient, and communicating 70% categorized as very poor. Third, based on gender, prospective female science teachers' mastery of science process skills (83%) is higher than prospective male science teachers' (73%). The results of this study serve as a reference for lecturers in the field of education at the university level to plan and implement learning strategies that can improve the science process skills of prospective students for science, biology, chemistry, and physics teachers, especially in practicum activity at the laboratory settings. However, this study has yet to use all science process skills indicators and only assessed three practicum titles. Therefore, further research is expected to (1) examine the mastery of science process skills for prospective science teachers in practicum activity at the laboratory with broader indicators; and (2) reveal the mastery of science process skills for prospective science teachers in practicum activity at the laboratory on more practicum titles.

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