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TEACHER ASSISTANCE IN PLANNING IPAS LEARNING PRACTICE-BASED TO DEVELOP STUDENTS' SCIENCE PROCESS SKILLS

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Abstrak

Kegiatan pengabdian kepada masyarakat ini bertujuan meningkatkan kompetensi guru dalam merancang pembelajaran IPAS berbasis praktik yang berorientasi pada pengembangan KPS siswa. Kegiatan dilaksanakan di SDN 98/II Muara Bungo dengan melibatkan 14 guru melalui tiga tahapan: persiapan, pelaksanaan, serta evaluasi dan refleksi. Pendekatan pendampingan berbasis active learning dan hands-on Activity dipilih dengan pertimbangan bahwa kompetensi guru berkembang lebih efektif melalui keterlibatan langsung, sehingga metode yang digunakan meliputi pemaparan materi, diskusi, demonstrasi, praktik penyusunan perangkat ajar, simulasi pembelajaran, dan pendampingan langsung. Hasil kegiatan menunjukkan peningkatan kompetensi guru yang terukur, 78,6% guru mampu mengembangkan modul ajar, Lembar Kerja Peserta Didik, dan rubrik penilaian berbasis KPS berkualitas baik dan siap diimplementasikan dalam pembelajaran IPAS di kelas. Evaluasi program menunjukkan bahwa 86% peserta menyatakan puas terhadap pelaksanaan program, dan 93% menilai program ini bermanfaat bagi peningkatan kompetensi mereka. Kegiatan ini memberikan implikasi praktis berupa tersedianya perangkat pembelajaran berbasis KPS yang dapat langsung digunakan guru, sekaligus menjadi model pengembangan profesional yang dapat diadaptasi oleh sekolah dasar lain dalam mengimplementasikan Kurikulum Merdeka secara lebih bermakna.

***Kata kunci**: Pendampingan Guru; IPAS; Praktik; Keterampilan Proses Sains.*

Abstract

This community service activity aimed to strengthen teachers' competence in designing practice-based IPAS learning oriented toward the development of students' SPS. The activity was conducted at SDN 98/II Muara Bungo involving 14 teachers through three stages: preparation, implementation, and evaluation and reflection. An active learning and hands-on activity-based mentoring approach was adopted on the grounds that teacher competence develops more effectively through direct engagement; accordingly, the methods employed included material presentation, discussion, demonstration, teaching material development practice, learning simulation, and direct mentoring. The results demonstrated measurable improvements in teacher competence, with 78.6% of teachers successfully developing Science process skills-based lesson modules, student worksheets, and assessment rubrics of good quality and ready for implementation in IPAS classroom instruction. Program evaluation revealed that 86% of participants expressed satisfaction with the program's implementation, and 93% considered it beneficial for enhancing their professional competence. This activity yields practical implications in the form of SPS-based instructional materials that teachers can immediately use, while simultaneously serving as a professional development model that can be adapted by other elementary schools in implementing the Merdeka Curriculum more meaningfully.

Keywords: Teacher Mentoring; IPAS; Practice Based Learning; Science Process Skills.

INTRODUCTION

The Merdeka Curriculum places the subject of Natural and Social Sciences (IPAS) as the main vehicle for the formation of scientific thinking skills of elementary school students. The Learning Outcomes of IPAS explicitly contain two elements that cannot be separated: Understanding of IPAS and Process Skills. The elements of understanding IPAS include the mastery of science and social concepts in an integrated manner, while the process skills element places students as active subjects who build knowledge through scientific activities (Kemendikbud, 2022; Pratiwi, S. N., Cari, C., & Aminah, 2019). Thus, the achievement of the complete science learning objectives requires the achievement of the two elements in a balanced manner, not just the dominance of concept mastery.

Real conditions in the field show a significant gap between the demands of Learning Outcomes and the practice of ongoing learning. Initial observations and interviews with the principal and teachers at SDN 98/II Muara Bungo revealed that science learning at the school is still dominated by a textbook-based lecture and assignment approach. Practical activities or scientific investigations are almost never carried out in a planned manner. Teachers acknowledge that the available learning tools do not contain process skill indicators, and the assessments used are entirely focused on understanding concepts through multiple-choice and fill-in questions. This condition is in line with the findings of several studies that show that science learning in elementary schools in general still emphasizes understanding of concepts as the main benchmark of learning outcomes, while process skills have not received proportionate attention (Elisa et al., 2023; Fauziyah et al., 2022; Hartini et al., 2018). As a result, the process skill element in Learning Outcomes IPAS has not been optimally facilitated at SDN 98/II Muara Bungo.

Science process skills are abilities that allow students to think and act like a scientist, from observing, formulating questions, designing investigations, collecting and processing data, to communicating findings (Gizaw & Sota, 2023; Kemendikbud, 2022; Rezba et al., 2003). Science process skills include various dimensions of scientific skills that are interrelated and need to be trained on an ongoing basis. Strengthening science process skills in elementary school is very important because in this phase students are at the stage of concrete operational development, where they can more easily understand concepts through direct experience and real activities (Anggraeni et al., 2025; Wati, 2018). Through Science process skills, students do not just passively receive knowledge, but are actively involved in the process of constructing meaningful knowledge, in line with the principles of constructivistic learning.

Practice-based learning is an approach that has proven to be effective in developing students' science process skills comprehensively. Through practicum activities and scientific investigation, students do not only act as recipients of information, but as active subjects who foster understanding through authentic experiences. Research results Adnan & Annisa, (2025); Hunegnaw & Melesse, (2023); Mertayasa et al., (2026) emphasizing that practice methods or experiments are consistently able to develop students' science process skills. However, the effectiveness of this approach is highly dependent on the teacher's competence in designing learning tools that deliberately integrate scientific activities into the learning flow. Teachers need to have an adequate understanding of the various dimensions of Science process skills in order to determine the type of skills that are most relevant to the demands of Learning Outcomes, prepare process-oriented Student Worksheets, and design assessment rubrics that are able to accurately measure the development of students' Science process skills.

There has never been a special mentoring or mentoring program that targets the design of science process skills-based learning tools in the school. This community service activity is present as a direct response to this gap. Different from conventional mentoring which is generally lecture and stand-alone, this activity integrates an experiential learning approach with direct mentoring in the partner school environment, so that teachers not only gain conceptual understanding but also produce teaching tool products that are ready to be implemented. This activity aims to improve the competence of 14 teachers of SDN 98/II Muara Bungo in designing and implementing practice-based science learning oriented to the development of students' Science process skills, with success indicators in the form of: (1) 75% of participants are able to develop practice-based science teaching tools oriented towards the development of students' Science process skills, including teaching modules, Student Worksheets, and assessment rubrics. (2) the level of satisfaction and usefulness of the activities for participants in the program reaches at least 80%.

METHOD

The method of implementing community service activities "Teacher Assistance in Designing Practice-Based Science Learning to Develop Students' Science Process Skills" includes three stages, namely preparation, implementation, and evaluation and reflection. This activity was held at SDN 98/II Muara Bungo on May 15, 2026 for two sessions (morning and afternoon), with the duration of each session being 3 hours. The participants of the activity are 14 classroom teachers who have had at least 2 years of teaching experience and have completed undergraduate education (S1).

The preparation stage begins with the identification of partner needs through a structured interview with the principal of SDN 98/II Muara Bungo. This activity aims to obtain a clear picture of the conditions of science learning, the needs of teachers, and the obstacles faced in developing students' science process skills. Based on the results of the identification, the implementation team then analyzes the learning outcomes of process skill elements according to the applicable curriculum. The preparation stage was then continued with the preparation of activity tools, which included workshop materials, mentoring modules, Student Worksheets, and interactive and practice-based workshop scenarios.

The implementation stage is carried out through face-to-face mentoring with an active learning approach and hands-on activities. At this stage, teachers are actively involved in developing practice-based learning tools to improve students' science process skills. In general, the series of activities at this stage includes material presentations, discussions, demonstrations, and practices in the preparation of teaching tools and learning simulations based on Science process skills. A detailed description of the activities carried out in each session is presented in the Results section.

The evaluation and reflection stage was carried out using two Likert scale questionnaire instruments, namely the satisfaction questionnaire and the usefulness questionnaire, each consisting of 10 statements. The data obtained from the two questionnaires were analyzed statistically descriptively to determine the level of satisfaction and usefulness of the activities according to the participants' perceptions. In addition, qualitative reflection is carried out by asking teacher representatives to convey the experiences gained during mentoring, the obstacles faced, and the plan to implement science process skills-based learning in their respective classes.

RESULTS AND DISCUSSION

RESULT

This community service activity began with the presentation of material to decipher the meaning of Learning Outcomes, elements of IPAS understanding, and elements of process skills. This is the basis because teachers must understand that teaching social studies to students is not only limited to understanding concepts, but process skills must also be trained to students. In addition, research results were presented that proved that social studies learning in elementary schools is still unequal between the two elements. Science process skills are still very rarely trained to students, especially in elementary school. Furthermore, through interactive discussions, teachers are guided to analyze examples of science learning based on Science process skills to understand the form of implementation of science process skills in learning activities. Presentation of documented material in Figure 1.

Figure 1. Material Presentation

The mentoring activity continued with a direct demonstration to teachers about the stages of preparation and implementation of practice-based learning. In this session, participants were given a real-world example of how to design learning that is able to develop students' science process skills through simple observation and experiment activities as described in Figure 2. The service team emphasized that practice-based learning requires careful planning, including the preparation of practice manuals, the preparation of tools and materials, the development of Student Worksheets, and the preparation of science process skill assessment instruments. Good preparation is an important factor in supporting the successful implementation of practice-based learning and the achievement of expected learning objectives.

Figure 2. Demonstration of the Implementation of Science Process Skills-Oriented Practices in Science Learning

Figure 2 shows the service team when demonstrating the implementation of social studies learning based on student Science Process Skills -oriented practices. The science material that was demonstrated to the mentoring participants was taken from the material in phase A, namely getting to know the characteristics of plants, with Learning Outcomes "students optimize the use of the five senses to make observations and ask questions about living things and changes in objects when given certain treatments". Knowing the characteristics of plants in Phase A. Based on the Learning Outcomes, the learning objectives designed include: (1) students are able to fill in the table of plant observation results through direct observation activities on real objects in full; (2) students are able to explain the characteristics of plants based on the results of observation of real objects correctly; and (3) students are able to ask questions about plant characteristics through direct observation activities of at least one question. The learning objectives explicitly accommodate three basic science process skills, namely observation skills, questioning skills, and the skills of recording or tabulating observational data. These three skills are an important foundation in science learning because they help students gain knowledge through direct experience, develop curiosity, and train scientific thinking skills from an early age.

The activity continued with the practice of developing teaching tools which included teaching modules, Student Worksheets based on science process skills, and Science process skills assessment rubric. To make it easier for participants to compile learning tools, the service team has prepared a format that can be used as a reference. The teacher then adjusts the device to the characteristics of the learning material, the learning objectives, and the type of science process skills to be developed. The mentoring process for developing social studies teaching tools is illustrated in Figure 3.

Figure 3. Practice of Developing Science Process Skills-Based Teaching IPAS Tools

During the activity, the service team provided direct assistance so that teachers could consult and obtain solutions to various obstacles faced. The output of teaching tools produced by participants was assessed for quality by the service team based on the rubric of quality assessment of practice-based teaching tools oriented to Science process skills as stated in Table 1.

Table 1. Rubric for Quality Assessment of Teaching Tools based on Science Process Skills Oriented Practice

Teaching Tools	Assessment indicators
Teaching modules	The Learning Outcomes selected are in accordance with the theme/topic of learning to be practiced
	Learning Objectives are logically and measurably derived from the set Learning Outcomes
	Learning Objective Narrative uses operational verbs that reflect science process skills, such as observing, classifying, predicting, communicating, or inferring
	Learning activities are designed based on practice/experiment that facilitates the active development of students' science process skills
	Learning flows (introduction, core, conclusion) are systematically structured and support student involvement in practical activities
Student Worksheets	The purpose of the practice is clearly narrated at the beginning of the Learner Worksheet as a guide for students
	Practice procedures/steps are explained sequentially, in detail, and easy for students to understand
	Adequate tables or spaces are available for students to record and report observation/practice data
	The Learner Worksheet contains questions or assignments that encourage students to analyze data, draw conclusions, or communicate findings (science-oriented high-level process skills)
Science Process Skills Assessment Rubric	The assessment aspect includes Science process skills indicators that are relevant to the designed practical activities
	Each aspect of the assessment has a clear and measurable description for each score level (Likert scale)
	The scores at each level are described specifically so that it makes it easier for teachers to conduct assessments objectively and consistently
	The rubric covers all components of Science Process Skills that are the focus of learning in the teaching modules and Student Worksheets

In the final stage of mentoring, the service team distributed two types of questionnaires to participants to measure the level of satisfaction and usefulness of the activities that had been carried out. The questionnaire serves as an instrument to evaluate the success of the program as well as a material for reflection for the team in designing the next community service program. The results of the measurement of these two aspects are presented in Table 2 and Table 3.

Table 2. Participant's Satisfaction Level with Mentoring

Total Participants	**Mentoring Satisfaction Criteria**							
	Very satisfied		Satisfied		Quite satisfied		Dissatisfied	
	n	%	n	%	n	%	n	%
14	5	36%	7	50%	2	14%	0	0%

Based on Table 1, most of the participants gave a positive assessment of the mentoring program implemented. A total of 12 (86%) participants were in the category of satisfied to very satisfied, which indicates that this mentoring program was well received by the participants. The high level of satisfaction can be attributed to the relevance of the mentoring material to the needs of participants, especially in strengthening the understanding and skills of implementing science-based learning based on Science process skills-oriented practices according to the demands of the Merdeka Curriculum. On the other hand, the level of usefulness of the program can also be seen in table 3.

Table 3. Usefulness of Mentoring Activities

Total Participants	**Criteria for Assistance Usefulness**							
	Very helpful		Helpful		Quite helpful		Not Useful	
	n	%	n	%	n	%	n	%
14	8	56%	5	37%	1	%	0	0%

Table 3 shows that the majority of participants consider that the assistance carried out provides high benefits for improving their competence. It was proven that 13 (93%) participants stated that this mentoring activity was beneficial for them. These results show that the mentoring and mentoring activities carried out are able to provide real benefits for teachers, especially in improving understanding and skills in designing and implementing science process skills-based science learning. Evidently, of the 14 participants who participated in the activity, there were 11 or (78.6%) participants who succeeded in developing teaching tools with good quality, while 3 or (21.4%) participants who developed teaching tools were still of sufficient quality. The three participants generally encountered weaknesses in: learning activities did not reflect practice-based learning; the practical procedures in the LKPD are not explained in a systematic and measurable manner; The descriptor in the Science process skills assessment rubric is not measurable. Although there are still 3 teachers who admit that they still have difficulties in designing activities and instruments for assessing Science process skills, they show high enthusiasm and participation in completing the assignments given. This condition shows that direct mentoring provides opportunities for participants to build understanding through real practice, which is one of the effective strategies in the development of teachers' professional competencies.

DISCUSSION

This community service activity was carried out in response to the gap found in social studies learning at SDN 98/II Muara Bungo, namely the inequality between the elements of concept understanding and the elements of science process skills. The main findings of this activity show that demonstration-based and hands-on assistance is able to increase teachers' understanding of the implementation of Science process skills in IPAS learning, which is reflected in the achievement of the quality of the teaching tools of the participants and the high level of satisfaction and usefulness of the programs that have been implemented. The results showed that 78.6% of participants succeeded in developing practice-based science teaching tools based on Science process skills with good quality, including teaching modules, Student Worksheets, and Science process skills assessment rubrics. This achievement is in line with the findings Diella et al., (2019) who reported that the training for the development of Student Worksheets based on Science process skills for science teachers was able to produce tools with a high level of integration of Science process skills in several indicators such as observation, interpretation, hypothesis, and experimental planning. However, the teacher's ability to compile Science process skills assessment instruments tends to be lower than the ability to integrate Science process skills into the Student Worksheet. These results were also consistent with the findings of this activity, where 3 participants (21.4%) still experienced difficulties in the aspect of preparing the descriptor of the measured Science process skills assessment rubric.

The main challenges faced by teachers in the implementation of the Independent Curriculum include limited understanding of Learning Outcomes and limited learning resources, so that teachers often have difficulty translating Learning Outcomes into operational learning objectives and authentic activities. This condition confirms that assistance that is contextual and direct, as carried out in this activity, is the right response to real needs in the field. The mentoring approach applied in this activity combines material presentation, interactive discussions, hands-on demonstrations, and guided practice, in line with the principles of effective teacher professional development. According to (Darling Hammond LD, Hyle EM, 2017), Effective teacher professional development programs should be practice-oriented, collaborative, sustainable, and provide opportunities for teachers to apply the knowledge gained in an authentic learning context. These findings are in line with the results of the study Azmi et al., (2025); Nasrah & Siraj, (2021); Sukarjita, (2020); Tyas et al., (2024) Effective teacher professional development programs should be practice-oriented, collaborative, sustainable, and provide opportunities for teachers to apply the knowledge gained in an authentic learning context. These findings are in line with the results of the study (Rehman et al., 2025).

However, this program still has a number of limitations, namely: (1) the mentoring program is only carried out in one meeting, so it is not possible to monitor the sustainability of the implementation of teaching tools that have been successfully developed by participants in their classrooms directly; (2) the evaluation of the success of the new program is measured only in terms of the level of satisfaction and usefulness of the program, as well as the quality of the teaching tool product, so that it has not touched the actual impact on improving students' science process skills in the classroom; (3) the relatively limited number of participants (14 teachers from one school) limited the generalization of the findings to the context of other schools with different characteristics. Theoretically, this activity contributes to the understanding that the gap in science process skills in learning science in elementary school is not only a curriculum issue, but also a problem of teachers' pedagogical competence in translating Learning Outcomes into process-oriented teaching tools (Fitriyeni et al., 2026). Therefore, the follow-up service program needs to be directed at direct classroom implementation assistance, as well as measuring its impact on the development of students' science process skills as an indicator of the program's final success.

CONCLUSIONS AND SUGGESTIONS

This community service activity succeeded in strengthening the competence of teachers of SDN 98/II Muara Bungo in designing practice-oriented science learning for students' process process skills, as evidenced by 78.6% of participants being able to produce good quality teaching tools, a program satisfaction level of 86%, and a usefulness level of 93%. However, the format of one-meeting mentoring has not allowed direct monitoring of the implementation of teaching tools in the classroom, and program evaluations have not reached the actual impact on improving students' science process skills, so the generalization of findings is still limited to the context of schools that are partners in the activity.

Based on the limitations found, the next service team is advised to design an advanced program in an advanced mentoring format that includes a cycle of classroom implementation, observation, and joint reflection, by including impact measurement on students' Science process skills as an indicator of final success; while principals in Muara Bungo Regency are encouraged to replicate this mentoring model in other schools by Engage more teachers to expand the reach of the program in an ongoing manner.

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