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SIMPLE EXPERIMENTS TO IMPROVE CHILDREN'S SCIENCE PROCESS SKILLS GUIDED PENANG LEARNING STUDIO INDONESIAN SOCIETY ORGANIZATION (PERMAI)

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***Abstract**. The Indonesian Community Association (PERMAI) is a nonprofit organization that supports Indonesian communities living in Malaysia. One of its educational programs is Sanggar Bimbing (SB) Permai, which provides access to education for Indonesian children who face difficulties obtaining formal education. In this program, students are introduced to Indonesian curriculum materials, including citizenship, history, culture, and the Indonesian language, as well as academic subjects such as basic science. However, limited facilities and teaching staff restrict the amount of material students receive. Therefore, an enrichment program on basic science was conducted through simple experiments to improve students' science process skills. The program was implemented in three stages: preparation, implementation, and evaluation. The results showed a moderate improvement in students' science understanding (N-gain = 0.53), very positive participant responses (average score = 4.38), and well-developed science skills, including observing, planning experiments, using tools and materials, and conducting experiments. Overall, the simple experiment activities received positive responses, although improvements are still needed to enhance their effectiveness and implementation according to students' conditions.*

***Keywords:** elementary students, local community, science experiment, science process skills*

Abstrak. Pertubuhan Masyarakat Indonesia (PERMAI) merupakan organisasi nonprofit yang mewadahi masyarakat Indonesia di Malaysia. Salah satu program pendidikannya adalah Sanggar Bimbing (SB) Permai yang memberikan akses belajar bagi anak-anak WNI yang sulit memperoleh pendidikan formal. Dalam kegiatan ini, siswa diperkenalkan pada materi kurikulum Indonesia seperti kewarganegaraan, sejarah, budaya, bahasa Indonesia, serta materi akademik seperti IPA. Namun, keterbatasan fasilitas dan tenaga pengajar menyebabkan materi yang diterima siswa masih terbatas. Oleh karena itu, dilakukan pendampingan pengayaan materi IPA dasar melalui eksperimen sederhana untuk meningkatkan keterampilan proses sains siswa. Kegiatan dilaksanakan melalui tahap persiapan, pelaksanaan, dan evaluasi. Hasil kegiatan menunjukkan peningkatan pemahaman IPA dengan kategori sedang (N-gain = 0,53), respons peserta sangat baik (rata-rata 4,38), serta keterampilan sains yang berkembang meliputi mengamati, merencanakan percobaan, menggunakan alat dan bahan, dan melaksanakan percobaan. Secara umum, kegiatan eksperimen sederhana mendapat respons positif, meskipun masih diperlukan perbaikan agar pelaksanaannya lebih efektif dan sesuai dengan kondisi peserta didik.

Kata Kunci: eksperimen sains, keterampilan proses sains, komunitas lokal, siswa sekolah dasar

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INTRODUCTION

In line with developments in the 21st century, education is now required to support the development of student competencies to ensure their relevance to the modern era. One of the competencies required by students in the 21st century is scientific literacy (Junita et al., 2022). Scientific literacy is closely related to the ability to understand scientific concepts, think critically, and apply scientific knowledge in everyday life that is relevant to current developments (OECD, 2019). One important component of scientific literacy is science process skills (SPS), which include the ability to observe, conduct scientific experiments, and think critically (Ozgelen, 2012).

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Science process skills are students' abilities to apply scientific methods to understand and develop knowledge. Science process skills include activities to collect and process information, then use them to synthesize estimates, explain phenomena, solve problems, and learn science (science) (Gizaw & Sota, 2023). There are five basic dimensions of science process skills: observing, measuring, interpreting, classifying, predicting, and communicating (Inayah et al., 2020). The learning process for science process skills emphasizes providing students with direct experiences, one of which is through simple science experiments. In the Independent Curriculum, science process skills are one of the skills that students need to achieve, alongside an understanding of science (Siahaan et al., 2023).

Children of migrant workers in Penang, Malaysia, struggle to access adequate formal education. These challenges range from living in areas where access to a decent education is difficult and financial difficulties (Prasanti et al., 2024). Furthermore, migrant workers and their families often face sociocultural differences between their countries of origin and destination, which can lead to other challenges. The Indonesian Community Organization (Permai) is *a non-governmental organization* (NGO) that accommodates Indonesians from various backgrounds in Malaysia. Permai operates in the social, educational, and cultural sectors (Permai, 2025). One of its educational programs is the Permai Guidance Center. The Permai Guidance Center provides educational access to the children of migrant workers, particularly those from Indonesia, who have difficulty accessing formal education, from elementary to junior high school. in addition to formal subjects such as mathematics, literacy, english, civics, and indonesian, students at SB Permai are also introduced to indonesian history, culture, and traditions.

However, various issues pose challenges in implementing SB Permai learning. First, a lack of funding limits Permai's ability to provide the resources needed by its students. Second, SB Penang Permai's teaching staff is also inadequate. Furthermore, limited infrastructure also limits students' learning experiences (Prasanti et al., 2024). According to initial observations, SB Permai students at various age levels, from kindergarten to junior high school, share classroom schedules and teaching staff, thus limiting the amount of material they can receive.

Natural Science (IPA) is one of the subjects taught at SB Permai. Students often find science difficult. This difficulty stems from a lack of student interest, motivation, and preparedness (Efendi & Putri, 2022), or from a lack of teacher involvement, the availability of infrastructure, assessment policies, the social environment at school and at home, and the content of the curriculum (Awang, 2015). External support is one factor that can boost student learning outcomes and reduce the perceived difficulty of science in elementary school.

To enhance the learning experience in science subjects and support the improvement of science process skills of SB Permai students, the authors provide a solution to conduct community service at SB Permai Penang using a simple experimental method. Thus, the students are trained to gradually become accustomed to scientific thinking, trained to solve problems, and able to analyze the problems around them (Wahid & Suyanto, 2015). This simple experiment can be used to train science process skills in elementary school-aged children and enrich the material that can be used in SB Permai classes.

METHOD

The method of implementing community service activities will be carried out at SB Permai. This community service activity is carried out in several stages, namely preparation, implementation, and evaluation. The preparation stage is carried out at the beginning to prepare materials, instruments, and supporting materials needed in training activities. The materials developed are outlined in a booklet. To evaluate the results of the community service, several instruments were developed, namely pretests and post-tests to assess the effectiveness of the material for learning, response instruments to assess student perceptions of the activities, and implementation observation sheets to see the implementation of science process skill indicators during the activities. The science process skill indicators observed include observing, planning experiments, using tools and materials, carrying out experiments, concluding experimental results, and communicating data.

The second stage is the implementation stage, in which the community service activities are carried out through mentoring methods. During this stage, science material for elementary school students is delivered with the support of learning media in the form of booklets that have been developed (Eliana et al., 2022; Hardiansyah & Mulyadi, 2022). The learning process is also supported by simple experiments designed to help students better understand the basic science concepts presented (Hardiansyah et al, 2023). In addition, a discussion and question-and-answer session is conducted to clarify any points that participants may not fully understand. This session also functions as a platform for exchanging knowledge and experiences between the community service team and the participants (Zamiri & Esmaeili, 2024).

The third stage is the evaluation of the community service activities. Evaluation is conducted to measure the program's success based on improvements in basic science knowledge, participant responses, and the implementation of science process skill indicators. Insight gains are analyzed from the N-gain of students' pretest and posttest scores using the following formula (Hake, 1999):

$$\text{N gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

The N-gain score is considered high if it is above 0,7; medium if it is between 0,3 and 0,7; and low if it is below 0,3 (Hake, 1999). Participant responses are categorized semi-quantitatively based on a Likert scale, namely a score of 5 for very good, a score of 4 for good, a score of 3 for sufficient, a score of 2 for less, and a score of 1 for very less. Meanwhile, for the implementation of science process skills indicators, direct observation by the implementing team during the activity is carried out, which includes indicators, namely observing, planning experiments, using tools and materials, carrying out experimental results, and communicating data.

RESULTS AND DISCUSSION

In the preparation stage, the preparation of tools and materials and the development of instruments were carried out. The instruments developed included a Simple Science Experiment Booklet, which included experimental materials on respiration in living things and testing the nutritional content of food (Figure 1), pretest and posttest instruments, activity response instruments, and observation instruments for the implementation of science process skill indicators. The booklet was compiled with reference to the science process skill indicators, namely observing, planning experiments, using tools and materials, carrying out experiments, concluding experimental results, and communicating data.

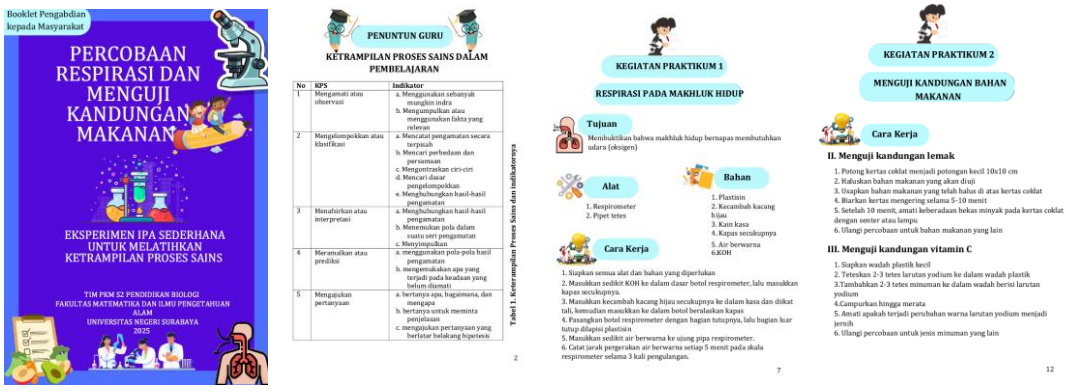


Figure 1. *Simple science experiment booklet*

The second stage of the activity is the implementation of community service. The community service activity was carried out on Thursday, May 29, 2025. The activity was held at the Permai Learning Centre, Georgetown, Pulau Pinang, Malaysia. 30 participants attended, consisting of 28 SB Permai students and 2 teaching staff. After the opening, the activity continued

with a pre-test by participants before the material was delivered by the community service team. The first material related to respiration experiments and food content testing was delivered by the implementation team. After the presentation of the material, participants then carried out experiments in groups accompanied by the community service team (Figure 2). The community service activity ended with a post-test and collection of participant responses.



Figure 2. *Childrens as participants carry out experimental activities in groups.*

To see the improvement in students' insight, an evaluation was conducted based on pretest and posttest scores. Table 1 presents the results of the evaluation of the improvement in students' insight at SB PERMAI after the activity. The average pretest score of the activity participants was 33,33 ± 15,69 before the activity. At the evaluation stage, there was an increase to 68,75 ± 12,46 in the post-test. Based on the N-gain calculation, the N-gain from the community service activity in improving the understanding of SB Permai's students was 0,53, which is classified as moderate (Hake, 1999).

Table 1. *N-gain based on pre-test and post-test scores*

Indicator	Score
Pretest Average	33,33 ± 15,69
Post-test Average	68,75 ± 12,46
N-Gain	0,53 (moderate)

On the other hand, the response to the community service activities obtained based on data collection using a response questionnaire instrument (Table 2) showed a good score for all aspects asked, with an average of 4,38 (good). The highest score was from the community service team providing services according to the needs of participants at 5.00 (very good), while the lowest score was from the aspect of community service materials according to the needs of participants at 3,89 (good).

Table 2. *Participant responses to the activity*

No	Indicator	Average Score
1.	Community service activities according to participant needs	4,11
2.	Community service material according to participant needs	3,89
3.	The presentation of material by the Community service Team was interesting	4,22
4.	The Community service material presented is easy to understand	4,33
5.	The Community service team is interactive and communicative with participants.	4,33
6.	The community service team provides services according to participant needs.	5,00
7.	The community service team provided good feedback to the participants.	4,22
8.	The time allocation provided for Community service activities is in accordance with	4,11
9.	Community service participants are enthusiastic about taking part in community service	4,44
10.	Community service activities can improve participants' knowledge and skills	4,56
11.	Supporting facilities and equipment for representative community service activities	4,67

No	Indicator	Average Score
12.	The facilities provided by the community service team are representative	4,44
13.	Participants felt satisfied with the community service activities as a whole	4,56
Average Total		**4,38**

Science process skills are reviewed from data collected through observation instruments, based on the designed science process skills indicators, namely observing, planning experiments, using tools and materials, carrying out experiments, concluding experimental results, and communicating data. Based on the observations made, the indicators that have been implemented well are observing, planning experiments, using tools and materials, carrying out experiments, while the indicators concluding experimental results, and communicating data still need to be optimized further.

Based on the results of the pretest and posttest instruments, the N-gain indicates that the effectiveness of learning with simple experiments is still moderate. This indicates that the learning carried out is still not optimal to support students to achieve the high N-gain category. Possible causes are due to suboptimal learning infrastructure and insufficient time allocation used for activities (Istakri et al., 2024). To achieve effective learning, student learning time allocation needs to be considered (Mohamed, 2006). To improve these results, efforts are needed to continuously improve various aspects of learning at SB Permai, starting from infrastructure, quantity and quality of teaching staff to continuous support from experts (Marlapa et al., 2024; Riyanto & Humaid, 2025). This requires direct attention from the relevant authorities, both from the local government and the Indonesian government (Setiawan et al., 2022)

According to participant responses (Table 2), the community service program activity received a very positive response from participants (4,38). However, there are several things that need attention, for example, the material was deemed less than appropriate (3.89), and the time allocation was less than appropriate (4,11). The community service program team provided direct assistance during the activity, and this was reflected in the community service team's response, providing services according to student needs, which received a very good score (5,00) (Zainuri & Huda, 2023; Pei et al., 2024). On the other hand, participants who participated in the community service activity came from heterogeneous learning age groups, so there is a possibility that some of the students who participated in the activity found the science experiment material given difficult. However, a positive response was conveyed directly by the SB Permai teaching staff, who also participated in the community service activity (Nandıwardana et al., 2024; Soelton et al., 2025).

Regarding the implementation of science process skills indicators, several indicators still need to be optimized (Gizaw & Sota, 2023). This is due to the limited time allocated for community service activities. To improve outcomes in this aspect, more effective science learning activities and more appropriate time allocation are needed at SB Permai Penang to further enhance science learning and insight, thus enhancing the learning experience for the students under their care.

CONCLUSION

Community Service activities have been carried out for the students of Sanggar Bimbing (SB) Permai by applying simple science experiment methods aimed at improving students' science process skills. These activities were designed to provide students with more engaging and meaningful learning experiences, especially considering the limited access to formal science education and learning facilities. Using simple experiments, students were encouraged to actively participate in the learning process by observing phenomena, asking questions, and directly practicing basic scientific concepts. This approach helped create a more interactive learning environment where students could develop their curiosity and understanding of science in a practical way.

The results of the activities indicate that the improvement in students' knowledge and understanding of science, measured using the N-gain score, falls into the moderate category. This shows that the simple experiment-based learning activities were able to contribute positively to the students' learning outcomes. In addition, the participants gave very positive responses to the

activities, indicating that the learning method used was interesting, enjoyable, and helpful in supporting their understanding of the material. From the observation of science process skills, several indicators were implemented well during the activities, including observing, planning experiments, using tools and materials, and conducting experiments. However, some indicators still need further improvement to ensure that all aspects of science process skills can be optimally developed. Based on these findings, it can be concluded that the implementation of simple science experiments is a promising approach for supporting science learning among SB Permai students. Nevertheless, future community service activities should consider developing more effective and varied learning strategies, as well as adapting them to the students' learning conditions and needs. By improving the learning design and providing more structured guidance, it is expected that science learning outcomes and students' science process skills can be enhanced further in future programs.

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