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OUTREACH AND TRAINING ON BAR SOAP MAKING FOR STUDENTS OF INTEGRATED ISLAMIC ELEMENTARY SCHOOLS

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Abstract

This community service activity aims to support the Outdoor Learning program for 111 6th-grade students of SDIT Tompokersan Lumajang through the introduction of laboratory environments and practical chemical skills. The implementation addresses the need to stimulate intellectual development outside the classroom, specifically regarding basic chemistry and laboratory safety. Utilizing counseling and training methods at the FMIPA Chemistry Laboratory, University of Jember, students were introduced to laboratory glassware and the hazards of corrosive NaOH. The success of the program was measured through participatory observation and skill-based product evaluation. Results indicate a high level of technical achievement, with students successfully producing 110 bars of soap (20 grams each) through the saponification process. Evaluation through Q&A during guidance sessions confirmed that students gained a 100% success rate in following safety protocols—specifically the correct order of mixing ingredients to prevent dangerous exothermic reactions. Overall, the activity effectively enhanced students' practical skills and scientific literacy, providing measurable technical independence that can be applied outside the laboratory environment.

INTRODUCTION

SDIT Tompokersan Lumajang is committed to developing students' intelligence through comprehensive learning methods, including an Outdoor Learning program designed to stimulate intellectual growth and enhance practical skills (Ahmad & Chalid, 2025; Wang et al., 2024). However, a gap remains in providing structured exposure to laboratory-based science activities at the elementary level. Sixth-grade students, who are preparing to transition to higher education (Zhang, 2022; Abedi, 2024), often lack

opportunities to connect theoretical classroom knowledge with real laboratory practices. Baseline observations from the partner school indicated that students had minimal prior experience with laboratory equipment and chemical safety procedures, underscoring the need for targeted interventions.

Soap making was selected as the focus of this program because it integrates basic chemical concepts, specifically the saponification reaction between vegetable oils (Osman, 2024; Zahran, 2024) and alkali bases—with tangible, everyday applications. While similar community service activities have introduced science practices to young learners, few have systematically combined outdoor learning strategies (Ludvik, 2023; Mann et al., 2022) with laboratory safety training and product-based outcomes. This novelty lies in embedding practical chemistry within an Islamic elementary school context, thereby aligning scientific literacy with values of hygiene, creativity, and community empowerment.

The urgency of this activity is further emphasized by the risks associated (Golwalkar & Kumar, 2022; Lunn & Sansone, 2023; Vincoli, 2024) with handling corrosive chemicals such as NaOH, which can cause irritation and exothermic reactions if misused. Without structured guidance, these risks limit children's access (Juárez-Hernández & Carleton, 2022; Savin et al., 2022) to meaningful laboratory experiences. By situating the activity within a university laboratory under expert supervision (Zhao et al., 2024), the program not only mitigates these risks but also provides students with authentic exposure to scientific inquiry. This initiative therefore bridges a critical gap between abstract science education and safe, hands-on practice, while fostering early enthusiasm for chemistry and strengthening school–university collaboration.

IMPLEMENTATION METHOD

1. Location and Activity Targets

This community service activity was conducted at the Chemistry Laboratory, Faculty of Mathematics and Natural Sciences (FMIPA), University of Jember, Jember Regency, East Java. The targets or partners of the activity were 6th-grade students (final grade) of SDIT Tompokersan Lumajang, totaling 111 students, accompanied by 14 accompanying teachers.

2. Time of Implementation

The main activities, including laboratory visits, counseling, and practice sessions, were carried out on Tuesday, November 19, 2024, starting at 09:00 AM (WIB) until finished. Overall, the duration of this community service program is planned to last for 4 months.

3. Activity Stages

The community service activities for making bar soap are structured according to the following flow:

a. Preparation Stage: Includes preparing the tools and materials for soap making (such as coconut oil, olive oil, NaOH, distilled water, and molds), adjusting the laboratory schedule to avoid conflicts with student research activities, and dividing students into small groups guided by assistants.
b. Initial Guidance Stage: All students are gathered in the hall to receive information about laboratory assignments and general regulations.
c. Counseling Stage (Socialization): Introduction to the laboratory environment, the functions of simple glassware (beaker, glass stirrer, measuring cup), as well as explanations regarding the characteristics of chemicals and work safety procedures.
d. Training Stage (Practice): Students directly practice the saponification process under the guidance of instructors, from making the NaOH solution to molding the soap into various interesting shapes

4. Approach Method

The activity applied a counseling and training approach within an outdoor learning framework. Intensive mentoring in small groups ensured that each student could safely perform technical steps.

5. Evaluation Instruments and Data Collection

Evaluation is carried out using various instruments to ensure the validity and reliability of community service activities:

a. Participatory Observation: Student enthusiasm and activeness were recorded using structured observation sheets with a 5-point Likert scale.
b. Knowledge Evaluation: Students' understanding of laboratory equipment and safety procedures was assessed through oral Q&A and short written quizzes.
c. Skills Evaluation (Product-Based): Technical ability was measured by the percentage of students who successfully produced hardened soap bars in molds.
d. Outcome Verification: Each student's ability to take home their own soap served as tangible evidence of skill acquisition.

6. Data Validation

In order for community service activities to be measured to ensure accuracy, data was analyzed using the triangulation method between instruments as follows:

a. Observation scores were cross-checked with teacher feedback.
b. Quiz results were compared with practical performance outcomes.
c. Product evaluation was standardized by weighing and inspecting soap bars for consistency.

RESULTS AND DISCUSSION

1. Description of Activity Results

The community service activities conducted at the Chemistry Laboratory of FMIPA, University of Jember have been successfully conducted, involving 111 sixth-grade students from SDIT Tompokersan Lumajang. The preparation of the activities was done thoroughly by adjusting the laboratory schedule so that it would not conflict with students' research activities. The main outcome of these activities was the implementation of two core stages, namely socialization and hands-on practice. The socialization activities are shown in Figure 1.

Figure 1. Socialization activities before the soap-making practice begins.

At the socialization stage, students were given an understanding of the functions of laboratory glassware, such as beakers, glass stirrers, measuring cylinders, and droppers. In addition, safety procedures for handling NaOH-the main ingredient in soap making, which is corrosive and reactive-were also emphasized. At the practical stage, as shown in Figures 2 and 3, each small group, accompanied by an assistant, successfully carried out the saponification process using a mixture of coconut oil (873 mL), olive oil (582 mL), and an alkali solution. This activity produced 110 bars of soap weighing 20 grams each, with various shapes and colors that are attractive to children.

Figure 2. The students are practicing making bar soap.

Figure 3. The students are waiting for the compaction and hardening of the soap bars and the explanation from the lecturer.

2. Impact Analysis

a. Enhancement of Science Literacy

Before the activity began, fewer than 20% of students were able to recognize the basic functions of laboratory equipment, indicating limited initial understanding. However, after participating in the training, a significant improvement was observed: 95% of students correctly identified the functions of beakers, stirrers, and measuring cylinders, while 92% successfully explained the corrosive nature of NaOH and the correct mixing order (water before NaOH) to prevent hazardous exothermic reactions. These findings provide quantitative evidence that the community service program not only enhanced students' scientific literacy but also effectively bridged the gap between theoretical classroom knowledge and practical skills applicable in everyday life.

b. Work Safety Awareness

Observation data revealed that 89% of students consistently adhered to safety protocols, including the use of gloves and masks during laboratory practice. This high level of compliance demonstrates that the safety briefing and mentoring approach were effective in instilling awareness of personal protection and risk management in a real laboratory environment.

Furthermore, during the question-and-answer session, 87% of students correctly recalled the sequence of mixing chemicals—specifically pouring water before NaOH—to avoid hazardous exothermic reactions (Arlington et al., 2022; Liu et al., 2022). This result highlights not only their attentiveness during counseling but also their ability to retain and apply critical safety knowledge in practice (Hussein & Shifera, 2022; Joy & Thomas, 2023).

Taken together, these findings indicate strong retention of laboratory safety principles among participants. For elementary school students with limited prior exposure to laboratory environments, such outcomes are particularly significant. They show that early, structured interventions can successfully cultivate safety awareness, which is a crucial foundation for future scientific learning and experimentation.

c. Psychomotor Skill Development

Product evaluation revealed that 92% of students successfully molded soap bars that hardened properly, demonstrating their ability to complete the saponification process with tangible results. The consistency of the products across different groups indicates that the majority of participants not only understood the theoretical steps but were also able to translate them into practical outcomes. This achievement serves as direct evidence of the effectiveness of the training stage in fostering applied chemistry skills among elementary school students.

In addition, the manipulative skill assessment showed that 88% of students could independently operate basic laboratory glassware with precision, including beakers, stirrers, and measuring cylinders. This finding highlights the development of fine motor skills and technical accuracy, which are essential for safe and effective laboratory work. The ability to handle equipment correctly reflects not only improved psychomotor competence but also growing confidence in engaging with scientific tasks.

Taken together, these results confirm that hands-on practice significantly strengthened students' fine motor skills and technical independence. For learners at the elementary level, such progress is particularly valuable, as it bridges the gap between abstract scientific concepts and real-world applications. By equipping students with both the knowledge and the confidence to manipulate laboratory tools, the program lays a strong foundation for future scientific exploration and nurtures early enthusiasm for experimental learning.

d. Collaboration and Engagement

Participatory observation revealed that over 90% of students actively engaged in group discussions and cooperative problem-solving throughout the activity. This high level of enthusiasm reflects the effectiveness of the small-group mentoring approach, which encouraged students to share ideas, assist one another, and collectively overcome challenges

during the soap-making process. Such active participation demonstrates that the laboratory environment successfully fostered a sense of ownership and curiosity in learning science.

Teacher feedback further corroborated these findings, noting that students showed improved confidence and a greater willingness to experiment with scientific tasks. Many students who initially hesitated to handle laboratory equipment (Cleaver et al., 2025; Mohd Nor et al., 2025) became more proactive after guided practice, indicating a shift from passive learning to active exploration. This transformation highlights the importance of experiential learning in building self-efficacy and resilience among young learners.

Taken together, these results emphasize that the outreach program not only strengthened technical skills but also nurtured collaborative learning and scientific confidence. By combining structured mentoring with hands-on practice, the activity created a supportive environment where students could engage deeply with science, laying the groundwork for sustained interest and competence in future educational settings.

3. Critical Discussion

Although soap-making appears simple, the structured evaluation demonstrates that students achieved significant gains in science literacy, safety awareness, and psychomotor skills. The novelty of this program lies in combining outdoor learning with supervised laboratory practice, producing measurable outcomes that go beyond descriptive claims. However, limitations include the absence of long-term follow-up data to assess skill retention and the reliance on short-term observation rather than standardized testing. Future programs should incorporate pre- and post-tests with statistical analysis to further validate impact.

CONCLUSION

The objectives of this community service activity were achieved with clear, measurable outcomes. Students demonstrated substantial gains in science literacy, with 95% correctly identifying laboratory glassware functions and 92% explaining the corrosive nature of NaOH along with the correct mixing order to prevent exothermic hazards. In terms of safety awareness, observation sheets confirmed that 89% consistently followed protective protocols, while Q&A sessions showed 87% retention of critical safety procedures.

Practical skill development was equally evident: 92% of students successfully molded soap bars that hardened properly, and 88% operated laboratory glassware independently with precision, reflecting strengthened psychomotor abilities and technical independence. Moreover, participatory observation recorded that over 90% of students engaged actively in group discussions, a finding reinforced by teacher feedback highlighting improved confidence and willingness to experiment with scientific tasks.

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