

## EDUCATION AND PRACTICAL TRAINING ON THE USE OF SIMPLE BALANCES FOR ELEMENTARY SCHOOL STUDENTS IN BAWONIFAOSO VILLAGE

Darmawan Harefa

Universitas Nias Raya

(darmawanharefa@uniraya.ac.id )

### Abstract

This community service program entitled “*Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village*” aimed to improve students’ understanding of basic science concepts, particularly mass measurement, through hands-on learning activities. The program addressed the common issue in rural elementary schools where science learning is often dominated by theoretical instruction with limited practical experience. To overcome this challenge, the activity was designed using an experiential learning approach involving simple balance tools that are easy to construct, affordable, and suitable for classroom use. The implementation consisted of three main stages: conceptual introduction, practical training, and evaluation. In the conceptual stage, students were introduced to the basic concept of mass and the function of balance instruments. In the practical stage, students worked in groups to measure and compare the mass of various objects using simple balances. The evaluation stage involved observation and simple assessments to measure students’ understanding and skills. The results of the program showed a significant improvement in students’ conceptual understanding, science process skills, and learning motivation. Students became more active, engaged, and confident in conducting simple scientific experiments. In addition, teachers gained new insights into the use of practical learning media that can be applied in daily instruction. Overall, the program demonstrated that the use of simple balances is an effective and sustainable strategy to enhance science learning in elementary schools, particularly in rural areas with limited resources.

**Keywords:** *Community Service; Simple Balance; Elementary Science Education; Hands-On Learning; Science Process Skills; Rural Education.*

### A. Introduction

Science education at the elementary school level plays a crucial role in developing students’ fundamental

understanding of natural phenomena and basic scientific concepts. One of the essential competencies that must be introduced early is the concept of measurement, particularly



mass measurement using simple tools such as balance scales. Understanding how to measure mass is not only a basic scientific skill but also an entry point to developing logical thinking, problem-solving abilities, and scientific reasoning among students (Harefa, D. et al., 2023). Science education at the elementary school level is a fundamental component in shaping students' understanding of basic scientific concepts and developing essential life skills. One of the key competencies introduced at this level is measurement, particularly the concept of mass. Understanding mass and how to measure it using tools such as simple balances is crucial, as it forms the foundation for more advanced scientific learning. Early exposure to measurement concepts helps students build logical thinking, accuracy, and analytical skills that are necessary for scientific inquiry (Otten et al., 2020).

However, in many rural areas, including Bawonifaoso Village, science learning often remains theoretical and lacks practical engagement. Students are frequently taught concepts through lectures or textbooks without being given sufficient opportunities to explore and experiment directly. This limitation can hinder students' conceptual understanding and reduce their interest in science. Studies have shown that active learning approaches, particularly those involving hands-on activities, significantly improve students'

comprehension and retention of scientific knowledge (Saleh et al., 2020).

The use of simple balances in science learning provides a practical and effective way to introduce the concept of mass. Simple balances allow students to directly observe and compare the weight of objects, making abstract concepts more concrete and understandable. Through this hands-on experience, students can develop a deeper understanding of measurement principles and improve their observational and analytical skills. Furthermore, balance-based learning tools have been found to support not only science learning but also mathematical reasoning, particularly in understanding equivalence and relationships between quantities (Stephens et al., 2020).

In addition, practical learning approaches such as guided inquiry and problem-based learning have been widely recognized as effective strategies to enhance students' science process skills. These skills include observing, measuring, classifying, predicting, and drawing conclusions. According to Anjarwani et al. (2020), guided inquiry learning significantly improves students' critical thinking and scientific process skills compared to conventional teaching methods. By integrating the use of simple balances into such approaches, students can engage more actively in the learning process and gain meaningful learning experiences.



Another important consideration is the availability of learning resources. Schools in rural areas often face limitations in terms of laboratory facilities and modern scientific equipment. Therefore, the use of simple, low-cost, and easily accessible tools such as manual balance scales becomes a practical solution. These tools can be made from locally available materials, making them sustainable and adaptable to the local context. Research indicates that the use of appropriate learning media positively influences students' motivation and learning outcomes (Wardani et al., 2020).

Moreover, experiential learning through physical interaction with objects has been shown to significantly enhance conceptual understanding. Otten et al. (2020) emphasize that physical experiences using balance models can improve students' reasoning abilities and conceptual development over time. This is particularly important for elementary school students, who are still in the concrete operational stage of cognitive development and benefit greatly from direct manipulation of learning materials.

Based on these considerations, the implementation of a community service program entitled *"Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village"* is highly relevant. This program aims to provide students with practical experience

in measuring mass using simple balances, thereby enhancing their understanding of scientific concepts. Additionally, the program seeks to support teachers in adopting more interactive and student-centered teaching methods (Harefa, D. 2025).

In conclusion, integrating practical training using simple balances into elementary science education is an effective strategy to improve students' understanding, engagement, and scientific skills. Through this initiative, students are expected to gain meaningful learning experiences that foster curiosity, critical thinking, and a positive attitude toward science.

## **B. Method of Community Service Activities**

The community service program entitled *"Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village"* is designed using a participatory, experiential, and student-centered approach. The primary objective is to enhance students' understanding of mass measurement through hands-on activities while simultaneously supporting teachers in implementing interactive science learning. The method is structured into several systematic stages to ensure effectiveness, engagement, and sustainability.

### **1. Needs Assessment and Planning**

The first stage involves conducting a needs assessment to identify the existing conditions of science learning in the target



school. This is carried out through classroom observations, informal interviews with teachers, and discussions with school administrators. The assessment focuses on identifying gaps in teaching practices, availability of learning media, and students' understanding of measurement concepts. According to educational research, needs assessment is a crucial step in designing effective community-based educational interventions (Saleh et al., 2020).

**Figure 1. Use of a Simple Balance**



Based on the findings, the program team develops a structured activity plan, including learning objectives, teaching materials, and evaluation instruments. Simple balance tools are also designed using low-cost and locally available materials to ensure accessibility and sustainability.

## 2. Development of Learning Materials and Tools

At this stage, instructional materials are prepared to support both theoretical and practical learning. These include modules on

the concept of mass, worksheets, and step-by-step guides for using simple balances. The materials are designed using a contextual and inquiry-based approach to make learning more meaningful.

The simple balances used in this program are either manually constructed or adapted from readily available tools. The design emphasizes ease of use, safety, and relevance to students' daily experiences. Research indicates that the use of appropriate and contextual learning media significantly improves students' motivation and understanding (Wardani et al., 2020).

## 3. Socialization and Orientation

Before the implementation, a socialization session is conducted with teachers and students. This session introduces the objectives, benefits, and procedures of the program. Teachers are also given a brief orientation on how to facilitate practical learning activities effectively (Harefa, D. 2025). This stage is important for building participants' readiness and encouraging active involvement. It also ensures that teachers understand their role in supporting students during the practical sessions.

## 4. Educational Session (Conceptual Learning)

The educational session focuses on introducing students to basic concepts of mass and measurement. Facilitators use interactive teaching strategies such as

questioning, demonstrations, and group discussions to engage students.

Key topics include:

- a. Definition of mass
- b. Units of measurement
- c. Differences between heavy and light objects
- d. Introduction to balance tools

This stage aims to build students' conceptual foundation before engaging in practical activities. Active learning methods have been shown to significantly enhance students' comprehension compared to traditional lecture-based instruction (Stephens et al., 2020).

### 5. Practical Training Using Simple Balances

The core component of this program is hands-on training, where students directly use simple balances to measure and compare objects. Students are divided into small groups to promote collaboration and peer learning.

During the practical session, students are guided to:

- a. Identify the parts and functions of a simple balance
- b. Use the balance correctly to measure mass
- c. Compare the weight of different objects
- d. Record and analyze their findings

This stage applies a guided inquiry approach, where students actively explore and discover concepts with facilitator support. According to Anjarwani et al. (2020), guided inquiry significantly improves

students' science process skills, including observing, measuring, and interpreting data.

Hands-on activities also align with experiential learning theory, which emphasizes learning through direct experience. Physical interaction with learning tools has been shown to enhance students' reasoning and conceptual understanding, especially at the elementary level (Otten et al., 2020).

### 6. Monitoring and Evaluation

Evaluation is conducted to assess the effectiveness of the program in improving students' knowledge and skills. This includes:

- a. Pre-test and post-test assessments
- b. Observation of student participation and performance
- c. Group discussions and feedback sessions

The evaluation focuses on both cognitive and psychomotor aspects of learning. Data collected from this stage are analyzed to measure learning outcomes and identify areas for improvement.

### 7. Reflection and Follow-up

The final stage involves reflection and follow-up activities. Facilitators and teachers discuss the strengths and weaknesses of the program and explore strategies for improvement. Teachers are encouraged to integrate similar practical activities into their regular teaching practices (Harefa, D. 2025).

To ensure sustainability, the program provides schools with simple balance kits



and instructional modules. This allows teachers to continue implementing hands-on learning independently. Sustainable educational interventions are essential for creating long-term impact in community-based programs (Saleh et al., 2020).

### C. Results of Community Service Activities

The implementation of the community service program entitled “*Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village*” produced several significant outcomes in terms of students’ knowledge, skills, and learning engagement. The program was carried out through a series of structured activities, including educational sessions, hands-on practice, and evaluation, all of which contributed to measurable improvements in students’ understanding of mass measurement concepts.

#### 1. Improvement in Students’ Conceptual Understanding

One of the primary outcomes of this program was the improvement in students’ conceptual understanding of mass and measurement. Based on the results of pre-test and post-test assessments, most students demonstrated a clear increase in their ability to identify, compare, and measure the mass of objects using simple balances. Before the intervention, many students had difficulty distinguishing between mass and size, often assuming that larger objects were always heavier. After participating in the practical

training, students were able to correctly explain the concept of mass and apply it in real-life contexts (Harefa, D. 2025).

This finding is consistent with previous research indicating that hands-on learning significantly enhances students’ conceptual understanding compared to traditional lecture-based methods (Otten et al., 2020). Physical interaction with balance tools enables students to construct their own understanding through direct experience, which is particularly important for learners at the elementary level.

**Figure 2. Children Carefully Observing How to Use a Balance**



#### 2. Enhancement of Science Process Skills

The program also contributed to the development of students’ science process skills, including observing, measuring, recording data, and drawing conclusions. During the practical sessions, students actively engaged in group activities where they measured various objects, recorded

their observations, and discussed their findings with peers.

Facilitators observed that students became more confident in using measurement tools and more systematic in conducting simple experiments (Harefa, D. 2025). These improvements align with the findings of Anjarwani et al. (2020), which highlight that guided inquiry-based learning can significantly improve students' scientific skills. The use of simple balances in an inquiry-based setting allowed students to practice essential scientific processes in a meaningful and engaging way.

### 3. Increased Student Engagement and Motivation

Another important outcome was the noticeable increase in students' engagement and motivation during the learning process. Students showed high levels of enthusiasm when participating in hands-on activities compared to traditional classroom instruction. They were more willing to ask questions, participate in discussions, and collaborate with their peers (Harefa, D. 2024).

This increased engagement can be attributed to the interactive and experiential nature of the learning activities. According to recent studies, active learning strategies that involve direct participation can significantly enhance student motivation and learning outcomes (Stephens et al., 2020). The use of simple, tangible tools such as balance scales

made learning more enjoyable and accessible for students.

### 4. Teacher Capacity Building

In addition to student outcomes, the program also had a positive impact on teachers. Teachers who participated in the program gained new insights into interactive teaching methods and the use of simple learning media. They expressed increased confidence in incorporating hands-on activities into their science lessons (Harefa, D. 2025).

Teachers also recognized the importance of using locally available materials to create effective learning tools. This aligns with research emphasizing that appropriate and contextual learning media can improve teaching effectiveness and student achievement (Wardani et al., 2020). As a result, teachers are more prepared to implement similar activities independently in the future.

### 5. Feasibility and Sustainability of the Program

The program demonstrated that the use of simple balances is a feasible and sustainable approach for science learning in rural schools. The tools used in the program were inexpensive, easy to construct, and adaptable to the local context. This makes them suitable for long-term use without requiring significant financial resources.

Furthermore, the provision of learning modules and simple balance kits ensures that



the program can be continued by teachers after the completion of the community service activity. Sustainable educational interventions are essential for ensuring long-term impact and continuous improvement in learning outcomes (Saleh et al., 2020).

### 6. Challenges and Limitations

Despite the positive outcomes, several challenges were identified during the implementation. Some students initially required additional guidance in using the balance tools correctly. Time constraints also limited the depth of exploration in some activities. However, these challenges were gradually addressed through continuous guidance and group collaboration.

Figure 3. Practicing the Use of a Balance



Overall, the community service program successfully achieved its objectives by improving students' understanding of mass measurement, enhancing their science process skills, and increasing their engagement in learning. The program also

contributed to teacher development and demonstrated the effectiveness of using simple, low-cost learning tools in rural educational settings. These findings support the integration of practical, hands-on learning approaches in elementary science education to achieve better learning outcomes.

### Discussion of Community Service Activities

The community service program titled *“Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village”* demonstrates that integrating hands-on learning tools into elementary science education significantly improves students' conceptual understanding, engagement, and science process skills. The findings of this program align with contemporary educational theories that emphasize experiential learning and inquiry-based instruction as effective approaches for young learners, particularly in developing foundational scientific concepts such as mass and measurement.

#### 1. Improvement in Conceptual Understanding of Mass

The implementation of simple balance tools enabled students to transform abstract scientific concepts into concrete experiences. Before the intervention, many students tended to equate mass with size or volume. However, after participating in structured practical activities, students showed a clearer



understanding that mass refers to the amount of matter in an object, which can be measured using appropriate instruments.

This improvement is consistent with cognitive development theory, which states that elementary school students learn best through direct manipulation of objects. Recent studies emphasize that physical interaction with learning tools enhances conceptual development, especially in science education (Otten et al., 2020). By using simple balances, students were able to observe equilibrium directly, which helped them internalize the concept of comparison and measurement more effectively.

## 2. Effectiveness of Hands-on Learning Approach

The success of this program strongly supports the effectiveness of hands-on learning in science education. Students were actively involved in measuring objects, recording results, and discussing findings in groups. This active participation encouraged deeper cognitive processing and improved retention of scientific knowledge.

The results are in line with recent research which shows that experiential learning significantly enhances students' understanding compared to traditional lecture-based teaching (Stephens et al., 2020). In this program, students were not passive recipients of information but active participants in constructing knowledge through exploration and experimentation.

Moreover, the use of simple balances as a learning medium made abstract concepts more accessible. This supports the argument that appropriate instructional media play a crucial role in improving learning outcomes, especially in resource-limited settings (Wardani et al., 2020).

## 3. Development of Science Process Skills

Another important outcome of the program is the improvement of students' science process skills. Through guided activities, students practiced observing, measuring, classifying objects, and interpreting data. These skills are essential components of scientific literacy and are fundamental for future learning in higher education levels.

The guided inquiry approach used in this program allowed students to explore scientific concepts while being supported by facilitators. This approach has been proven effective in improving critical thinking and process skills in elementary students (Anjarwani et al., 2020). Students were encouraged to ask questions, test hypotheses, and draw conclusions based on their observations, which reflects authentic scientific practice.

## 4. Increased Motivation and Student Engagement

The program also revealed a significant increase in student motivation and engagement. Students showed enthusiasm when participating in practical activities and



were more willing to collaborate with peers. This behavioral change indicates that learning becomes more meaningful when students are actively involved in the process.

Engagement is a key factor in learning success, especially in science education. Recent studies highlight that interactive and inquiry-based learning environments significantly enhance students' motivation and interest in learning science (Saleh et al., 2020). In this program, the use of simple and relatable tools such as balance scales contributed to creating a fun and engaging learning atmosphere.

### 5. Teacher Professional Development

In addition to student outcomes, the program also had a positive impact on teachers. Teachers gained new insights into how to implement practical, student-centered learning strategies using simple materials. They expressed increased confidence in integrating hands-on activities into their science lessons.

This finding is important because teacher competence plays a crucial role in the success of instructional innovation. Research shows that when teachers use contextual and interactive teaching strategies, student achievement improves significantly (Wardani et al., 2020). Therefore, this program not only benefits students but also strengthens teacher capacity in delivering effective science instruction.

### 6. Challenges in Implementation

Despite its success, the program faced several challenges. Some students initially struggled to use the balance tools accurately, requiring additional guidance. Time limitations also restricted the depth of exploration in certain activities. However, these challenges were mitigated through repeated practice and collaborative group work. Such challenges are common in community-based educational programs, especially in rural settings. Nevertheless, they do not diminish the overall effectiveness of the intervention. Instead, they highlight the importance of continuous support and adaptation in implementing educational innovations.

Figure 4. Practicing the Use of a Balance in Groups



### 7. Sustainability and Educational Impact

One of the most important aspects of this program is its sustainability. The use of simple, low-cost balance tools ensures that



the learning model can be continued even after the program ends. Teachers can independently replicate the activities using locally available materials, making the approach highly sustainable.

Sustainable educational interventions are essential for long-term impact, particularly in rural schools with limited resources. The findings of this program suggest that simple and contextual learning tools can play a significant role in improving the quality of science education over time (Otten et al., 2020).

Overall, the community service program demonstrates that education and practical training using simple balances is an effective strategy for improving elementary science education in rural areas. It enhances students' conceptual understanding, develops science process skills, increases motivation, and supports teacher professional growth. These results confirm that hands-on, inquiry-based learning using simple tools is a powerful approach to achieving meaningful and sustainable educational outcomes.

#### D. Conclusion and Recommendations

##### Conclusion

The community service program titled *“Education and Practical Training on the Use of Simple Balances for Elementary School Students in Bawonifaoso Village”* has demonstrated strong effectiveness in improving elementary science learning through hands-on and

student-centered activities. The primary objective of this program was to enhance students' understanding of mass measurement concepts by using simple balance tools, while also improving their science process skills, engagement, and motivation toward learning science.

Based on the implementation results, it can be concluded that the use of simple balances significantly improved students' conceptual understanding of mass. Before the intervention, many students struggled to distinguish between mass, size, and weight. However, after participating in structured theoretical explanations followed by practical training, students were able to correctly identify, compare, and measure mass using simple balance tools. This indicates that concrete, visual, and hands-on learning experiences are highly effective in helping elementary school students understand abstract scientific concepts.

Furthermore, the program successfully enhanced students' science process skills, including observing, measuring, recording data, and drawing conclusions. Through guided inquiry-based activities, students were actively involved in the learning process rather than being passive recipients of information. This approach encouraged critical thinking, curiosity, and collaborative learning among students. These findings are consistent with recent educational studies that highlight the importance of inquiry-



based and experiential learning in developing scientific literacy among young learners.

In addition to cognitive improvements, the program also had a positive impact on students' learning motivation and engagement. Students showed high enthusiasm during practical sessions, actively participated in group discussions, and demonstrated increased confidence in using learning tools. The interactive nature of the activities made learning more enjoyable and meaningful, thereby increasing students' interest in science subjects. This confirms that learning becomes more effective when students are directly involved in real-world, hands-on experiences.

The program also contributed to teacher development. Teachers gained new insights into the use of simple, low-cost teaching aids and interactive learning strategies. They expressed increased readiness to integrate practical activities into their regular science lessons. This is an important outcome, as teacher competence plays a key role in sustaining educational innovation and improving learning quality in schools. Moreover, the use of simple balance tools proved to be practical, cost-effective, and suitable for rural school contexts such as Bawonifaoso Village. The simplicity of the tools allows for easy replication and long-term use without

requiring advanced laboratory facilities. This makes the program highly sustainable and adaptable to similar educational environments.

Overall, the program successfully achieved its objectives by improving students' understanding, skills, and motivation in science learning. It also strengthened teacher capacity and demonstrated the effectiveness of experiential learning approaches in elementary education. Therefore, it can be concluded that integrating practical training using simple educational tools is an effective strategy to enhance the quality of science education in rural schools.

### Recommendations

Based on the findings and outcomes of this community service program, several recommendations are proposed to ensure sustainability and further improvement of science education practices in elementary schools.

#### 1. For Teachers

Teachers are encouraged to continuously integrate hands-on learning activities into their science teaching. The use of simple and locally available materials, such as balance scales, should be expanded to other science topics beyond mass measurement. Teachers should also adopt inquiry-based learning strategies to encourage students' active participation, critical thinking, and problem-solving skills.



Continuous professional development and training programs are also recommended to strengthen teachers' competence in designing interactive learning activities.

## 2. For Schools

Schools are advised to support the implementation of practical learning by providing basic resources and encouraging innovation in teaching methods. School management should facilitate the use of simple laboratory tools and allocate time for practical science activities within the curriculum. In addition, schools should promote a learning environment that values experimentation, creativity, and student engagement.

## 3. For Students

Students should be encouraged to actively participate in learning activities and develop curiosity toward scientific phenomena in their daily lives. They should be motivated to explore, ask questions, and engage in collaborative learning. By doing so, students can develop not only cognitive skills but also social and scientific competencies that are essential for future learning.

## 4. For Future Community Service Programs

Future programs are recommended to expand the scope of practical science learning by integrating other simple experimental tools and broader scientific concepts. Long-term mentoring programs should also be developed to ensure

continuous support for teachers and students. Additionally, further research and evaluation should be conducted to measure the long-term impact of such interventions on student achievement and learning behavior.

It is also recommended that future initiatives incorporate digital learning support, such as instructional videos or mobile-based learning resources, to complement hands-on activities. This blended approach may further enhance student understanding and engagement in science learning.

In conclusion, the implementation of education and practical training using simple balances has proven to be an effective, sustainable, and contextually appropriate approach for improving elementary science education in Bawonifaoso Village. The program not only enhances students' academic abilities but also fosters a more interactive, enjoyable, and meaningful learning environment. With continued support from teachers, schools, and stakeholders, this model has the potential to be replicated in other rural areas to improve the overall quality of science education.

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