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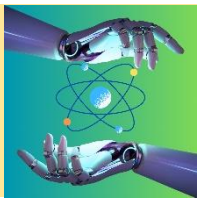

Multidisciplinary Community Service Activities to Enhance Education and Local Culture in Rural Aceh

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Abstract

This community service and research program aims to enhance educational quality, cultural awareness, scientific literacy, and environmental responsibility among children in rural Aceh through a multidisciplinary approach. The activities were implemented through a collaboration between Universitas Serambi Mekkah and the community of Ujong Mesjid Tanoh Abee Village, Seulimeum District, Aceh Besar Regency in 2025. Five key interventions were carried out: mathematics tutoring, storytelling-based introduction to human body parts, cultural learning through Acehnese regional songs, cleaning and reorganising the school library, and conducting simple thermometer experiments. A mixed-methods approach was used to collect data through observation, interviews, documentation, participant feedback, and field notes. The findings indicate that the mathematics tutoring sessions successfully improved students' engagement and foundational numeracy skills. The storytelling activity effectively enhanced children's understanding of basic health concepts while supporting their literacy development. Introducing local Acehnese songs helped strengthen cultural identity and fostered appreciation for regional heritage. The library cleaning activities not only improved the physical learning environment but also cultivated students' sense of responsibility and cooperation. Meanwhile, the simple thermometer experiment increased students' interest in science and provided practical exposure to basic scientific principles. Overall, the results demonstrate that integrating educational, cultural, scientific, and environmental activities into a single community service program offers significant benefits for holistic learning in rural settings. This multidisciplinary model provides a practical and replicable framework for supporting community development and improving student learning outcomes in under-resourced regions.

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1. Introduction

Community service plays a crucial role in enhancing the quality of life, strengthening social structures, and supporting sustainable development, particularly in rural areas where access to educational and cultural resources is often limited [1], [2]. In Aceh, Indonesia, community engagement has become an essential strategy for empowering local populations through collaborative educational and cultural initiatives [3]. Rural communities, such as fishing villages, frequently face structural barriers, including limited formal education opportunities and insufficient exposure to scientific knowledge and cultural literacy [4], [5]. Therefore, multidisciplinary community service programs are critical in supporting these communities through integrated approaches that address both educational and socio-cultural needs [6]. Education-oriented community service activities have been shown to significantly improve students' cognitive, social, and creative abilities, especially when implemented through direct, hands-on interactions such as tutoring and learning demonstrations [7], [8]. Mathematics tutoring, as documented in the community activities, provides foundational numeracy skills that support logical reasoning and problem-solving among school-aged children [9]. These initiatives help bridge learning gaps that often exist between urban and rural educational environments [10], thereby creating more equitable learning opportunities. In coastal communities, such interventions are particularly beneficial since many students struggle with limited access to academic support outside school hours [11].

Another essential component of multidisciplinary community service is promoting health literacy and early childhood development. Activities such as introducing human body parts and their functions through storybooks support children's understanding of basic health concepts, stimulate curiosity, and foster early scientific thinking [12]. Research indicates that storytelling improves long-term memory retention and enhances children's ability to connect abstract concepts with real-world experiences [13]. Integrating health-related content into community service not only enriches children's knowledge but also contributes to the broader goals of promoting well-being and healthy lifestyles in rural communities [14], [15]. Cultural preservation is equally important in maintaining the identity and continuity of rural societies. Activities that introduce local culture such as regional Acehnese songs strengthen cultural pride and intergenerational knowledge transfer [16]. Music and traditional arts serve as vehicles for transmitting values, history, and community identity, particularly in culturally rich regions like Aceh [17]. Community service programs that include cultural components help safeguard intangible heritage while providing young learners with meaningful experiences that connect them to their local traditions [18]. Such engagement also supports national efforts to preserve and revitalise regional cultures across Indonesia [19].

In addition to educational and cultural initiatives, community service also often involves improving community facilities, such as cleaning and organising school libraries. Clean, well-maintained learning environments are essential for fostering effective learning and supporting literacy development [20]. Library maintenance activities promote shared responsibility, environmental awareness, and student engagement in caring for educational spaces [21]. Enhancing the physical environment of rural schools helps increase their functionality and overall educational impact, especially in under-resourced areas [22]. Scientific literacy among young learners can also be strengthened through simple, hands-on experiments such as constructing basic thermometers. These activities encourage inquiry-based learning and stimulate curiosity about natural phenomena [23]. Introducing scientific concepts through practical demonstration has been widely recognised as an effective approach to improving students' understanding of fundamental scientific principles [24]. When implemented together with other community-based educational activities, simple science experiments help build a strong foundation for future STEM learning in rural settings [25]. Thus, multidisciplinary community service activities collectively enhance education, cultural preservation, and scientific awareness while supporting holistic community development in rural Aceh.

2. Data Collection Methods

Data collection in this community service project employed a combination of qualitative and quantitative approaches to ensure a comprehensive understanding of the educational and cultural

impacts on participants in rural Aceh. Several instruments and procedures were utilised to gather relevant information based on the type of activities conducted.

2.1 Observation

Direct observation was the primary method for documenting participant engagement, behavioural responses, and the overall implementation of each activity. Observations were conducted during mathematics tutoring sessions, storytelling activities on human body parts, cultural song introductions, school library cleaning, and simple thermometer experiments. Field notes and activity checklists were used to systematically capture learning interactions, participation levels, and the effectiveness of each activity.

2.2 Interviews

Semi-structured interviews were conducted with students, teachers, and community members to gather insights into their experiences, perceptions, and understanding of the activities. Interviews helped identify perceived benefits, challenges, and suggestions for improving future community service programs. Teachers provided additional contextual information about students' learning needs and cultural background.

2.3 Documentation

Photographic documentation, including the images presented in the article, served as visual evidence of the activities conducted. These images helped validate the implementation process, illustrate participant involvement, and provide supporting materials for the analysis. Additional documents such as attendance lists, activity plans, and school records were also collected.

2.4 Field Notes

Researchers recorded detailed field notes during all activities to capture situational details that may not be fully captured through observation alone. These notes included reflections on participant dynamics, environmental conditions, and unexpected occurrences during the program.

2.5 Participant Feedback Forms

Simple feedback forms were distributed to students and teachers to assess their level of satisfaction, the clarity of the learning materials, and the perceived usefulness of the activities. The forms included both closed-ended questions (Likert scale) and open-ended questions to allow participants to express their opinions freely.

2.6 Informal Discussions

Informal discussions with community members, particularly parents and fishermen's families, were used to gather contextual information about educational and cultural practices in the community. These conversations helped participants understand the broader social environment surrounding them. By integrating these data collection methods, the study was able to triangulate findings, enhance validity, and gain a holistic understanding of the impact of multidisciplinary community service activities in rural Aceh.

3. Result & Discussion

The results of this multidisciplinary community service program reveal meaningful educational, cultural, and social impacts on students and community members in rural Aceh. Each activity, from mathematics tutoring and science demonstrations to cultural song introduction and school library maintenance, contributed uniquely to enhancing learners' cognitive skills, cultural awareness, and engagement in school environments. The findings demonstrate that hands-on, context-based learning approaches were effective in increasing student participation and motivation, while community-centred cultural activities strengthened local identity and facilitated intergenerational knowledge transfer. Moreover, the program's collaborative nature fostered stronger relationships among educators, students,

and community members, underscoring the importance of integrated service activities in enhancing learning experiences and community well-being. The following section discusses these outcomes in detail, drawing connections between the observed results and broader educational and community development frameworks.

The mathematics tutoring activities shown in **Figure 1** illustrate an engaging, collaborative learning environment in which children receive direct academic support from facilitators. The photos reveal an outdoor, open-air setting that encourages relaxed yet focused learning, which is particularly beneficial for rural communities with limited classroom facilities. Students appear actively involved, working on worksheets while receiving guidance on basic mathematical concepts such as arithmetic and numeracy. The presence of a whiteboard suggests that facilitators used visual explanations to strengthen students' conceptual understanding. This form of peer-supported and facilitator-guided learning is especially valuable in communities where formal educational resources are scarce, helping reduce learning gaps and boosting students' confidence in mathematics.

Furthermore, the images show a high level of student participation, indicating that the tutoring activities successfully fostered motivation and engagement. Children sit in small groups, discussing problems and sharing ideas, which supports collaborative learning and helps develop communication and problem-solving skills. The involvement of multiple facilitators ensures that students receive individualised attention, allowing them to progress at their own pace. The informal and friendly atmosphere also creates a favourable emotional climate that encourages students who may otherwise feel anxious about mathematics. Overall, these tutoring sessions demonstrate the effectiveness of community-based educational interventions in enhancing foundational math skills and promoting a supportive learning culture among children in rural Aceh.

Figure 1. Mathematics tutoring activities

The activities illustrated in **Figure 2** constitute an interactive learning session in which children are introduced to human body parts and their functions through storybooks and visual demonstrations. The facilitators appear to engage the children through storytelling, an effective way to simplify complex biological concepts into narratives that are easy for young learners to understand. The arrangement of students sitting attentively on the floor indicates strong interest and focus, suggesting that the combination of visual aids, storytelling, and facilitator explanations created an enjoyable and meaningful learning experience. This activity also highlights the importance of early health education, as introducing body awareness helps children develop foundational knowledge about personal health and well-being.

In addition, the photos show active participation from both facilitators and students, demonstrating a dynamic, student-centred teaching approach. The facilitators' use of expressive gestures and storybooks likely enhanced comprehension and maintained student engagement throughout the session. Such interactive methods are particularly valuable in rural communities where access to science learning materials may be limited. By integrating literacy development with basic biological education, the activity not only improves children's understanding of the human body but also strengthens listening skills, vocabulary, and cognitive development. Overall, the activity depicted in **Figure 2** effectively integrates storytelling and science education, supporting both intellectual and emotional development among young learners in the community.

Figure 2. Activities introducing human body parts and their functions through reading storybooks

The activities shown in **Figure 3** depict an engaging cultural learning session where children are introduced to Acehnese regional songs as part of efforts to preserve and strengthen local cultural identity. The facilitators appear to lead the singing activity by demonstrating song lyrics, rhythms, and movements, while the children follow attentively and participate actively. This interactive format not only familiarises young learners with traditional Acehnese music but also helps them appreciate the cultural heritage embedded in local songs. The images show children standing in groups and facing the facilitators, suggesting a structured yet enjoyable learning environment that encourages participation and collective expression. Such cultural education activities are essential for fostering a sense of pride, belonging, and continuity within the community, especially among younger generations.

Moreover, the activity serves as a platform for social interaction and character-building. Singing together promotes cooperation, emotional expression, and confidence, allowing children to engage in communal activities that strengthen social bonds. The presence of multiple facilitators ensures that the learning session remains lively and well-coordinated, providing guidance and encouragement throughout the activity. By incorporating traditional Acehnese songs into community service, the program successfully supports cultural revitalisation while also enhancing children's auditory, linguistic, and motor skills. Overall, the activity highlighted in **Figure 3** demonstrates the effectiveness of integrating cultural heritage into educational outreach, ensuring that traditional values and local identity continue to thrive within rural communities.

Figure 3. Activities introducing local culture through regional songs from Aceh

The activities shown in Figure 4 illustrate a collaborative effort by students and facilitators to clean and reorganise the school library at SMPN 3 Seulimeum. The images show participants sweeping the floor, arranging books on shelves, and sorting scattered materials, indicating a structured approach to improving the library's overall cleanliness and functionality. Such efforts are essential for creating a more conducive learning environment, as a clean, well-organised library can significantly enhance students' motivation to read and access educational resources. The active involvement of students in the process also promotes a sense of ownership and responsibility toward their school environment, encouraging them to maintain cleanliness and care for shared facilities.

Additionally, these activities offer valuable opportunities for character development and the enhancement of soft skills. By working together, students practice teamwork, communication, and problem-solving skills while learning the importance of maintaining public spaces. The facilitators' participation ensures that tasks are well coordinated and that students receive guidance on handling books and materials properly. The presence of both male and female students working harmoniously reflects a positive and inclusive atmosphere that supports collective community engagement. Overall, the cleaning activity shown in Figure 4 not only improves the physical condition of the school library but also strengthens students' civic values, environmental awareness, and collaborative spirit.

Figure 4. Activities for cleaning the school library of SMPN 3 Seulimeum

The activities depicted in Figure 5 illustrate an engaging, hands-on science learning experience in which students construct and observe a simple thermometer experiment. The facilitators demonstrate how temperature changes can cause liquids to expand, using everyday materials such as coloured water, plastic bottles, and straws. This practical approach to science education allows students to directly observe physical phenomena rather than relying solely on theoretical explanations. The expressions of curiosity and concentration on the students' faces indicate strong engagement, suggesting that the experiment successfully stimulated their interest in scientific inquiry. By integrating experiential learning, the activity effectively helps students build a foundational understanding of temperature, heat transfer, and basic scientific principles.

Furthermore, the images highlight the collaborative and supportive learning atmosphere created during the experiment. Students are seen discussing observations, adjusting the experimental setup, and interacting with facilitators who guide the activity. This interaction fosters critical thinking, problem-solving, and cooperative learning skills. The use of simple, accessible materials also demonstrates that meaningful science education can be conducted in resource-limited environments, making the activity highly suitable for rural schools. Overall, the thermometer experiment activities depicted in Figure 5 not only improve students' scientific literacy but also promote creativity, teamwork, and a positive attitude toward science learning.

Figure 5. Simple thermometer experiment activities

4. Novelty of the Study Compared to Previous Research

The novelty of this community service and research program lies in its multidisciplinary and integrative approach, which simultaneously addresses educational, cultural, scientific, and environmental needs within rural Aceh communities. While previous studies on community service typically focus on a single dimension, such as mathematics tutoring, literacy development, cultural preservation, or health education, this study combines several mutually reinforcing activities within a single structured program. By doing so, it creates a more holistic model of community engagement that reflects the diverse learning needs of children in rural areas. The integration of mathematics tutoring, storytelling-based health education, cultural song introduction, library revitalisation, and simple science experiments distinguishes this initiative from earlier works that often treat these domains independently rather than as complementary components of community development.

Another key novelty is the emphasis on contextual, low-resource, and community-embedded learning, particularly using local cultural elements and simple scientific tools that are easily accessible to rural schools. Previous research has documented the benefits of both culturally based learning and hands-on science activities, but few studies combine both within a unified outreach program targeting marginalised coastal populations. Moreover, this study contributes to the field by situating the interventions within Aceh's unique socio-cultural context and using regional songs and local storytelling traditions as educational tools. The inclusion of environmental stewardship through collaborative library cleaning activities further adds an innovative dimension by linking character education with improvements to school infrastructure. This comprehensive, community-centred model demonstrates a new form of multidisciplinary service learning tailored to rural Aceh, offering a replicable framework that extends beyond the narrower scope of earlier research.

5. Conclusion

This community service and research program demonstrates that a multidisciplinary approach can significantly enhance educational quality, cultural awareness, and scientific literacy among children in rural Aceh. The mathematics tutoring activities effectively supported students' understanding of basic numeracy concepts, increasing their engagement and confidence in learning. The introduction of human body parts through storytelling provided a way for young learners to build foundational health knowledge, while the integration of Acehnese regional songs strengthened cultural identity and fostered pride in local heritage. In addition, the collaborative effort to clean and reorganise the school library created a more conducive learning environment and encouraged students to take responsibility for maintaining shared educational spaces. The simple thermometer experiment further enriched students' scientific understanding by providing hands-on experience with observable physical phenomena.

Overall, the findings indicate that combining educational, cultural, environmental, and scientific activities within one community service program creates a holistic learning experience that addresses the diverse needs of rural children. The involvement of facilitators and students in each activity not only improved learning outcomes but also promoted teamwork, communication, and a positive learning culture. This integrated model of community engagement offers a valuable framework for future programs supporting underserved communities, demonstrating that meaningful improvements in learning and community well-being can be achieved through collaborative, context-based, and resource-efficient initiatives.

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