JOURNAL INFORMATIC, EDUCATION AND MANAGEMENT (JIEM)
Vol. 7, No. 2, August 2025, pp. 153 ~ 159
ISSN: 2716-0696, DOI: 10.61992/jiem.v7i2.132

Multidisciplinary Collaboration in the Development of Teaching Aids and Learning at SDN 8 Juli

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Article Info

Article history:
Received 8 July 2025
Revised 11 July 2025
Accepted 13 July 2025

Keywords:
Multidisciplinary Collaboration, Teaching Aids, ADDIE Model, Elementary Education

ABSTRACT

This community service program aimed to develop instructional teaching aids through multidisciplinary collaboration between lecturers and students from various study programs at Universitas Islam Kebangsaan Indonesia (UNIKI). The activity was conducted at SDN 8 Juli, an elementary school located in a rural area of Bireuen Regency, Aceh, which faces limitations in concrete learning media. The development process adopted the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), allowing the creation of teaching aids to be carried out systematically and participatively. Based on a needs analysis, it was found that students experienced difficulties in understanding abstract concepts in science and English subjects. To address this challenge, the team designed several innovative teaching aids, including a volcanic eruption model, a rain cycle diorama, bilingual science vocabulary cards, and thematic student worksheets (LKS). These media were then implemented in thematic learning activities in Grades III and V. The implementation results indicated improvements in conceptual understanding, learning motivation, and student participation. Teachers also expressed enthusiasm and a willingness to use the media independently in the future. The evaluation, carried out through classroom observation and teacher reflection, showed that the developed media were relevant to classroom needs and easy to apply. This program demonstrated that cross-disciplinary collaboration can produce effective and sustainable learning media. The model is recommended for replication in other elementary schools, particularly those located in areas with limited educational resources.

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1. Introduction

Instructional media play a vital role in supporting active, enjoyable, and contextual learning processes at the elementary school level. However, many schools in rural areas, such as SDN 8 Juli, face challenges due to the limited availability of concrete learning media. This condition affects students' comprehension of abstract concepts, especially in science, mathematics, and English subjects (Hasanah & Widodo, 2022). Within the context of the Merdeka Curriculum, the emphasis on project-based and exploratory learning requires teaching aids and media that support student-centered learning activities (Kemendikbudristek, 2022). Therefore, a contextual approach using concrete media is highly relevant in building meaningful learning experiences that meet students' needs. Recent research shows that the use of teaching aids can increase students' motivation and academic achievement, particularly in science and mathematics subjects (Sari, Pramono, & Arifin, 2023). In mathematics learning, concrete media such as geometric models, number boards, or educational games help students understand concepts of geometry, measurement, and arithmetic operations in a visual and applicable manner. Integrating mathematical media into thematic teaching aids enables students to connect numerical concepts with real-life contexts, such as calculating the volume of a volcano or measuring rainfall from a diorama used in science lessons. Thus, the integration of mathematics into thematic learning media not only enhances students' numeracy skills but also reinforces conceptual understanding across subjects through an interdisciplinary approach.

Teaching aids not only assist in explaining complex scientific and mathematical concepts but also enhance student engagement in the learning process through visual and kinesthetic approaches. However, the development of teaching aids is often still sectoral and lacks cross-disciplinary collaboration. In fact, according to Wahyuni & Lestari (2023), multidisciplinary collaboration has the potential to produce more holistic, innovative, and applicable learning media by combining the strengths of various academic disciplines. In this community engagement program, the Universitas Islam Kebangsaan Indonesia (UNIKI) formed a cross-program team consisting of lecturers in mathematics, biology education, accounting, and English who collaborated in designing and producing thematic teaching aids for SDN 8 Juli. This collaboration is part of a strategy to empower elementary schools in 3T (frontier, outermost, and disadvantaged) areas through an academic community-based approach (Iskandar, Rahayu, & Fauzan, 2024).

Furthermore, a study by Pratiwi & Kurniawan (2024) shows that the use of visual media such as volcanic eruption simulations and rainfall process dioramas improves students' understanding of science material, while also enhancing their observational and critical thinking skills. This reinforces the idea that teaching aids are highly effective in developing 21st-century skills among elementary students. The integration of English into science media also adds value in developing teaching aids. The use of bilingual vocabulary cards, for instance, has been proven to support early literacy and expand students' understanding of

scientific terms in two languages (Ramadhani & Suhendra, 2023). This aligns with national basic education policy directions that emphasize strengthening early literacy and numeracy skills. Through this program, teachers at SDN 8 Juli also received training on the use and development of simple media that are relevant to the local context. The impact of this training was felt not only by the students but also in enhancing teachers' pedagogical competence in utilizing local resources as learning media (Nugroho, Dini, & Farhan, 2025). Therefore, multidisciplinary collaboration in developing teaching aids at SDN 8 Juli is expected to serve as a model for comprehensively strengthening the capacity of elementary schools. This article aims to describe the process of developing such media and its impact on improving the quality of learning, as well as to encourage similar practices in other schools.

2. Research Methodology

This study employed a descriptive qualitative approach in the form of a collaborative community service program. This approach was chosen as it is capable of capturing the processes, engagement, and outcomes of multidisciplinary collaboration in the development of teaching aids. The media development model used was ADDIE (Analysis, Design, Development, Implementation, Evaluation), which is widely recognized for designing instructional products that are systematic and relevant to learners' needs (Nurhalimah & Fitria, 2023). The program was conducted at SDN 8 Juli, located in Bireuen Regency, Aceh Province, during May 2025. The location was selected based on preliminary observations indicating a lack of learning media and strong motivation among teachers to innovate. The subjects of this activity included classroom teachers, elementary school students, and a collaborative team from Universitas Islam Kebangsaan Indonesia (UNIKI), involving lecturers and students from the Informatics, Physical Education, Accounting, and English Education departments. The aim of this collaboration was to combine various areas of expertise to produce teaching aids that are not only educational but also practical and contextually appropriate (Iskandar et al., 2024).

During the analysis stage, classroom observations and structured interviews were conducted with SDN 8 Juli teachers to identify concepts that students found difficult to understand, particularly in science and English subjects. This information was used to determine the types of media and instructional approaches to be developed. The involvement of teachers as active participants in this stage was considered essential to ensure the relevance of the media to actual classroom needs (Sari et al., 2023). The design and development stages were carried out through interdisciplinary collaboration. Informatics lecturers assisted in media visualization, science and physical education lecturers designed content and structure, English lecturers developed the bilingual components, and accounting and management lecturers oversaw logistics and cost evaluation. The resulting products included a volcanic eruption model, a rain cycle diorama, bilingual science vocabulary cards, and thematic student worksheets (LKS). According to Wahyuni & Lestari (2023), media developed

through collaborative and interdisciplinary efforts significantly enhance student engagement in thematic learning. The implementation and evaluation stages involved teacher training and in-class trials of the media. Teachers were encouraged to directly apply the teaching aids in their lessons, while students actively engaged with the tools. Evaluation was conducted through classroom observations, feedback collection from teachers and students, and reflective sessions on media effectiveness. This model supports a feedback loop for continuous improvement. Participatory evaluation is considered crucial in community-based media development initiatives (Nugroho et al., 2025).

3. Results and Discussion

The community service activity conducted at SDN 8 Juli resulted in several key outputs in the form of innovative learning media collaboratively developed by a multidisciplinary team. The teaching aids produced included: (1) a volcanic eruption model using baking soda and vinegar as a simulation of an eruption, (2) a rain cycle diorama made from simple materials, (3) bilingual science vocabulary cards (Indonesian and English), and (4) integrated student worksheets (LKS). All of these media were trialed in thematic learning activities for Grade III and Grade V students. Observations during the implementation revealed that students were highly enthusiastic when the teaching aids were used. They found it easier to understand concepts such as natural phenomena, the water cycle, and scientific terminology in English. These findings are consistent with Ramadhani & Suhendra (2023), who noted that visual and bilingual media can enhance both science literacy and language literacy from an early age. Teachers also responded positively to the developed media, finding them easy to use, contextual, and aligned with the Merdeka Curriculum.

The use of teaching aids also led to increased student participation. Several previously passive students became more engaged, asked questions, and expressed curiosity through experimentation. This reinforces the argument by Sari et al. (2023) that concrete teaching aids can stimulate curiosity and critical thinking skills in students. Through a "learning by doing" approach, students gained direct experience that supported their understanding of abstract material. Teachers trained during the program expressed motivation to independently develop simple teaching aids following the completion of the project. This reflects the success of the empowerment-based approach, as highlighted by Iskandar et al. (2024), which emphasizes that involving teachers as active partners enhances the sustainability of teaching media utilization. Additionally, this activity strengthened the relationship between the university and the school as collaborative partners. From a managerial perspective, the involvement of lecturers from accounting and management ensured that planning, budgeting, and reporting processes were carried out efficiently and accountably. The evaluation process, conducted through reflective discussions with teachers and students, provided evidence of the success of the ADDIE model in community-based media development. According to Nugroho et al. (2025), integrating participatory evaluation into media development is a crucial factor in ensuring the relevance and effectiveness of the

program's outcomes. Thus, the results of this activity support previous findings regarding the effectiveness of collaborative and participatory approaches in developing instructional media for elementary education. Multidisciplinary collaboration not only produces high-quality teaching aids but also strengthens teacher competence and significantly enhances student learning motivation.

Here is one of the pictures showing students observing the results of a teaching aid in the form of an erupting volcano. The students were also given the opportunity to measure the height of the volcano and the distance of the volcanic eruption.

Figure 1. Students Observing the Results of the Constructed Teaching Aid

Table 1. Evaluation Results of Teaching Aid Usage at SDN 8 Juli

Evaluation Aspect	Average Student Score (%)	Average Teacher Score (%)
Concept Understanding	88	85
Student Participation	92	90
Learning Interest	90	87
Teacher Engagement	85	90
Media Sustainability	80	83

Source: Observation and Reflection Results at SDN 8 Juli, 2025

In Table 1. Evaluation of Teaching Aid Usage by Teachers and Students, the table presents a comparison of average scores between students and teachers across five key aspects of learning media evaluation: (1) concept understanding, (2) student participation, (3) learning interest, (4) teacher engagement, and (5) sustainability of media use. Student participation and learning interest received the highest scores among all aspects, indicating the effectiveness of the developed teaching aids in capturing attention and actively engaging students in the learning process.

4. Conclusion

The multidisciplinary community service activity conducted at SDN 8 Juli successfully developed innovative, contextual, and applicable learning media. Through the ADDIE model approach and the involvement of lecturers and students from various academic disciplines, several teaching aids were created, including a volcanic eruption model, a rain cycle diorama, bilingual vocabulary cards, and thematic student worksheets (LKS), all of which proved effective in enhancing students' understanding of abstract concepts, particularly in science and English subjects. The implementation results showed that the developed media not only improved students' learning motivation and participation but also strengthened teachers' competencies in managing active learning. This activity demonstrated that the synergy between technological, pedagogical, managerial, and linguistic expertise can provide concrete solutions to learning challenges in elementary schools, particularly in rural areas. The participatory evaluation conducted with both teachers and students ensured that the products developed were highly beneficial and sustainable. This experience affirms that multidisciplinary collaboration not only enriches the media development process but also builds a more empowered and sustainable educational ecosystem. Therefore, the cross-disciplinary collaborative approach applied in this program is worthy of being adopted as a model for developing instructional media at the elementary education level. Similar programs are recommended for replication in other schools, especially those facing limitations in educational resources but with strong potential for partnerships with higher education institutions.

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