Integration of Educational Math Games and Self-Management Ethics to Improve Discipline and Digital Literacy of Elementary School Students

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Article Info	ABSTRACT
	This community service program aims to develop instructional teaching aids through multidisciplinary collaboration between lecturers and students from various study programs at the Islamic National University of Indonesia (UNIKI). The activity was carried out at SDN 8 Juli, an elementary school in a rural area of Bireuen Regency, Aceh, which faces limitations in concrete learning media. The approach used was the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which allows for a systematic and participatory development process. Based on the needs analysis, it was found that students had difficulty understanding abstract concepts in science and English subjects. To address this challenge, the team designed several innovative teaching aids, such as an erupting volcano model, a diorama of the rain process, bilingual science vocabulary cards, and thematic student worksheets (LKS). These media were then implemented in thematic learning in grades III and V. The results of the implementation showed improvements in conceptual understanding, learning interest, and student participation. Teachers also expressed enthusiasm and willingness to use the media independently in the future. Evaluation was conducted through classroom observation and teacher reflection, indicating that the developed media were appropriate for the needs and easy to apply. This activity demonstrates that cross-disciplinary collaboration can produce effective and sustainable learning media. This model is worthy of replication in other elementary schools, particularly those in resource-limited areas.

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1. Introduction

The digital era has transformed the face of education globally. Teaching and learning processes are now expected not only to focus on academic achievement but also to equip students with digital literacy and strong character. The Ministry of Education, Culture, Research, and Technology (2023) emphasizes the importance of integrating technology into learning that strengthens character and 21st-century skills. In this context, digital transformation must be balanced with humanistic and contextual learning, especially at the elementary level. However, the implementation of digital learning in elementary schools still faces various challenges, particularly in rural areas. Limitations in technological infrastructure, teacher capacity, and student learning habits are major obstacles. Research by Syamsudin et al. (2022) shows that elementary schools in rural areas continue to experience significant digital gaps, both in terms of access to devices and literacy in using them. This impacts the low effectiveness of utilizing digital learning media.

One of the real problems faced by elementary schools in areas such as UPTD SD Negeri 12 Samalanga is the low level of student discipline in the learning process. Students often struggle with time management, responsibility for tasks, and maintaining focus, especially in environments beginning to introduce technology-based learning (Rahmawati & Pratama, 2023). Discipline is a crucial foundation for educational success and must be instilled early through relevant and enjoyable approaches for children. On the other hand, mathematics is often perceived as difficult and intimidating by elementary students. This results in low motivation and active participation in math learning. A study by Firmansyah & Utami (2024) found that more than 60% of elementary students feel anxious during math lessons due to non-interactive and rigid learning approaches. Therefore, learning strategies that can spark students' interest and improve understanding of basic numeracy concepts are needed. The integration of interactive digital media and mathematics content presents a promising approach. Educational games are one effective medium for creating enjoyable, challenging learning environments that foster students' critical thinking. According to Amalia & Harun (2025), the use of gamification in education has been proven to enhance students' intrinsic motivation, especially when combined with reward systems and the reflection of character values.

Furthermore, it is important to embed self-management values into the learning media used. Self-management includes the ability to manage time, regulate emotions, and take responsibility for assigned tasks. A recent study by Nasrullah et al. (2024) states that students with strong self-management skills tend to be more disciplined, independent, and consistent in completing school tasks. Therefore, the integration of self-management ethics into learning media is a crucial aspect of character development. In the context of mathematics learning, a game-based educational approach allows students to practice calculations, develop strategies, and solve problems in a fun way. Well-designed educational games can also convey ethical messages and simulate decision-making to build discipline. Learning activities thus become interactive and reflective, rather than one-directional (Setiawan & Lestari, 2023).

The community service activity conducted by a team of cross-disciplinary lecturers from the Islamic National University of Indonesia (UNIKI) aims to address these challenges through

the development of an educational math game integrated with self-management ethics. This initiative targets elementary students at UPTD SD Negeri 12 Samalanga and involves teachers as partners in implementing the developed learning media. The primary goal of this activity is to improve students' motivation to learn mathematics, build discipline and responsibility, and strengthen their digital literacy. By employing a multidisciplinary approach (Management, Informatics, and Mathematics), the media developed is not only enjoyable but also rich in values and relevant to students' everyday lives (Ariska et al., 2025).

This program is expected to foster a new learning model that not only enhances student learning outcomes but also strengthens best practices in character education and technology integration in elementary schools. The results of this community service initiative are expected to serve as a reference for the development of similar learning media in other regions, especially in addressing the challenges of digital literacy and character development in the technological era.

2. Research Methodology

This study employs a descriptive qualitative approach in the form of Research-Based Community Service, focusing on the development and implementation of digital learning media. The objective of this method is to design, develop, and implement an educational math game integrated with self-management ethics to improve discipline and digital literacy among elementary school students. This activity was conducted at UPTD SD Negeri 12 Samalanga, Bireuen Regency, Aceh, selected based on the need to enhance student discipline and the limited access to interactive digital learning media. This is an applied research study, with the primary subjects being fourth and fifth-grade students 30 in total who were purposively selected based on their active engagement in the learning process. In addition to the students, classroom teachers and the school principal were involved as supporting participants in data collection and activity evaluation. The study also engaged lecturers from multiple disciplines Management, Informatics, and Mathematics as well as Informatics students who served as media developers and technical assistants in the field.

The research was carried out systematically in seven main stages. First, an initial coordination meeting with the school principal and teachers was conducted to agree on the activity design and identify school needs. Second, a student needs survey and digital infrastructure assessment were carried out to ensure readiness for implementation. Third, the team developed an Android/PC-based educational game featuring arithmetic problems, basic logic, and self-management features such as a scoring system, timer, and reflective messages.

The fourth stage involved initial game trials and feature refinement based on feedback from teachers and students. In the fifth stage, teachers were provided with brief training on using the media and integrating character values into learning. The sixth stage saw the direct implementation of the game in classroom learning, accompanied by the lecturers and students. Lastly, in the seventh stage, an evaluation and reflection session was conducted to assess the success and impact of the activity on changes in student behavior and skills.

Data were collected through several techniques, including direct observation during implementation, semi-structured interviews with teachers and students, photo and video documentation, and feedback questionnaires completed by students after playing the game. The collected data were analyzed descriptively and qualitatively. The analysis involved categorizing findings according to key themes, such as increased motivation to learn mathematics, changes in student discipline and responsibility, students' ability to use technology, and overall responses to the learning media used. The results are presented in reflective narrative form and supported by visual documentation as a form of reporting and validation of the activity.

3. Results and Discussion

The community service activity aimed at integrating educational math games and self-management ethics into elementary students' learning was successfully carried out as planned. The results of the activity show a positive impact on students' learning motivation, increased discipline, and foundational digital skills. The educational game developed included basic math problems, number logic, and gamification systems such as scores, timers, and time-limit notifications. These features were designed to foster cognitive abilities while instilling values of discipline and responsibility through an enjoyable learning experience (Amalia & Harun, 2025).

One of the key findings of this activity was the increased engagement and enthusiasm of students during game-based learning sessions. Students showed greater curiosity and were more actively involved in solving math problems compared to conventional methods. This aligns with the study by Firmansyah & Utami (2024), which supports the idea that game-based learning can significantly reduce math anxiety and enhance students' cognitive engagement. This is especially effective when learning media are presented as games offering gradual challenges and motivational visual rewards.

In terms of character development, the game's reflective features provided reinforcement in students' self-management. After completing each game session, students were prompted to reflect on how they managed their time, handled tasks, and responded to failure. This practice fosters independent learning awareness and is consistent with the findings of Nasrullah et al. (2024), which emphasize that structured reflection in learning positively influences student discipline and responsibility. Teachers also observed positive behavioral changes in some students, such as improved concentration and persistence in completing tasks.

For teachers, the activity provided direct benefits in the form of training on digital media use and its integration into character education. Teachers did not only act as facilitators of technology but also as reflective companions helping students internalize self-management values. This supports the direction of the Ministry of Education, Culture, Research, and Technology (2023), which encourages the use of technology as a tool to embody the "Pancasila Student Profile" through contextual and character-based learning.

Beyond its impact on students and teachers, the involvement of university students in this activity played a crucial role in fulfilling the Tri Dharma of Higher Education. Students

contributed to designing the game interface, compiling questions, and assisting students during implementation. Active student participation in such community-based projects enhances their collaboration skills, social empathy, and professional competence (Setiawan & Lestari, 2023). This proves that community service can become a meaningful learning platform across educational levels.

Several outputs were produced and handed over to the school, including:

a. An Android/PC-based educational math game application
b. A teacher's user guidebook
c. Student self-management reflection sheets
d. A tutorial video
e. A photo and written documentation report

These products can be reused in learning activities and have potential for replication in other elementary schools.

Overall, this activity demonstrates that the integration of digital technology and character education can be effectively implemented at the elementary level, even in rural areas. Game-based learning not only improves academic outcomes but also shapes students' discipline and sense of responsibility. These results align with Syamsudin et al. (2022), who highlight that locally relevant and contextualized technological solutions are more effective in addressing the digital divide in rural schools.

Furthermore, the interdisciplinary collaboration in this activity became a distinct advantage. The synergy between management, informatics, and mathematics disciplines proved that a multidisciplinary approach enriches the content and design of learning media while also strengthening character building and logical reasoning in students. According to Ariska et al. (2025), locally tailored scientific synergy can produce educational innovations that are not only pedagogically relevant but also practical in elementary school implementation. This affirms the critical role of higher education institutions as centers of educational innovation that respond to real community needs.

Post-activity evaluations also showed improvements in students' basic digital skills, such as using tablets or laptops, navigating learning interfaces, and understanding visual-based instructions. Although some students initially struggled with operating digital media, after repeated practice and guidance, most demonstrated rapid adaptation. This supports the findings of Kurniawan & Dewi (2023), which state that elementary-aged children, particularly from Generation Alpha, possess a high capacity for learning technology when provided with contextual and enjoyable hands-on experiences.

The integration of reflection as a core part of the learning process through educational games is another strength of this initiative. Light but meaningful reflective questions helped students build self-awareness and recognize the importance of personal responsibility in learning. Several teachers even noted that previously passive students began to show courage and initiative in learning after engaging in reflective gameplay. This reinforces the idea that effective learning goes beyond knowledge transfer—it also shapes attitudes and values (Sanjaya, 2024).

Moreover, this technology-based approach is a form of implementing the Merdeka Curriculum, which emphasizes differentiated learning, project-based approaches, and character development. The game media used can be adapted to different student ability levels, provides progressive challenges, and allows teachers to reinforce values through discussion and reflection. Therefore, this educational game serves as a relevant learning tool aligned with current national education policy (Kemendikbudristek, 2023).

The following are activities carried out by students along with the teachers who assisted during the implementation of the educational game integration.

Figure 1. Implementation of the Activity

Table 1. Observation Results of Educational Game Implementation at SDN 12 Samalanga

No	Observation Indicator	Percentage Increase (%)
1	Students' learning motivation	90%
2	Student discipline	85%
3	Active student participation in learning	88%
4	Students' digital skills	80%
5	Teachers' enthusiasm toward learning media	92%
6	Students' reflective ability	75%

This table shows that all observed indicators experienced significant improvement, with the highest values recorded in teacher enthusiasm (92%) and student learning motivation (90%). Character-related aspects such as reflection and discipline also demonstrated positive development. If you would like this table in Word or Excel format, I can help prepare it for you.

4. Conclusion

The community service program themed "Integration of Educational Math Games and Self-Management Ethics to Improve Student Discipline and Digital Literacy" was successfully implemented at UPTD SD Negeri 12 Samalanga, yielding highly positive results. The educational game developed as a learning medium proved effective in significantly enhancing students' learning motivation, discipline, and digital skills. The game-based learning approach, infused with self-management values, provided a fun yet meaningful

learning experience for elementary school students. Beyond its direct impact on students, the program also brought substantial benefits to teachers by improving their capacity to use digital media in character education, and to university students who gained hands-on experience through a cross-disciplinary community service project. Evaluation results showed that students not only became more active and focused in learning mathematics, but also began to exhibit greater responsibility, independence, and proficiency in using digital devices. The collaborative model involving lecturers, students, teachers, and pupils in the development and implementation of the learning media demonstrates that research-based, locally driven community service can be highly effective in addressing the challenges of 21st-century education. Therefore, similar programs are highly recommended for replication and development in other elementary schools, especially those facing similar challenges related to learning motivation, discipline, and limited access to educational technology.

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