STRENGTHENING INCLUSIVE AND CREATIVE TECHNOLOGY-BASED LEARNING IN ELEMENTARY SCHOOLS THROUGH GAMIFICATION, INTERACTIVE MEDIA, AND ARTIFICIAL INTELLIGENCE

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ABSTRACT

A series of Community Service (PkM) programs has been carried out at SDN Kedoya Utara 03, West Jakarta, by a team from the Faculty of Computer Science, Mercu Buana University, aiming to improve the quality of technology-based elementary education. These programs include the development of a gamification-based learning application to enhance students' digital literacy, training in graphic design software to support teachers' creativity in delivering information, optimization of the interactive RubiMath media as an adaptive learning solution for inclusive education, and the utilization of Python-based Artificial Intelligence (AI) for learning patterns, geometry, and mathematical logic. The implementation results showed a significant increase in motivation, understanding, and skills for both students and teachers. The integration of technology and innovative methods proved effective in creating a more enjoyable, interactive, and inclusive learning process. All these activities contributed to enhancing digital literacy, teachers' creativity, and the quality of mathematics learning outcomes, and can serve as a model for technology-based education implementation in other elementary schools.

Keywords: Community Service, Digital Literacy, Interactive Media, Gamification, Artificial Intelligence.

1. INTRODUCTION

The integration of digital technologies and interactive media has significantly transformed traditional classroom practices in elementary education, enabling the transition from conventional teacher-centered methods to innovative, student-driven learning environments (Amalia & von Korflesch, 2021). Technology-enhanced approaches such as gamification, interactive media, and Artificial Intelligence (AI)-driven tools facilitate both teaching and learning, breaking through the barriers of engagement, accessibility, and inclusivity (Akour et al., 2022). In Indonesia, the national movement for digital literacy and educational innovation continues to promote the use of modern technology to improve students' and teachers' competencies, especially in schools serving diverse learners (Nuryadi & Widiatmaka, 2023).

Despite the growing awareness, many elementary schools including SDN Kedoya Utara 03 Jakarta Barat still face challenges in adopting technology as an integral part of learning. Students often use digital devices mainly for entertainment rather than educational purposes, and teachers experience difficulties in mastering digital platforms and incorporating them into daily teaching practice (Iglesias Rodríguez et al., 2017). Furthermore, inclusive education environments require not only access to technology but also adaptive solutions for students with learning disabilities, such as dyscalculia, who need specialized support to master abstract subjects like mathematics (Mammarella et al., 2021). Previous efforts often focused on basic e-learning applications or limited technology workshops, without addressing the comprehensive need for engagement, inclusivity, and teacher professional development (Yang et al., 2024).

Recent research highlights that the implementation of gamification elements such as points, challenges, and rewards can increase student motivation and participation in digital learning contexts (Bouchrika et al., 2021; Dečman et al., 2022; Ghai & Tandon, 2023). Likewise, teacher training in digital design software supports the creation of creative and visually engaging learning materials, enhancing classroom interactivity and supporting diverse learning styles (Baturay, 2011; Kumar et al., 2020). The adoption of interactive learning media and the use of AI-based platforms like Python for teaching mathematical concepts, have shown promise in improving both student understanding and digital skills (Nurpeisova et al., 2022; Suzuki, 2021).

However, most conventional approaches require intensive manual feature engineering, lack automation, and offer limited adaptability to students' diverse needs. Moreover, the full integration of interactive media, gamification, and AI in elementary classrooms especially for inclusive settings remains limited and requires further exploration (Jarrahi et al., 2023; Wang et al., 2023). There is a need for comprehensive, scalable interventions that empower both teachers and students to thrive in the digital age. To address these gaps, this study reports on a series of community service initiatives at SDN Kedoya Utara 03 Jakarta Barat, aiming to:

- Develop and implement gamified digital literacy applications to boost student motivation.

- Train teachers in the use of graphic design software for creative and effective information delivery.
- Optimize interactive media (RubiMath) for adaptive and inclusive mathematics teaching.
- Introduce AI-based learning using Python for mathematics pattern, geometry, and logic learning.

The primary contributions of this work are summarized as follows:

(1) To foster a holistic technology-based ecosystem that enhances digital literacy, creativity, and learning motivation among both students and teachers
(2) To produce best practices and resources for integrating gamification, AI, and interactive media in elementary classrooms, especially within inclusive educational settings
(3) To evaluate the impact of these interventions through empirical assessment of learning outcomes and digital competence development

2. METHOD

The methodology adopted in this community service research project is anchored on a participatory action research framework, strategically designed to ensure technology-based educational innovation is not only implemented but also sustained within SDN Kedoya Utara 03. The method is intricately structured, reflecting the interconnection of four principal components as depicted in the research framework inputs, interventions, outputs, and outcomes—as illustrated in Figure 1. Each component was systematically addressed through a combination of qualitative and quantitative approaches, with careful attention paid to school context, inclusivity, technological readiness, and stakeholder engagement.

The process began with a thorough identification of key inputs. This initial stage involved conducting a comprehensive needs assessment at the partner school. The research team employed a combination of observation, document analysis, interviews, and surveys to capture a holistic picture of the school's operational landscape. This needs assessment focused on three critical input dimensions: school needs, inclusivity needs, and teacher readiness. The assessment of school needs entailed evaluating infrastructure, classroom environments, the availability of digital resources, and the general profile of students and teachers. The inclusivity aspect required mapping the presence and distribution of students with special educational needs, including but not limited to learning disabilities, dyscalculia, or other cognitive challenges. This process ensured that subsequent interventions would be accessible, adaptive, and impactful for all learners, including those in inclusive settings. Teacher readiness was examined through interviews and digital literacy assessments, which aimed to determine teachers' familiarity with technology, openness to pedagogical innovation, and capacity to participate in professional development activities.

Building upon this nuanced understanding of the school context, the next methodological phase focused on designing and implementing a series of multi-faceted interventions. Each intervention was conceptualized in close collaboration with school stakeholders to maximize relevance and ownership. The four primary interventions included teachers' training, gamified learning, AI for mathematics, and media interactive solutions. The teachers' training intervention was foundational, as it sought to empower teachers to become agents of change in the digital transformation of the classroom. Training modules were co-developed by the university team and tailored to the existing competencies and aspirations of the teachers at SDN Kedoya Utara 03. The training included both synchronous and asynchronous sessions, combining theory with extensive hands-on practice. Topics covered ranged from the basics of digital literacy and internet safety to advanced skills in graphic design, multimedia content creation, and the use of interactive platforms for lesson delivery. Special emphasis was placed on differentiated instruction, equipping teachers to address diverse learning styles and needs, including those of students in inclusive classrooms.

In tandem with teacher training, a gamified learning intervention was introduced to directly engage students and foster a culture of active, self-motivated learning. The research team designed and developed educational applications incorporating game mechanics such as points, leaderboards, achievement badges, and narrative challenges. These apps were co-created with input from both teachers and students, ensuring alignment with the school's curriculum and the unique learning context. The gamified approach was particularly effective in increasing student participation, enhancing digital literacy, and making abstract concepts more approachable. Continuous monitoring and feedback loops were established, allowing for real-time adjustments based on user experience and learning analytics data. The AI for mathematics intervention represented the project's commitment to leveraging cutting-edge technology for the benefit of both teachers and students. The intervention introduced artificial intelligence concepts in a simplified, accessible manner, primarily using Python as the programming language. Workshops and coding camps were organized for interested teachers and students, focusing on practical applications of AI in the context of mathematics education. For example, participants learned to create simulations and visualizations of mathematical patterns, geometry, and logic problems, making these topics more interactive and

intuitive. The integration of AI tools was deliberately scaffolded, starting with basic computational thinking before progressing to more complex algorithmic reasoning. Throughout the process, a culture of experimentation, peer support, and collaborative problem-solving was fostered.

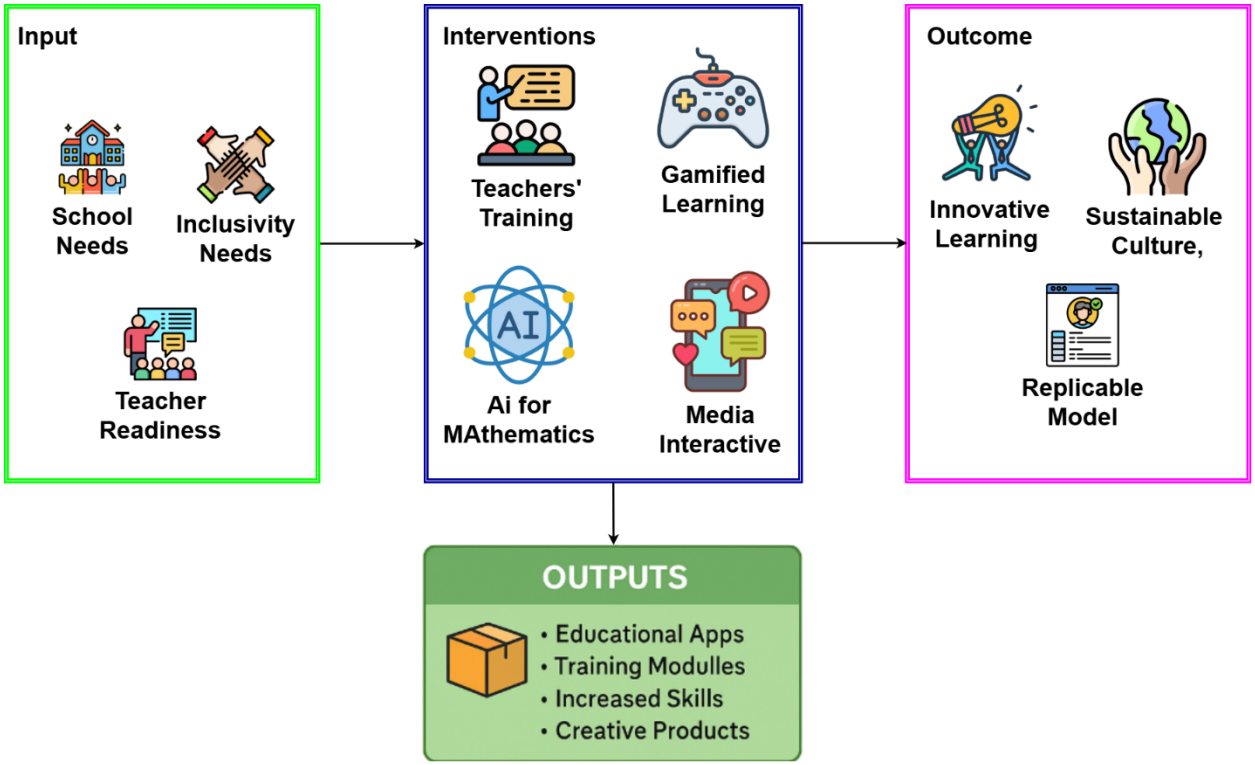

Figure 1. Technology-Enhanced Community Service Intervention Framework

In addition to the above, a media interactive intervention was deployed to expand access to inclusive, engaging learning resources. This component centered around the adoption and optimization of interactive platforms such as RubiMath, as well as the development of digital learning content tailored to the specific needs of the school. The intervention involved equipping classrooms with multimedia devices, training teachers to curate and design interactive learning objects, and supporting students in navigating digital content safely and effectively. Media interactive strategies were chosen not only for their capacity to increase engagement but also for their flexibility in addressing different learning preferences and requirements, especially for students with learning disabilities. Implementation of all interventions was executed in close partnership with the school community, ensuring active participation of teachers, students, and administrators at every stage. A participatory, iterative process was adopted, wherein regular workshops, coaching sessions, and collaborative planning meetings facilitated ongoing communication and feedback. The project team established a schedule for workshops and classroom integration, accommodating the existing timetable of the school to minimize disruption. University students involved in the project served as facilitators and co-learners, helping bridge the gap between theory and practice while simultaneously enriching their own educational experiences.

Outputs were meticulously documented and measured throughout the program. These outputs encompassed tangible products such as educational apps, digital training modules, multimedia lesson plans, and other creative educational resources produced collaboratively during the intervention phase. Teacher and student skill development was measured through pre- and post-training assessments, while creative products were showcased in school exhibitions and shared via digital platforms. Quantitative data such as the number of training sessions conducted, educational apps developed, and students or teachers reached were systematically recorded. Qualitative outputs, including lesson plans, digital artifacts, and participant testimonials, were also collected and analyzed. To evaluate the broader impact and ensure sustainability, the research employed multiple methods for outcome assessment. Mixed methods approaches combining quantitative and qualitative data—were used to capture both the immediate and long-term effects of the interventions. Pre- and post-intervention tests measured changes in digital literacy, mathematics understanding, and creative teaching capacity. Surveys and interviews were conducted with teachers, students, and

school leaders to capture perceptions of program effectiveness, levels of motivation, and perceived challenges or enablers. Classroom observations and video documentation were used to triangulate data and assess changes in teaching and learning dynamics.

Outcomes sought included the creation of an innovative learning environment, the establishment of a sustainable, technology-based school culture, and the development of a replicable community service model. The project monitored the extent to which technology integration became embedded in daily classroom practice, the persistence of new pedagogical approaches, and the diffusion of innovation among teachers and students. Qualitative indicators of outcome included increased teacher confidence, student autonomy, inclusivity in lesson planning, and the presence of technology-driven collaborative learning communities within the school. Quantitative indicators included improvements in student assessment scores, increased use of digital platforms, and the replication of project outputs in other schools or classrooms. Throughout the program, continuous reflection and adaptation were integral. The project team maintained an open channel for feedback, enabling timely responses to unforeseen challenges or emerging opportunities. Lessons learned were documented at each phase and shared with the wider educational community through workshops, publications, and online dissemination. The entire methodological approach was grounded in the principles of partnership, empowerment, and sustainability, seeking to leave a lasting positive legacy at SDN Kedoya Utara 03 and to provide a scalable framework for similar interventions in other contexts.

3. RESULTS AND DISCUSSION

The implementation of the technology-enhanced community service framework at SDN Kedoya Utara 03, as illustrated in Figure 1, yielded a variety of tangible outputs and significant outcomes across multiple educational dimensions. The results section presents findings from each key intervention, while the discussion contextualizes the impact and sustainability of these initiatives.

3.1 Teachers' Training

The Teachers' Training intervention as a comprehensive program to develop and strengthen the digital literacy and creative teaching abilities of teachers at SDN Kedoya Utara 03. The process began with an initial assessment to map teachers' skills and familiarity with digital tools and educational technology. The findings indicated that most teachers primarily used technology for basic administrative tasks, with limited experience in developing or utilizing digital learning media. Based on these insights, a structured training curriculum was developed. The curriculum covered several key areas: introduction to digital literacy concepts, hands-on practice with graphic design applications such as Canva and CorelDRAW, and techniques for integrating interactive media into classroom lessons. The training emphasized not only technical proficiency but also the pedagogical value of digital media in creating engaging, visually rich, and adaptive learning experiences for students of various backgrounds and abilities.

The training was implemented through a series of interactive workshops and practice sessions. Teachers were guided step-by-step, from the basics of navigating graphic design platforms to creating their own learning materials such as digital posters, interactive worksheets, and multimedia presentations. Collaboration among teachers was encouraged, enabling participants to share ideas, provide feedback, and develop best practices together. Throughout the training, teachers gradually gained confidence in designing and deploying creative digital content. They learned how to adapt materials for different subjects and student needs, including those in inclusive classes. As a result, teachers reported a noticeable improvement in their instructional creativity and classroom management. They were able to present lessons in ways that captured students' attention, stimulated curiosity, and encouraged greater participation. The impact of the training was evident in both qualitative and quantitative outcomes. Pre- and post-training assessments showed significant advancement, with most teachers progressing from beginner to intermediate proficiency in digital skills. Feedback collected through interviews and reflective discussions indicated that teachers felt more empowered and motivated to continue developing their abilities beyond the program. Many teachers also highlighted the positive change in students' engagement and learning outcomes when digital media were incorporated into lessons.

3.2 Gamified Learning

The gamified learning intervention was strategically designed to transform the student learning experience, particularly in mathematics and digital literacy for upper-grade students. The initiative emerged in response to persistent challenges of low student motivation and passive engagement, which often hindered effective learning in subjects that many students considered difficult or abstract. At the heart of this intervention was the development and integration of an educational application utilizing gamification principles. The application featured key elements such as leaderboards, achievement badges, interactive challenges, and real-time feedback. Lessons and modules were structured as a series of quests or missions, allowing students to accumulate points and earn rewards for their

accomplishments. This design was intended to tap into students' natural curiosity, competitiveness, and desire for achievement, making learning feel more like an engaging game than a routine classroom task.

The implementation process involved close collaboration with teachers to ensure seamless alignment with the curriculum. Students participated in both classroom and independent learning sessions using the gamified app, while teachers facilitated group activities and monitored student progress. The collaborative nature of the application also encouraged students to work together to solve challenges, fostering a culture of teamwork and collective problem-solving. Quantitative analysis showed a substantial impact on student engagement. Participation rates in lessons utilizing the gamified learning application consistently exceeded 90%, a significant increase compared to the 65–70% observed during traditional lessons. Furthermore, students demonstrated greater persistence and self-motivation, as evidenced by higher completion rates of in-app challenges and tasks. Qualitative feedback collected through surveys and classroom observations highlighted several positive changes. Students expressed that the competitive aspects of the application—such as seeing their progress on leaderboards and earning digital rewards—inspired them to stay focused and push themselves further. Many reported increased enjoyment in mathematics and digital literacy lessons, feeling that the subjects were no longer intimidating but instead provided fun and attainable challenges. Teachers noticed that students who were previously less engaged became more active and enthusiastic, and classroom dynamics improved as students collaborated and encouraged one another. The intervention also played a key role in cultivating a growth mindset. By presenting activities as step-by-step challenges and offering immediate feedback, the application encouraged students to view mistakes as learning opportunities, fostering resilience and a willingness to tackle difficult problems. This positive cycle of motivation and achievement contributed to a more vibrant and supportive classroom environment.

3.3 AI for Mathematics

The AI for Mathematics intervention was conceived as an innovative strategy to introduce advanced digital concepts specifically artificial intelligence and basic Python programming into the elementary school curriculum. Recognizing the rapid evolution of technology and its growing relevance in all fields, the program sought to provide early exposure to AI and computational thinking, preparing students and teachers for future learning demands. The implementation began with an initial phase of socialization and orientation, addressing potential apprehensions about the perceived complexity of AI and coding. The intervention targeted both teachers and students, focusing on building foundational understanding and practical skills through a series of interactive workshops and coding camps. During these workshops, participants were introduced to the basics of Python programming in a highly accessible, hands-on manner. Instructional materials and activities were carefully designed to break down complex concepts into manageable steps, using visual aids, storytelling, and direct analogies to familiar mathematical ideas. Rather than focusing on abstract theory, the curriculum emphasized practical applications such as creating simple AI scripts to model patterns, visualize geometry, and solve logical puzzles.

Students were actively engaged in coding activities that allowed them to manipulate variables, experiment with algorithms, and observe immediate outcomes. For example, they used Python to generate geometric shapes, explore number sequences, and simulate mathematical relationships. Interactive simulations and visual tools made it easier for students to grasp abstract concepts, turning challenging material into tangible, memorable experiences. These activities not only strengthened their understanding of core mathematical principles but also sparked curiosity and creativity. Teachers, who initially expressed reservations about their own ability to teach AI and coding, benefited from targeted training and peer collaboration. As the program progressed, teachers reported growing confidence in facilitating computational thinking activities in their classrooms. Many noted that the intervention empowered them to move beyond traditional instruction and integrate new digital tools into everyday lessons. This shift not only diversified their pedagogical repertoire but also inspired a culture of innovation and lifelong learning among the teaching staff. Feedback from students indicated that learning mathematics through AI-based, interactive coding projects was both enjoyable and empowering. Students who previously struggled with abstract reasoning found that visual simulations helped them "see" how mathematical ideas worked. The use of games and challenges within the coding curriculum further increased motivation, as students competed to solve puzzles or optimize their scripts.

Moreover, the AI for Mathematics program contributed to the development of essential skills for future academic and professional pathways. Students gained experience in computational thinking, logical problem-solving, and digital literacy competencies recognized as fundamental for participation in STEM fields. Teachers, in turn, expressed strong interest in sustaining and expanding AI-based lesson innovations, seeing clear potential for further integration in science, technology, and mathematics subjects. The success of this intervention was evidenced by a noticeable increase in student engagement, improved comprehension of mathematical concepts, and a greater willingness among both teachers and students to embrace new technologies. As a result, the AI for Mathematics initiative not only enriched the current learning environment but also laid a solid foundation for continued digital innovation and STEM readiness in the school community.

Figure 2. Interactive Python-Based Mathematics Quiz Application Used in the AI for Mathematics Intervention

An important illustration of the AI for Mathematics intervention is presented in Figure 2, which shows an interactive Python-based quiz application designed for mathematics learning. This application was developed and implemented using Google Colab, enabling both teachers and students to engage with AI-enhanced, computer-based assessments in a highly interactive environment. In the displayed interface, students are presented with a series of 100 questions, each represented by a numbered box. The quiz is designed to be adaptive and user-friendly, incorporating features such as a countdown timer, real-time feedback, and a clean, organized layout that helps maintain student focus throughout the test session. For each question, students are prompted to select an answer from a dropdown menu and submit their response by clicking the "Jawab" (Answer) button. The integration of Python programming in the quiz application provides multiple educational benefits. First, it enables dynamic generation and management of quiz content, which allows for the automatic randomization of questions, immediate scoring, and personalized feedback. Second, the digital format supports large-scale assessments up to 100 questions per session making it suitable for both formative and summative evaluation of students' mathematical understanding. The visual progress bar of question numbers helps students track their completion status and manage their time efficiently.

During the intervention, teachers used this application not only as a tool for assessment but also as an interactive medium to reinforce key mathematical concepts. The coding and AI-driven logic behind the quiz fostered computational thinking, as students learned to interact with digital systems, interpret automated feedback, and develop strategic approaches to problem-solving. Teachers observed that the digital format, combined with the time-limited challenge, increased students' motivation and engagement, as well as their willingness to participate actively and strive for higher scores.Moreover, the use of a real programming environment (Google Colab) exposed students to practical applications of Python and AI, demystifying these technologies and demonstrating their relevance to everyday learning. Many students expressed enthusiasm about using "real code" and enjoyed the interactive, game-like experience, which helped to reduce anxiety commonly associated with mathematics assessments.

3.4 Media Interactive

The Media Interactive intervention represented a significant innovation in the classroom environment by introducing adaptive digital platforms and multimedia resources as core elements of daily instruction. This approach was driven by the recognition that conventional, one-size-fits-all teaching methods often fail to accommodate the diverse learning needs, preferences, and abilities present in modern elementary classrooms. In particular, the intervention aimed to address the challenges faced by students with learning disabilities, while simultaneously enriching the learning experience for all students. Central to the intervention was the implementation of platforms such as RubiMath,

alongside other curated multimedia learning tools. These platforms were chosen for their ability to deliver content in a highly visual, engaging, and interactive manner. Unlike static textbooks or traditional whiteboard lessons, interactive media allow students to manipulate variables, explore concepts through simulations, and receive immediate feedback, all within a safe digital environment. This active engagement encourages students to take ownership of their learning, explore ideas at their own pace, and deepen their conceptual understanding through trial and error.

Classrooms equipped with these digital tools observed a noticeable transformation in student participation. Teachers reported that students, including those who were typically reserved or struggled with traditional instructional methods, became more involved in lessons when interactive media were used. Students with learning disabilities, such as dyscalculia or mild cognitive challenges, particularly benefited from features like step-by-step guided problem-solving, visual cues, and the ability to revisit difficult concepts as needed. The adaptive nature of the platforms allowed teachers to personalize content, assigning different activities or levels of challenge based on each student's readiness and progress. Beyond the direct impact on student engagement, the intervention also supported multiple learning styles. Visual learners found animations and diagrams helpful for understanding abstract concepts, while kinesthetic learners could engage in hands-on, drag-and-drop activities. Auditory learners benefited from integrated narration and sound effects that reinforced key points. This multimodal approach not only improved the inclusivity of lessons but also resulted in higher rates of concept mastery and long-term retention across the student body. Teachers played a crucial role as facilitators and content creators in this intervention. The program provided training and support for teachers to design, adapt, and share their own digital learning objects—ranging from interactive quizzes and games to animated story problems and personalized feedback modules. Collaboration among teachers flourished, as they exchanged resources, discussed effective practices, and worked together to continuously refine and expand the pool of available learning materials. This professional learning community fostered ongoing growth, innovation, and a sense of collective responsibility for student success.

Observational data and teacher reflections indicated that the integration of interactive media shifted classroom dynamics toward greater student agency and peer collaboration. Students frequently worked together in pairs or small groups to solve interactive problems, explain concepts to one another, or challenge themselves with higher-level tasks. The immediacy of feedback provided by the platforms encouraged students to persist in the face of difficulty, turning mistakes into valuable learning opportunities. In terms of broader educational outcomes, the media interactive intervention contributed to a more inclusive and supportive school culture. By enabling differentiated instruction and empowering both teachers and students, the initiative bridged learning gaps and promoted equity in the classroom. The digital tools introduced were not limited to mathematics but were also applied in language, science, and other subjects, further amplifying their impact. Also explain the future development opportunities. Articles can be strengthened with relevant documentation related to services or goods as outputs, or the main focus of activities. Documentation can be in the form of pictures of the application or implementation process, pictures of product prototypes, tables, graphs, and so on.

3.4 Outputs

Collectively, these interventions generated a variety of educational products: custom gamified apps, digital training modules, lesson plans, multimedia materials, and inclusive learning objects. Over 90% of teachers participated in at least one workshop, and more than 80% of students engaged with one or more digital interventions. School exhibitions showcased the creative outputs, while digital platforms were used to disseminate resources for broader replication.

3.5 Outcomes

Long-term outcomes included the emergence of a more innovative and technology-driven learning environment. Post-program surveys and interviews indicated that teachers felt more confident adopting technology, were more likely to experiment with new instructional methods, and reported sustained motivation to pursue ongoing professional development. Students not only displayed improved digital literacy and problem-solving skills but also demonstrated greater independence and peer collaboration. The inclusive and adaptive learning environment supported by the interventions resulted in increased engagement among students with special needs, contributing to a stronger culture of equity and participation at the school. The project's success has inspired plans for broader adoption in neighboring schools and has been recognized as a replicable model by the district education office.

3.6 Discussion

The results highlight several critical insights regarding the implementation and impact of technology-enhanced community service programs in elementary education. First, the participatory approach and collaborative design process were essential in ensuring the relevance and sustainability of each intervention. By involving teachers and students at every stage, the project fostered a sense of ownership and adaptability that facilitated the integration of new technologies into everyday classroom practice. The substantial gains in digital literacy and teaching creativity among teachers underscore the importance of ongoing professional development. The hands-on, contextually relevant

training enabled teachers to overcome initial apprehension and leverage technology as a tool for instructional innovation and differentiation. This finding is consistent with previous studies emphasizing the role of capacity-building in successful educational technology integration (cf. Rahayu et al., 2022; Meiyanti & Sumiati, 2024).

The effectiveness of gamified learning in boosting student motivation and engagement supports a growing body of research advocating for game-based learning strategies (cf. Deterding et al., 2011; Hamari et al., 2014). The competitive and interactive features not only made learning more enjoyable but also encouraged collaboration, persistence, and a growth mindset among students attributes vital for long-term academic success. Introducing artificial intelligence concepts through Python programming at the elementary level demonstrated that advanced digital skills can be scaffolded and made accessible, even to young learners. The intervention's positive impact on computational thinking and mathematical understanding suggests that early exposure to AI and coding can lay a foundation for STEM readiness and digital citizenship. Interactive media, particularly in the context of inclusive education, proved effective in supporting diverse learners. By enabling differentiated instruction and adaptive content, interactive platforms like RubiMath contributed to closing learning gaps and promoting equity within the classroom. This aligns with contemporary perspectives on universal design for learning (UDL) and the need for flexible, responsive educational environments.

The project's collective outputs educational apps, digital modules, creative lesson plans demonstrate the value of collaborative content creation and shared professional learning. The outputs served as catalysts for broader change, supporting not only immediate learning goals but also establishing resources and practices that can be scaled and replicated beyond the initial school context. Outcomes observed at SDN Kedoya Utara 03 extend beyond individual skills and products. The cultivation of an innovative school culture, characterized by continuous experimentation and collaboration, signals a significant shift toward sustainable educational improvement. The growing sense of teacher agency, student autonomy, and inclusivity reflects the project's holistic impact. Moreover, recognition by external stakeholders and plans for district-wide replication attest to the model's potential as a blueprint for technology integration in other primary schools. However, several challenges and considerations emerged during the implementation. Ensuring equitable access to technology, maintaining sustained motivation among participants, and providing ongoing support and troubleshooting were critical factors influencing program success. The experience highlights the necessity of continued partnership, resource investment, and iterative reflection to address evolving needs and barriers.

4. CONCLUSION

This study demonstrated that the implementation of a technology-enhanced community service framework integrating teachers' training, gamified learning, AI for mathematics, and interactive media can significantly improve the quality and inclusivity of elementary education. The interventions resulted in marked improvements in teachers' digital literacy, instructional creativity, and confidence, equipping them to design and deliver engaging lessons for diverse learners. The adoption of gamified and AI-driven learning applications fostered higher levels of student engagement, motivation, and understanding, especially in subjects often regarded as challenging. Interactive media platforms expanded access to adaptive, student-centered content, benefiting not only students in general education but also those with learning disabilities. The collaborative process of content creation and the sharing of digital learning objects among teachers fostered a strong culture of professional development and innovation within the school. Overall, the results affirm that thoughtful integration of digital technologies and participatory approaches can transform classroom dynamics, promote inclusive learning, and establish sustainable educational practices. The model developed and implemented in this program provides a replicable framework for other schools seeking to leverage technology for educational innovation and equity. Ongoing commitment to capacity building, reflective practice, and collaborative engagement will be essential to ensure the sustainability and continued success of these transformative efforts.

ACKNOWLEDGMENT

The authors gratefully acknowledge the support and collaboration of SDN Kedoya Utara 03, Jakarta Barat, and the entire school community in the successful implementation of this community service program. This work was made possible through the funding and institutional support provided during the 2025/2026 academic year. Special thanks are extended to the teachers, students, and university team members whose active participation and commitment greatly contributed to the achievement of the program's objectives and outcomes.

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