

WORKSHOP ON DEVELOPING GAMIFICATION TEACHING MATERIALS TO ENHANCE STUDENTS' LITERACY AND NUMERACY

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ABSTRACT

This community development program was conducted at SMPN 1 Gedeg, Mojokerto, East Java, to enhance students' literacy and numeracy skills through the development of gamification-based teaching materials integrated with local wisdom. The project, funded by the Ministry of Education, Research, and Technology, aimed to address gaps in digital learning resources and improve teacher competence in creating engaging and effective teaching tools. The methodology involved three phases: preparation, implementation, and evaluation. In the preparation stage, the needs of the school were identified through coordination with school administrators. The implementation phase included workshops and mentoring sessions, where teachers from both SMPN 1 Gedeg and affiliated schools were trained in developing digital learning materials using gamification techniques. Participants showed a significant increase in their knowledge and skills, as demonstrated by a 74.42% improvement in post-test scores. The evaluation phase revealed the program's effectiveness in improving both teachers' digital competencies and students' literacy and numeracy performance. However, challenges such as the technological proficiency of senior teachers were identified, highlighting areas for future improvements. Overall, this initiative successfully promoted innovative teaching practices aligned with the national curriculum.

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INTRODUCTION

SMPN 1 Gedeg is located at Jl. Soekarno Hatta, Jl. Raya Mulyosari No. 134, Mulyosari, Gembongan Village, Gedeg District, Mojokerto Regency, East Java 61351. This partner school is situated near the Gempolkrep Sugar Factory (PG), approximately 14.5 kilometers from the Islamic University of Majapahit (UNIM). The current principal of SMPN 1 Gedeg is Mr. Sumardi, M.MPd. SMPN 1 Gedeg is a 'driving school,' meaning it focuses on holistic student learning outcomes by fostering the Pancasila Student Profile, which emphasizes both competence and character, starting with excellent human resources (school principals and teachers). Additionally, SMPN 1 Gedeg oversees several "impact schools" (mentored schools) in implementing the independent curriculum. These schools include SMPN 2 Gedeg, SMP Karya Gedeg, SMP Islam Rodlotun Nasyiin, and SMP Swasta Gedeg.

Based on interviews with the principal of SMPN 1 Gedeg, accompanied by Mrs. Virza Syafitri, S.Pd., the teachers use textbooks and accompanying workbooks (LKS) in their teaching activities.



Figure 1. Documentation of Classroom Learning Activities

Research conducted by the proposing team regarding teaching materials based on gamification and local wisdom shows that bilingual teaching materials based on gamification and local wisdom to improve students' literacy and numeracy skills in Mojokerto meet the criteria for effectiveness.

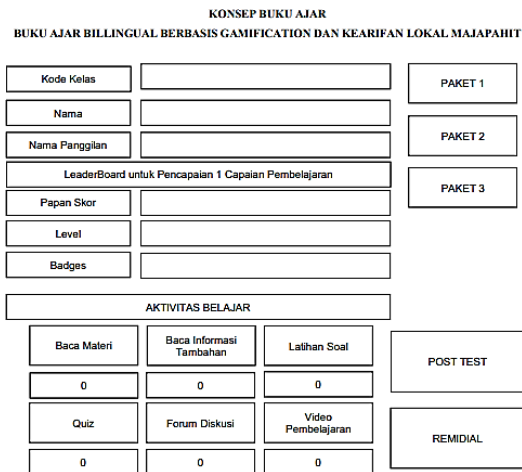


Figure 2. Gamification and Local Wisdom-Based Teaching Materials

However, the teaching materials developed are still in paper format and have not yet incorporated technology or innovative learning methods. Additionally, according to pusatinformasi.raporpendidikan, the education report is a selected indicator from the educational profile reflecting the priorities of the Ministry of Education and Culture's Research and Technology department. This report is used to assess regional and educational unit performance. According to this report, literacy and numeracy skills are categorized as good, meaning that most students have reached the minimum competency in literacy and numeracy. Nationally, the school ranks highly in both literacy and numeracy skills. The overall recommendations can be seen in the image below.

	A	B	C	D	E	F	G	H	I	J
37	D.1 Kualitas pembelajaran	Berk	70	D.2 Refleksi dan perbaikan pembelajaran oleh guru	D.2.3 Penerapan praktik inovatif	Peningkatan kompetensi GTK dan kebijakan yang menunjang penerapan praktik inovatif	1. Kepala satuan pendidikan dan pendidik mempelajari tentang penerapan praktik inovatif sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan tentang penerapan praktik inovatif untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan penerapan praktik inovatif melalui program, kebijakan dan penganggarannya	1. Kepala satuan pendidikan dan pendidik mempelajari tentang pengetahuan dan keterampilan mengajar sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan dan keterampilan mengajar untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan proses pembelajaran pendidik terkait pengetahuan dan keterampilan mengajar di satuan pendidikan melalui program, kebijakan, dan penganggarannya	https://guru.kemdikbud.go.id/artikel/9727m_source=aparpendidikan	Kegiatan BOS Reguler - Kegiatan komunitas belajar antar sekolah (termasuk KKG, MGMP, MGMPs, MGMPK, KKKS, atau MKKS) - Peningkatan kompetensi guru untuk memahami karakteristik dan cara belajar peserta didik - Peningkatan kompetensi guru untuk memahami konten pembelajaran dan cara mengajarkannya
44	D.1 Kualitas pembelajaran	Berk	70	D.2 Refleksi dan perbaikan pembelajaran oleh guru	D.2.1 Belajar tentang pembelajaran	Peningkatan kompetensi GTK dan kebijakan yang menunjang belajar tentang pembelajaran	1. Kepala satuan pendidikan dan pendidik mempelajari tentang pengetahuan dan keterampilan mengajar sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan dan keterampilan mengajar untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan proses pembelajaran pendidik terkait pengetahuan dan keterampilan mengajar di satuan pendidikan melalui program, kebijakan, dan penganggarannya	1. Kepala satuan pendidikan dan pendidik mempelajari tentang pengetahuan dan keterampilan mengajar sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan dan keterampilan mengajar untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan proses pembelajaran pendidik terkait pengetahuan dan keterampilan mengajar di satuan pendidikan melalui program, kebijakan, dan penganggarannya	https://guru.kemdikbud.go.id/artikel/8570m_source=aparpendidikan	Kegiatan BOS Reguler - Pelaksanaan kegiatan komunitas belajar di satuan pendidikan - Peningkatan kompetensi guru untuk memahami karakteristik dan cara belajar peserta didik - Peningkatan kompetensi guru untuk memahami konten pembelajaran dan cara mengajarkannya
45	D.1 Kualitas pembelajaran	Berk	70	D.2 Refleksi dan perbaikan pembelajaran oleh guru	D.2.1 Belajar tentang pembelajaran	Peningkatan kompetensi GTK dan kebijakan yang menunjang belajar tentang pembelajaran	1. Kepala satuan pendidikan dan pendidik mempelajari tentang pengetahuan dan keterampilan mengajar sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan dan keterampilan mengajar untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan proses pembelajaran pendidik terkait pengetahuan dan keterampilan mengajar di satuan pendidikan melalui program, kebijakan, dan penganggarannya	1. Kepala satuan pendidikan dan pendidik mempelajari tentang pengetahuan dan keterampilan mengajar sebagai bagian dari kualitas pembelajaran 2. Pendidik mengimplementasikan pengetahuan dan keterampilan mengajar untuk memperbaiki proses pembelajaran peserta didik 3. Kepala satuan pendidikan mendorong perbaikan proses pembelajaran pendidik terkait pengetahuan dan keterampilan mengajar di satuan pendidikan melalui program, kebijakan, dan penganggarannya	https://guru.kemdikbud.go.id/artikel/8570m_source=aparpendidikan	Kegiatan BOS Reguler - Pelaksanaan kegiatan komunitas belajar di satuan pendidikan - Peningkatan kompetensi guru untuk memahami karakteristik dan cara belajar peserta didik - Peningkatan kompetensi guru untuk memahami konten pembelajaran dan cara mengajarkannya

Figure 3. Overview of the PDB SMPN 1 Gedeg Education Report

Recommendations on Quality Learning and Issues in Implementing Innovative Practices

As reported by pusat informasi.raporpendidikan, PBD (Problem-Based Development) is tailored to the needs of educational units by identifying problems arising from data on the Education Report platform. PBD encourages educational units to make improvements through activities aimed at increasing performance, analyzing achievements in the Education Report, and the current conditions in the field. Based on the overall recommendations for the PDB SMPN 1 Gedeg, areas that require follow-up include improving teacher competency (GTK) and policies that support the implementation of innovative practices. Specific examples of suggested improvement activities include: (a) teachers implementing knowledge on innovative practices to improve student learning processes, (b) school principals encouraging improvements in the application of innovative practices through programs, policies, and budgeting, (c) teachers applying knowledge and teaching skills to improve student learning processes, (d) school principals promoting improvements in teaching-related skills through programs, policies, and budgeting, and (e) teachers applying innovative practices to support students' character development.

Based on the situation analysis, problems, and the potential of the partner school, the aim of this community service activity is to develop gamification-based teaching materials that support students' literacy and numeracy skills and improve the quality of learning that integrates local wisdom and character in the independent curriculum, taking into account students' literacy and numeracy abilities. This activity is part of the 2024 Community Empowerment Grant Program under the Directorate of Research, Technology, and Community Service, Directorate General of Higher Education, Research, and Technology, Ministry of Education, Culture, Research, and Technology.

LITERATURE REVIEW

Various researches have pinpointed that gamification improves learners' performances. Gamification integrates components including points, badges, leaderboards, and challenges to enhance the competitive nature of learning and to orient it towards specific objectives (Zainuddin et al., 2020). In literacy and numeracy education, gamified learning tools offer students the chance to work within an engaging environment where students are able to apply the core competencies in a dynamic and playful way. In fact, (Domínguez et al., 2013) emphasize that gamification improves cognitive skills, enhances problem-solving, and increases retention by providing immediate feedback and requiring active participation. Looyestyn et al., positive effects on motivation and behaviorist engagement are underlined.

This basically means that more time and effort are spent carrying out these types of gamified

learning activities, which might then reflect again in higher academic performance. Use of gamification in literacy education supports motivating students to learn new vocabulary, reading comprehension, and critical thinking. Gamification in numeracy education provides support for learning mathematical concepts, developing calculation skills, and logical reasoning (Su & Cheng, 2015).

The integration of local wisdom in education serves as an alternative approach that can enhance cultural relevance. (Arjaya et al., 2024) stated that local wisdom functions as a foundation for preserving cultural identity, particularly in diverse educational settings. Moreover, local wisdom can enrich learning by providing contextually relevant content that increases student engagement and understanding (Munawir et al., 2024). Furthermore, (Sabat et al., 2024) found that incorporating local wisdom into the learning process significantly improves critical thinking skills, suggesting that curricula should include these elements to promote better educational outcomes. Based on these ideas, there is a growing interest in integrating local wisdom with gamified teaching materials. Several studies have examined the integration of games and local wisdom in learning, finding that it enhances motivation and the ability to learn mathematics. Research conducted by (Sabat et al., 2024) revealed that learning using educational game-based media in the form of an Android application, integrated with Timorese local wisdom, received positive feedback. Students found it helpful in understanding mathematical concepts in a more enjoyable and effective way. (Aini et al., 2024) also highlighted that STEAM-based learning, combined with local wisdom, effectively improves students' numeracy literacy skills by increasing their engagement and comprehension of mathematical material. Therefore, it is crucial to carry out community service activities related to the development of gamified teaching materials that integrate local wisdom, focusing on enhancing students' numeracy literacy skills.

MATERIAL AND METHOD

The method of implementing this community service activity consists of three phases: preparation, implementation, and evaluation. First, the preparation phase. Activities in this phase include: socialization and coordination with partners, needs analysis, administration, preparation of supplies and materials, printing training modules, organizing workshops and mentoring, and preparing implementation tools. Second, the implementation phase. In this phase, activities are conducted according to the proposed solution, namely workshops and mentoring for the development of digital teaching materials based on gamification and local

wisdom to enhance students' literacy and numeracy skills. The activities include training, workshops, and mentoring. Training was chosen to transfer knowledge and/or skills, and to ensure that the knowledge and/or skills delivered could be understood and mastered by participants. This activity can be conducted for small or large groups and in a short period, as Sulistiyani explains that training is a short-term educational process that uses systematic procedures to change the behavior of employees in one direction to improve organizational goals (Sulistiyani & Teguh, 2023). By the end of the training, it is hoped that partner teachers and principals will have the knowledge to develop digital teaching materials based on gamification and local wisdom to enhance students' literacy and numeracy skills. Workshops were chosen because a workshop is a forum where a group of people works together to produce a tangible output.

The result of a workshop is something concrete, observable, and real. Therefore, workshops focus on practice rather than theoretical discussions (Syarifuddin, 2021). This workshop also invites and involves the 'impact schools,' as SMPN 1 Gedeg is a 'driving school.' These impact schools include SMPN 2 Gedeg, SMP Karya Gedeg, SMP Islam Rodlotun Nasyiin, and SMP Swasta Gedeg. Third, the evaluation and sustainability phase. Problems prioritized by the partner school can be resolved according to the proposed solution if the success indicators are met. Therefore, active collaboration between the community service team and the partner school is essential to carry out the agreed-upon program effectively. The third phase is evaluation. Evaluation instruments must be created for each program stage, and based on the program's evaluation results, the success level of the community service activity at SMPN 1 Gedeg and its sustainability can be assessed. The success indicators of this activity include an increase in partner knowledge regarding the development of digital teaching materials based on gamification and local wisdom to enhance students' literacy and numeracy skills by $\geq 70\%$, and an improvement in partner skills in developing teaching materials using a Likert scale of 1-4, which is carried out during the workshop. Additionally, each group of teachers involved in the School Subject Teacher Council (MGMPs) successfully develops one teaching material.

RESULT AND DISCUSSION

This community service activity was carried out in three main stages according to the planned method. The following are the results and discussions from each stage:

a. Preparation Stage

The activities began with socialization and coordination with SMPN 1 Gedeg as the main partner on August 3, 2024. During this stage, the community service team met with the principal of SMPN 1 Gedeg, Mr. Sumardi, M.MPd., to discuss the technical implementation and identify the specific needs of the school regarding the development of teaching materials. The school's needs analysis revealed the following: the absence of an e-learning platform, frequent use of platforms such as Quizzizz, Kahoot, PowerPoint, video lessons, and Wordwall by teachers, and the previous training on literacy, numeracy, and teaching innovation which was a Learning Innovation Workshop. Therefore, it was concluded that the school requires enhanced competency in developing gamified teaching materials that integrate local wisdom and literacy-numeracy skills.



Figure 4. Coordination between the Community Service Team and Partner

At this stage, the team also coordinated the preparation of various necessities, including training manuals, mentoring materials, evaluation tools, and infrastructure.

b. Implementation Stage

The training activities were conducted in several phases, including training on gamified teaching material development, workshops, mentoring on the creation of gamified teaching materials, and implementation guidance along with dissemination.

The gamified teaching material development training took place on Saturday, August 24, 2024, attended by 52 participants from partner schools and affiliated schools including SMPN 2 Gedeg, SMP Karya Gedeg, SMP Islam Rodlotun Nasyiin, and SMP Swasta Gedeg. The event was opened with a speech by SMPN 1 Gedeg school supervisor Mr. Ruslan Efendi, M.Pd., and a welcoming speech by the principal, Mr. Sumardi, M.MPd. Before the material was presented, participants took a pre-test related to literacy, numeracy, gamification, and local wisdom.



Figure 5. School Supervisor’s Opening Remarks during the Training

The session continued with literacy and numeracy materials, techniques for creating literacy-numeracy-based questions by Feriyanto, M.Pd., and the use of gamification in teaching materials. Following this, Taswirul Afkar, S.S., M.Pd., presented the integration of local wisdom into learning. In the final session, participants were asked to draft literacy-numeracy materials and questions using a template provided by the community service team. At the end of the session, participants took a post-test with the same material as the pre-test. The pre-test and post-test results are summarized in the following table:

Table 1. Comparison of Pre-test and Post-test Scores

	<i>Pre-test</i>	<i>Post-test</i>
Highest Score	80	100
Lowest Score	20	30
Range	60	70
Average	43	75



Figure 6. Literacy, Numeracy, and Gamification Material Session

The next phase was a workshop and mentoring session on creating gamified and local wisdom-based teaching materials to enhance students' literacy and numeracy skills. This activity was held on Thursday, September 26, 2024, and was attended by teachers from partner schools as well as

affiliated schools including SMPN 2 Gedeg, SMP Karya Gedeg, SMP Islam Rodlotun Nasyiin, and SMP Swasta Gedeg. The workshop was opened by a school supervisor, followed by a speech from the principal.



Figure 7. Hands-on Workshop on Teaching Material Development and Implementation

This was followed by a session on creating teaching materials, delivered by Soffa Zahara, S.T., M.T. Then, a practical session on gamified teaching materials and local wisdom was led by Agil Aryanusa.



Figure 8. Participant Enthusiasm During Teaching Material Creation Practice

In this session, the speaker demonstrated how to create gamified teaching materials using e-learning or Moodle, accessible at <https://gamifikasi-smpn1gedeg.com/course/index.php?categoryid=1&browse=courses&perpage=20&page=1>. He participants learned to manage subjects, create discussion forums, attach files, link instructional videos, create gamified quizzes, and assign tasks. While the speaker provided practical instruction, all participants directly practiced creating gamified teaching materials under the guidance of the community service facilitators.



Figure 9. E-learning Platform Interface as a Gamification Media

Several senior teachers experienced difficulties creating gamified materials due to their limited IT skills. Some participants struggled to operate computers, primarily due to their age. According to Ashidiq et al. (2023), one challenge in implementing e-learning is the age factor, as senior teachers often face difficulties in using computers/laptops. Despite this, the teachers were very enthusiastic during the practice sessions, and several teachers from affiliated schools requested similar workshops and mentoring at their respective schools. At the end of the session, participants were asked to complete a response questionnaire about the material, methods, and presenters, using a scale from 1 to 5: Strongly Agree (5), Agree (4), Moderately Agree (3), Disagree (2), and Strongly Disagree (1). The results of this questionnaire are displayed in the following diagram.

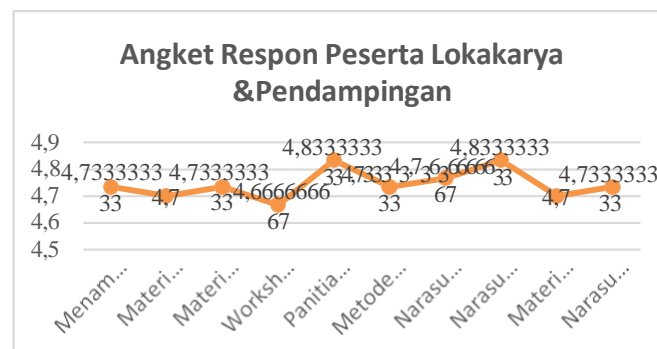


Figure 10. Response Results from Participants on Gamified Teaching Material Workshops and Mentoring

Based on Figure 10, participants' responses to the gamified teaching materials and local wisdom workshops were rated with an average score of 4,74 on a scale of 1 to 5, with a "very good" category (Widoyoko, 2017). Some critiques were gathered regarding the session, including insufficient time for practical game-making, overly fast explanations, and the need for pre-session account distribution. Suggestions were also made for future workshops, such as extending the practice time and improving dissemination practices.

Considering the feedback, a follow-up training was held on October 10, 2024, focusing on lesson scenario development. This session was attended by supervisors and teachers from SMPN 1 Gedeg and the affiliated schools. The participants were very enthusiastic, as they also learned to use Canva for lesson scenario development. Many teachers had accounts from the Ministry of Education,

enabling them to use Canva's premium features, but for those without accounts, the organizers helped provide the necessary premium access.

The activity continued with advanced practice on developing gamified teaching materials, local wisdom integration, and dissemination on Saturday, October 26, 2024. The event was opened by the principal of SMPN 1 Gedeg and a school supervisor. The practical sessions were led by Soffa Zahara, S.T., M.T., while the other facilitators assisted participants in creating gamified teaching materials. The activity concluded with a skills evaluation questionnaire.



Figure 11. Group Photo at the Conclusion of the Teaching Material Development Session

c. Evaluation Stage

Based on Table 1, there was a significant increase in the average score of knowledge on literacy, numeracy, gamification, and local wisdom between the pre-test and post-test results. The overall increase was 74,42% Participants' responses regarding the practice of developing gamified and local wisdom-based teaching materials scored an average of 4,74 on a scale of 1 to 5, categorized as very good (Widoyoko, 2017).

Several senior teachers faced difficulties operating computers when creating gamified teaching materials due to their age, as outlined by (Ashidiq et al., 2023) which identified age as a common challenge in e-learning implementation. Senior teachers often struggle with using computers or laptops.

CONCLUSION AND RECOMMENDATION

The outcomes of the Community Service Program (PKM) conducted at SMPN 1 Gedeg successfully achieved its primary goal of developing gamification and local wisdom-based learning media, which proved effective in enhancing students' literacy and numeracy skills. The participants' increased knowledge of literacy, numeracy, and gamification, evidenced by a 74.42% improvement in post-test scores, reflects the success of the training. This activity not only met its quantitative targets but also had a tangible impact on improving teachers' skills. With the support of digital platforms and

e-learning, the teachers were able to immediately apply what they had learned. Suggestions for the sustainability of the program, such as extending the duration and addressing technical improvements, indicate potential for further development in the implementation of this initiative.

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