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Strengthening Elementary School Teachers' Competence through Mentoring in the Development of Technology-Based Gamified Learning Media

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Abstract: The integration of digital technology into education requires teachers to possess adequate competencies in selecting and developing appropriate learning media. This community service program aims to strengthen elementary school teachers' competencies in developing technology-based gamified learning media through a hands-on mentoring approach. The program was conducted at SDN 12 Rambutan, Banyuasin Regency, and involved 20 elementary school teachers from several schools in the area. It employed a participatory training and mentoring approach comprising instructional sessions, discussions, question-and-answer sessions, simulations, hands-on practice, and product development assistance. Program outcomes were evaluated using pretest and posttest measures, while practical achievements were assessed based on the learning media developed collaboratively by participants. Quantitative data were analyzed using descriptive statistics, N-Gain analysis, a paired-samples t-test, and the Wilcoxon signed-rank test to assess improvements in participants' knowledge and understanding. Meanwhile, the developed media products were descriptively evaluated based on their alignment with learning objectives, integration of gamification elements, interactivity, and utilization of digital platform features. The results demonstrated a substantial improvement in participants' scores, with the mean score increasing from 49.50 on the pretest to 88.50 on the posttest, representing a gain of 39.00 points. All participants (100%) demonstrated improvements in their scores, and the mean N-Gain score of 0.775 fell within the high category. Both inferential statistical tests revealed statistically significant differences between pretest and posttest scores ($p < 0.001$). Furthermore, all three participant groups successfully developed gamified learning media. These findings indicate that hands-on mentoring can strengthen teachers' knowledge and understanding of technology-based gamified learning media while providing practical experience in developing more interactive and engaging instructional resources.

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Introduction

The development of digital technology has driven transformation across various aspects of life, including education. The integration of technology into learning provides teachers with opportunities to create learning experiences that are more interactive, engaging, and responsive to students' characteristics (Maharani et al., 2023). At the elementary school level, the use of digital technology has become increasingly relevant because learning processes need to provide meaningful experiences while maintaining students' attention and

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engagement. Therefore, teachers' ability to select and develop technology-based learning media is an important aspect of supporting learning innovation in elementary schools.

One form of innovation that can be used to create more interactive learning is gamification. Gamification refers to the application of game elements in non-game contexts, including education, with the aim of creating more engaging learning experiences and encouraging student engagement (Shermukhammadov, 2022). Elements such as challenges, rewards, points, feedback, and competition can be incorporated to provide a more dynamic learning experience. In elementary education, the use of gamification has the potential to increase students' motivation and participation because learning activities can be presented in more interactive and enjoyable forms.

Several studies have shown that the implementation of gamification in digital technology-based learning can contribute positively to students' motivation and engagement. Gamification enables students to experience learning through mechanisms such as challenges, rewards, and feedback, which can encourage their participation in the learning process (Shen et al., 2024). Other research has indicated that the use of gamification-based learning media at the elementary school level can improve students' learning interest and learning outcomes, particularly when the media are interactive and easy to use (Lampropoulos & Sidiropoulos, 2024). In addition, gamification-based learning supported by digital technology has the potential to provide benefits not only in the cognitive domain but also in affective aspects, such as motivation, collaboration, and students' self-confidence (Saleem et al., 2021).

Nevertheless, the successful integration of digital technology into learning is not determined solely by the availability of technological devices and platforms. Teacher competence is an important factor in determining how technology is translated into meaningful learning experiences. Teachers need to be able to select technologies that are appropriate to learning objectives, design interactive activities, and integrate digital media with the learning strategies being implemented (Zhang, 2022). Teachers with adequate digital literacy are more likely to develop innovative, interactive, and student-centered learning. Thus, strengthening teachers' competence in designing and using digital learning media is an important prerequisite for optimizing the use of technology in elementary education.

This issue was also identified among elementary school teachers in Sungai Pinang Village, Banyuasin Regency, South Sumatra. The partner institutions comprised several elementary schools in the village, with SDN 12 Rambutan serving as the host institution. The program involved 20 elementary school teachers. Based on the needs assessment, several challenges were identified: limited competence in developing digital learning media, insufficient skills in using interactive learning applications, limited experience in designing gamification-based media, and inadequate understanding of gamification principles and their integration into classroom instruction. Although facilities such as laptops, projectors, smartphones, and internet access were available, their utilization for interactive learning remained suboptimal. Consequently, classroom instruction tended to rely on one-way teaching approaches, limiting the variety of learning media and opportunities for student engagement.

This condition has implications for the limited variety of learning media used by teachers. Based on the needs assessment, learning processes tended to rely on one-way teaching methods and were not yet supported by a variety of engaging media, resulting in suboptimal student engagement. On the other hand, Sungai Pinang Village has several conditions that support the implementation of technology-based learning, including teachers' motivation to develop their competencies, access to smartphones and the internet, support

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from schools and the community, and its proximity to Universitas Sriwijaya as a source of educational mentoring and innovation.

The need to develop digital learning media is also supported by the proposing team's previous research. Research on the development of interactive multimedia for Pancasila Education in elementary schools indicated the need for more interactive and contextual technology-based learning innovations. Other research on interactive learning media based on local contexts showed that contextually designed digital media can support students' literacy and numeracy while increasing their interest in learning (Fatonah et al., 2025; Maharani et al., 2024). These findings reinforce the importance of developing digital media alongside teachers' readiness and competence as both users and designers of learning media.

Based on these conditions, an activity was needed that would not only introduce teachers to the concept of gamification but also provide them with direct experience in developing technology-based gamified learning media. A hands-on training approach is important because it enables teachers to understand the concepts while applying them in the development of media that are relevant to their learning needs. In this activity, teachers were introduced to and guided in exploring several relatively accessible digital platforms, namely Wordwall, Quizizz, and Canva. The proposed mentoring approach employed participatory, practice-based mentoring that combined facilitator guidance, hands-on activities, and collaborative group work. Teachers worked in groups to explore platform features, exchange ideas and experiences, design learning activities, and develop gamified learning media with direct assistance from the facilitators. These three platforms enable teachers to develop various forms of interactive media, including quizzes, educational games, visual learning materials, and learning activities incorporating game elements.

This community service activity aimed to strengthen elementary school teachers' competence in developing technology-based gamified learning media. Specifically, the activity was designed to provide an understanding of the concepts and principles of gamification, improve teachers' skills in utilizing digital platforms to develop learning media, and provide practical experience through collaborative media development. Through this approach, teachers were expected not only to become users of technology but also to be able to select, design, and develop digital learning media that are relevant to learning objectives and students' characteristics.

The contribution of this activity lies in integrating an understanding of gamification concepts, exploration of digital platforms, hands-on media development, and teacher mentoring in producing learning media. This approach was intended to bridge the gap between the availability of digital technology and teachers' ability to utilize it pedagogically. Therefore, the activity is expected to provide an applicable mentoring model for strengthening teachers' capacity to create learning media that are more interactive, engaging, and adaptive to the learning needs of elementary school students.

Method

The community service program was implemented over a six-month period, from July to December 2026, encompassing preparation, implementation, mentoring, monitoring, and evaluation. The preparatory stage began in July 2026, followed by the initial face-to-face training on August 8, 2026, at SDN 12 Rambutan, Sungai Pinang Village, Banyuasin Regency, South Sumatra, Indonesia. The program involved 20 elementary school teachers from several schools in Sungai Pinang Village. Following the initial training, the program continued with online training sessions, ongoing mentoring, and periodic monitoring to

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support teachers in developing and refining gamified learning media. The final stage involved evaluating participants' progress and the learning media developed. Participants were selected based on the partners' need to strengthen teachers' competence in developing and utilizing technology-based learning media, particularly those incorporating gamification elements.

Participants were selected based on the partners' need to strengthen teachers' competence in developing and utilizing technology-based learning media, particularly learning media incorporating gamification elements. The participants were actively involved throughout the entire program. They not only received materials on the concept of gamification but also explored and practiced using digital platforms to develop learning media. This participatory approach was consistent with the program design, which positioned teachers as active partners in the training, media development, and activity evaluation processes.

The activity employed a hands-on training approach combined with instructional sessions, discussions, question-and-answer sessions, simulations, direct practice, and mentoring. This approach was selected to ensure that participants not only understood the concept of gamification theoretically but also gained direct experience in developing technology-based learning media. The program design placed practice and simulation at the core of the training using Wordwall, Quizizz, and Canva. The implementation consisted of the following stages.

1) Activity Socialization and Orientation

The initial stage was conducted to provide participants with an understanding of the objectives, benefits, and overall sequence of activities. At this stage, participants were introduced to the importance of utilizing digital technology in learning and to the basic concepts of gamification. The orientation also served to identify participants' prior experiences and needs related to the use of digital learning media. This stage provided a basis for directing subsequent practical activities toward teachers' actual needs in the learning process.

2) Delivery of Gamification Materials

Participants received materials on the basic concepts of gamification and the principles of interactive learning design. The materials focused on understanding the use of game elements in learning, including challenges, points, feedback, and interactive activities.
In addition to the concept of gamification, participants were introduced to various digital platforms that could be used to develop learning media. The materials were delivered through presentations, discussions, and question-and-answer sessions, enabling participants to connect the concepts they learned with their existing teaching experiences. The activity design positioned an understanding of gamification concepts and interactive learning design principles as the core content of the training.

3) Exploration of Digital Technology Platforms

The next stage involved the introduction and exploration of three digital platforms: Wordwall, Quizizz, and Canva. These platforms were selected because they provide features that can be utilized to develop interactive and game-based learning media. Wordwall can be used to develop educational games, Quizizz to create interactive quizzes, and Canva to design learning materials and visual elements. During the activity, all participants were given the opportunity to try all three platforms. The exploration was conducted directly using the available digital devices, allowing participants to understand the functions and potential applications of each platform in learning.

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4) Development of Gamified Learning Media

After gaining a conceptual understanding and becoming familiar with the digital platforms, participants engaged in hands-on development of gamified learning media. The 20 participants were divided into three working groups based on the different digital gamification platforms used for media development, allowing each group to focus on exploring and utilizing a particular platform. Each group discussed the design of the learning media to be developed and subsequently implemented the design using the digital platforms introduced during the training. The practice was conducted collaboratively through several activities: determining the learning content, designing learning activities, selecting appropriate gamification elements, developing the media using digital platforms, and reviewing the resulting products. The collaborative approach enabled teachers to exchange experiences and provide feedback throughout the media development process. All groups successfully produced gamified learning media. Thus, the activity resulted in three learning media products, each developed by one participant group.

5) Product Mentoring and Refinement

Mentoring was provided throughout the practical sessions to assist participants in addressing technical and pedagogical challenges encountered during media development. The community service team provided guidance on using platform features, ensuring alignment between the media and learning objectives, and selecting activities that could encourage student engagement. Mentoring also provided participants with opportunities to improve their developed products based on feedback received during the practical process. This stage was important to ensure that the use of technology resulted not only in visually appealing media but also in media that were relevant to the intended learning objectives.

6) Activity Evaluation

Evaluation was conducted to determine participants' achievements after completing the activity. The evaluation included a pre-test and post-test, following the program evaluation design, which employed measurements before and after the training to assess participants' mastery of gamification concepts. The evaluation instrument was used to measure participants' understanding of gamification concepts, principles of interactive learning media development, and the use of digital technology in learning. Pre-test and post-test data were analyzed quantitatively by comparing participants' performance before and after the activity. In addition to knowledge evaluation, the outcomes of the activity were assessed based on participants' ability to produce gamified learning media in groups. The products were reviewed based on their alignment with learning objectives, incorporation of gamification elements, interactivity, and utilization of digital platform features.

Pre-test and post-test data were analyzed using descriptive quantitative analysis by calculating the mean, minimum score, maximum score, and percentage of participants achieving the assessed outcomes. Changes in scores before and after the activity were subsequently used to describe participants' learning gains following the training. Pre-test and post-test data were analysed using descriptive quantitative analysis to calculate the mean, minimum score, maximum score, and percentage of participants achieving the assessed outcomes. The mean score difference and N-Gain were calculated to determine the extent of improvement in participants' knowledge and understanding. Inferential statistical analyses were conducted using a paired-samples t-test and the Wilcoxon signed-rank test to examine the significance of differences between pre-test and post-test scores. The selection of these tests enabled the examination of changes in participants' performance before and after the mentoring program. The media products were analyzed descriptively based on the products

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developed by the three participant groups. The analysis focused on the fulfillment of gamified learning media components, alignment with learning objectives, interactivity, and utilization of the digital platforms used.

Result and Discussion

Implementation of the Mentoring Program for Gamified Learning Media Development

The mentoring program for the development of technology-based gamified learning media was conducted on August 8, 2026, at SDN 12 Rambutan, Sungai Pinang Village, Banyuasin Regency, South Sumatra. The activity was attended by 20 elementary school teachers. All participants completed the planned series of activities, including the delivery of instructional materials, introduction to gamification concepts, exploration of digital platforms, hands-on media development, mentoring, and evaluation.

The activity employed a participatory and learning-by-doing approach. Participants not only received explanations of gamification concepts and digital learning media but were also directly involved in exploring and developing learning media. Three digital technology platforms were introduced and practiced during the activity: Wordwall, Quizizz, and Canva. The use of these platforms provided participants with different experiences in developing learning media. Wordwall and Quizizz were used to explore interactive and game-based learning activities, while Canva was used to develop visual materials that could support more engaging presentation of learning content.

During the practical sessions, the 20 participants were divided into three working groups. Each group was given the opportunity to explore the platforms, determine the form of learning activities, select appropriate learning content, and develop media products based on the learning needs of elementary schools. Mentoring was provided directly while participants developed their media. Facilitators provided guidance when participants encountered difficulties in operating the platforms, determining appropriate learning activities, or aligning the media with learning objectives.



Figure 1. Delivery of materials on gamified learning media development

The implementation of the activity showed that the mentoring process was not limited to introducing digital applications but also provided teachers with direct experience in designing learning media. The hands-on approach helped participants connect the concepts presented during the activity with the process of developing learning media products.

Pre-Test and Post-Test Results

Pre-test and post-test evaluations were conducted to examine changes in participants' knowledge and understanding after participating in the mentoring program. The analysis involved 20 participants who completed the entire activity. Descriptive analysis indicated a substantial change between the scores obtained before and after the activity.

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Table 1. Pre-Test and Post-Test Results

Indicator	Pre-Test	Post-Test
Number of participants	20	20
Minimum score	30	80
Maximum score	60	90
Mean	49.50	88.50
Median	50	90
Standard deviation	6.86	3.66
Mean difference	—	39.00

Based on Table 1, participants demonstrated an improvement in their knowledge and understanding following the mentoring program. The improvement was observed across the score distribution, including the minimum score and median. Analysis of individual score changes further showed that all 20 participants (100%) experienced an increase in their scores. These findings indicate that the improvement occurred across all participants, including those with relatively lower initial scores. Analysis of individual score changes showed that all 20 participants (100%) experienced an increase in their scores. No participants maintained the same score or experienced a decrease.

Statistical Analysis of Pre-Test and Post-Test Differences

To determine the statistical significance of changes in participants' scores, the pre-test and post-test data obtained from the same participants were analyzed. The paired-samples t-test indicated a statistically significant difference between the pre-test and post-test scores ($t(19) = 39.00$; $p < 0.001$). As an additional analysis, the Wilcoxon signed-rank test was conducted, yielding $W = 0$; $p < 0.001$. The results were consistent with the paired-samples t-test, confirming a statistically significant difference between participants' scores before and after the activity. Furthermore, the mean N-Gain value was 0.775, which was classified as high. These findings provide statistical evidence of improvements in participants' knowledge and understanding following the mentoring program.

Results of Gamified Learning Media Development

In addition to changes in evaluation scores, the mentoring program provided participants with practical experience in developing technology-based gamified learning media. The 20 participants were divided into three groups to conduct hands-on media development. During the practical sessions, all groups explored Wordwall, Quizizz, and Canva. Participants were given opportunities to explore the available features, determine the forms of learning activities, incorporate learning content, and adapt the appearance of the media to the learning needs of elementary school students. The practical activities demonstrated that participants were able to move from conceptual understanding toward application through the development of learning media products. The division of participants into groups also facilitated the exchange of ideas and experiences throughout the development process.



Figure 2. Teachers practicing the development of technology-based gamified learning media

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The products developed during the practical sessions constituted an important outcome of the mentoring process. While the pre-test and post-test results provided an indication of changes in participants' knowledge or understanding, the developed products demonstrated participants' involvement in applying that knowledge through the practical process of media development.

Overall Outcomes of the Mentoring Program

Based on the implementation results, two main outcomes were identified. First, the knowledge evaluation demonstrated improvements in participants' understanding of gamification concepts, interactive learning media development, and the utilization of digital technology in learning. Second, all three working groups successfully developed technology-based gamified learning media using the digital platforms introduced during the program.

These two outcomes complement each other. The evaluation results demonstrate improvements in participants' knowledge and understanding, while the developed media products provide practical evidence of their ability to apply the knowledge gained during the mentoring process. Thus, the program supported both conceptual understanding and practical experience in developing interactive learning resources for elementary school students.



Figure 3. Group photo with participants after the mentoring program

Overall, the results indicate that a mentoring approach combining instructional delivery, digital platform exploration, hands-on practice, group work, and direct mentoring provided participants with a comprehensive learning experience. The activity went beyond conceptual understanding by giving teachers opportunities to directly explore and develop technology-based gamified learning media.

The findings demonstrate that the mentoring program supported improvements in teachers' knowledge and understanding of technology-based gamified learning media. Beyond the knowledge gained through instructional sessions, participants also acquired practical experience in exploring digital platforms and developing interactive learning resources. This combination of conceptual understanding and direct practice is important because teachers need more than technical knowledge of digital applications; they also need the ability to integrate technology into meaningful learning activities. The use of digital technology in learning requires teachers to understand the functions of technological tools and apply them appropriately to support instructional objectives (Hidajat, 2026).

The improvement can also be understood in relation to the characteristics of gamification introduced during the activity. Gamification enables game elements to be incorporated into learning contexts to create more interactive activities and encourage learner engagement (Failasufa et al., 2026; Fathoni & Safitri, 2022). Therefore, teachers' understanding of gamification was not limited to its conceptual definition but was directed toward how interactive elements could be translated into learning activities through digital media.

These findings further emphasize the importance of a mentoring model that is not merely informative but also provides teachers with opportunities to explore, practice, and

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directly produce learning media. Through this approach, teachers gained more concrete experience in understanding the relationship between gamification concepts, digital technology, learning content, and students' learning needs.

An important aspect of the activity was the use of a participatory and learning-by-doing approach. Participants did not merely receive information about gamification but directly practiced using Wordwall, Quizizz, and Canva to develop learning media. This approach is relevant because strengthening teachers' digital competence requires practical experience in using technology. Knowledge of a particular application does not necessarily enable teachers to use it effectively in learning. Teachers need opportunities to explore features, determine appropriate activities, incorporate learning content, and adapt media to learning objectives.

The findings demonstrate that hands-on practice constituted an important component of the mentoring process. After receiving explanations about the concepts and functions of learning media, participants were immediately directed to explore digital platforms and develop products through group work. This process enabled participants to experience the development of learning media directly, including dealing with technical challenges and determining alternative solutions during practice. These findings are consistent with previous studies emphasizing the importance of strengthening teachers' capacity to utilize digital media as part of the transformation of learning (Amalia et al., 2026). Thus, practice-based mentoring can serve as one strategy for strengthening teachers' readiness to utilize digital technology in learning.

The use of three digital platforms during the activity provided participants with experience in exploring different forms of learning media development. Wordwall and Quizizz provided opportunities for teachers to develop interactive learning activities with game-like characteristics, whereas Canva could be used to develop visual materials to support the presentation of learning content. The use of multiple platforms within a single activity also helped teachers understand that gamification does not have to be implemented through a single type of media. Teachers can select and combine technologies according to learning objectives, content characteristics, and students' needs. Therefore, technology was positioned not as an end in itself but as a means of creating more interactive learning experiences.

The division of the 20 participants into three working groups was also an important component of the mentoring process. Through group work, participants not only practiced using technology but also exchanged ideas concerning learning content, activity formats, media design, and their alignment with students' needs. This collaborative process was beneficial because participants did not necessarily have the same level of digital technology proficiency. Participants who understood particular features more quickly could assist other group members, while other participants could contribute ideas related to learning content and instructional strategies. Thus, the media development process became a form of collaborative learning rather than merely a one-way transfer of knowledge from facilitators to participants.

This condition demonstrates that teachers' digital competence can be developed within a collaborative learning environment. Such an approach also strengthens the mentoring process by positioning teachers as active subjects who develop learning solutions rather than merely as recipients of instructional materials. In this activity, the media products produced by the groups also served as evidence that the mentoring process had progressed toward the application of knowledge in the form of tangible products. This is important because the success of a community service activity should not be assessed solely through

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changes in evaluation scores but also through participants' ability to apply the knowledge gained during the activity.

The findings reveal two complementary outcomes: an increase in knowledge scores based on the pre-test and post-test and participants' successful involvement in practical digital media development. The increase in scores from 49.50 to 88.50 indicates a change in participants' knowledge or understanding, while their involvement in practical activities provides evidence of the process through which this knowledge was applied. However, these two outcomes need to be interpreted proportionally. An increase in test scores cannot automatically be interpreted as an improvement in all dimensions of teachers' competence. Teacher competence encompasses broader dimensions than the knowledge assessed through a test instrument. Therefore, the findings of this activity are more appropriately interpreted as evidence of improved participants' knowledge and understanding of gamified learning media development, supported by practical experience in using digital technology. From this perspective, the mentoring program can be viewed as an initial stage in strengthening teachers' digital competence. The knowledge acquired and practical experiences gained during the activity can provide a foundation for teachers to develop and implement digital learning media more independently.

The findings also have implications for the development of more interactive learning practices. Mentoring in technology-based gamified learning media development has the potential to expand teachers' capacity to design interactive learning experiences. Teachers were not merely introduced to technology as a tool but were also guided to connect technology with learning objectives and students' characteristics. This is consistent with the direction of digital transformation in education, which positions teachers as important actors in integrating technology into the learning process (Nurdyansyah et al., 2017). In this context, the success of media development is determined not solely by teachers' technical ability to operate applications but also by their ability to select learning activities that are appropriate to instructional objectives.

The findings further reinforce previous research concerning the importance of interactive digital media in elementary education (Firdaus et al., 2024; Safitri et al., 2022). By providing teachers with direct experience in developing media using relatively accessible platforms, mentoring activities can serve as one alternative for supporting teachers' readiness to respond to the demands of technology-based learning. Nevertheless, further evaluation is needed to determine whether the media developed during the activity are used sustainably and how their implementation may influence classroom learning processes, student engagement, and student learning outcomes.

Conclusion

The mentoring program for the development of technology-based gamified learning media for elementary school teachers was successfully implemented and fully attended by 20 participants. The mentoring approach, which combined instructional delivery, digital platform exploration, hands-on practice, group work, and direct mentoring, provided teachers with experience in understanding and developing gamified learning media using Wordwall, Quizizz, and Canva.

The mentoring program demonstrated its contribution to strengthening elementary school teachers' knowledge and understanding of technology-based gamified learning media development. Through a combination of instructional sessions, digital platform exploration, and hands-on practice, participants gained opportunities to understand gamification concepts

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and apply them in developing interactive learning media. The development activities conducted in three working groups also provided practical experience in utilizing digital platforms to create learning resources relevant to elementary school contexts.

These findings highlight the importance of participatory and practice-based mentoring in supporting teachers' digital competence. Rather than focusing solely on introducing digital applications, mentoring activities should guide teachers in selecting appropriate technological tools, designing meaningful learning activities, and aligning media with instructional objectives and students' needs. The media development experience gained through this program can serve as an initial foundation for teachers to independently integrate technology-based gamification into their classroom practices. Nevertheless, continued mentoring and follow-up evaluation are necessary to assess the sustainability of media use and its potential contribution to student engagement and learning outcomes. Overall, mentoring in the development of technology-based gamified learning media can serve as one strategy for supporting the capacity building of elementary school teachers in utilizing technology for learning. However, further research or evaluation is needed to examine the sustainability of the use of the developed media and its impact on classroom learning processes, student engagement, and student learning outcomes.

Recommendation

Based on the results of the activity, several recommendations can be proposed. First, teachers are encouraged to continue utilizing and developing the gamified learning media introduced during the mentoring program and to adapt them to different learning objectives, subject areas, and students' characteristics. Continuous practice is expected to support teachers in developing greater independence in designing and utilizing digital learning media. Second, schools are encouraged to provide continued support for the use of digital technology in learning, including access to digital devices, internet connectivity, and opportunities for teachers to participate in further professional development. Sustained institutional support is important to ensure that the knowledge and practical experience gained during the mentoring program can be implemented continuously in classroom practice. Third, future community service programs should consider providing follow-up mentoring to monitor the implementation and refinement of the media developed by teachers. Further evaluation is also recommended to examine the sustainability of media use and its potential effects on classroom learning processes, student engagement, and student learning outcomes.

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