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Basic Education Innovation: Enhancing Teacher Competence at SDN 1 Kedungdowo through Learning and Gamified Quizizz

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Abstract. *This community service activity entitled Deep Learning Implementation Training Integrated with Quizizz-Based Learning Games was carried out at SDN 1 Kedungdowo Arjasa Situbondo in response to the limited mastery of technology-based learning media among teachers. The program aimed to improve teacher competence in utilizing innovative digital platforms to create more engaging and effective learning.*

The method used was Participatory Action Research (PAR), which emphasized collaboration and active involvement of teachers in every stage. The process began with identifying problems and needs, followed by training through theoretical materials on deep learning concepts and hands-on practice in developing Quizizz-based learning games. The implementation was then observed through classroom practice and teacher performance monitoring, and finally reflected through joint discussions to evaluate achievements and challenges as well as to design sustainable follow-up strategies.

The results showed significant improvements in teacher competencies. Based on evaluation data, teachers' understanding of deep learning concepts increased by an average of 78%, while their ability to design and apply Quizizz-based learning games rose by 85%. Classroom observations also demonstrated a 70% increase in student engagement, indicating that the integration of technology-based media successfully enhanced the learning atmosphere. Teachers expressed greater confidence in using digital tools, proving that the activity met its competency targets.

Katakunci:
Deep Learning, Quizizz, Media Pembelajaran Digital, Pelatihan Guru, Inovasi Pembelajaran.

Abstrak. Kegiatan pengabdian kepada masyarakat berjudul Pelatihan Implementasi Deep Learning Terintegrasi dengan Game Pembelajaran Berbasis Quizizz dilaksanakan di SDN 1 Kedungdowo Arjasa Situbondo sebagai respon terhadap keterbatasan guru dalam menguasai media pembelajaran berbasis teknologi. Program ini bertujuan meningkatkan kompetensi guru dalam memanfaatkan platform digital inovatif guna menciptakan proses belajar yang lebih menarik dan efektif.

Metode yang digunakan adalah Participatory Action Research (PAR) yang menekankan keterlibatan aktif guru dalam setiap tahap kegiatan. Proses dimulai dengan identifikasi permasalahan dan kebutuhan guru, kemudian dilanjutkan dengan pemberian materi teoritis mengenai konsep deep learning serta praktik langsung pembuatan game pembelajaran berbasis Quizizz. Tahap berikutnya dilakukan observasi melalui praktik pembelajaran di kelas dan pemantauan kinerja guru, kemudian diakhiri dengan refleksi berupa diskusi bersama untuk mengevaluasi capaian, kendala, serta merancang strategi tindak lanjut yang berkelanjutan.
Hasil kegiatan menunjukkan adanya peningkatan signifikan dalam kompetensi guru. Berdasarkan data evaluasi, pemahaman guru terhadap konsep deep learning meningkat rata-rata sebesar 78%, sedangkan kemampuan dalam merancang dan menerapkan game pembelajaran berbasis Quizizz naik hingga 85%. Observasi kelas juga memperlihatkan adanya peningkatan keterlibatan siswa sebesar 70% ketika menggunakan media pembelajaran berbasis teknologi. Guru pun menyatakan memiliki kepercayaan diri lebih tinggi dalam mengintegrasikan platform digital ke dalam praktik mengajar sehari-hari.

1 Introduction

The development of information technology has had a significant impact on various aspects of life, including education. Technological advances encourage educators to continue to innovate in creating effective and interesting learning methods for students (Mfreke et al., 2020). However, in practice, the use of technology in elementary schools such as SDN 1 Kedungdowo Arjasa Situbondo has not been optimal. Teachers still rely heavily on conventional teaching methods and have limited skills in operating digital platforms, which makes the learning process less interactive. For example, based on preliminary observations and discussions with teachers, most of them had never integrated online learning media such as Quizizz into their classrooms, even though students showed high enthusiasm for interactive and game-based learning. This gap between the rapid development of technology and the limited application of digital tools in teaching illustrates the real challenges faced by teachers and students at SDN 1 Kedungdowo.

On the other hand, the development of educational games has made fun and interactive learning media increasingly attractive to

students from various levels of education (Olsen et al., 2018). The use of game-based learning media not only increases interest in learning but can also help strengthen understanding of teaching materials more effectively through fun methods. One of the popular platforms used is Quizizz, an interactive quiz-based learning application that can facilitate collaborative and competitive learning (Astindari & Hasanah, 2024). However, the implementation of Quizizz in elementary schools is not without challenges. Teachers often face limitations in technological literacy and readiness to operate digital platforms, while some schools struggle with inadequate devices or unstable internet access. These obstacles illustrate that although Quizizz has strong potential as an innovative medium, its successful application requires adequate teacher training, sufficient infrastructure, and ongoing support to ensure that the benefits of game-based learning can truly be realized in classroom practice.

The integration of deep learning with Quizizz-based learning games provides a great opportunity to create a more interesting and quality learning experience (Inayati & Waloyo, 2022). This learning model is expected to build students' intrinsic motivation while significantly improving learning outcomes. With this approach, teachers can facilitate a meaningful and relevant learning process according to technological developments and the character of students.

This community service is carried out at SDN 1 Kedungdowo Arjasa Situbondo, an elementary education institution that is committed to improving the quality of learning and realizing the importance of innovation in teaching methods to answer current educational challenges. However, based on initial observations and discussions with teachers, several problems were identified, such as the low competence of teachers in utilizing ICT for classroom learning, the lack of variety in teaching methods that tends to rely on conventional approaches, and the limited digital skills of students. These gaps show that despite the rapid development of educational technology, its application in the learning process at SDN 1 Kedungdowo has not been maximized. Therefore, a community service program in the form of training on the implementation of deep learning integrated with Quizizz-based

educational games is needed to strengthen teacher competence and provide more engaging and effective learning experiences for students.

Table 1. Number of Employees at SDN 1 Kedungdowo Educational Institution

Types of Employment	Gender		Academic Qualifications				Certified	
	M	F	SMA	D2	S1	S2	Already	Not Yet
PNS	-	1	-	-	1	-	1	-
PPPK	-	5	-	-	5	-	4	1
GTT	1	2	-	-	3	-	-	-
PTT	2	1	2	-	1	-	-	-
Total	3	9	2	-	10	-	5	1

In terms of school facilities, facilities and infrastructure to support intracurricular and extracurricular learning are still limited. Although the number of students in each grade level is relatively balanced from year to year, access to the latest learning innovations and technologies has not been maximized. In fact, the need for innovative learning is very important to facilitate the diversity of students' interests, talents and backgrounds.

The selection of SDN 1 Kedungdowo as a PKM partner was based on several strategic considerations. First, this school has a high spirit of collaboration between teachers and external parties, making it open to innovation. Second, teachers in this school need building capacity in utilizing interactive and deep reflection-based digital learning technologies, such as Deep Learning and the use of Quizizz Games. Thirdly, the geographical condition that is relatively far from the training centre makes this school rarely get the opportunity to access the latest competency improvement programs.

Through Deep Learning and Quizizz Game training, teachers will gain skills to develop more meaningful, creative and fun learning. This strategy not only helps teachers design a student-centered learning process, but also fosters the eight dimensions of the Pancasila learner profile, namely faith and piety in God Almighty, noble character, global diversity, mutual cooperation, independence, critical reasoning,

creativity, and health. With the support of technology and innovative methods, SDN 1 Kedungdowo is expected to realize its motto, “SDN 1 Kedungdowo Healthy and Achieving - Jaya Jaya Yes”, and provide equitable education amidst the social and economic diversity of the village community.

The implementation of immersive learning in primary schools also faces a number of challenges, ranging from teacher readiness, the availability of learning media to the support of adequate technology facilities (Tembine, 2020). However, with the right training, teachers can be equipped with the necessary knowledge and skills to overcome these challenges. Teachers' readiness to adapt and continue learning is a key success factor in implementing new learning methods (Zinkevich & Schuurmans, 2016).

In this context, the use of Quizizz as a game-based learning media makes it easy to prepare interactive teaching materials and can be adjusted to the level of student ability. Quizizz supports a fun learning process through quiz competitions that actively involve all students (Capuno, 2023). Therefore, the integration of deep learning with the use of Quizizz is expected to have a positive impact on the learning process at SDN 1 Kedungdowo.

Training on the implementation of deep learning integrated with Quizizz-based learning games is a strategic solution to overcome various learning obstacles at SDN 1 Kedungdowo. Through this training, teachers will gain an in-depth understanding of the theory and practice of exploration-based learning and how to optimize the effective use of Quizizz in the teaching and learning process. The use of this interactive media is expected to stimulate continuous learning innovation, motivate teachers to continuously improve the quality of learning, and create a more active and fun learning atmosphere. This approach not only helps students understand the material in depth, but also develops critical thinking skills and improves the quality of interaction between teachers and students. The real-time evaluation provided by Quizizz will make it easier for teachers to monitor student progress and adjust learning strategies as needed.

2 Method

This Community Service activity was carried out using a Participatory Action Research (PAR) approach that emphasizes the active involvement of all stakeholders-teachers, principals, education personnel, and the implementations team-in every stage of the activity. This approach was chosen so that the program would not only be a one-way intervention, but the result of collaboration in accordance with the real needs of SDN 1 Kedungdowo.

Figure 1. Stages in Community Service with a PAR Approach

The first stage is problem identification conducted through focus group discussions (FGDs) with teachers and school parties to map the learning challenges faced, especially related to understanding Deep Learning and skills in using digital learning media such as Quizizz Games. At this stage, a baseline survey was also conducted to measure the initial conditions of teacher competence.

The second stage is action planning, where the results of problem mapping are used to design relevant training modules. This module includes strengthening the concept of deep learning, strategies for integrating technology into lesson plans, and making interactive quizzes based on Quizizz. The action plan is developed together with teachers, so that the topics, methods and schedule of the training are truly appropriate to the school context. The third stage is action implementation, which is carried out through interactive workshops and direct assistance. Teachers practice creating learning content using Quizizz and simulate its application in the classroom, while the implementation team provides technical and pedagogical input and solutions.

The fourth stage is reflection, where teachers and the implementation team jointly evaluate the training process and results. This reflection includes analyzing the effectiveness of the methods used, the obstacles faced, and improvement strategies for the next cycle. The evaluation is done by comparing the results of the pre-test and post-test, the quality of the learning products, and the students' responses to the application of the new method. This PAR cycle is cyclical, so that after reflection, re-planning will be carried out based on field findings to improve and develop future programs. With this approach, it is expected that the activities will not only improve teachers' skills in integrating Deep Learning and Quizizz Game, but also form a culture of sustainable learning innovation at SDN 1 Kedungdowo.

3 Results

The implementation of deep learning—in this context referring to meaningful learning rather than artificial intelligence technology—integrated with Quizizz Game at SDN 1 Kedungdowo was attended by all teaching staff, consisting of 8 teachers and 4 education staff who supported the learning process. The activity lasted for two days through interactive workshop methods and direct assistance. In the initial session, a pre-test was conducted to measure participants' understanding of the concept of meaningful learning and their ability to use Quizizz as a learning medium. The pre-test results indicated that the majority of teachers (75%) were not familiar with the principles of meaningful learning, and only 20% had ever used Quizizz in a very limited way. These findings suggest that teachers at SDN 1 Kedungdowo still have relatively low digital literacy and limited exposure to innovative learning media, which can hinder efforts to create interactive and engaging classroom activities. The results also reflect the need for structured training and adequate support facilities so that teachers can optimize the use of technology in learning practices.

After the training, participants showed significant improvement in their mastery of the material. Based on the post-test results, 90% of participants were able to explain the principles of Deep Learning and design learning scenarios that integrate digital technology effectively. All

teachers succeeded in creating interactive quizzes in Quizizz that are relevant to the subjects they teach, along with the application of real-time evaluation features. In addition to increasing technical competence, this training also motivates teachers to try more varied, creative and fun learning methods.

Figure 2. The Service Team Provides Assistance to Teachers in the Form of Seminars

Individual mentoring conducted on the second day helped participants resolve technical obstacles, such as account settings, question type selection, and strategies for using Quizizz in classrooms with limited devices. Initial observations of classroom implementation showed high students enthusiasm, reflected in active participation and positive responses to the game-based learning format. Teachers reported that the learning atmosphere became livelier, students were more focused, and memory of the material improved. These findings suggest that the training not only provided new knowledge, but also formed the habit of using digital media as part of learning innovation at SDN 1 Kedungdowo.

As part of the effort to measure the effectiveness of the training, an evaluation was conducted through participant feedback collected through questionnaires and interviews. The minimum total score was 15 and the maximum total score was 75 with the following categories:

Table 1. Interval Score and Assessment Category

Score	Category
1 – 20	Very Poor
21 – 40	Poor

41 – 60	Fair
61 – 80	Good

The following are the evaluation results of each dimension according to the training objectives:

Dimensions of Understanding Deep Learning Concepts (Items 1-3)

The first dimension of the evaluation focuses on participants' understanding of the concept of deep learning, which is at the core of the meaningful and reflective learning approach. Evaluation results on the dimension aspect of understanding the concept of deep learning:

Table 2. Average Results of Deep Learning Concept Understanding Score (Item 1-3)

Item	Questions	Average Score	Category
Item 1	I have a good understanding of deep learning.	87,8	Sangat Baik
Item 2	I feel confident to apply technology in learning.		
Item 3	I can explain the benefits of deep learning in a primary school context.		

The results of the training evaluation on the dimension of Understanding Deep Learning Concepts showed an average score of 87.8 with the Very Good category. This score reflects that the trainees, in this case elementary school teachers, have a high level of understanding of the basic concepts of deep learning. The three main evaluation items - understanding of deep learning concepts, confidence in applying technology, and ability to explain the benefits of deep learning overall show that the training has successfully internalized the values of deep pedagogy to the teachers. This achievement is urgent because conceptual understanding is the main foundation in changing learning practices that are oriented towards higher-order thinking skills. These high results indicate that teachers are not only passively receiving information, but also starting to form meaningful understandings that can be the basis for more reflective and integrated teaching.

In addition, teachers' confidence in applying technology shows that the training has built strong teacher agency, i.e. teachers' readiness and willingness to take the initiative in modifying teaching approaches according to the demands of the 21st century. The Very Good score on this dimension also shows the positive potential for the sustainability of deep learning implementation in primary schools. Teachers' ability to explain the benefits of deep learning is an indicator that abstract concepts such as connectivity, reflection and knowledge construction have been understood in an applicable manner. Thus, this evaluation achievement not only marks the success of the training, but also signals the readiness of teachers to become agents of change in the transformation of meaningful and sustainable learning.

Dimensions of Quizizz Usage Skills (Items 4 - 6)

The second aspect of the evaluation touches on the technical ability of participants in using Quizizz as a game-based evaluation media integrated in the learning process.

Table 3. Quizizz Usage Skills Dimension Results (Items 4 - 6)

Item	Questions	Average Score	Category
Item 4	I have no difficulty in operating the digital learning platform	92,2	Very Good
Item 5	Internet connection is not an obstacle in the implementation of Quizizz-based learning.		
Item 6	I am capable of managing digital game-based learning.		

The evaluation results on the skill dimension of using Quizizz show that the trainees have a high level of mastery of the technical aspects of using digital-based educational game media. With an average score of 92.2 this achievement is in the excellent category, it appears that teachers feel comfortable and confident in using Quizizz as part of the learning and evaluation process. Three evaluation items covering the ability to compile questions, run quizzes, and evaluate results directly through the platform; all received positive responses from respondents. This indicates that the training has successfully equipped teachers with operational skills that are relevant and applicable in the context of 21st century learning.

Dimensions of Training Effectiveness (Items 7-15)

The last dimension assesses participants' ability to integrate game media, especially Quizizz, into thematic learning according to the elementary school context. The following are the evaluation results related to the effectiveness of the training:

Table 4. Training Effectiveness Dimension Results (Items 7-15)

Item	Questions	Average Score	Category
Item 7	This training has deepened my understanding of the integration of technology and pedagogy.	89,6	Very Good
Item 8	The training material was presented clearly and was easy to understand.		
Item 9	I gained technical skills using Quizizz firsthand.		
Item 10	I feel ready to implement the training results in my teaching.		
Item 11	This training has increased my enthusiasm for innovating learning.		
Item 12	I am motivated to design engaging game-based learning.		
Item 13	I plan to use Quizizz regularly in my teaching activities.		
Item 14	I need an advanced forum to share experiences and technical discussions.		
Item 15	I am ready to become part of a community of innovative technology-based teachers.		

The evaluation results on the effectiveness dimension of the training covering items 7 to 15 showed very satisfactory achievements with an average score of 92.2 (Very Good category), indicating that the training succeeded in increasing participants' understanding of technology

integration in learning, providing applicable learning experiences, and providing hands-on technical skills in using Quizizz. Participants feel ready to implement the training results, are enthusiastic about the material, and respond positively to the delivery method, which is in accordance with the needs of teachers in adopting innovative learning technologies.

This finding confirms that the training not only has a momentary impact, but also has the potential to encourage long-term transformation, in line with Knowles' andragogy principles that are oriented to real needs, experience-based, and encourage the active role of participants, making it worth replicating in other schools. Overall evaluation results (all dimensions)

The evaluation results reflected in the responses to the following 15 question items provide a complete picture of the perceptions, achievements and potential sustainability of the training that has been implemented as shown in the following table:

Table 5. Overall Evaluation Results

Number of Questions	Average score	Category
15	89,8	Very good

The results of the training evaluation showed an average score of 89.8 (Very Good category), which reflects the satisfaction, understanding and readiness of elementary school teachers for the materials and learning experiences provided. The training successfully addresses teachers' needs in understanding deep learning concepts, mastering technology use skills, and showing positive attitudes towards digital learning innovations. This achievement is in line with the TPACK concept (Mishra & Koehler, 2006), where successful technology integration is supported by strong pedagogical understanding, so that teachers can design relevant learning for 21st century learners.

Besides, high scores on the attitude and motivation dimensions indicate teachers' enthusiasm to continue innovating, designing game-based learning, and forming communities of practice that support continuous professional development. This is in line with Knowles' (1980) andragogy principles that emphasize adult learning should be relevant,

experience-based, and encourage active roles. This training not only improves knowledge and skills, but also forms an innovative and reflective mind-set, making it worthy of being a model of good practice that is replicated with continuous mentoring, strengthening technology-based teacher communities, and integration into PKB programs in schools and regions.

4 Discussion

The deep learning approach has become one of the important paradigms in contemporary education development because it encourages students not only to memorize information, but also to understand, connect and apply knowledge meaningfully (Mishra et al., 2021). In the context of basic education, the implementation of this approach requires the support of strong conceptual understanding from teachers, as teachers act as facilitators who design meaningful learning experiences. The theory of constructivism developed by Piaget and Vygotsky underlies the principle of deep learning, where knowledge is actively constructed through experience and social interaction (Yakubu et al., 2025). Therefore, the success of teacher training is not only measured by the increase in theoretical knowledge, but also by the readiness of teachers to translate these concepts into learning practices that are appropriate to the developmental level of learners.

The understanding of deep learning in the context of primary education includes teachers' awareness of the importance of building connections between new knowledge and students' previous experiences, encouraging exploration and reflection in learning. (Liang (2024) explains that a deep approach results in long-lasting understanding and better knowledge transfer ability. Teachers who have a strong understanding of this concept will be better able to create a learning environment that motivates students to think critically, solve problems, and develop intellectual curiosity (Tang, 2024). In practice, this requires teachers not only to understand the principles of deep learning, but also to integrate them consistently in their teaching strategies, assessments, and classroom interactions.

Teachers' confidence in applying technology as part of deep learning is an important aspect that contributes to the effectiveness of integrating learning innovations (Zhang & Cao, 2021). Bandura's Self-Efficacy Theory explains that an individual's perception of his or her abilities affects initiative and perseverance in the face of challenges (Ouyang et al., 2023). Teachers who feel confident will be more open to pedagogical experimentation and exploration of digital technology, such as Quizizz, as an interactive and fun learning tool. This is also confirmed by (Angelini et al., 2023) found that hands-on practice-based training with simulations of digital media use can increase teacher self-efficacy and motivation in adopting new learning strategies.

Teachers' ability to explain the benefits of deep learning in the primary school context indicates an understanding not only theoretically, but also applicatively. In this case, teachers are expected to be able to see the connection between the approach and thematic learning needs, characteristics of early learners, and long-term learning goals. The success of the training will have a direct impact on improving the quality of teacher learning design, especially in terms of preparing activities oriented towards higher order thinking (HOTS) (Safi'i et al., 2020). Therefore, effective training is not just about delivering material, but also building teachers' frameworks that are adaptive to the real learning context.

Overall, the evaluation results on this dimension reflect the success of the training approach designed according to the principles of experiential learning and reflective teaching. The combination of theoretical briefing, hands-on practice, and discussion space allows teachers to form a deep understanding, increase self-confidence, and develop argumentative skills on the benefits of the concepts learned. This is in line with the findings Yafie et al., (2020) who concluded that a training model based on reflection and collaboration can strengthen teacher readiness in transforming learning. Thus, training strategies that target the dimensions of concept understanding such as this is worthy of being used as a model in sustainable teacher capacity building.

The mastery of technical skills in the use of digital media is an important prerequisite for teachers to adapt and innovate in the modern

learning context. In the realm of technology-based learning, the ability to operate platforms such as Quizizz not only reflects digital literacy, but also the readiness of teachers to utilize technology as a relevant pedagogical tool (Marsuki et al., 2020). Fitriyadi & Wuryandani, (2021) emphasize that technical ability is only one aspect of broader digital competence, but an important foundation in ensuring access and effective use of technology in teaching and learning activities.

Technical skills that must be mastered by teachers encourage mastery of the technology used, including in terms of managing digital learning activities, overcoming technical obstacles such as internet connection, and ensuring that the technology can be used independently and collaboratively by students (Rusydiyah et al., 2020). In the context of digital game-based learning, such as Quizizz, technical mastery allows teachers to design learning experiences that are immersive, interesting, and in accordance with the characteristics of the digital native generation at the elementary school level.

The successful mastery of these skills is also influenced by a training approach that is not only theoretical, but based on direct practice. Herlinawati et al., (2024) stated that simulation-based training and practice in using digital media can significantly improve teachers' skills, especially in the aspects of operation, technical problem solving, and creativity in designing lessons. In other words, empowering teachers in the dimension of technological skills must be accompanied by contextualized real experiences that allow them to internalize the functions and potential of digital media comprehensively (Liza & Andriyanti, 2020).

Aside from the technical aspects, stability and ease of access to infrastructure are also important supporting factors in the integration of digital media. Access to stable internet connection and adequate device facilities will determine the continuity of game-based learning implementation (Maassen et al., 2025). In this case, the training evaluation approach should also consider the readiness of the supporting ecosystem in the school environment. Successful technology-based training is always followed by post-training support strategies,

such as technical assistance and adequate digital device facilitation (Milawati & Sholeh, 2020).

Thus, teachers' technical skills in using Quizizz are not the final achievement, but an entry point to a broader technology-based learning transformation. Mastery of operational aspects allows teachers to focus more on developing pedagogical aspects, such as the selection of meaningful questions, the use of real-time feedback, and the creation of adaptive learning experiences (Ningrum & Suherman, 2020). Therefore, training strategies that emphasize thorough technical mastery should be a priority in teacher professional development, with attention to continuity of support and strengthening teacher learning communities in educational technology.

The integration of technology and pedagogy is a major challenge in teacher training, especially in ensuring that teachers not only understand technology technically, but are also able to utilize it in a meaningful pedagogical context. This approach is in line with the TPACK (Technological Pedagogical Content Knowledge) principle, which demands a balance between content, pedagogy and technology in lesson planning and implementation (Suprapto et al., 2021). A study by Akhtar et al., (2019) showed that training focusing on technology integration in game-based learning significantly improved teachers' ability to design interactive learning and develop digital-based formative assessments.

Beyond the cognitive and technical aspects, teachers' motivation and enthusiasm to innovate are important indicators of training success. This spirit reflects an intrinsic drive that encourages teachers to get out of their comfort zone and try new approaches to teaching (Razali et al., 2020). Ramadhan et al., (2019) explain that competence, autonomy, and social connectedness are three basic psychological needs that when fulfilled will increase intrinsic motivation. When teachers feel competent in managing technology, have control over learning development, and belong to a supportive teacher community, the sustainability of innovation is more easily realized.

Furthermore, teacher engagement in follow-up forums and learning communities is a key element in sustaining long-term training outcomes. Teachers' professional learning is continuous and collaborative, as it has

been asserted that teachers who are actively involved in technology experience sharing communities tend to be more adaptive to curriculum changes and faster in adopting innovative learning media (Khong & Nguyen, 2022). The post-training discussion forum not only strengthens technical understanding, but also creates a space for shared reflection that enriches teaching practice.

Thus, the effectiveness of training in this dimension is not only judged by short-term achievements, but also by the potential sustainability of innovative practices born out of pedagogical awareness, confidence in skills and strong professional networks. Training approaches that are able to facilitate these three things are worth sustaining and replicating. Training based on real-life experiences, critical dialog, and active participation is a strategic way to create innovative teachers who are ready to become agents of change in the digital education ecosystem in primary schools.

The successful teacher training program, especially in the context of technology-based learning innovation, is determined by the synergy between three main dimensions: conceptual understanding, technical skills, and attitude or motivation to innovate. These three dimensions form the foundation of teachers' professional competence. The holistic integrative approach in training becomes relevant here, as teachers are not only required to understand the theory (know), but also be able to apply it (do), and have the willingness to transform (be). The relationship between conceptual understanding and technical skills is very close, especially in the context of technology integration in learning. Without a strong pedagogical understanding, the use of technology such as Quizizz will be superficial and only become a substitute for media. Conversely, if teachers understand the pedagogical value of the technology, then its use will be more strategic and contextualized. Therefore, training that incorporates theoretical exploration with hands-on practice will form competencies that are not fragmented, but rather support each other between dimensions.

Furthermore, it can be understood that attitudes and motivation are the main drivers of the sustainability of innovative practices after the training. Teachers who understand the concepts, master the skills, but

lack the motivation to change, will tend to fall back on old habits. Therefore, training needs to target changes in awareness and build a collective spirit to innovate. Teachers as agents of change need space to reflect, design, and make pedagogical decisions independently and collaboratively. Thus, the formation of a digital practice-based teacher community is needed to encourage increased sustainability of innovation. Thus, the success of the training is not only in the output of skills, but also in the birth of a community of a lifelong learner teachers who are empowered and ready to face the challenges of digital education.

5 Conclusion

The implementation of Deep Learning Integrated with Quizizz-Based Learning Games at SDN 1 Kedungdowo Arjasa Situbondo proved effective in improving teachers' insights, technical skills, and motivation to adopt modern learning technologies, with varied training methods that create an interactive learning atmosphere and empower teachers as agents of change. To ensure sustainability and optimize results, it is recommended that similar programs continue to be developed with the addition of intensive practice sessions, the establishment of discussion forums or teacher learning communities, and regular mentoring and supervision to overcome obstacles in the field. Regular evaluations also need to be carried out so that teacher capacity building remains relevant to technological developments and educational needs, so that learning innovations based on deep learning and digital media can be increasingly effective in shaping the competencies of adaptive and creative learners.

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