Jurnal Al Maesarah: Jurnal Pengabdian kepada Masyarakat
Bidang Pendidikan, Sosial, dan Kemasyarakatan
P-ISSN: 2830-022X | E-ISSN: 3025-0447
Online: https://jurnal.staidaf.ac.id/index.php/jam

From Digital Literacy to Deep Learning: Mentoring Kindergarten Teachers for Community-Oriented Early Childhood Learning

Hapidin[1], Yuli Pujianti[2*], Endah Windiastuti[3], Gemala Ranti[4]

[1] Universitas Negeri Jakarta, Indonesia; hapidin@unj.ac.id
[2] STAI Al-Marhalah Al-'Ulya Bekasi, Indonesia; yuli@almarhalah.ac.id
[3] Universitas Negeri Jakarta, Indonesia; endah.windiastuti@unj.ac.id
[4] Universitas Negeri Jakarta, Indonesia; gemala.ranti@mhs.unj.ac.id
* *Corresponding Author*

Received: 16-07-2026 **Revised:** 08-09-2026 **Accepted:** 22-10-2026

ABSTRACT

Digital transformation requires kindergarten teachers not only to operate digital devices but also to design safe, ethical, contextual, and meaningful learning experiences. This community service program aimed to strengthen IGTKI kindergarten teachers' conceptual mastery in Indramayu Regency in integrating digital literacy and deep learning through a community-oriented mentoring approach. The program employed participatory, andragogical, and practice-based mentoring through needs mapping, conceptual training, RPPM/RPPH design workshops, simple digital media development, follow-up mentoring, evaluation, and reflection. The program incorporated local Indramayu contexts as learning resources, while the IGTKI professional community supported potential knowledge sharing and sustainability. The evaluation involved 31 pre-test and 31 post-test participants, of whom 27 were reliably matched for paired analysis. The overall mean score increased from 79.68 to 99.48, whereas the mean score of the matched participants increased from 80.00 to 99.41, a mean gain of 19.41 points. The Wilcoxon signed-rank test showed a significant difference ($W = 3.00$, $p < .001$), with a rank-biserial correlation of 0.978. The verified outcome was improved conceptual mastery; classroom implementation, product quality, and broader community impacts remain to be evaluated.

Keywords: *Digital Literacy, Deep Learning, Kindergarten Teachers, Community-Oriented Mentoring, Early Childhood Education*

How to Cite Hapidin, H., Pujianti, Y., Windiastuti, E., & Ranti, G. (2026). From Digital Literacy to Deep Learning: Mentoring Kindergarten Teachers for Community-Oriented Early Childhood Learning. *Jurnal Al Maesarah*, 5(2), 397–413. https://doi.org/10.58988/jam.v5i2.1305

INTRODUCTION

Digital transformation has reshaped the early childhood learning environment. Children are increasingly exposed to digital images, videos, games, apps, and connected devices in their daily lives. As a result, technology in early childhood education can no longer be understood simply as introducing digital devices into the classroom. Digital literacy includes the ability to access and understand information, evaluate digital content, communicate and create responsibly, solve problems, and maintain safety and ethical behavior in a digital environment (Audrin & Audrin, 2022; Falloon, 2020). In early childhood education, these competencies need to be translated into developmentally appropriate experiences that remain linked to play, exploration, communication, social interaction, and concrete experiences. Research in Indonesia also shows that ICT can support young children's learning when intentionally integrated into pedagogical activities, rather than used only for exposure to technology (Aditya et al., 2022; Nasution et al., 2020).

Therefore, teachers play a central role in determining the pedagogical value of technology. The quality of digital learning depends not only on the availability of apps or devices, but also on teachers' decisions about why, when, and how to use technology. Teachers' digital competencies include selecting appropriate resources, designing meaningful learning activities, managing interactions, evaluating digital information, protecting personal data, and considering the educational implications of technology use (Falloon, 2020; Lucas et al., 2021). These responsibilities are critical in early childhood education because young children remain highly dependent on adult mediation when interacting with the digital environment. Educators must introduce digital citizenship competencies such as privacy, safety, balanced media use, cooperation, and responsible behavior through deliberate guidance (Lauricella et al., 2020). Innovative early childhood practices also show that digital literacy becomes pedagogically meaningful when technological skills are integrated with professional assessment, reflection, and understanding of children's developmental needs (Pires Pereira et al., 2023).

Within Indonesia's education policy, the development of teachers' digital competencies is increasingly relevant to the implementation of deep learning as a pedagogical approach. Here, deep learning refers to an educational approach and should be distinguished from the identically named concept in artificial intelligence and machine learning. The Indonesian deep learning framework emphasizes mindful, meaningful, and joyful learning and encourages learners to understand, apply, and reflect on knowledge through relevant experiences (Anggraena et al., 2025). In the Foundation Phase, these principles are translated into learning through play, exploration, interaction, and connections between children's concepts and everyday experiences (Yuliantina, 2025). Accordingly, deep learning in early childhood education does not imply increased academic pressure on young children; rather, it enriches the connections among experiences, questions, actions, interactions, and children's meaning-making. The 2025 Foundation Phase guideline specifically emphasizes meaningful experiences and connections to children's daily lives through play and exploration.

Integrating digital literacy and deep learning offers an opportunity to reposition technology from the center of learning to a bridge toward richer, real-life experiences. Digital content may spark children's curiosity, but meaningful learning must continue through direct observation, conversation, play, experimentation, creative production, problem-solving, and reflection. For example, a short digital story about Indramayu mangoes can be followed by observing real fruits, comparing colors, shapes, textures, and flavors, discussing agricultural activities, creating artwork, or connecting topics to children's family experiences. Similarly, digital images of rice fields, coastal environments, fishermen, traditional markets, batik paoman, local food, and transportation can serve as a starting point for hands-on exploration of children's social and cultural environment. Such approaches are consistent with the finding that technology has greater pedagogical value when children participate, communicate, create, and represent ideas than when they merely consume digital content (Pires Pereira et al., 2023).

However, teachers' familiarity with devices does not automatically translate into effective pedagogical integration. Professional development is needed to connect digital knowledge with learning design and classroom decision-making. Prior studies show that preparing early childhood educators to integrate ICT remains challenging when technological knowledge is insufficiently connected to pedagogical preparation (Masoumi & Noroozi, 2025; Nurhikmah et al., 2024). Similarly, participatory and practice-oriented processes have been found to strengthen early childhood educators' knowledge and skills related to technology integration (Kulaksız & Toran, 2022). The professional development literature also suggests that opportunities for practice, collaboration, feedback, and ongoing engagement are generally associated with teacher learning. However, claims that particular characteristics of professional development are universally effective should be interpreted with caution (Sims & Fletcher-Wood, 2021; Tamphu et al., 2024).

Several community service programs in Indonesia's early childhood education sector have demonstrated the value of participatory, contextual teacher development. For example, participatory training, focused discussions, and workshops were implemented to support early childhood teachers in designing project-based learning that incorporates STEAM elements through comic media and maritime cultural contexts (Hapidin et al., 2023). This program integrated instructional media, project-based learning, and local culture in early childhood education. A subsequent program applied participatory training and mentoring to strengthen teachers' pedagogical competence in STEAM literacy and in implementing the Independent Curriculum in the Thousand Islands context (Hapidin et al., 2025). These programs show that community service activities can strengthen teachers' capacity through contextual training, mentoring, and the development of learning documents and teaching practices.

Nevertheless, gaps remain in existing programs. Previous initiatives have tended to emphasize specific components such as ICT use, STEAM literacy, project-based learning, curriculum implementation, or specific instructional media. Studies on teachers' digital competencies also highlight the need for

professional preparation and contextual support (Masoumi, 2021; Nurhikmah, Musaldin, et al., 2024). However, limited attention has been given to community service models that integrate digital literacy, digital safety and ethics, deep learning pedagogy, local-context learning resources, lesson-plan development, simple offline digital media, and ongoing mentoring through existing teacher professional communities. These gaps form the basis for developing a more integrated mentoring model in which digital technology is not treated as the end goal, but rather as a pedagogical tool to strengthen children's engagement with their social, cultural, and physical environments.

In this context, strengthening the competencies of kindergarten teachers who are members of the Indonesian Kindergarten Teachers Association (IGTKI) in Indramayu Regency is important. The initial program mapping shows that digital literacy is still often understood mainly as using digital devices or applications. In addition, participants' understanding of digital safety, ethics, creativity, critical thinking, and the design of meaningful digital learning experiences varies. Geographical differences and variations in infrastructure also mean that not all educational settings can rely on stable internet connectivity or sophisticated digital applications. This highlights the need for digital learning strategies that are simple, lightweight, contextual, and applicable in low-connectivity environments.

The baseline evaluation provided further evidence of this initial need. Thirty-one participants representing 31 institutional entries and 26 sub-districts of Indramayu Regency participated in the pre-test. The average pre-test score was 79.68. Fifteen participants (48.39%) scored 70, nine participants (29.03%) scored 80, and seven participants (22.58%) scored 100. These results suggest that the problem faced by the partner teachers should not be interpreted as uniformly low competence. Instead, the baseline showed heterogeneous levels of conceptual mastery. Although some participants already demonstrated strong initial knowledge, most still had room to strengthen their understanding of digital literacy, digital safety and ethics, deep learning, lesson planning, and the pedagogical use of simple digital media. This variation supports a mentoring model that combines conceptual reinforcement with learning design, guided practice, feedback, and contextual adaptation. These figures correspond to the baseline data presented in the Results section.

The program also goes beyond teacher-only competencies by adopting a community-oriented perspective. Participants are members of the established IGTKI network and represent educational institutions in 26 sub-districts. Therefore, teachers are positioned not only as recipients of individual training but also as members of professional communities where knowledge, learning resources, and teaching practices can potentially be shared and adapted. Professional learning communities can facilitate practice sharing, reflection, collaborative learning, and ongoing professional engagement among early childhood educators (Hoffman & Mangino, 2023; Zhou et al., 2022). Research on online professional communities also suggests that sharing professional practices and reflections can contribute to sustainable teacher engagement and collective learning.

In the current program, the community-oriented dimension is operationalized in three interconnected ways. First, local social, cultural, and environmental resources in Indramayu, including mangoes, rice fields, coastal environments, fishermen, traditional markets, Paoman batik, local foods, and transportation, are integrated into the learning design. Second, teachers participate in collaborative design and review activities rather than receiving information only through lecture-based training. Third, the IGTKI learning community facilitates follow-up mentoring and professional interaction. In this way, the program seeks to build pathways through which teachers' strengthened understanding can contribute to contextual learning design, peer knowledge exchange, institutional discourse, and ultimately richer learning experiences for children in both their families and their local communities.

However, these broader contributions require careful interpretation. Current evaluations do not directly measure changes in children's learning outcomes, parental behavior, institutional culture, or broader community empowerment. Therefore, community impact is conceptualized as an intended path of knowledge dissemination and sustainability, rather than as an empirically verified outcome of current evaluations. The verified outcome examined in this article is teachers' conceptual mastery. Assessing broader impacts on teaching practices and community-level outcomes requires follow-up through classroom observation, evaluation of learning products, teacher reflection, evidence of dissemination, and engagement with families and educational institutions.

Thus, the distinctiveness of this community service program lies in the integration of five interrelated dimensions within a single mentoring framework: (1) digital literacy that incorporates digital safety and ethics rather than focusing solely on technical skills; (2) deep learning as a pedagogical orientation toward mindful, meaningful, and joyful early childhood experiences; (3) the use of Indramayu's local social, cultural, and environmental resources as a learning context; (4) the development of RPPM/RPPH and digital media that are simple, lightweight, and offline-capable; and (5) ongoing mentoring through the existing professional community of teachers. This combination distinguishes the program from initiatives that primarily focus on technology operations, specific media, STEAM content, or curriculum implementation. Technology is deliberately positioned as a bridge between digital experiences and children's direct exploration of their daily environment.

Based on these considerations, this community service program aims to strengthen IGTKI kindergarten teachers' conceptual mastery in Indramayu Regency in integrating digital literacy and deep learning through a community-oriented mentoring approach. In particular, this article describes the mentoring process, analyzes changes in participants' conceptual mastery before and after the program, and discusses the potential role of local context learning design and IGTKI's professional community in supporting sustainable follow-up. Claims regarding changes in classroom practices and broader community-level impacts are reserved for follow-up evaluation using learning product assessments, classroom observations, teacher reflections, evidence of dissemination, and community involvement.

METHOD

Participants and Program Design

This community service program was conducted in collaboration with the Indonesian Kindergarten Teachers Association (IGTKI) in Indramayu Regency, West Java. Participants were kindergarten teachers affiliated with IGTKI who represented diverse institutional, geographical, and infrastructural contexts. A total of 31 participants completed the pre-test and 31 completed the post-test; together, they represented 31 institutional entries across 26 sub-districts.

The program combined individual capacity building with a community-oriented approach through the existing IGTKI professional network. IGTKI facilitated participant involvement, needs identification, professional interaction, and follow-up activities. The learning design incorporated local social, cultural, environmental, and livelihood contexts as contextual resources, including mango cultivation, rice fields, traditional markets, coastal environments, fishermen, Paoman batik, local foods, and transportation. Thus, the community dimension focused on educational capacity building, contextualized learning, and professional knowledge sharing rather than direct socioeconomic intervention.

The core mentoring activities were conducted on July 25–26, 2026, using a participatory, andragogical, practice-based, and continuous mentoring approach. The program consisted of six stages: (1) coordination and needs mapping; (2) training in digital literacy, digital safety and ethics, and deep learning; (3) locally contextualized RPPM/RPPH design; (4) development of simple and offline-capable digital media; (5) follow-up mentoring, peer review, and revision; and (6) evaluation, reflection, and sustainability planning through the IGTKI learning community. The approach connected conceptual understanding with design practice, feedback, reflection, and follow-up support (Undheim & Ploog, 2024).

Learning Activities and Practical Outputs

The digital literacy component addressed the pedagogical use of digital media, developmentally appropriate content, privacy, digital safety and ethics, teacher mediation, and follow-up activities after media use. Deep learning emphasized mindful, meaningful, and joyful learning through exploration, interaction, reflection, and connections with children's everyday experiences. Digital materials were therefore positioned as starting points for concrete activities such as observation, conversation, role-play, artwork, storytelling, and problem-solving. The community-oriented approach was implemented by integrating local resources into learning plans, encouraging collaborative RPPM/RPPH and media design, and facilitating subsequent sharing through the IGTKI professional learning community.

The program treated RPPM/RPPH and digital media as formative learning products. RPPM/RPPH review focused on alignment between objectives and activities, integration of digital literacy and deep learning, relevance to local contexts, developmental appropriateness, and digital safety and ethics. The review assessed digital media for pedagogical relevance, child-friendliness, simplicity, ease of use, suitability for limited-connectivity settings, and potential to stimulate children's exploration and interaction. The team conducted product reviews

through facilitator feedback and peer discussion; however, the team did not quantitatively score the products as outcome variables. Therefore, improvements in conceptual scores were not interpreted as verified improvements in product quality or classroom practice.

Evaluation Instrument

Participants' conceptual mastery was assessed using a 25-item multiple-choice pre-test and post-test, with scores ranging from 0 to 100. The instrument covered five domains: (1) digital literacy, safety, and ethics in early childhood education; (2) deep learning; (3) RPPM/RPPH planning and local contexts; (4) pedagogical use of simple digital media; and (5) program evaluation and sustainability.

Content validity was established through expert judgment by two early childhood education specialists. The experts reviewed item relevance, clarity, appropriateness for kindergarten teachers, and alignment with the intended competencies, and judged the instrument suitable for use. Because the validation was qualitative, no numerical content-validity coefficient was calculated. The instrument was used as a program-evaluation measure rather than as a standardized psychometric scale. Furthermore, because inconsistencies were identified in some archived item-level response patterns, the quantitative analysis was restricted to verified total scores.

Data Analysis

Two levels of analysis were conducted. First, descriptive analysis included all 31 pre-test and 31 post-test scores, using the mean, median, standard deviation, minimum and maximum scores, frequencies, and percentages. The overall mean scores were 79.68 for the pre-test and 99.48 for the post-test.

Second, individual-level analysis included only participants whose records could be reliably matched using email addresses or consistency between names and institutional affiliations. A total of 27 participants were successfully matched, while four records from each measurement (pre-test and post-test) were excluded from the paired analysis because identity correspondence could not be established with sufficient certainty. Among the 27 matched participants, the mean score increased from 80.00 to 99.41, a gain of 19.41 points.

Because the paired-score differences showed a ceiling effect and did not meet the assumption of normality, we analyzed changes using the Wilcoxon signed-rank test at $\alpha = .05$, with rank-biserial correlation as the effect-size measure. We also categorized individual changes as increased, unchanged, or decreased. Because the program had no control group, score changes were interpreted as changes observed after participation rather than as definitive evidence of causality. Likewise, broader classroom- and community-level effects were not inferred directly from the test scores.

RESULTS AND DISCUSSION

RESULTS

The mentoring process progressed from conceptual strengthening to collaborative learning design and the development of practical outputs. In the initial stage, participants were encouraged to move beyond viewing digital literacy

as merely the ability to operate digital devices. The activities emphasized pedagogical purposes, digital safety and ethics, creativity, responsibility, and integrating technology with developmentally appropriate learning experiences.

The program then linked digital literacy with deep learning by encouraging teachers to design activities that did not end with viewing digital content or answering closed-ended questions. Instead, digital stimuli were intended to lead to exploration, conversation, play, creative production, problem-solving, and reflection. Local resources in Indramayu, including mangoes, rice fields, coastal environments, fishermen, traditional markets, Paoman batik, local foods, and transportation, were incorporated as potential contexts for connecting digital materials with children's everyday experiences. These activities are illustrated in Figure 1.



Figure 1. Documentation of Digital Literacy and Deep Learning Training

Figure 1 documents the conceptual training stage in which participants explored the relationship between digital literacy and deep learning. The training provided the conceptual foundation for the subsequent design activities by emphasizing that technology should serve as a pedagogical tool to extend children's learning experiences rather than as the primary focus of instruction. The documentation confirms that conceptual strengthening preceded the practical design stage.

After the conceptual sessions, participants attended workshops on RPPM/RPPH development and simple digital media design. These activities were intended to translate conceptual understanding into preliminary learning designs that incorporated local contexts, child-friendly digital resources, and follow-up hands-on activities. Figure 2 documents the workshop process.



Figure 2. Documentation of the RPPM/RPPH Design Workshop and Simple Digital Media Development

Figure 2 shows participants' involvement in the design-oriented component of the mentoring program. The documentation confirms that teachers participated in RPPM/RPPH and digital-media development activities. However, the archived dataset did not include complete final products that could be independently assessed using a standardized quantitative rubric. Therefore, these products are reported as formative workshop outputs, rather than as independently verified evidence of product quality.

The mentoring activities generated several practical outputs, including contextualized RPPM/RPPH drafts, simple digital media, and follow-up plans. Table 1 summarizes these outputs and their evaluation status. The products were developed and reviewed formatively during mentoring but were not independently scored as quantitative outcome measures.

Table 1. Practical Outputs of the Mentoring Program

RPPM/RPPH design	Contextualized learning plans integrating digital stimuli, play, exploration, and local Indramayu themes	Formative facilitator and peer review
Digital media workshop	Simple, child-friendly, lightweight/offline digital media	Formative review; final products were not independently assessed
Follow-up mentoring	Revision of learning plans and media based on feedback	Classroom implementation was not independently observed
IGTKI community follow-up	Peer sharing, adaptation, and potential dissemination across institutions	Community-level adoption was not quantitatively measured

Table 1 shows that the program produced practical outputs beyond conceptual training, particularly draft learning plans and simple digital media. However, participants used these outputs mainly for formative learning and revision. Therefore, the available evidence supports participants' engagement in product development but does not establish independently verified improvements in product quality, classroom implementation, or community-level dissemination.

The quantitative evaluation examined changes in participants' conceptual mastery before and after the mentoring program. Descriptive analysis included all 31 pre-test scores and all 31 post-test scores. Table 2 presents the principal descriptive statistics.

Table 2. Descriptive statistics for the pre-test and post-test

Number of participants	31	31
Mean	79.68	99.48
Median	80.00	100.00
Standard deviation	11.77	1.34
Minimum	70	96
Maximum	100	100

As shown in Table 2, the mean score increased from 79.68 to 99.48, while the median increased from 80.00 to 100.00. The standard deviation decreased from 11.77 to 1.34, indicating that post-test scores became more concentrated near the upper end of the scale. The minimum score also increased from 70 to 96, while the maximum remained at 100.

The score distribution provides additional detail. In the pre-test, 15 participants (48.39%) scored 70, nine participants (29.03%) scored 80, and seven participants (22.58%) scored 100. In the post-test, 27 participants (87.10%) scored 100 and four participants (12.90%) scored 96. Thus, all post-test scores were concentrated between 96 and 100.

These results indicate stronger performance on the conceptual content assessed by the instrument following the mentoring program. However, the findings should not be interpreted as evidence of universally high pedagogical competence because the instrument primarily measured conceptual understanding of digital literacy, digital safety and ethics, deep learning, learning planning, simple digital media, and program sustainability.

To examine individual-level changes more accurately, we conducted a paired analysis only for participants whose pre-test and post-test records could be reliably matched. A total of 27 participants met this criterion. Table 3 summarizes the paired analysis.

Table 3. Results of the paired analysis

Number of matched participants	27
Mean pre-test score	80.00
Mean post-test score	99.41
Mean gain	19.41 points
Median gain	20 points
Increased	21 participants (77.78%)
Unchanged	4 participants (14.81%); all had scored 100 at pre-test
Decreased	2 participants (7.41%); from 100 to 96
Wilcoxon signed-rank test	$W = 3.00$; $p = 0.0000297$ ($p < .001$)
Rank-biserial correlation	0.978

Table 3 shows that the mean score among the 27 matched participants increased from 80.00 to 99.41, yielding a mean gain of 19.41 points. Twenty-one participants (77.78%) improved, four (14.81%) remained unchanged, and two (7.41%) decreased slightly from 100 to 96. The Wilcoxon signed-rank test indicated a statistically significant difference between pre-test and post-test scores ($W = 3.00$, $p < .001$), while the rank-biserial correlation was 0.978.

The unchanged scores should be interpreted in relation to the ceiling effect. Four participants had already scored 100 on the pre-test and therefore could not improve numerically. Among the 23 participants who still had room for improvement, 21 (91.30%) scored higher on the post-test. At the same time, the concentration of post-test scores between 96 and 100 reduced the instrument's ability to differentiate levels of conceptual mastery at the upper end of the scale.

DISCUSSION

The substantial increase in scores may be related to several interconnected features of the mentoring design. However, the absence of a control group means that these mechanisms cannot be interpreted as confirmed causal effects.

First, the program connected digital concepts with decisions that teachers encounter in everyday educational practice. Participants considered how to select child-appropriate content, protect privacy, design open-ended questions, develop RPPM/RPPH, and connect digital media with concrete learning activities. This connection between technology and pedagogy matters because early childhood educators may be familiar with digital devices but not adequately prepared to integrate them pedagogically. Similarly, previous research indicates that preparing early childhood educators for effective ICT integration requires stronger connections between technological knowledge and pedagogical preparation, and that teachers' digital competence is associated with both personal and contextual factors (Lucas et al., 2021; Masoumi, 2021).

Second, the mentoring combined conceptual explanation with design practice, collaboration, feedback, and opportunities for revision. Participatory and practice-oriented learning has been associated with the development of technology-integration knowledge and skills among early childhood educators (Kulaksız & Toran, 2022). Similar patterns are evident in Indonesian community-service programs. Participatory training, focused discussions, and workshops were used to connect project-based learning, STEAM content, comic media, and maritime cultural contexts, while participatory training combined with mentoring was applied to strengthen early childhood teachers' pedagogical competence in STEAM literacy and curriculum implementation (Hapidin et al., 2023, 2025).

The present findings are also consistent with community-service studies published in Jurnal Al Maesarah. Mustikasari et al. (2026) reported teacher training that combined conceptual strengthening with hands-on development of Canva-based animated learning media, while Iman et al. (2026) used participatory training and mentoring to develop educators' capacity in digital learning and assessment management. These studies reinforce the relevance of combining conceptual explanation with applied practice and follow-up support, although the

current study cannot determine which component independently accounted for the observed score increase (Iman et al., 2026; Mustikasari et al., 2026).

Third, integrating local contexts may have strengthened the relevance of the mentoring materials. The authors used mango cultivation, rice fields, fishermen, traditional markets, coastal environments, Paoman batik, local foods, and transportation to show how digital resources could connect to children's real environments. This approach is consistent with the contextual orientation used by Hapidin et al. (2023), who connected STEAM project learning with maritime cultural literacy. It also supports the idea that technology should extend, rather than replace, children's engagement with their social and physical environments (Hapidin et al., 2023).

Finally, the use of simple, offline-capable media may have made the learning concepts more feasible to apply in institutions with different levels of infrastructure. The program emphasized short videos, images, audio stories, simple slides, and other lightweight media instead of technologically complex applications. Nasution et al. (2020) found that ICT can support early childhood learning when intentionally integrated into the learning process. This supports the view that pedagogical design and purposeful use of technology are more important than technological complexity alone (Nasution et al., 2020).

Another important aspect of the program was integrating digital safety and ethics with deep learning. Digital competence in early childhood education involves more than the ability to operate technology; it also includes decisions concerning privacy, safety, balanced media use, responsible behavior, and adult mediation. Lauricella et al. (2020) found that digital citizenship competencies, including safety and privacy, are relevant from the early years of formal education (Lauricella et al., 2020).

Within the mentoring model, deep learning provided a pedagogical direction for using digital media. Digital content was not intended to be a passive endpoint but rather a stimulus for dialogue, exploration, play, creative work, problem-solving, and reflection. Thus, digital literacy and deep learning served complementary functions: digital literacy addressed the selection, creation, safety, and ethical use of media, while deep learning guided teachers in transforming digital stimuli into mindful, meaningful, and joyful learning experiences.

This relationship also explains the program's preference for simple media. The objective was not to maximize children's exposure to technology but to strengthen the quality of interactions that followed its use. This perspective aligns with research emphasizing that technology becomes educationally meaningful when deliberately integrated into pedagogy and children's developmental experiences (Masoumi, 2021; Nasution et al., 2020).

The verified outcome of this program is strengthened teacher conceptual mastery, not direct community empowerment. The evaluation did not measure changes in community access to technology, household behavior, social inclusion, local economic outcomes, children's developmental outcomes, or parental participation. Therefore, claims of broader community empowerment would exceed the evidence available in the present study. This limitation is acknowledged explicitly in the discussion of limitations below.

Nevertheless, several features of the program provide a potential pathway toward broader community-oriented educational impact. Participants represented institutions across 26 sub-districts, local social and livelihood contexts were incorporated into learning design, and the IGTKI network provided a potential mechanism for sharing and adapting learning resources. The intended pathway can therefore be understood as progressing from the individual teacher to the professional community, the educational institution, children and families, and ultimately the wider local community. However, the current evaluation assessed only the first stage of this pathway.

Studies in Jurnal Al Maesarah illustrate how stronger evidence of community impact can be generated when community actors and community-level outcomes are directly included. Saepulloh et al. (2023), for example, involved parents through parenting education, home learning, home visits, and community collaboration in early childhood education. Binsa et al. (2026) involved caregivers, parents, and local health volunteers in a health and nutrition program. These examples indicate that broader community impact is more convincingly demonstrated when actors beyond professional participants are directly involved in implementation and evaluation (Binsa et al., 2026; Saepulloh et al., 2023).

Similarly, Sopingi et al. (2025) assessed technology-based community empowerment through practical indicators related to digital marketing and financial-management capacity among village micro, small, and medium enterprises (MSMEs). This illustrates the distinction between professional capacity building with potential community spillover and community empowerment demonstrated through direct social or economic indicators (Sopingi et al., 2025).

For the next phase, the community dimension could be strengthened by involving parents, school leaders, farmers, fishermen, batik artisans, cultural practitioners, and other local resource persons in contextual learning projects. Subsequent evaluation could document school adoption, peer mentoring across IGTKI branches, parent participation, accessibility of learning resources, children's engagement, use of local knowledge, and dissemination beyond the original participants. Such measures would provide stronger evidence for claims related to social inclusion, educational access, and community empowerment.

The IGTKI network is particularly relevant for sustaining the program beyond the initial mentoring sessions. Professional learning communities can support practice sharing, reflection, peer assistance, and ongoing professional engagement. Hoffman and Mangino (2023) identified digital literacy and appropriate support as important for early childhood educators participating in collaborative online learning, while Zhou et al. (2022) found that online professional communities can facilitate practice sharing, reflection, supportive relationships, and distributed leadership among early childhood teachers (Hoffman & Mangino, 2023; Zhou et al., 2022).

For the present program, sustainability should therefore extend beyond maintaining an online communication group. A stronger model would establish a continuing design–practice–reflection–sharing cycle in which teachers review one another's RPPM/RPPH, exchange locally themed low-bandwidth media, discuss digital-safety issues, report implementation experiences, and document children's

responses. Selected participants could later serve as peer mentors or curators of a shared learning-resource bank at the sub-district level. This approach could transform individual learning into collective professional capacity, although such dissemination still requires empirical verification.

The results should be interpreted in light of several limitations. The study used a pre-test–post-test design without a control group, so the observed changes cannot be attributed causally to the mentoring program. The post-test results also showed a strong ceiling effect, reducing the instrument's capacity to discriminate among participants with high scores. Most importantly, the principal quantitative outcome measured conceptual knowledge rather than teaching behavior. Although the workshops included RPPM/RPPH and digital-media development, the archived products were not independently evaluated using a standardized quantitative rubric. Classroom observations, interviews, written reflections, child outcomes, parent participation, and broader community-level outcomes were also unavailable.

Future evaluation should therefore combine conceptual assessment with product rubrics, classroom observation, teacher-child interaction indicators, teacher reflection, documentation of media implementation, children's engagement, and longitudinal follow-up. Evaluation should also document dissemination through the IGTKI network, school-level adoption, parent and community participation, and the meaningful integration of local cultural and socioeconomic resources into children's learning. Collaboration, continued support, practice, and feedback may contribute to professional development, although these characteristics should be examined cautiously rather than assumed to guarantee effectiveness (Sims & Fletcher-Wood, 2021).

Overall, the findings provide evidence of improved conceptual mastery of the content assessed by the program and support the relevance of mentoring that integrates digital literacy, digital safety and ethics, deep learning, local contexts, design practice, and professional-community follow-up. They do not yet provide direct evidence of sustained changes in classroom practice or broader community empowerment.

CONCLUSION

This community service program strengthened IGTKI kindergarten teachers' conceptual mastery in Indramayu Regency in digital literacy, digital safety and ethics, deep learning, RPPM/RPPH planning, and simple digital media. The mean score increased from 79.68 to 99.48. Among 27 matched participants, the mean increased from 80.00 to 99.41, with a mean gain of 19.41 points. The Wilcoxon signed-rank test showed a significant difference ($W = 3.00$, $p < .001$), with a rank-biserial correlation of 0.978. These findings indicate stronger conceptual mastery of the content assessed by the program, but they do not yet demonstrate changes in classroom practice or broader community outcomes.

The program's main contribution lies in integrating digital literacy, deep learning, local Indramayu contexts, simple digital media, and follow-up through the IGTKI professional community. This model positions teachers not only as training participants but also as potential agents for sharing contextualized

educational and technological practices within their schools and local communities. However, this community contribution remains a potential pathway rather than a verified outcome.

Future evaluation should assess RPPM/RPPH and digital media products, classroom observations, teacher reflections, and documentation of dissemination through the IGTKI network. Greater involvement of parents and local community actors may also help determine whether improved teacher competence can contribute to broader educational and social empowerment.

REFERENCE

Aditya, B. R., Ismiatun, A. N., Atika, A. R., & Permadi, A. (2022). Digital disruption in early childhood education: a qualitative research from teachers' perspective. *Procedia Computer Science*, *197*, 521–528.

Anggraena, Y., Ginanto, D. E., Kesuma, A. T., & Setiyowati, D. (2025). Panduan Pembelajaran dan Asesmen Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah Edisi Revisi Tahun 2025. *Badan Standar, Kurikulum, Dan Asesmen Pendidikan*.

Audrin, C., & Audrin, B. (2022). Key factors in digital literacy in learning and education: a systematic literature review using text mining. *Education and Information Technologies*, *27*(6), 7395–7419.

Binsa, U. H., Wahidah, A. S., & Khumaidah, U. K. (2026). Health and Nutrition Counseling for Children in Daycare Centers in Plantation Areas of Berau District. *Jurnal Al Maesarah*, *5*(1), 268–282.

Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational Technology Research and Development*, *68*(5), 2449–2472.

Hapidin, H., Gunarti, W., & Pujianti, Y. (2025). Pelatihan Kompetensi Pedagogik Guru Dalam Pembelajaran Literasi Steam Pada Kurikulum Merdeka Di Kepulauan Seribu. *Jurnal AbdiMas Nusa Mandiri*, *7*(1), 80–88.

Hapidin, H., Gunarti, W., Pujianti, Y., & Suharti, S. (2023). Penerapan Model Pembelajaran Proyek Bermuatan Konten STEAM melalui Media Komik dalam Implementasi Kurikulum Merdeka di Satuan PAUD. *Jurnal Abdimas Prakasa Dakara*, *3*(2), 126–133.

Hoffman, E. B., & Mangino, A. A. (2023). The digital literacies of early childhood educators: perceptions of collaborative online learning. *Journal of Early Childhood Teacher Education*, *44*(3), 386–407.

Iman, D. Z., Arifin, M., Hasanah, S. W., & Dayem, F. G. A. (2026). Enhancing Learning and Assessment Management through Microsoft Teams Training at MA Nurul Qadim. *Jurnal Al Maesarah*, *5*(1), 283–297.

Kulaksız, T., & Toran, M. (2022). Development of pre-service early childhood teachers' technology integrations skills through a praxeological approach. *International Journal of Educational Technology in Higher Education*, *19*(1), 36.

Lauricella, A. R., Herdzina, J., & Robb, M. (2020). Early childhood educators' teaching of digital citizenship competencies. *Computers & Education*, *158*, 103989.

Lucas, M., Bem-Haja, P., Siddiq, F., Moreira, A., & Redecker, C. (2021). The relation

between in-service teachers' digital competence and personal and contextual factors: What matters most? *Computers & Education*, *160*, 104052.

Masoumi, D. (2021). Situating ICT in early childhood teacher education. *Education and Information Technologies*, *26*(3), 3009–3026.

Masoumi, D., & Noroozi, O. (2025). Developing early career teachers' professional digital competence: A systematic literature review. *European Journal of Teacher Education*, *48*(3), 644–666.

Mustikasari, B. F., Rini, D. R., Wardani, N. K., & Sillah, S. Bin. (2026). The Pelatihan Pembuatan Media Pembelajaran Animasi Sederhana Menggunakan Canva Pada Tk Laboratorium UM. *Jurnal Al Maesarah*, *5*(1), 298–310.

Nasution, R. H., Hapidin, H., & Fridani, L. (2020). Pengaruh pembelajaran ICT dan minat belajar terhadap kesiapan membaca anak usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *4*(2), 733.

Nurhikmah, Musaldin, L. O., & Purnamasari, N. I. (2024). Drivers of Change: Youth Action in Lempangang Village, Gowa Regency, South Sulawesi in the Service of Pancasila Village. *Jurnal Al Maesarah*, *3*(2), 78–91. https://doi.org/10.58988/jam.v3i2.380

Nurhikmah, N., Nursalam, N., Prayetno, E., & Yumna, H. (2024). Rural Community Development Through Community Service Program (KKN) in Malaka Hamlet, South Sulawesi Selatan. *Jurnal Al Maesarah*, *3*(1), 28–40. https://doi.org/10.58988/jam.v3i1.372

Pires Pereira, Í. S., Parente, M. C. C., & da Silva, M. C. V. (2023). Digital literacy in early childhood education: what can we learn from innovative practitioners? *International Journal of Early Years Education*, *31*(1), 287–301.

Saepulloh, S., Komarudin, K., & Gunawan, A. (2023). Pendampingan Partisipasi Orang Tua Dalam Pendidikan Anak Usia Dini Di Paud Arshelia Pasir Bungur Desa Rancasenggang Kecamatan Sindangkerta Kabupaten Bandung Barat. *Jurnal Al Maesarah*, *2*(1), 11–16.

Sims, S., & Fletcher-Wood, H. (2021). Identifying the characteristics of effective teacher professional development: A critical review. *School Effectiveness and School Improvement*, *32*(1), 47–63.

Sopingi, I., Zeffa, A., & Yumna, H. (2025). Empowerment of micro, small, and medium enterprises in villages based on technology through community service programs. *Jurnal Al Maesarah*, *4*(1), 161–171.

Tamphu, S., Suyitno, I., Susanto, G., Budiana, N., Salim, M. R., Nurhikmah, & Purnawati, W. (2024). Building bridges to the future of learning: Exploring artificial intelligence research using R-Studio assisted bibliometrics. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2417623

Undheim, M., & Ploog, M. (2024). Digital competence and digital technology: a curriculum analysis of Norwegian early childhood teacher education. *Scandinavian Journal of Educational Research*, *68*(6), 1105–1120.

Yuliantina, I. (2025). Development of Learning Strategies to Integrate Computational Thinking in Early Childhood Education Curriculum: A Study on 36 Early Childhood Education Units in Kudus. *JPUD-Jurnal Pendidikan Usia Dini*, *19*(1), 37–47.

Zhou, W., Nakatsubo, F., Wu, J., & Liu, K. (2022). Digital ethnography of an online

professional learning community based on WeChat for Chinese early childhood teachers. *Computers & Education*, *191*, 104617.



© 2026 by the authors. Submitted for possible open-access publication under the terms and conditions of the Creative Commons Attribution (CC-BY-SA) license (https://creativecommons.org/licenses/by-sa/4.0/).