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Mentoring Elementary School Teachers' Competency Enhancement in Utilizing Digital Platforms and Interactive Content for Kurikulum Merdeka Implementation in Rural Areas

Kaso Mustamin[1], Mila Karmila[2], Dodi Sukmayadi[3], Musa Hefer Smas[4], Triyugo Winarko[5]

[1] *Universitas Pejuang Republik Indonesia, kamust1204@gmail.com*
[2] *Universitas Negeri Manado, milamk041097@gmail.com*
[3] *FKIP Universitas Terbuka, dsukmayadi999@gmail.com*
[4] *Universitas Cenderawasih, musahefersmas@gmail.com*
[5] *Universitas Mitra Indonesia, triyugo_win@umitra.ac.id*

ABSTRACT

This qualitative research investigates the effectiveness of a mentoring program designed to enhance elementary school teachers' competency in utilizing digital platforms and interactive content for implementing Kurikulum Merdeka in rural Indonesian areas. The study employed a comprehensive mentoring approach focusing on the Platform Merdeka Mengajar and interactive digital content creation to address the digital divide in rural education. Twenty elementary school teachers from remote areas participated in a 12-week structured mentoring program. Data collection utilized in-depth interviews, focus group discussions, participant observations, and document analysis. The findings reveal significant improvements in teachers' digital literacy, confidence in technology integration, and student engagement levels. Pre-mentoring assessment showed 65% of teachers had low digital literacy, which improved substantially post-intervention with 100% satisfaction rates among participants. Key challenges identified included limited internet connectivity, inadequate hardware, and insufficient technical training, which were addressed through innovative solutions including mobile hotspot sharing, device lending systems, and peer mentoring networks. The study demonstrates that systematic mentoring programs can effectively bridge the digital competency gap among rural teachers, enabling successful Kurikulum Merdeka implementation despite infrastructure limitations. This research contributes to understanding professional development strategies for educational transformation in underserved regions.

Keywords: digital platforms, teacher mentoring, rural education, interactive content.

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[1]Corresponding Author: Publisher, Inovasi Pratama Internasional Ltd; Cempaka Street, No. 25, Ujung Padang, Padang Sidempuan, North Sumatra; Email: xxx@xxx.com

INTRODUCTION

The implementation of Kurikulum Merdeka in Indonesia represents a paradigm shift toward student-centered, flexible, and technology-enhanced learning approaches that emphasize the critical thinking, creativity, and collaboration skills essential for 21st-century education. This curriculum reform mandates the integration of digital platforms and interactive content to create engaging learning experiences that align with the diverse needs and interests of students. However, the successful implementation of this curriculum faces significant challenges, particularly in rural areas where educational infrastructure, teacher competency, and access to digital resources remain limited.

The digital divide between urban and rural schools in Indonesia has created substantial disparities in terms of educational quality and opportunities. Rural elementary school teachers often lack adequate digital literacy skills, access to reliable Internet connectivity, and institutional support necessary for effective technology integration. Research indicates that only 35% of teachers in rural areas report feeling confident in their digital teaching capabilities, which is significantly lower than that of their urban counterparts. This competency gap directly impacts the quality of education delivery and students' preparedness for the digital age (Novita et al., 2022).

The Platform Merdeka Mengajar (PMM), introduced by Indonesia's Ministry of Education, Culture, Research, and Technology, serves as a comprehensive digital ecosystem designed to support teachers in curriculum implementation, professional development, and educational resource access. Despite its potential benefits, the utilization of PMM remains suboptimal in rural areas owing to various systemic constraints including infrastructure limitations, inadequate training programs, and limited technical support. Studies reveal that many rural teachers struggle with basic platform navigation, content creation, and the integration of digital tools into their pedagogical practices.

Teachers professional development in rural Indonesian contexts faces unique challenges that require innovative approaches to capacity building. Traditional top-down training models have proven inadequate for addressing the complex needs of rural educators who require sustained support, contextual learning opportunities, and peer collaboration networks. The concept of mentoring has emerged as a promising strategy for teachers professional development, offering personalized guidance, reflective practice opportunities, and collaborative learning experiences that can effectively address individual teacher needs and local contextual factors (Soekamto et al., 2022).

Interactive content creation is a critical component of modern pedagogical practice, enabling teachers to develop engaging, multi media-rich learning materials that cater to diverse learning styles and preferences. However, research indicates that rural teachers often lack the technical skills and creative confidence necessary to develop high-quality interactive content. The absence of adequate training in digital content creation tools, combined with limited access to design resources and peer collaboration opportunities, has resulted in continued reliance on traditional teaching methods that may not align with Kurikulum Merdekas objectives.

The sociocultural context of rural Indonesian education adds complexity to technology integration efforts. Rural communities often exhibit a limited understanding of digital education benefits, resulting in reduced parental support and community engagement in technology-enhanced learning initiatives. Furthermore, the multilingual nature of Indonesian society presents challenges for content localization and cultural relevance in digital learning materials. These factors necessitate comprehensive approaches to teacher development that address not only technical competencies but also community engagement and cultural sensitivity considerations (Susi & Helmawati, 2025).

Recent studies have highlighted the potential of structured mentoring programs to address teachers professional development challenges in a rural context. Effective mentoring programs typically incorporate needs assessments, progressive skill building, peer collaboration, and ongoing support mechanisms that can sustain learning and implementation over time. However, limited research exists on the specific design and implementation of mentoring programs focused on digital platform utilization and interactive content creation for Kurikulum Merdeka s implementation in rural Indonesian elementary schools.

The significance of this research lies in its potential to inform policies and practices regarding teacher professional development strategies that can effectively support educational transformation in underserved regions. This study contributes to the growing body of literature on educational technology integration in developing countries by examining the effectiveness of a comprehensive mentoring program designed to enhance rural teachers' digital competencies. These findings can provide valuable insights for education policymakers, teacher training institutions, and school administrators seeking to implement sustainable professional development programs that address the unique challenges of rural education settings (Syafruddin et al., 2025).

This study addresses a critical gap in understanding how systematic mentoring interventions can support rural elementary school teachers in developing the competencies necessary for effective Kurikulum Merdeka implementation through digital platform utilization and interactive content creation. The study's focus on practical and contextually appropriate solutions to infrastructure and competency challenges makes it particularly relevant for educational stakeholders working to improve educational equity and quality in rural Indonesian communities.

METHOD

The study was conducted in three rural elementary schools located in West Java Province, Indonesia, specifically in remote villages with limited internet connectivity and educational infrastructure. These schools were selected on the basis of their implementation of Kurikulum Merdeka, willingness to participate in the mentoring program, and representation of the typical challenges faced by rural Indonesian elementary schools. The selected schools predominantly served communities with agricultural livelihoods, where the digital literacy levels among both teachers and community members remained low.

The research setting provides an authentic context for examining the challenges and opportunities associated with digital platform integration in resource-constrained environments. All participating schools had basic electricity infrastructure but faced intermittent internet connectivity, limited computer access, and minimal technical support systems. These conditions are representative of many rural Indonesian elementary schools, enhancing the potential transferability of research findings to similar contexts.

The study employed purposive sampling to select 20 elementary school teachers from three participating schools, ensuring representation across different grade levels, subject areas, and experience levels. Participant selection criteria included (1) active teaching status in grades 1-6, (2) willingness to participate in the 12-week mentoring program (3) basic smartphone or computer access and (4) minimal prior experience with Platform Merdeka Mengajar or interactive content creation tools.

The participant profile included teachers aged 25-43 years (average 33.2 years) with teaching experience ranging from to 1-18 years (average 7.6 years). The gender distribution was 65% female and 35% male teachers, reflecting the typical demographics of Indonesian elementary education. Educational qualifications included 70% bachelor's degree holders (S1) and 30% master's degree holders (S2), with subject specializations across mathematics, science, the Indonesian language, and social studies.

Data collection employed multiple methods to ensure a comprehensive understanding of the participants' experiences and program effectiveness. The primary data collection methods were as follows

In-depth Semi-structured Interviews: Individual interviews were conducted with all participants at three time points: pre-mentoring (baseline), mid-program (Week 6), and post-mentoring (Week 13). The interview protocols explored participants' digital literacy levels, technology integration experiences, challenges faced, and perceptions of program effectiveness. Each interview lasted 45-60 minutes and was conducted in Bahasa Indonesia to ensure participants comfort and accurate expression of experiences.

Focus Group Discussions: Four focus group sessions were organized during the mentoring program to facilitate peer learning and collaborative reflection. Each focus group included to 5-6 participants and lasted 90 minutes, focusing on shared challenges, collaborative solutions, and collective insights regarding digital platform utilization and interactive content creation.

Participant Observation: Structured observations were conducted during mentoring sessions, training workshops, and classroom implementations to document behavioral changes, skill development, and interaction patterns. Observation protocols focused on technical skill demonstrations, collaborative behaviors, and evidence of learning transfer to classroom practice.

Document Analysis: Various documents were analyzed including lesson plans incorporating digital tools, interactive content, reflection journals, and assessment materials. This documentation provides evidence of the practical application and sustained implementation of mentoring program outcomes.

The mentoring program was designed based on the GROW (Goal, Reality, Options, Will) model, which provides a systematic framework for goal-oriented

professional development. The 12-week program included structured activities that addressed digital literacy development, Merdeka Mengajar utilization, interactive content creation, and classroom implementation strategies.

Program implementation followed a progressive competency development approach, beginning with basic digital skills assessment and advancing through platform navigation, content creation tools, and pedagogical integration strategies. Weekly sessions included 3-5 hours of direct instruction, hands-on practice, and individual mentoring support. The program incorporated flexible scheduling to accommodate teachers' workload constraints and provided both face-to-face and remote support options when internet connectivity was permitted.

Key program components included needs assessment and baseline evaluation, introduction to Kurikulum Merdeka principles, Merdeka Mengajar training platform, basic and advanced digital content creation, collaborative learning activities, peer mentoring systems, technical troubleshooting support, and implementation evaluation. Each component was designed to address specific competency gaps identified in the baseline assessment while building toward sustained classroom implementation.

The data analysis followed Braun and Clarke's thematic analysis framework, involving six phases: familiarization with data, initial code generation, theme identification, theme review, theme definition, and report writing. All interviews and focus group discussions were transcribed verbatim and analyzed using both inductive and deductive coding approaches to identify patterns, themes, and relationships within the data.

The analysis process began with open coding to identify the initial patterns and concepts emerging from participants experiences. Axial coding was then employed to establish relationships between codes and to develop higher-order categories. Finally, selective coding integrates categories into coherent themes that addressresearch objectives. Data analysis was conducted iteratively throughout the data collection period, allowing for emerging insights into subsequent data gathering activities.

Multiple strategies were employed to enhance research rigor and trustworthiness including triangulation of data sources, member checking with participants, peer debriefing with research colleagues, and the maintenance of detailed audit trails documenting analytical decisions. These measures ensured that the findings accurately reflected the participants' experiences and provided credible insights into the effectiveness of mentoring programs

Ethical approval was obtained from the relevant institutional review board prior to data collection. All participants provided informed consent after receiving detailed information about the research purposes, procedures, and rights as research participants. Confidentiality was maintained through the use of participant codes rather than names, and all data were stored securely with access limited to research team members.

Participants were informed of their right to withdraw from the study at any time without consequences, and measures were taken to ensure that participation in the stdy did not create additional burden or stress. The mentoring program was designed to provide genuine professional development benefits to participants, ensuring that

research participation positively contributed to their professional growth and classroom practice.

RESULTS AND DISCUSSION

The mentoring program demonstrated significantl positive outcomes in enhancing elementary school teachers' competency in utilizing digital platforms and interactive content for Kurikulum Merdeka implementation. Qualitative analysis revealed substantial improvements across multiple dimensions of teacher professional development, accompanied by the successful resolution of various implementation challenges through innovative collaborative solutions.

Teacher Profile and Initial Assessment

The baseline assessment revealed significant variations in participants' digital literacy levels and technology integration experience. Table 1 presents the demographic profiles and initial competency assessments of the participating teachers.

Table 1. Teacher Profile and Demographics

Aspect	Detail	Statistics
Digital Literacy Level	Low digital literacy	65% of participants (n=13)
	Medium digital literacy	35% of participants (n=7)
	High digital literacy	0% at program start
Teaching Experience	Range	1 to 18 years
	Average	7.6 years
Gender Distribution	Female	65%
	Male	35%
Education Qualification	Bachelor's degree (S1)	70%
	Master's degree (S2)	30%
Subject Area Specialization	Core curriculum areas (e.g., Math, Science, Indonesian, Social Studies)	Diverse across all participants

The initial assessment indicated that 65% of the participants (n=13) possessed low digital literacy levels, with only 35% (n=7) demonstrating medium-level competencies. No participant exhibited high digital literacy at the program's commencement, highlighting the substantial competency gaps that need to be addressed through the mentoring intervention. The teaching experience range of 1-18 years (average of 7.6 years) provided diverse perspectives on traditional versus digital pedagogical approaches, enriching the collaborative learning environment throughout the program.

The gender distribution showed 65% female and 35% male participants, reflecting typical Indonesian elementary education demographics. Educational qualifications included 70% bachelor's degree holders and 30% master's degree holders, indicating that formal educational attainment does not necessarily correlate with digital competency levels in this rural context. Subject area specializations were distributed across the core curriculum areas, ensuring program applicability across diverse teaching contexts.

Digital Platform Usage Assessment

The pre-mentoring assessment of digital platform utilization revealed limited engagement with key educational technology tools. Table 2 illustrates participants' initial proficiency levels and their primary challenges.

Table 2. Digital Platform Usage Assessment (Pre-Mentoring)

Assessment Aspect	Level/Category	Percentage (%)	Number of Participants (n)	Description
Platform Merdeka Mengajar Usage	Never	70	14	Majority of teachers had never used this government educational platform, indicating low adoption in rural areas.
	Sometimes	25	5	A minority of teachers used the platform occasionally.
	Rarely	5	1	Very few teachers engaged with the platform rarely.
Google Classroom Proficiency	Beginner	75	15	Most teachers had beginner-level proficiency in using Google Classroom tools.
	Intermediate	20	4	Some teachers had moderate proficiency.

Assessment Aspect	Level/Category	Percentage (%)	Number of Participants (n)	Description
Interactive Content Creation	Advanced	5	1	Only one teacher had advanced proficiency.
	No Experience	75	15	Majority lacked prior experience in creating interactive content.
	Basic Skills	20	4	A few teachers possessed basic content creation skills.
	Intermediate Skills	5	1	Only one teacher had intermediate skills in interactive content creation.
Technology Integration Confidence	Very Low	70	14	Most participants reported very low confidence in integrating technology in teaching.
	Low	15	3	Some teachers reported low confidence.
	Medium	10	2	Few teachers had moderate confidence levels.
	High	5	1	One teacher reported high confidence.
Identified Challenges	Internet Access	30	6	Limited internet access was a primary challenge.
	Lack of Training	30	6	Insufficient training opportunities hindered technology use.
	Device Limitations	15	3	Inadequate or insufficient devices affected usage.

Assessment Aspect	Level/Category	Percentage (%)	Number of Participants (n)	Description
	Time Constraints	15	3	Teachers faced limited time to engage with digital tools.
	Content Quality	10	2	Concerns about the quality of available digital content were noted.

The assessment revealed that 70% of participants (n=14) had never used the Merdeka Mengajar platform, while only 25% (n=5) used it sometimes, and 5% (n=1) used it rarely. This finding aligns with previous research indicating low adoption rates for government educational platforms in rural areas. Google Classroom proficiency was similarly low, with 75% (n=15) at the beginner level, 20% (n=4) at the intermediate level, and only 5% (n=1) at the advanced level.

Interactive content creation experience was particularly limited, with 75% of the participants (n=15) having no prior experience, 20% (n=4) possessing basic skills, and only 5% (n=1) demonstrating intermediate capabilities. Technology integration confidence levels reflected these competency gaps, with 70% (n=14) reporting very low confidence, 15% (n=3) reporting low confidence, 10% (n=2) reporting medium confidence, and 5% (n=1) reporting high confidence.

The primary challenges identified were Internet access limitations (30%, n=6), lack of training opportunities (30%, n=6), device limitations (15%, n=3), time constraints (15%, n=3), and content quality concerns (10%, n=2). These challenges align with the systemic barriers documented in previous research on rural Indonesian educational contexts.

Mentoring Program Implementation

The 12-week mentoring program was implemented systematically, with detailed tracking of the activities, participation rates, and outcomes. Table 3 provides a comprehensive overview of the program implementation.

Table 3. Mentoring Program Implementation timelines

Week	Activity	Method	Duration (Hours)	Participation Rate (%)	Key Outcome
1	Needs Assessment & Digital Literacy Evaluation	Survey & Interview	3	100	Baseline established
2	Introduction to Kurikulum	Workshop & Discussion	4	95	Understanding improved

Week	Activity	Method	Duration (Hours)	Participation Rate (%)	Key Outcome
	Merdeka Principles				
3	Platform Merdeka Mengajar Overview	Demonstration & Practice	4	90	Platform familiarity gained
4	Basic Digital Content Creation	Tutorial & Practice	5	85	Basic skills acquired
5	Interactive Learning Tools Training	Workshop & Practice	5	80	Interactive tools mastered
6	Hands-on Practice Session 1	Individual Mentoring	3	85	Individual progress made
7	Collaborative Content Development	Group Activity	4	90	Collaboration enhanced
8	Peer Learning & Feedback Session	Peer Review	3	85	Peer support established
9	Advanced Digital Tools Integration	Workshop & Practice	5	75	Advanced skills developed
10	Hands-on Practice Session 2	Individual Mentoring	3	80	Confidence increased
11	Implementation Support & Troubleshooting	Technical Support	4	85	Problems resolved
12	Final Evaluation & Reflection	Assessment & Interview	3	90	Success documented

The participation rates remained consistently high throughout the program with an average participation rate of 87.5%, ranging from 75% to 100%. The initial needs assessment achieved 100% participation, establishing a comprehensive baseline understanding of participants competencies and needs. The introduction to the Kurikulum Merdeka principles maintained 95% participation, demonstrating strong teacher interest in curriculum reform concepts.

The Merdeka Mengajar overview sessions achieved 90% participation, with participants gaining familiarity with key platform features and navigation procedures.

Basic digital content creation workshops maintained 85% participation despite technical challenges, indicating a sustained commitment to skill development. The interactive learning tool training achieved 80% participation, representing the program's most technically challenging component.

Hands-on practice sessions demonstrated the value of individualized mentoring support, with participation rates of 85% and 80%. These sessions provided opportunities for personalized guidance and troubleshooting, and addressed individual learning needs and technical difficulties. Collaborative content development activities achieved 90% participation, highlighting the effectiveness of peer learning approaches in rural teachers professional development contexts.

Advanced digital tool integration sessions had the lowest participation rate of 75%, reflecting the cumulative technical complexity and time demands of advanced competencies. However, the final evaluation and reflection sessions achieved 90% participation, indicating sustained engagement and commitment to the program completion.

Post-Mentoring Assessment Results

The post-mentoring assessment revealed substantial improvements across all measured competency dimensions. Table 4 presents the results of the comprehensive post-intervention assessments.

Table 4. Post-Mentoring Assessment Results

Indicator	Percentage (%)	Number of Participants (n)	Notes
Digital Literacy Level: High	35	7	Substantial improvement from pre-mentoring where 65% were low; no participants remained low
Digital Literacy Level: Medium	65	13	
Digital Literacy Level: Low	0	0	Complete transformation from baseline
Platform Merdeka Mengajar Usage: Very Often	15	3	Large increase from baseline where 70% never used the platform
Platform Merdeka Mengajar Usage: Often	30	6	
Platform Merdeka Mengajar Usage: Sometimes	55	11	
Interactive	15	3	Shift from 75% with no

Indicator	Percentage (%)	Number of Participants (n)	Notes
Content Creation: Advanced			experience to all having skills
Interactive Content Creation: Intermediate	30	6	
Interactive Content Creation: Basic	55	11	
Student Engagement: Significantly Improved	35	7	Reflected enhanced teacher digital competencies translating into improved experiences
Student Engagement: Improved	65	13	
Implementation Confidence: Very High	15	3	Marked increase post-mentoring
Implementation Confidence: High	30	6	
Implementation Confidence: Medium	55	11	
Overall Satisfaction: Very High	35	7	100% overall satisfaction rate
Overall Satisfaction: Satisfied	65	13	

Digital literacy levels showed remarkable improvement, with 35% of the participants (n=7) achieving high competency levels and 65% (n=13) reaching medium levels. None of The participants remained at low digital literacy levels, representing a complete transformation from the baseline assessment where 65% had low competency. This finding demonstrates the effectiveness of systematic mentoring approaches in addressing the fundamental digital literacy gaps in rural teacher populations.

The Merdeka Mengajar platform usage patterns changed dramatically, with 15% of participants (n=3) using the platform very often, 30% (n=6) using it often, and 55%

(n=11) using it sometimes. This represents a substantial shift from the baseline where 70% had never used the platform. Increased platform adoption indicates the successful integration of government educational resources into participants' professional practices

Interactive content creation capabilities showed significant development, with 15% of participants (n=3) achieving advanced skills, 30% (n=6) reaching intermediate levels, and 55% (n=11) developing basic competencies. This transformation from 75% with no experience to 100% possessing content creation skills represents a fundamental shift in teachers' technological capabilities.

Student engagement levels improved substantially, with 35% of participants (n=7) reporting significantly improved engagement and 65% (n=13) noting improved engagement. These outcomes suggest that enhanced teacher digital competencies translate into meaningful improvements in classroom learning. Implementation confidence levels also increased markedly, with 15% (n=3) achieving very high confidence, 30% (n=6) reaching high confidence, and 55% (n=11) attaining medium confidence.

Overall satisfaction with the mentoring program was 100%, with 35% (n=7) expressing very high satisfaction and 65% (n=13) indicating satisfaction. This unanimous positive response demonstrates the program's effectiveness in meeting participants needs and expectations.

Challenges and Solutions Identified

This research identified numerous implementation challenges and corresponding solutions developed collaboratively during the mentoring program. Table 5 summarizes the key challenges, their frequency and impact, and the implemented solutions and effectiveness ratings.

Table 5. Challenges and Solutions Identified

Challenge Category	Specific Challenge	Frequency Mentioned	Impact Level	Solution Implemented	Effectiveness Rating
Infrastructure	Limited Internet Connectivity	18	High	Mobile Hotspot Sharing Program	Effective
Infrastructure	Inadequate Hardware/Devices	15	High	Device Lending System	Very Effective
Competency	Low Digital Literacy	16	Very High	Progressive Skills Training	Very Effective
Competency	Lack of Technical Skills	14	High	Peer Mentoring System	Effective

Challenge Category	Specific Challenge	Frequency Mentioned	Impact Level	Solution Implemented	Effectiveness Rating
Content	Insufficient Interactive Materials	12	Medium	Collaborative Content Development	Effective
Content	Language Barriers in Digital Content	8	Medium	Local Language Integration	Moderate
Support	Minimal Institutional Support	11	High	Administrative Policy Support	Very Effective
Support	Lack of Peer Collaboration	9	Medium	Professional Learning Community	Effective
Time Management	Heavy Teaching Workload	13	High	Flexible Training Schedule	Effective
Time Management	Conflicting Schedule Priorities	10	Medium	Priority Task Management	Moderate

Infrastructure challenges represented the most frequently mentioned barriers, with limited Internet connectivity affecting 90% of participants (n=18) and inadequate hardware/devices affecting 75% (n=15). These findings confirm previous research highlighting infrastructure limitations as primary obstacles to educational technology integration in the rural Indonesian context. The high impact ratings of these challenges underscore their fundamental importance in determining program success.

Competency-related challenges included low digital literacy (80% of the participants, n=16) and lack of technical skills (70%, n=14). The very high impact rating of digital literacy challenges validates the programmes focus on systematic competency development. These findings demonstrate that infrastructure provision alone is insufficient without corresponding investment in human capacity development.

Content-related challenges included insufficient interactive materials (60%, n=12) and language barriers to digital content (40%, n=8). These challenges highlight the need for localized, culturally appropriate educational resources that align with the rural Indonesian context. The medium impact rating suggests that although important, these challenges are more manageable than infrastructure and competency barriers.

Support system challenges included minimal institutional support (55%, n=11) and a lack of peer collaboration (45%, n=9). These findings emphasize the importance of systemic approaches to educational technology integration that address organizational culture and collaborative practices. Time management challenges affected 65% of the participants through heavy teaching workloads (n=13) and 50% through conflicting schedule priorities (n=10).

The implemented solutions demonstrated varying levels of effectiveness in addressing the identified challenges. Infrastructure solutions, including mobile hotspot sharing programs and device lending systems, achieved very effective ratings, providing practical approaches to resource limitations. Progressive skills training and peer mentoring systems proved very effective in addressing competency gaps and validating collaborative learning approaches in professional development contexts.

Collaborative content development and local language integration achieved effective to moderate ratings, suggesting opportunities for further refinement of content localization strategies. Administrative policy support proved effective in addressing institutional barriers, highlighting the importance of leadership commitment to educational innovation. Professional learning communities effectively address peer collaboration needs and create sustainable support networks beyond the formal mentoring program.

Emergent Themes from Qualitative Analysis

Beyond the quantitative assessments, the qualitative analysis revealed several important themes that provided deeper insights into the mentoring program's impact and effectiveness.

Digital Confidence and Professional Identity: Participants consistently reported increased confidence in their professional identities as modern educators capable of integrating technology effectively. This transformation extended beyond technical skills to encompass a fundamental shift in professional self-perception and teaching philosophy alignment with 21st-century educational approaches.

Collaborative Learning Culture: The mentoring program fostered a strong collaborative learning culture among participants, with teachers actively supporting each other's professional development and sharing resources beyond the ormal program requirements. This emergent peer support network represents a sustainable outcome that extends program benefits beyond a formal intervention period.

Student-Centered Pedagogical Shift: Participants reported fundamental changes in their pedagogical approaches, moving from teacher-centered to student-centered methodologies that emphasized active learning, engagement, and technology-mediated instruction. This shift aligns with Merdekas objectives and demonstrates the successful implementation of the curriculum.

Community Engagement Enhancement: Teachers noted improved engagement with parents and community members as they demonstrated new technological capabilities and shared student learning outcomes facilitated by digital tools. This community response suggests broader acceptance of and support for educational innovation in rural contexts.

Sustainability and Continuous Learning: Participants expressed commitment to continued professional development and technology integration beyond the formal mentoring program. This finding indicates that the successful cultivation of lifelong learning attitudes is essential for sustained educational innovation.

The comprehensive results demonstrate that systematic mentoring programs can effectively address the complex challenges of educational technology integration in rural Indonesian elementary schools, producing measurable improvements in teacher competencies, student engagement, and the institutional capacity for Kurikulum Merdeka implementation.

The findings of this research provide substantial evidence for the effectiveness of systematic mentoring programs in enhancing rural elementary school teachers' competencies in digital platform utilization and interactive content creation within the Kurikulum Merdeka framework. The comprehensive transformation observed across multiple competency dimensions reflects the potential of well-designed professional development interventions to address the digital divide and educational inequities prevalent in the rural Indonesian context.

The remarkable shift from 65% of participants with low digital literacy to 100% achieving medium or high competency levels demonstrates the potential of systematic mentoring to address fundamental skill gaps in rural teacher populations. This transformation is particularly significant given the limited prior exposure to digital tools and platforms among the participating teachers. The progressive competency development approach, incorporating both technical skill building and pedagogical integration strategies, proved effective in building sustainable digital literacy capabilities (Triastuti, H., 2025).

The increased utilization of Platform Merdeka Mengajar from 70% never having used it to 100% of participants engaging with the platform represents a substantial achievement in government educational technology adoption. This outcome suggests that targeted professional development can overcome the initial resistance and technical barriers that often limit platform adoption in rural contexts. Sustained engagement with PMM beyond the formal mentoring period indicates the successful integration of the platform into participants' regular professional practice.

The development of interactive content creation skills among all the participants may represent the most significant competency transformation observed in this study. The progression from 75% with no content creation experience to 45% achieving intermediate or advanced skills demonstrates the feasibility of developing complex technical competencies through systematic mentoring approaches. This skill development directly supports Kurikulum Merdekas objectives by enabling teachers to create engaging, student-centered learning materials that align with contemporary pedagogical practices (Alfionita et al., 2025).

The research findings confirm that infrastructure limitations, although significant, need not be insurmountable barriers to educational technology integration when addressed through collaborative problem-solving approaches. The mobile hotspot sharing program and device lending system exemplify innovative solutions that emerged from collective teacher problem solving during the mentoring process. These locally developed solutions demonstrate the importance of involving practitioners to identify and implement contextually appropriate responses to systemic challenges.

The effectiveness of peer mentoring systems in addressing competency gaps highlights the untapped potential of collaborative learning approaches in rural teachers professional development. The emergence of sustained peer support networks beyond the formal program period suggests that mentoring interventions can catalyze self-sustaining professional learning communities that continue to support teacher development long after external facilitation ends (Lailiyah et al., 2024).

The successful integration of local language elements and culturally relevant content creation strategies addresses a critical gap in educational technology implementation in multilingual culturally diverse Indonesian contexts. The moderate effectiveness rating of these solutions suggests opportunities for further refinement, particularly in developing systematic approaches to content localization that respects linguistic diversity while maintaining educational quality standards.

The reported improvements in student engagement levels, with 100% of the participants noting positive changes, provide evidence that enhanced teacher digital competencies translate into meaningful improvements in classroom learning experiences. This finding supports the theoretical assumption that teacher professional development investments ultimately benefit student learning outcomes through improved instructional quality and engagement strategies (Anggraeni et al., 2025).

The shift toward student-centered pedagogical approaches reported by participants aligns with Kurikulum Merdekas objectives and demonstrates successful curriculum implementation at the classroom level. This pedagogical transformation extends beyond technical skill acquisition to encompass fundamental changes in teaching philosophy and instructional design, suggesting that the mentoring program successfully integrates technical and pedagogical competency development.

The emergence of collaborative learning cultures among teachers and students represents an important secondary outcome that supports broader educational quality improvements. The cultivation of peer support networks and collaborative problem-solving approaches creates sustainable capacity for continued innovation and adaptation to future educational challenges (Akbar & Wijaya, 2024).

The unanimous satisfaction levels among participants and their expressed commitment to continued professional development suggest that mentoring-based approaches address critical professional development needs that are often unmet by traditional training models. Individualized support, collaborative learning opportunities, and practical application focus of the mentoring program appear to resonate with rural teachers' professional development preferences and learning styles.

The effectiveness of flexible scheduling and multimodal delivery approaches in maintaining high participation rates despite competing professional demands provides important insights for designing sustainable professional development programmes in rural contexts. The recognition that rural teachers face unique time and resource constraints necessitates an adaptive program design that accommodates local contextual factors while maintaining program integrity and effectiveness.

The successful integration of administrative policy support as a key solution to institutional barriers highlights the critical importance of leadership commitment and

institutional cultural change in supporting educational innovation. The very effective rating of administrative support initiatives suggests that systematic approaches to educational technology integration must address organizational factors alongside individual competency development (Supratman et al., 2025).

Evidence of sustained platform utilization and continued collaborative learning beyond the formal mentoring period suggests that the program successfully established foundations for long-term professional practice changes. The cultivation of intrinsic motivation for continued learning and technology integration represents a critical factor in ensuring that professional development investments produce lasting benefits rather than temporary improvements.

The scalability of the mentoring model depends significantly on the availability of qualified mentors and the development of sustainable support systems that can operate within the existing educational infrastructure constraints. The peer mentoring components of the program offer promising approaches for scaling mentoring interventions by developing internal capacity within teacher populations rather than relying exclusively on external expertise.

The transferability of program components to diverse rural contexts requires careful attention to local cultural, linguistic, and infrastructural variations which may influence implementation effectiveness. The collaborative problem-solving approaches demonstrated in this study provide frameworks for adapting mentoring interventions to diverse contextual challenges while maintaining core program integrity.

CONCLUSION

This research demonstrates that systematic mentoring programs can effectively address the significant challenges faced by rural elementary school teachers in implementing Kurikulum Merdeka through digital platform utilization and interactive content creation. The comprehensive 12-week mentoring intervention produced remarkable transformations in teacher competencies, with digital literacy levels improving from 65% low proficiency to 100% medium or high proficiency, and Platform Merdeka Mengajar adoption increased from 30% to 100% among participants. The study's findings revealed that infrastructure limitations, while substantial, can be overcome through collaborative problem-solving approaches and innovative resource-sharing strategies developed by teachers themselves. The mobile hotspot sharing programs, device lending systems, and peer mentoring networks that emerged during the program demonstrated the potential for locally developed solutions to address systemic barriers in rural educational contexts. The success of the mentoring program in fostering sustainable professional learning communities represents a particularly significant outcome, as these collaborative networks continue to support teacher development beyond the formal intervention period. The unanimous satisfaction rates and sustained platform engagement demonstrate that

well-designed mentoring approaches can meet critical professional development needs often unaddressed by traditional training models..

Thank-you note

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REFERENCES

Akbar, M., & Wijaya, G. (2024). Digital Literacy of Rural Areas in Indonesia: Challenges and Opportunities. *Proceedings of the 4th International Conference on Rural Socio-Economic Transformation, RUSET 2023, 1 November 2023, Bogor, Indonesia*. https://doi.org/10.4108/eai.1-11-2023.2344347

Alfionita, O., Apriani, E., Reta, N. E. (2025). Platform Merdeka Mengajar: Tantangan dan Hambatan Guru di SMA IT Izzatuna. *Journal of Innovation in Teaching and Instructional Media 5*(2), 619–625. https://doi.org/10.52690/jitim.v5i2.997

Anggraeni, A., Erita, Y., Nora, D., Rahmi, U. (2025). Development of smart apps creator-based interactive learning Media to Support 21st Century Skills in Pancasila education for elementary schools. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *11*(2), 702. https://doi.org/10.33394/jk.v11i2.15136

Lailiyah, N., Wijaya, I. P., Meyta Lusiana, & Dewi Sholihatur Rohmah. (2024). Inovasi Pembelajaran Digital: Pelatihan Perancangan Media Pembelajaran Interaktif bagi Guru Sekolah Dasar. *Dedikasi Nusantara: Jurnal Pengabdian Masyarakat Pendidikan Dasar*, *4*(2), 34–43. https://doi.org/10.29407/dedikasi.v4i2.23972

Novita, M., Dwi Saputro, N., Singh Chauhan, A., & Waliyansyah, R. R. (2022). Digitalization of Education in the Implementation of Kurikulum Merdeka. *KnE Social Sciences*. https://doi.org/10.18502/kss.v7i19.12438

Soekamto, H., Nikolaeva, I., Abbood, A. A. A., Grachev, D., Kosov, M., Yumashev, A., Kostyrin, E., Lazareva, N., Kvitkovskaja, A., Nikitina, N. (2022). Professional Development of Rural Teachers Based on Digital Literacy. *Emerging Science Journal*, *6*(6), 1525–1540. https://doi.org/10.28991/ESJ-2022-06-06-019

Supratman, L., Irfan, A. M., Nurramadhani, A., Ningsih, R. D., Pomares, K. M. R. (2025). Empowering teachers' digital literacy: Training on creating digital learning media in rural elementary schools. *Pedagogia: Jurnal Ilmiah Pendidikan 17*(1) 151–160. https://doi.org/10.55215/pedagogia.v17i1.45

Susi, S., Helmawati, H. (2025). Collaborative-Based Principal Guidance Management to Optimize Teacher Learning Groups: A Case Study at SDN Palasari, Cipanas District, Cianjur Regency. *Dinasti International Journal of Education Management And Social Science*, *6*(4), 3354–3369. https://doi.org/10.38035/dijemss.v6i4.4462

Syafruddin, S., Aprianto, R., & Safitri, A. (2025). Digital Literacy for Rural Teachers Through Optimization of Learning Applications to Support the Implementation of the Kurikulum Merdeka. *Unram Journal of Community Service*, *6*(1), 96–101. https://doi.org/10.29303/ujcs.v6i1.830

Triastuti, H., & P. (2025). *The Analysis of the Implementation Factors of the Platform Merdeka Mengajar (PMM) Using the Human Organization Technology (Hot) Fit Models. Elinvo (Electronics, Informatics, and Vocational Education), 10(1), 88–100.* https://doi.org/https://doi.org/10.21831/elinvo.v10i1.82503

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[2]Corresponding Author: Publisher, Inovasi Pratama Internasional Ltd; Cempaka Street, No. 25, Ujung Padang, Padang Sidempuan, North Sumatra; Email: xxx@xxx.com