Strengthening Deep Learning for Rural Elementary School Teachers through Local Wisdom-Based Pentigraphs as Innovative Interactive Literacy Media

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Abstract. *This community engagement program empowered rural public elementary school teachers in Grati Subdistrict, Pasuruan Regency, East Java, to develop local wisdom-based literacy media using the folktale The Origin of Lake Ranu Grati. This location was selected because the partner schools are close to Lake Ranu Grati and the folktale remains a living oral tradition, yet it has not been used systematically as classroom material. The program responded to needs identified in an initial assessment: limited integration of local cultural content in learning (86%) and limited creative writing and digital media competence (78%). Using a participatory empowerment method, the program was implemented through five connected stages: outreach to identify needs and agree on outputs, training with mentoring to build skills, monitoring to ensure implementation progress, evaluation to measure impact, and continuation to support sustainability through a teacher forum and school literacy agendas. Teachers wrote three-paragraph short stories (pentigraf) based on the folktale and then transformed the texts into multimodal literacy media, including comics, an interactive e-book, and short animations for classroom use. Evaluation using rubrics and questionnaires showed an average 90% improvement in pentigraf writing skills and an 85% increase in teachers' use of local potential as teaching media, alongside observable practice changes such as consistent drafting and revision through feedback cycles and greater initiative to create and use culture-based media in lessons. The main outputs were published as an ISBN and E-ISBN anthology and e-book titled Kisah Yang Tumbuh Dari Danau.*

Abstrak. Program pengabdian kepada masyarakat ini memberdayakan guru sekolah dasar negeri di wilayah perdesaan Kecamatan Grati, Kabupaten Pasuruan, Jawa Timur, untuk mengembangkan media literasi berbasis kearifan lokal dengan memanfaatkan cerita rakyat *Asal-Usul Danau Ranu Grati*. Lokasi ini dipilih karena sekolah mitra berada dekat Danau Ranu Grati dan cerita tersebut masih hidup dalam tradisi lisan masyarakat, namun belum dimanfaatkan secara sistematis sebagai bahan ajar. Program ini merespons kebutuhan yang teridentifikasi pada asesmen awal, yaitu rendahnya integrasi konten budaya lokal dalam pembelajaran

(86%) serta keterbatasan kompetensi menulis kreatif dan pengembangan media pembelajaran digital (78%). Dengan metode pemberdayaan partisipatif, program dilaksanakan melalui lima tahap yang saling terhubung, yaitu sosialisasi untuk pemetaan kebutuhan dan kesepakatan luaran, pelatihan disertai pendampingan untuk penguatan keterampilan, monitoring untuk memastikan kemajuan pelaksanaan, evaluasi untuk mengukur dampak, serta keberlanjutan melalui forum guru dan integrasi ke agenda literasi sekolah. Guru menulis cerita pendek tiga paragraf (pentigraf) berdasarkan cerita rakyat, lalu mentransformasikannya menjadi media literasi multimodal berupa komik, e-book interaktif, dan animasi singkat untuk penggunaan di kelas. Evaluasi menggunakan rubrik dan angket menunjukkan peningkatan rata-rata 90% pada keterampilan menulis pentigraf dan peningkatan 85% pada pemanfaatan potensi lokal sebagai media pembelajaran, disertai perubahan praktik yang terlihat melalui konsistensi penyusunan draf dan revisi berbasis umpan balik serta meningkatnya inisiatif guru dalam membuat dan menggunakan media berbasis budaya dalam pembelajaran. Luaran utama dipublikasikan dalam bentuk antologi dan e-book ber-ISBN dan E-ISBN berjudul *Kisah Yang Tumbuh Dari Danau*.

1 Introduction

The Grati Subdistrict in Pasuruan Regency is a rural area with schools located near Lake Ranu Grati, approximately 1.8 kilometers from SDN Grati 1 (Elementary School). The lake is not only an ecological asset but also a cultural landmark. It is linked to an oral tradition about the Legend of the Origin of Lake Ranu Grati that is still known in the community and reflected in daily practices. However, this local knowledge has not been utilized systematically as a learning resource in schools, and it has not been well-documented in the form of teaching materials.
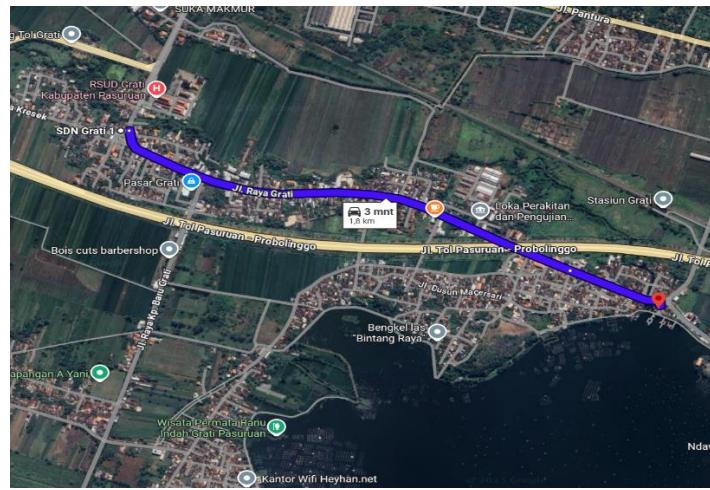
Figure 1. Distance from SDN Grati 1 to Lake Ranu
Source: Google Maps

This condition matters for two reasons. First, literacy in rural schools requires learning materials that are relevant to learners' lives, making reading and writing activities meaningful rather than merely routine tasks (Usman et al., 2025). It also aligns with Hadianto et al. (2022) research, which said that literacy teaching that integrates with local culture can increase effectiveness. Furthermore, literacy encompasses the ability to access, comprehend, assess, and apply information in various forms for informed decision-making and personal growth. If learning materials remain detached from students' environment, students tend to engage only at the surface level, and teachers often rely on generic texts that do not build local awareness (Darling-Hammond et al., 2020; El-Sulukiyyah & Mardiningsih, 2023). Second, when local stories remain only in oral form and are not integrated into teaching, there is a risk of gradual loss of community memory (Fernández-Llamazares et al., 2021). Schools play a strategic role in cultural continuity because teachers can transform local stories into structured learning experiences and documented products that can be utilized repeatedly (Cobb et al., 2025).

Initial observations and a preliminary survey of 25 teachers in the partner schools in Grati show a clear practical gap. Most teachers have not utilized local cultural content as teaching materials, and many report limited skills in creative writing that align with their students' cultural

contexts. In the survey, 80% of teachers stated that they had never used local cultural content as teaching material, and 78% stated that they did not yet have creative writing skills aligned with their students' cultural context. This gap is not only a matter of knowledge about local culture, but it is also a matter of understanding the local culture. It also reflects obstacles that limit implementation in daily teaching, such as limited experience in designing contextual learning resources, limited confidence in writing, limited access to ready-to-use local culture-based teaching media, and limited opportunities for structured training and mentoring (Yusron et al., 2024). As a result, the local potential around Lake Ranu Grati remains underutilized, while teachers closest to this cultural resource have not yet become active producers of contextual literacy materials.

A relevant educational response is deep learning as a pedagogical approach. In this paper, deep learning refers to learning that helps learners build meaning by connecting new knowledge with their real context, values, and lived experiences (Andriana, 2021; Weng et al., 2022). For teachers, deep learning requires concrete learning materials and media that can bring local context into classroom activities in a structured way (Rosidah & Sugianti, 2025). Without such media, deep learning often remains a theoretical concept rather than a practical classroom application (Raup et al., 2022). In rural schools, this challenge becomes more visible because teachers may have fewer examples of contextual learning resources, fewer opportunities for training, and limited support to develop locally-based media (Mustaghfirin & Zaman, 2025). Therefore, an effective intervention should not only explain deep learning conceptually, but also provide an accessible pathway for teachers to create learning resources that make deep learning feasible in daily instruction.

This PKM program offers that pathway by using pentigraf as the core literacy medium. Pentigraf is a three-paragraph short story with a compact structure, making it suitable for beginners, as it supports focused idea development and clear organization (Indradi, 2021). In practice, a pentigraf typically presents one main event and a small number of characters, employs simple settings, and develops a precise

narrative movement from introduction to conflict and closure within three concise paragraphs. Because the form is concise, teachers can complete drafts within a limited time, revise them efficiently, and use them as short texts for reading and writing activities. Pentigraf also allows writers to embed values and local contexts directly in the storyline without requiring lengthy exposition (Tarsinih, 2018). For teachers who are beginning to develop creative literacy materials, this form reduces barriers and supports consistent practice (Mardiningsih, 2024; Mardiningsih et al., 2025).

The program deliberately selects the Legend of the Origin of Lake Ranu Grati as the core narrative for three practical reasons. First, it is geographically and socially close to the partner schools and students, which supports contextual learning. Second, the legend is part of a living oral tradition that is still recognized locally, offering culturally legitimate content for learning. Third, the legend contains local values and ecological awareness linked to Lake Ranu Grati, which can be translated into themes suitable for elementary education, such as responsibility, respect for nature, social relations, and community identity. These reasons provide a strong foundation for literacy activities that aim to strengthen both skills and cultural awareness, and they justify their selection over other stories that may be less connected to the immediate learning environment of the partner schools.

This PKM program focuses on training and mentoring teachers to write pentigraf based on local wisdom using the Ranu Grati legend as the narrative source, then transforming the pentigraf into learning media such as comics and interactive literacy animations. This transformation is the key link between deep learning and pentigraf. Pentigraf provides the culturally grounded text, while the media development process helps teachers present the same story in formats that support active engagement, discussion, and reflection. The program employs a blended approach, combining online and in-person sessions, to enable teachers to participate actively while receiving guided practice and feedback.

The novelty of this service lies in the integrated pathway it offers for rural teachers: from local oral tradition to short narrative writing, and from written text to multimodal literacy media that can be used in

classrooms. The program is not limited to training teachers to write. It also strengthens documentation of local culture through written and digital outputs that can be shared and reused. One key output is an ISBN-registered anthology and an ISBN-registered e-book titled *Kisah Yang Tumbuh Dari Danau*, which compiles pentigraf written by public elementary teachers in rural Grati who joined the PKM. Furthermore, the evaluation used a scoring rubric and questionnaires. The results show substantial improvement in teachers' pentigraf writing skills, with an average increase of 90%, and greater use of local potential as teaching media, with an increase of 85%. These findings indicate that pentigraf-based literacy rooted in local wisdom can strengthen teacher creativity and cultural awareness and can make deep learning more practical through locally relevant learning media in rural elementary schools.

2   Method

This community engagement program applied a participatory empowerment approach through collaboration between the proponent team and partner teachers in public elementary schools (SDN) in Grati Subdistrict, Pasuruan Regency, East Java. Teachers were selected because of their central role in literacy development and cultural transmission at the primary level (Drain et al., 2018; Hossen, 2016). A needs assessment revealed that 86% of teachers had not effectively integrated local potential into their teaching, and 78% had not developed mastery in creative writing skills or the effective use of digital learning media. Based on this profile, teachers were positioned as active participants in identifying problems, planning activities, implementing tasks, and evaluating outputs.
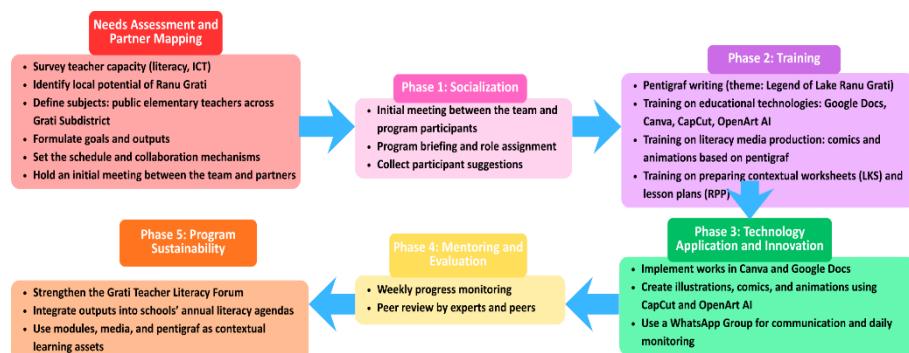
Figure 2. PKM program implementation process flowchart

Stage 1 (Socialization) focused on building shared understanding and agreement on program direction. The team conducted an initial meeting with the partner teacher group, explained program goals, outputs, and roles, and facilitated an open discussion to collect partner input. The main result of this stage was a shared work plan and partner commitment to complete the agreed outputs. This stage also established a coordination mechanism for implementation through a teacher forum as the partner communication platform.

Figure 3. Pentigraf Writing and Teaching Media Production Training

Stage 2 (Training) developed partners' core competencies in literacy production and media development teaching. Training covered writing pentigraf based on the Legend of the Origin of Lake Ranu Grati and transforming the texts into learning media. Teachers were also guided to prepare contextual teaching materials that could use the pentigraf products in classroom practice. The result of this stage was the production of initial pentigraf drafts by teachers and the readiness of teachers to begin developing media based on their texts.

Figure 4. Implementation of Digital Learning Technologies

Stage 3 (Technology Application and Innovation) operationalized training outcomes through guided practice using accessible digital tools. Teachers revised and finalized pentigraf texts and developed visual and digital versions of their stories, including comics and short literacy animations. Communication and coordination were facilitated through an online group, enabling daily monitoring and feedback. The result of this stage was the development of digital learning media prototypes derived from teachers' pentigraf, with each product anchored in local wisdom content.

Figure 5. Mentoring and Evaluation Activities

Stage 4 (Mentoring and Evaluation) ensured product quality and measured learning progress. Mentoring ran throughout implementation through regular monitoring and feedback, including peer review and expert review for the pentigraf and media products. Evaluation used rubrics and questionnaires to assess literacy performance, creativity, and partner engagement, using formative feedback during development and summative assessment at the end of activities. The results of this stage were improved quality of the pentigraf and media outputs after revision cycles, as well as documented evaluation evidence used to report changes in teacher competence and use of local potential as teaching media.

Stage 5 (Program Sustainability) aimed to secure continued use of outputs and maintain partner activities beyond the program period. Sustainability steps included strengthening the teacher literacy community as a platform for continued production and sharing, integrating program outputs into school literacy agendas, and using the produced modules, pentigraf, and media as contextual learning assets.

The result of this stage was an agreed-upon sustainability mechanism, allowing literacy activities and local wisdom-based learning resources to continue developing and being used in partner schools.

3   Results

This program positioned local culture as a legitimate learning resource by applying two complementary perspectives. Contextual learning theory explains that learning becomes more meaningful when it is connected to learners' real environment and daily experience (Kaliraj et al., 2024). Funds of knowledge emphasize that knowledge embedded in community life can be used as a valid basis for teaching and learning. In this program, the Legend of the Origin of Lake Ranu Grati and the cultural ecology around Lake Ranu Grati were treated as contextual content that teachers transformed into literacy texts and learning media. Program outcomes were documented through product evidence and measured using rubrics and questionnaires during mentoring and evaluation.

The first outcome area was teachers' ability to write pentigraf based on local wisdom. The initial needs assessment showed that 86% of teachers had not integrated local potential into learning and 78% had not mastered creative writing skills or the use of digital learning media. After training and iterative mentoring, rubric-based assessment showed an average increase of 90% in teachers' pentigraf writing performance. The improvement was visible in the transition from early drafts, which were mainly descriptive, to final texts that followed the expected pentigraf characteristics, including a clear three-paragraph structure, concise narrative development, and explicit integration of local settings and values drawn from the Ranu Grati legend.

Mentoring results were also reflected in teachers' revision behavior. Teachers completed drafting and revision cycles after peer and expert feedback, which indicates stronger writing discipline and greater responsiveness to guidance. The benchmark for completion at this stage was a pentigraf that met rubric criteria and was ready for classroom use and media conversion. Product documentation supports this benchmark through an ISBN-registered anthology and an ISBN-registered e-book

titled Kisah Yang Tumbuh Dari Danau, which compiles pentigraf written by participating teachers.

The second outcome area was teachers' capacity to transform pentigraf into classroom-ready learning media. Teachers produced three main media formats: (1) short comics presented in three-to-five panels, (2) interactive e-books, and (3) short literacy animations of about three minutes per story. Tool use was guided by instructional needs. Canva supports readable layouts, comics, and interactive e-book elements that can be used for guided reading, discussion prompts, and follow-up writing tasks (Wildani et al., 2024). OpenArt AI supported the creation of consistent story illustrations so that local narratives became more concrete for elementary learners. CapCut supported basic editing so teachers could present the same storyline in audio-visual form for short viewing sessions in class.

Rubric and questionnaire evidence showed an increase of 85% in teachers' use of local potential as teaching media. This indicates a shift from using generic materials toward designing teaching media grounded in local content. The benchmark at this stage was the production of media prototypes that were aligned with pentigraf content and lesson objectives and could be used directly in literacy learning. Product documentation includes the Pentigraf comic compilation in print and digital formats, as well as an interactive e-book that integrates text, illustrations, and interactive elements.

The third outcome area was the integration of local wisdom into literacy practice and the development of collaborative work patterns among teachers. Integration was shown in the content of the pentigraf and media products, which consistently used local settings, community memory, and ecological values connected to Lake Ranu Grati. Integration was also shown in teachers' preparation of contextual teaching materials, including lesson plans and worksheets linked to the pentigraf, comics, and animations.

Collaboration was documented through the functioning of the Grati Teacher Literacy Forum and an online coordination group used for drafting, sharing products, and feedback exchange. Teachers participated in peer review and cross-school sharing during the

production process, and the shared outputs provide concrete evidence of collective work. These include the ISBN-registered anthology and e-book, along with associated comics and animation products developed from teachers' pentigraf. In practice, teachers demonstrated behavioral change through sustained participation in writing, revising, and producing local wisdom-based literacy media that can be reused in their classrooms and shared with other teachers.

4   Discussion

This program demonstrates that local culture can serve as a valid learning resource when teachers are supported in translating community knowledge into structured literacy texts and classroom media. The measured outcomes indicate improvement in teachers' pentigraf writing performance (90% average increase) and an increase in the use of local potential as teaching media (85% increase). These results are consistent with contextual learning theory, which posits that learning becomes more meaningful when it is connected to learners' real-world environment, and with the funds of knowledge perspective, which recognizes community knowledge as a legitimate basis for teaching and learning (Kaliraj et al., 2024). In this context, the Legend of the Origin of Lake Ranu Grati and the cultural ecology around the lake served as the local knowledge base that teachers transformed into pentigraf, comics, interactive e-books, and short animations.

Social and community impact through learning communities

A key social outcome was the emergence of a learning community among teachers. The Grati Teacher Literacy Forum and the online coordination group became structures for regular communication, peer review, and shared production of learning resources. This aligns with the idea that professional learning develops through social interaction and shared practice, as explained in social constructivism and communities of practice (Vygotsky, 1978). The mentoring design did not treat teachers as passive trainees. Instead, it created repeated cycles of drafting, feedback, revision, and product development. These cycles encouraged teachers to learn from one another, negotiate quality criteria, and share

practical solutions. The collective outputs, including the ISBN-registered anthology and e-book, provide product-based evidence that collaborative learning occurred and resulted in shared, reusable resources.

The learning community structure also supports sustainability. When teachers develop routines for peer feedback and co-production, skill development does not depend only on external facilitators. This is consistent with community empowerment perspectives that define success not only by short-term skill gains but also by local initiative and continuity of practice after the intervention (Chambers, 2009, 2013). In practical terms, the forum created a channel for cross-school sharing, while the online group enabled continuous support between meetings. These structures make it more feasible to maintain literacy production and media development as an ongoing professional practice.

Integration of local wisdom as cultural capital in education

The program also demonstrates how local wisdom can function as cultural capital in education. Cultural capital refers to valued cultural knowledge and practices that can support participation and success within learning contexts when they are recognized and used in teaching (Mawardi et al., 2019). In many rural settings, local stories and ecological values are present in community life but are not formally represented in school materials. By selecting the Ranu Grati legend and turning it into written and digital resources, teachers repositioned local knowledge as a legitimate source of literacy learning. This strengthens the connection between schooling and community identity, and it supports students' sense that learning content is relevant to their lives (Macblain, 2022; Mardiningsih et al., 2023).

The integration process was not limited to inserting local names or settings into texts. Teachers were guided to embed local values and ecological messages into narratives that can support classroom discussion and reflection. This aligns with the Funds of Knowledge approach, as it treats community knowledge as something to be studied, organized, and utilized to build learning activities, rather than as informal background (Machado et al., 2021). Teachers, therefore, acted as

cultural mediators who translated oral tradition into classroom resources that can be revisited and adapted over time.

Educational and social impact of literacy transformation

The results also indicate a shift in teacher practice and identity. Teachers moved from relying on generic texts toward producing contextual literacy resources that can be used directly in classroom learning. This shift is consistent with teacher agency perspectives, which emphasize teachers' capacity to make informed decisions and create resources that fit their students and context (Priestley et al., 2015). The improvement in writing scores and the increased use of local potential as teaching media reflect not only skill acquisition but also a change in professional behavior, shown through sustained drafting, revision, and completion of products.

From a critical literacy perspective, literacy is not only a technical skill but also a tool for building awareness of social and cultural realities (Freire, 1970). In this program, writing pentigraf based on the Ranu Grati legend supported teachers in articulating local identity narratives and in selecting values they considered important for students. When those texts were converted into classroom media, literacy practice became a bridge between learning goals and cultural preservation. Social impact therefore appears through the documentation of oral tradition into durable resources and through the expansion of teacher collaboration that can support continued production and sharing of local culture-based learning materials.

Transformation of pentigraf into a multimodal learning medium

Another central contribution of the program is the transformation of pentigraf into multimodal learning media. Pentigraf offers a concise narrative form that is manageable for teachers and suitable for short reading and writing activities. Converting pentigraf into comics, interactive e-books, and short animations adds visual and audio-visual supports that can help elementary students follow plot, identify characters, and interpret values (Wulandari et al., 2025). This approach is consistent with multimedia learning principles that suggest learning can be strengthened when verbal information is supported by relevant

visuals, provided the design remains simple and aligned with learning objectives (Mayer, 2009).

The program also reflects the logic of the TPACK framework, because the media products required teachers to integrate content knowledge (local narratives and values), pedagogical planning (how the media will be used for literacy activities), and technology use (how to produce and present the media) in a coherent way (Mishra & Koehler, 2006). The tools were not treated as the outcome. They were used to meet clear instructional functions, such as creating readable story layouts, developing panel sequences that support comprehension, and producing short animations that can be used for guided viewing and follow-up writing tasks. This strengthens the argument that multimodal conversion is not merely a technical upgrade, but a pedagogical strategy that helps teachers implement deep learning through context-based literacy activities.

Overall, the findings support the view that deep learning in rural schools becomes more feasible when teachers have a practical pathway from local knowledge to classroom resources. The pathway in this program starts from a local legend, moves into concise narrative writing through pentigraf, and ends with multimodal literacy media that teachers can use and adapt. The combination of measurable competence gains, documented products, and collaborative teacher structures indicates that local wisdom-based literacy can strengthen teacher capacity while supporting cultural continuity through education.

5   Conclusion

The program shows that participatory collaboration between the implementation team and public elementary school teachers in SDN Grati 1 strengthened local wisdom-based digital literacy through measurable improvements in teachers' pentigraf writing skills and their use of local potential as teaching media, supported by documented print and digital outputs. The results also indicate changes in practice, shown by teachers' increased confidence to produce and use culture-based texts and multimodal media and by the functioning of teacher collaboration structures that supported peer review and shared

production. To sustain and extend these outcomes, future work should focus on integrating the pentigraf, comics, interactive e-books, and short animations into school literacy programs and local-content learning, maintaining the teacher forum as a routine professional learning community, and developing a shared digital repository so products and templates can be reused and replicated across other schools in Pasuruan Regency.

6   Acknowledgment

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