

## Digital Creativity Based on Local Wisdom: Creating Science Audio Comics for Science Teachers Using Canva and AI

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### Abstract

This community service program was designed to empower science teachers in Keerom Regency, Papua, through the development of audio comics based on local ethnography, utilizing Canva and Artificial Intelligence (AI) as digital tools. The program specifically aimed to integrate Papuan cultural narratives into science learning, thereby creating contextualized and culturally relevant instructional materials for students. A total of 35 science teachers, organized under the MGMP IPA (Subject Teachers Forum), participated in the program. The method employed a participatory workshop model, followed by sustained coaching and evaluation. Teachers were trained to design digital comics using Canva, generate illustrations and voice-overs with AI tools, and embed local cultural stories such as traditional hunting, forest management, and local folklore into science topics like ecosystems, energy cycles, and adaptation of living organisms. The process included pre-test and post-test assessments, hands-on production of audio comics, classroom trials, and the establishment of a digital repository for documentation and dissemination. The findings revealed a 33% increase in teachers' digital literacy across three assessed domains: mastery of Canva and AI tools, integration of culture into science content, and pedagogical competence in developing audio comics. Five audio comics were fully developed and ready for classroom use, while 28 were in progress. Classroom trials demonstrated enhanced student engagement, improved comprehension of abstract science concepts, and stronger connections between cultural knowledge and scientific understanding. Overall, this program demonstrates that combining digital technologies with local ethnography is an effective approach to empower teachers, enrich science learning, and promote educational innovation in underserved regions such as Papua.

**Keywords:** Audio Comic, Digital literacy, Ethnography Papua, Canva, Artificial Intelligence (AI)

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## INTRODUCTION

Learning in local contexts often faces challenges in bridging abstract scientific concepts with students' real-world experiences, especially in remote areas like Keerom Regency, Papua. The use of narrative visual media, such as digital comics, has been shown to increase student motivation and understanding of science materials, combining elements of storytelling, visual illustrations, and simplification of scientific concepts. Faria

et al. (2024) demonstrated that science comics can facilitate effective science communication and increase student engagement in science learning.

Research by Fitria et al. (2023) on digital comic media in learning revealed that the use of carefully designed digital comic teaching materials can improve students' scientific literacy in the topic of organism characteristics through a more engaging visual and narrative approach than traditional methods.

More generally, research trends on digital comics in education have shown significant growth over the past decade. A bibliometric study by (Ghifary et al., 2024; Suprpto et al., 2024) noted that digital comics, animations, and cartoons are increasingly being used as interactive visual learning media in various disciplines, particularly science, through a combination of visual technology and contextual pedagogical strategies.

On the other hand, digital ethnography is a relevant approach in the context of local culture and digital media. Digital ethnography research centers promote cross-cultural understanding and human interactions with digital media in specific local contexts, including those of marginalized and multicultural communities in the Asia-Pacific region Padricelli & Punziano (2023) This approach enables teachers and students to use local cultural narratives as a basis for developing science learning content that is more meaningful and reflective of the cultural context, rather than simply adopting generic examples from textbooks (Forberg & Schilt, 2023)

Keerom Regency, as one of the 3T (Underdeveloped) regions in Papua, faces several obstacles in developing innovative digital learning media, including limited infrastructure, limited access to digital technology training, and a lack of contextual learning resources based on local culture. Although teachers are actively involved in MGMP (National Teachers' Groups) for each subject, few use interactive digital media in their lessons that integrate elements of Papuan local wisdom.

In response to this challenge, this community service program seeks to empower teachers in Keerom Regency to develop audio comic learning media based on Papuan ethnography, using the Canva platform and artificial intelligence (AI). This combination of visual and audio narratives is expected to not only improve teachers' digital and scientific literacy but also strengthen the relevance of local culture in learning, creating a more contextual, engaging, and meaningful learning experience for Papuan students.

Therefore, this program is aimed at improving teachers' technological competencies (visual design, digital comic creation, and audio narrative integration) in the teaching context, utilizing Papuan ethnography as a source of local cultural content that can be linked to concepts in learning materials, developing applicable audio comic media that can be directly used in classroom learning, and building sustainable capacity in Keerom Regency to continue developing and disseminating digital learning media based on local culture. This approach is expected to produce learning media that are not only informative, but also rich in cultural values, motivate students, and strengthen local identity in 21st-century science education.

## **METHOD**

This community service approach combines participatory workshops, ongoing coaching, and digital ethnography as a conceptual foundation for designing local culture-based learning media. The overall design method consists of four main phases:

### **1. Needs Analysis and Context Mapping**

Before the training began, a survey and field observations were conducted to understand the digital literacy level of teachers in Keerom Regency, particularly their experience using digital design platforms and artificial intelligence (AI) to create learning media. The potential of Papuan ethnography, local cultural values, folklore, and traditional environmental knowledge that could be integrated into the materials were explored. Key

challenges faced included access to technological devices, internet connections, and teachers' experience with interactive digital media.

Observation and semi-structured interviews were used in this phase to explore teachers' needs and contextualize local culture as content. This approach is inspired by digital ethnography, which emphasizes that technology integration in education must be sensitive to local cultural practices and teachers' digital literacy (Mahmud et al., 2025).

## 2. Intensive Practical Training (Participatory Workshop)

The training phase was designed using a participatory workshop approach, so that teachers not only received theory but also directly engaged in the practice of media creation. This training model emphasized the active involvement of participants to enable them to produce applicable products according to class needs. First, teachers were introduced to the use of Canva as a visual design tool for creating digital comics. The material covered design basics, from panel layout, graphic element selection, typography use, dialog balloon placement, and digital aesthetics appropriate to the characteristics of junior high school students.

Second, teachers were trained in using artificial intelligence (AI) applications, specifically generative image tools to create text-based illustrations (text-to-image) and text-to-speech to generate automatic voice narration. The use of AI aimed to speed up the production process, enrich the variety of illustrations, and train teachers to utilize the latest technology in learning. Third, teachers were asked to design comic scripts based on Papuan ethnography. In this stage, teachers explore local stories, traditional knowledge about the environment, and cultural practices of the Papuan people. These elements are then linked to science concepts, such as ecosystems, energy, and the adaptation of living things, and then presented in the form of simple yet meaningful narrative sketches.

Fourth, audio is integrated into digital comics. Teachers learn to edit voice-over narration, including text reading, sound effects, and simple background music to enhance the media's appeal. This integration makes digital comics more interactive and communicative, resulting in audio comics ready for use in the classroom. To support the workshop's effectiveness, a blended learning method is implemented. Face-to-face sessions are used for hands-on practice with facilitators, while digital modules and online discussion forums serve as spaces for independent learning and post-training reflection. This approach has proven effective in developing teacher competencies related to the use of interactive digital comics (Šarčević, 2024).

## 3. Production Assistance and Ongoing Coaching

After the initial training, the activity continues with the media production assistance phase. At this stage, teachers not only review the training material but also receive intensive support to produce audio comic products ready for use in science lessons. Technical facilitators provide coaching both individually and in small groups. This approach allows teachers to receive specific guidance according to their needs, from refining narrative scripts, improving visual illustrations, integrating audio, and creating the complete digital comic. Coaching is conducted in stages, allowing teachers to learn reflectively while developing their work. Next, teachers are asked to create an audio comic prototype as an initial product. This prototype is then revised based on feedback from facilitators and fellow teachers through a peer review mechanism. The peer feedback process encourages teachers to be more critical of the quality of their products and also strengthens collaboration among MGMP members.

As a sustainability effort, a community of MGMP Science practitioners has been established to serve as a forum for sharing experiences, discussing implementation challenges, and conducting regular peer reviews. This community also serves as a platform for teachers to develop further innovations and disseminate good practices to other

schools in Keerom Regency. A coaching approach combined with community empowerment has proven effective in improving teachers' Technological Pedagogical Content Knowledge (TPACK) competencies. This approach ensures that the resulting media not only possesses good digital aesthetic quality but also possesses pedagogical value and applicability appropriate to the classroom learning context (Mahmud et al., 2025; Satar, Irdyana, et al., 2024).

#### 4. Product Evaluation and Classroom Trials

First, a media product evaluation focused on the quality of the teachers' work. Each audio comic was assessed using a collaborative rubric developed by a team of facilitators and senior teachers. The aspects evaluated included: (1) visual design quality, including panel layout, illustrations, and aesthetic consistency; (2) integration of local Papuan cultural narratives with science concepts; (3) audio narrative quality, in terms of clarity, synchronization, and meaningfulness; and (4) the media's potential for use in science learning in the classroom. This evaluation provides an objective overview of the extent to which teachers are able to produce learning media that meet pedagogical standards while being relevant to the cultural context.

Second, classroom trials were conducted to assess the effectiveness of the produced media. Several selected audio comics were used in science learning at partner schools. Data were collected through direct observation by the facilitator team, student questionnaires, and reflective interviews with the teachers who used them. The primary focus of the trials was on student engagement, student perceptions of the ease of understanding science concepts, and their responses to the local cultural content integrated into the media.

The trial results showed that students were more active in asking questions, discussing, and participating during the lessons with audio comics. This media not only helped students understand abstract science concepts but also made them feel more connected to the material because the narratives were drawn from their culture and everyday experiences. These findings align with previous research that suggests the use of digital comics can significantly increase student learning motivation, engagement, and understanding of the science concepts taught (Fitria et al., 2023; Šarčević, 2024)

Therefore, this parallel evaluation approach ensures that the developed media not only meets product quality standards but is also effective and meaningful when used in real-life classroom learning.

#### 5. Media Documentation and Distribution

To ensure the sustainability of the program, the final results of this community service activity are documented in a digital repository accessible to MGMP Science teachers and schools in Keerom Regency and the wider Papua region. This repository is designed as a central repository for storing and sharing the resulting audio comics, ensuring that the learning media can be utilized not only by participating teachers but also by other teachers outside the partner schools.

This digital repository serves a dual function. First, it serves as a means of formal documentation of community service products, ensuring that the results of the activity do not stop at the individual participant level but develop into a collective resource. Second, it serves as an instrument for disseminating knowledge and educational innovation that broadens the impact of the activity, in line with the principles of open educational resources (OER), which emphasize open access and collaboration in education (Wiley, 2021).

This repository ensures the sustainable development and utilization of Papuan ethnography-based audio comics. Teachers can continuously update, enrich, and disseminate their media independently through the MGMP Science forum. Ultimately, this

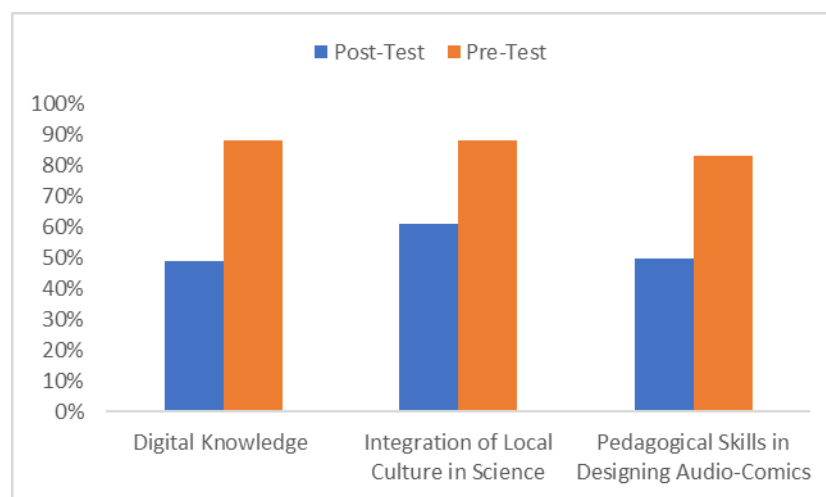
repository is not only a storage facility, but also a platform for collaboration and joint innovation, strengthening digital literacy while affirming local cultural identity in science learning.

## RESULT AND DISCUSSION

### 1. Improving Science Teachers' Digital Literacy

Evaluation results indicate a significant increase in teachers' digital literacy after participating in a series of training and mentoring sessions. Based on pre- and post-test results, there was an average increase of 33% in three main aspects assessed: (1) digital knowledge related to the use of Canva and AI applications (including text-to-image and text-to-speech), (2) integration of local culture in science, and (3) pedagogical skills in designing audio comics. These data demonstrate that participating teachers are not only technically proficient in the use of digital technology but also able to integrate it pedagogically within the context of Papuan culture-based learning.

Figure 1. Percentage of Score Pre-test and Post-Test



This achievement aligns with the trend in teacher digital literacy in Indonesia, particularly following the COVID-19 pandemic, which accelerated the adoption of technology in learning. Stefany & Helmi (2024) found that educators' digital literacy competencies are strongly correlated with the quality of online course design, with variations in teachers' digital skills contributing significantly to the quality of the resulting teaching materials. This supports the community service findings that strengthening teachers' digital literacy through systematic training is crucial for producing effective and meaningful learning media. In the Indonesian context, research by Soepriyanti et al. (2022) shows that teachers' digital literacy levels vary widely, influenced by factors such as experience, institutional support, and access to professional training. The main barriers identified were limited internet access and a lack of professional development opportunities. Therefore, the ongoing coaching model implemented in this community service program proved appropriate, helping teachers address the digital literacy gap and supporting more equitable technology adoption.

Therefore, it can be concluded that improving the digital literacy of science teachers in Keerom Regency not only impacts their technical skills in using Canva and AI, but also their ability to design pedagogically, contextually, and culturally relevant learning media.

## 2. Production and Diversity of Audio Comic Media

From a series of training and mentoring activities, the MGMP Science teachers successfully developed 33 audio comic media. Five audio comic products are complete and ready for use, while 28 others are still in development. Each product features a diverse Papuan cultural theme, such as narratives about hunting traditions, traditional forest management practices, local folklore, and local indigenous technology. These cultural elements are then linked to science concepts, such as the energy cycle through traditional fire narratives, the adaptation of living organisms in Papuan forest ecosystems, and ecological principles manifested in local wisdom.

The integration of local culture into these learning media produces products that are not only contextual but also facilitate students' understanding of the connection between science and their daily lives. This is consistent with the findings of Fitria et al. (2023), who reported that the use of digital comic teaching materials significantly improved students' scientific literacy, particularly on the topic of organism characteristics. The study also confirmed that media that reflects students' life contexts is easier to understand and more engaging than conventional teaching materials.

Furthermore, a recent literature review on the application of comics as learning tools (*Applying Comics as Learning Tools*) confirms that digital comics have significant potential to increase student engagement, simplify complex scientific concepts, and encourage multimodal learning through visual and audio narratives (Šarčević, 2024). This further strengthens the argument that the audio comics developed in this community service activity have high pedagogical potential, especially in the context of 3T regions like Papua, which require a contextual, creative, and inclusive approach.

Thus, the results of this development demonstrate that the combination of digital technology (Canva and AI) with Papuan ethnographic narratives can produce innovative learning media that is not only aesthetically pleasing, but also culturally relevant and pedagogically meaningful.

## 3. Teacher and Student Responses

### Teacher Responses

Teacher participants in the training stated that they felt more confident in using interactive digital media for science learning. The training process, accompanied by ongoing mentoring, not only helped them produce products that were aesthetically appealing but also narratively and pedagogically meaningful. This finding aligns with research by Khairina et al. (2022) emphasized that improving teachers' digital literacy would be more effective if training was accompanied by ongoing coaching and support, rather than a one-time training session.

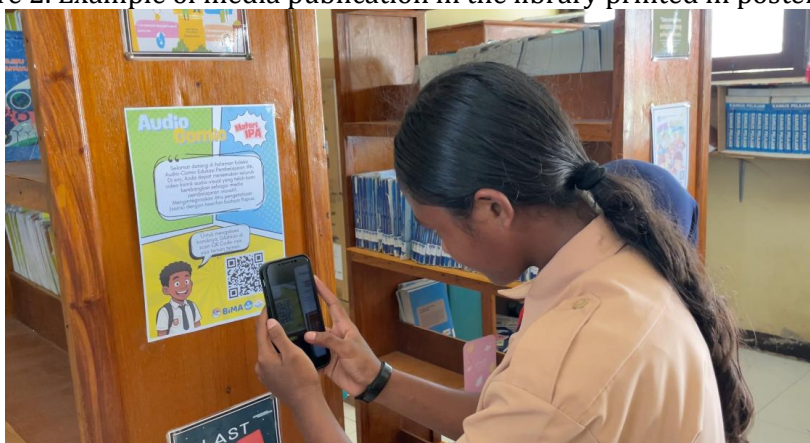
Furthermore, several teachers reported that integrating local Papuan cultural narratives into audio comics gave them space to express local values within science learning themes. This created a more relevant, contextual, and "lively" teaching experience compared to using generic teaching materials that typically do not reflect the realities of students' lives. Thus, teachers acted not only as science facilitators but also as agents of cultural preservation through digital media.

### Student Response

The media trial in the classroom demonstrated a positive response from students. Students appeared more actively engaged in the learning asking questions, discussing, and even connecting the comic content to their own cultural experiences. For example, students were able to compare the energy cycle in the traditional Papuan fire narrative with the concept of heat in science, bringing the learning closer to their daily lives.

Although quantitative data has not been fully processed due to the nature of this community service activity, facilitator observations indicate that the use of multimodal media (text, visual, and audio) enriched student interactions and facilitated understanding of complex scientific concepts. This aligns with international research reporting the effectiveness of digital comics in increasing student motivation and engagement. Herrera et al. (2025) for example, found that EFL students learning using digital comics demonstrated engagement rates of up to 88%, demonstrating that digital comic-based media can be an effective and engaging educational tool.

Figure 2. Example of media publication in the library printed in poster form



Thus, the positive response from both teachers and students confirms that audio comics based on Papuan ethnography have significant potential for application in science learning. This medium not only supports the achievement of academic goals but also strengthens the cultural bonds between students and the knowledge they are learning.

#### 4. Challenges and Lessons Learned in Implementation

Although the community service activities have shown positive results, several challenges emerged during their implementation. First, limited access to technology and the internet in some partner schools was a major obstacle. Some teachers experienced difficulty accessing digital design platforms and generative AI due to unstable internet connections, particularly in remote areas. This situation aligns with the findings of Soepriyanti et al. (2022), who stated that limited digital infrastructure remains a major barrier to teachers' digital literacy in remote areas of Indonesia.

Second, there was variation in teachers' initial digital literacy skills. Most teachers were able to master the use of Canva and AI, but some participants required longer and more intensive mentoring before being able to produce products independently. This suggests that training programs need to be designed in a differentiated manner, taking into account teachers' diverse digital skills (Stefany & Helmi, 2024).

Third, teachers' limited time was also a constraint. Although workshops and coaching sessions were designed efficiently, the realities of teaching workloads and administrative responsibilities in schools made it difficult for some teachers to complete their audio comics on time. This situation emphasizes the importance of school institutional support, so that teachers have more space to develop learning innovations.

Fourth, although the MGMP IPA community of practitioners has been established to ensure the program's sustainability, local facilitators or internal trainers who can act as ongoing mentors are still needed. This aims to ensure that activities do not stop at the training stage, but develop into a collective movement of teachers integrating local culture-based media into learning. This community of practitioners model has proven effective in supporting technology-based pedagogical transformation in various

educational contexts (Nurbaya et al., 2025; Satar, 2023; Satar, Nurbaya, et al., 2024; Tanta et al., 2023)

Based on the implementation reflection, it can be concluded that the success of developing digital learning media based on local culture depends heavily on three main components. First, improving teachers' digital literacy through ongoing training and coaching. Second, developing content relevant to the local cultural context so students feel more connected to the material being learned. Third, program sustainability through strengthening the community of practitioners as a driving force for innovation at the local level.

Overall, the results of this community service demonstrate that the audio comic development model based on local ethnography and digital technology (Canva and AI), combined with a participatory approach and ongoing coaching, is an effective strategy for empowering science teachers in remote areas. The resulting media is not only aesthetically pleasing and engaging for students, but also pedagogically, contextually, and culturally relevant. These findings strengthen the evidence that integrating digital technology with local wisdom can be an innovative solution for improving the quality of education in the 3T (third-to-third) regions. However, several challenges remain, such as limited internet access in some schools, variations in teachers' digital literacy, and time constraints due to workloads. However, the establishment of the MGMP IPA community of practitioners and the digital audio comic repository are strategic steps to ensure the program's sustainability.

Overall, this community service demonstrates that integrating local culture with digital technology is an effective approach to empowering teachers, strengthening digital literacy, and creating more meaningful, inclusive, and relevant science learning in Papua, particularly in the 3T (frontier and remote) areas.

## **CONCLUSION**

A community service activity in the form of Papua Ethnography-Based Audio Comic Creation Training, supported by Canva and AI, successfully improved the competency of science teachers in Keerom Regency in utilizing digital technology for learning. Through needs analysis, participatory training, ongoing coaching, evaluation, and media documentation and distribution, teachers were able to produce audio comics that were not only visually and audibly engaging, but also contextual, integrating local Papuan cultural values with science concepts. The evaluation results showed a 33% increase in teachers' digital literacy across three main aspects: technology mastery (Canva & AI), cultural integration in science, and pedagogical skills in developing media. Five audio comic products are ready for use, while 28 others are still in development, with diverse themes highlighting Papuan local wisdom. Classroom trials demonstrated positive responses: teachers felt more confident in using digital media, while students demonstrated higher engagement and found it easier to understand science concepts through media that is close to their lives.

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mentoring to the production of audio comic media. The principal of SMP Negeri 3 Arso also supported this activity by providing the training venue.

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#### **AUTHOR CONTRIBUTION STATEMENT**

All authors contributed significantly to this community service activity. The details of their contributions are as follows, SS was responsible for designing the community service program, drafting the article, and coordinating with the Keerom Regency Science MGMP partners. REM played a role in implementing training, mentoring teachers, and analyzing pre- and post-test data. MI supported the field data collection process, activity documentation, and the development of a digital audio comic repository. RPW and GB assisted in the implementation of the community service activity. All authors were actively involved in the manuscript revision process, approved the final content of the article, and take full responsibility for the authenticity and scientific integrity of this publication.

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