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NEEDS AND CONTENT CONCEPT ANALYSIS OF LOCAL WISDOM–BASED DIGITAL SUPPLEMENTARY TEACHING MATERIALS FOR ENVIRONMENTAL AWARENESS IN BAJULAN VILLAGE, NGANJUK

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Abstract. Digital transformation in education requires learning innovations that are not only technology-oriented but also integrate local cultural values. This study aims to analyse needs and design a concept for digital teaching materials based on the local wisdom of the Bajulan Traditional Village, Nganjuk. This study employs a qualitative approach supported by simple quantitative data. The research subjects included teachers and class XI Geography students at SMAN 3 Nganjuk, as well as traditional leaders from Bajulan Village as supporting informants. Qualitative data was obtained through observation, interviews, and curriculum analysis, whilst quantitative data was obtained through questionnaires analysed using percentages. The results of the study indicate that teachers and students require digital teaching materials that are more interactive, contextual, and relevant to daily life, as the media currently in use are considered unengaging. Content analysis indicates that ATP 1.1–1.2 still emphasise environmental concepts in a theoretical manner, whilst ATP 1.3–1.5 have the potential to be integrated with local wisdom values such as sowan punden, ruwat sumber, and bersih desa. The integration of local wisdom into digital teaching materials has the potential to strengthen students' understanding of geographical concepts, enhance environmental awareness, and foster a love for local culture.

Keywords**:** Digital learning supplement, Local wisdom, Bajulan Indigenous Village

Introduction

The phenomenon of digital transformation in the education sector has become an urgent necessity in the era of the Fourth Industrial Revolution, as developments in information technology have transformed the global learning paradigm. As emphasised by Perkins (2024), the integration of digital technology can broaden access and enrich learners' educational experiences, but its implementation is often not aligned with the local socio-cultural context. Most digital learning resources still employ a universal approach without considering local cultural values and character, thereby potentially diminishing cultural relevance and national identity (Eloranta et al., 2024). Consequently, digital learning in Indonesia must not only prioritise technological aspects but also integrate cultural preservation and character development through local wisdom.

Local wisdom constitutes a framework of values, norms and cultural practices that have been passed down through generations, significantly influencing the development of human character, ethical standards and interpersonal relationships with the surrounding environment (Mutia et al., 2019). In the field of education, the integration of local wisdom serves to enhance the relevance of learning experiences to students' real lives, whilst also acting as a channel for cultural preservation (Darmadi, 2018). As education evolves, digital learning based on local wisdom has become an effective strategy for bridging the gap between global and regional dimensions within modern learning systems.

Although many initiatives have been undertaken to date, the majority of digital learning in Indonesia remains generic and does not fully reflect regional cultural characteristics. F Wibowo and Sumarmi (2025) state that most digital educational content still lacks contextual local values, thereby losing its cultural relevance. Conversely, teachers in rural areas often face challenges in designing digital content that reflects the social realities of their students (Setiawati et al., 2025). Consequently, the local potential of culturally rich regions is often not utilised optimally in technology-based learning.

One area with a rich cultural heritage is the Bajulan Traditional Village in Nganjuk Regency, known for its traditions, social structure and local knowledge system that emphasise a balanced relationship between humans and nature, God, and fellow human beings. This local wisdom is reflected in various traditional customs, philosophical values and environmental conservation practices that can support contextual learning. Mutia (2023), states that local culture has the potential to support character education and social sciences, whilst Musthofa & Khowim (2023), emphasise that the ecological values within Bajulan traditions can be utilised to foster students' environmental awareness through digital learning. However, these cultural values have, to date, not been widely integrated into the development of digital teaching materials based on modern technology.

The development of digital teaching materials based on local wisdom is a strategic step towards linking modern learning needs with the preservation of local culture. Digital teaching materials serve not only as learning aids but also as contextual media that bring local social, cultural and environmental realities into the learning process (Oktavianty et al., 2022). In the Bajulan Traditional Village, values such as cooperation, the wise management of natural resources, and respect for local traditions and ecosystems can be integrated into meaningful Geography lessons. The integration of local content with digital technology also enables the creation of interactive learning that strengthens students' environmental awareness and cultural identity (South & Qiu, 2025).

Several studies indicate a growing trend in the development of digital teaching materials based on local wisdom. Syafani (2023) found that e-books based on local culture can enhance students' conceptual understanding and active participation, whilst Darmastuti (2019) stated that the integration of local values into digital media can strengthen students' cultural literacy and ecological awareness. However, most research still focuses on product development and has not emphasised needs analysis or conceptual design. Therefore, this study was conducted to address the need for

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innovative, interactive digital teaching materials that are culturally and ecologically relevant through needs analysis and the conceptual design of digital teaching materials based on the local wisdom of the indigenous community of Bajulan Village in Nganjuk, with the aim of supporting environmental awareness, strengthening cultural identity, character education, and environmental conservation.

Method

This study is a qualitative research project supported by quantitative data, focusing on needs analysis and content analysis. It aims to provide a comprehensive description of the needs of teachers and pupils in the development of digital teaching materials based on local wisdom, supported by simple quantitative data, as well as to identify elements of local culture in the traditional village of Bajulan that are relevant to the teaching of geography. This approach allows for the exploration of the meanings, values, and social practices of the community, ensuring that the research findings are not merely descriptive but also interpretative (Rahardjanto et al., 2025). The research process was carried out in two main stages, namely: (1) a needs analysis teachers and students in class XI Geography at SMA Negeri 3 Nganjuk, and (2) a content analysis of the values of Bajulan's local wisdom that have the potential to serve as a source for enriching digital teaching materials.

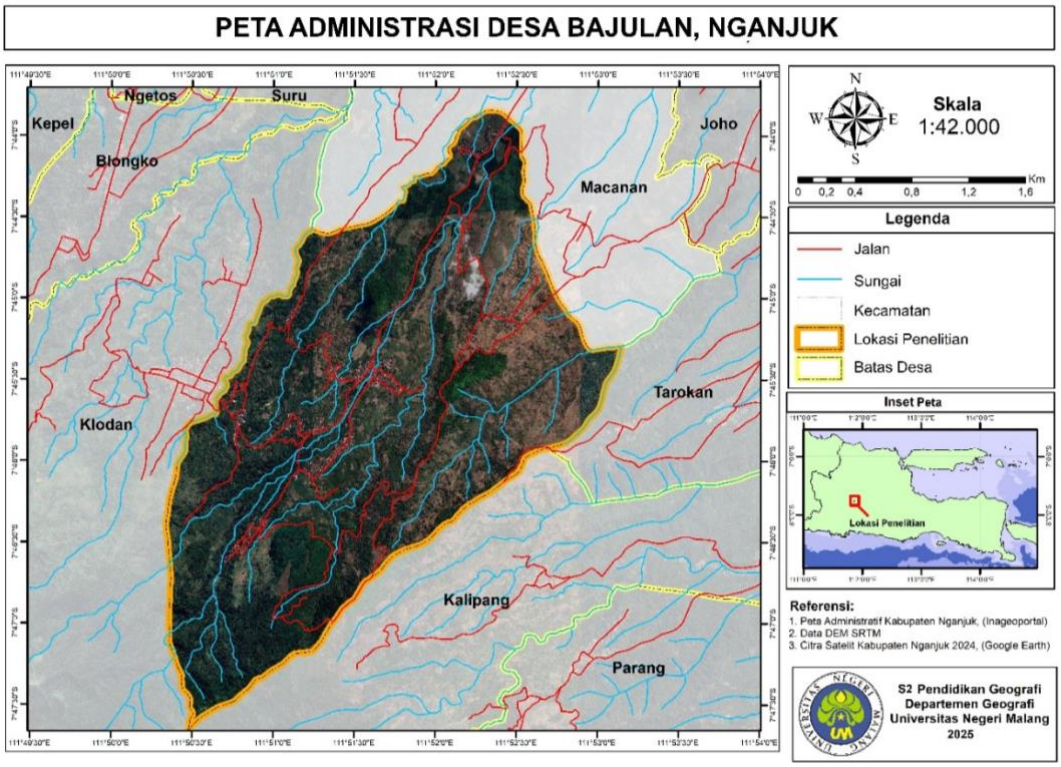

Figure 1. Administrative map of Bajulan Village, Nganjuk

The subjects of this study were teachers and students in class XI at SMA, selected using purposive sampling based on their involvement and relevance to geography education. The research data sources comprised primary and secondary data. Primary data were obtained through participatory observation, in-depth interviews with teachers

and traditional leaders, and the distribution of questionnaires to students. Secondary data, meanwhile, was obtained from curriculum documents, previous research findings, and various scientific literature related to education based on local wisdom. The instruments used in this study included a needs analysis questionnaire, an interview guide, and an observation sheet.

Data analysis in this study was conducted descriptively, emphasising the interpretation of qualitative data supported by simple quantitative data. Questionnaire data were analysed using percentages to illustrate the needs of teachers and students regarding the development of digital teaching materials based on local wisdom. The results of this analysis were then interpreted to determine the priority needs for content, features, and presentation formats of teaching materials that align with the characteristics of geography learning.

Meanwhile, data from observations and interviews were analysed through the stages of data reduction, data presentation, and drawing conclusions in accordance with the Miles and Huberman model. In the data reduction stage, the researcher selected, focused on, and grouped information relevant to the research objectives. Data were presented in the form of narrative descriptions and thematic tables to facilitate interpretation. The final stage involved drawing conclusions and continuous verification to ensure valid and consistent findings. Data validity was strengthened through triangulation of sources, techniques, and time, as well as verification by members with key informants (B. Miles & Huberman, 1994).

Research Result

1. Needs Analysis

Based on the results of the questionnaire analysis that was given to geography teachers and 87 Class XI students at SMAN 3 Nganjuk in Geography, the data listed in the following table and figure were obtained:

Table 1. Results of interviews to analyse the needs of geography teachers at SMAN 3 Nganjuk

No	Observation Results
1	Students get very bored when learning uses conventional media such as *Lembar Kerja Siswa* (LKS) and packages.
2	Students have poor environmental awareness, such as not caring about disposing of rubbish in the proper place.
3	Students are very interested in the local wisdom of their region.
4	Students need learning resources that combine technology and local wisdom to foster an environmentally conscious attitude.

The results of the study indicate that the geography learning process at SMAN 3 Nganjuk is still dominated by conventional media, such as textbooks and (*Lembar Kerja Siswa*/LKS), which causes boredom among students. This is based on Table 1. Interviews with teachers found that students are very bored with conventional learning media and need more contextually relevant and interactive learning innovations. Teachers also observed that most students showed a high level of interest in material related to local wisdom. Still, no digital teaching materials were available that

accommodated the local cultural context, especially those relevant to the local wisdom of Bajulan Traditional Village.

In addition, field observations revealed that students' environmental awareness remained low, as evidenced by their habit of littering. This shows that integrating Bajulan local wisdom values, rich in ecological conservation principles, is highly relevant to shaping an environmentally conscious attitude. Most teachers believe that the ideal learning resource is digital teaching materials that combine technology and local cultural values to make learning more meaningful and contextual.

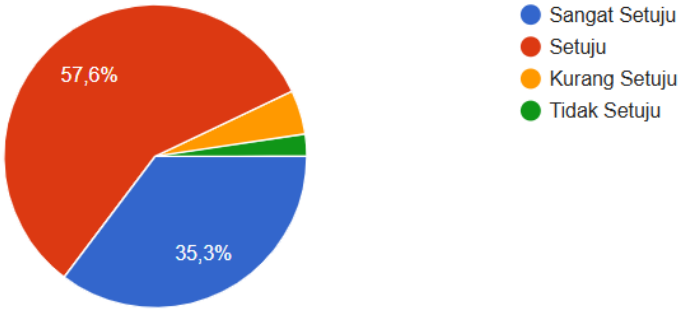

Figure 2. Diagram showing the need for additional learning resources other than school textbooks

The findings of the needs analysis also reinforced the results of the teacher interviews conducted with students in class XI at SMAN 3 Nganjuk. Figure 1 shows that 57.6% of students agreed and 35.3% strongly agreed that they needed additional learning resources besides school textbooks, particularly digital and contextual resources.

Table 2. Types of learning methods that students easily understand

No	Types of Learning Methods	Percentage (%)
1	Physical Book	7,1%
2	Digital Media (Video, Animation, E-Books)	48,8%
3	Group Discussion	15,5%
4	Hands-on Field Practice	28,6%

Table 2 also shows that in terms of learning methods, 48.8% of students prefer digital media such as videos, animations, and e-books, while 28.6% favour field-based learning. This shows a strong preference for technology-based learning that is exploratory and visual in nature.

Table 3. Types of digital learning resources needed by students

No	Types of Digital Learning Resources	Percentage (%)
1	Educational Website	48,2%
2	Interactive E-book	10,6%
3	Presentation Slides	12,9%
4	Educational Games	28,2%

Table 3 shows that in terms of the type of learning resources expected, 48.2% of students want educational websites, followed by 28.2% who want educational games. At the same time, interactive e-books and presentation slides account for a smaller

proportion. These data indicate that students need learning media that are interactive, visual, and based on local experiences.

Table 4. Content of material that interests students

No	Contents	Percentage (%)
1	The material is related to everyday life.	45,2%
2	The material is presented using local examples or examples from the surrounding culture.	53,6%
3	The material is directly related to the examination.	0%
4	The material was presented in general terms without local examples.	1,2%

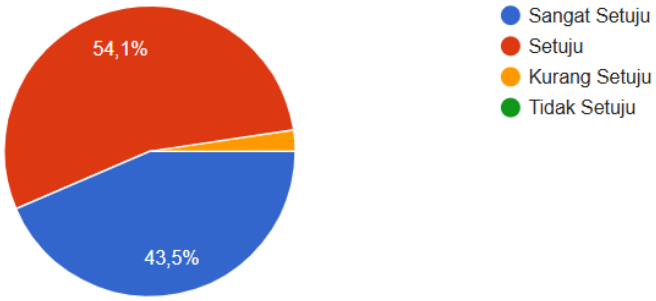

Figure 3. Diagram of learning resource requirements linked to local wisdom

Regarding the content of the material of interest in Table 4, 53.6% of students prefer material presented through cultural examples or local contexts, and 45.2% prefer material related to daily life. This finding is reinforced in Figure 3, where 54.1% agree and 43.5% strongly agree that learning resources can be linked to local wisdom. This confirms that students are more interested in learning that is applicable, contextual, and rooted in the social and cultural realities around them, including the local wisdom values of Bajulan, which emphasise cooperation, nature conservation, and social harmony.

2. Content Analysis

Content analysis was conducted by examining the curriculum of students' class XI Geography, particularly in the sub-chapter on Environmental Conservation, through a review of conceptual understanding and the alignment of (*Alur Tujuan Pembelajaran* /ATP) indicator with the local wisdom values of Bajulan Traditional Village. The analysis focused on the alignment between the learning objectives in the curriculum and the potential to integrate local cultural values relevant to the theme of environmental conservation. This approach was taken to ensure that each learning outcome not only reflected a theoretical understanding of environmental aspects but also strengthened the contextual dimension by applying local values (Damien et al., 2026). The following table shows the results of the curriculum adjustments.

Table 5. Curriculum Adjustments for the Sub-Chapter 'Environmental Conservation' in Class XI Geography

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Achievement of Conceptual Understanding	(*Alur Tujuan Pembelajaran*/ATP)	Material Adjustment	
		Aspects Environmental	Aspects Local Wisdom
At the end of phase F, students can identify, understand, process, analyse, and evaluate Strategic Spatial Positioning, Patterns of Biodiversity in Indonesia and the World, Disasters and the Environment, Regionalism and Development, and Inter-regional Cooperation, present their ideas, and publish them.	1.1 Students can describe the meaning of environment, ecosystem, and environmental ethics.	V	
	1.2 Students can distinguish between different types of living environments.	V	
	1.3 Students can describe the benefits of the environment.	V	V
	1.4 Students can apply environmental concepts to local issues.	V	V
	1.5 Students can analyse environmental quality and environmental issues.	V	V

Table 5. Section ATP 1.1 focuses on introducing fundamental concepts of the environment and ecosystems. The material developed at this stage is theoretical, with an emphasis on definitions, environmental components (biotic–abiotic), and relationships between ecosystem components. Learning in this ATP is designed so that students understand the basic principles of sustainability and natural balance before relating them to the local cultural context. Therefore, the material at this stage only covers environmental aspects conceptually, without integrating local wisdom values. The aim is to equip students with a strong scientific foundation as a basis for understanding the socio-cultural context in the next stage.

In ATP 1.2, students are guided to recognise the differences between natural and artificial environments. The material presented includes environmental features such as forests, agricultural land, and settlements, as well as factors that influence environmental change. Similar to ATP 1.1, this section is still at the theoretical level, where students learn about the environment's classification and characteristics through pictures, diagrams, or simple digital maps. The supplementary teaching materials at this stage do not yet include the context of local wisdom. Still, they serve as an essential foundation for developing analytical skills in the next stage.

In ATP 1.3, the integration of aspects of Bajulan local wisdom begins. The discussion of environmental benefits not only covers ecological and economic functions but also the socio-cultural values inherent in local community practices. One example used is the traditions of Sowan Punden, Ruwat Sumber, and Bersih Desa, which reflect the wise and sustainable use of the environment. These traditions serve as concrete illustrations that environmental conservation cannot be separated from the community's social and spiritual values. Through this approach, students are expected to understand that environmental benefits are not merely physical functions, but also sources of cultural value and identity.

In section ATP 1.4, we enter the application stage, where students learn to apply environmental concepts to analyse fundamental problems in their area. In the context of Bajulan, learning is directed towards recognising the community's role in preserving the environment and the meaning of environmental preservation through a series of traditions with implications for forest conservation. These traditions contain values of respect for nature and a collective understanding of ecosystem balance. In the digital teaching material supplement, the content is presented in the form of case studies or documentary videos that illustrate how local values can be applied in environmental conservation actions. Thus, the integration between ecological aspects and local wisdom is not only conceptual but also applicable and contextual.

Finally, ATP 1.5 emphasises students' critical thinking skills in analysing environmental conditions and finding locally based solutions. At this stage, aspects of Bajulan local wisdom are integrated to enrich analytical learning. For example, Ruwat Sumber is used as a concrete example in analysing water quality and community behaviour towards the environment. Through this approach, students not only assess environmental conditions using scientific data but also understand the cultural values underlying these conservation practices. This integrative approach supports the principle of ecopedagogy, environmental education that combines ecological awareness and human values, and strengthens environmental awareness.

Discussion

1. Needs Analysis

The study's findings confirm that, in the needs analysis conducted at SMAN 3 Nganjuk for students in Class XI in geography students, it is crucial to develop digital teaching materials based on local wisdom to address the limitations of conventional learning media in schools. Observations show that student boredom with printed teaching materials demands contextual technology-based innovation (Rasyida et al., 2023). Previous research by Sumarmi (2021) also confirms that digital teaching materials that integrate local cultural values have been proven to increase student motivation and conceptual understanding. In the context of Bajulan Traditional Village, values such as environmental preservation, cooperation, and social harmony can be used as a basis for developing learning content that fosters environmental awareness.

Students' preference for digital media such as videos, animations, and educational games indicates that 21st-century learning needs to adapt to the characteristics of the digital native generation (Hakiki et al., 2023). According to Oktavianty (2022), interactive media-based teaching materials are more effective in increasing student participation and engagement than conventional media. In this case, the design of digital teaching materials based on local wisdom can combine interactive visual elements with Bajulan cultural content, such as water conservation practices, community forest management, or traditional rituals oriented towards natural balance.

In addition, the finding that students prefer material that is related to their daily lives and surrounding culture is in line with the principles of Contextual Teaching and Learning (CTL), which emphasises the importance of the relevance of material to the real-life experiences of learners (Perales & Ulla, 2025). This approach also supports culturally relevant pedagogy (Lim et al., 2019), in which the integration of local culture can increase a sense of belonging to the learning community. In the context of geography, the local

values of Bajulan, which reflect traditional ecological knowledge, can enrich students' understanding of the human-environment relationship.

Furthermore, the low level of environmental awareness found in this study indicates the need for learning that instills the values of ecopedagogy, namely, education oriented towards ecosystem preservation (Misiaszek, 2023). Through the combination of technology and local wisdom, digital teaching materials can be a means of shaping ecological attitudes and environmentally conscious character. These findings support the results of research by Supartono (2024), which shows that integrating local cultural values in digital media can strengthen students' cultural literacy and ecological awareness.

Overall, the needs analysis confirms that the development of Bajulan local wisdom-based digital teaching materials is of high urgency in responding to the challenges of 21st-century learning. The results of the needs analysis show that students and teachers need learning resources that are not only modern and interactive, but also culturally relevant. Thus, the design of these digital teaching materials based on local wisdom is expected to foster meaningful, context-based geography learning and to contribute to the preservation of cultural and environmental values at the regional and national levels.

2. Concept Analysis

The results of the content analysis show that (*Alur Tujuan Pembelajaran*/ATP) structure in the 'Environmental Conservation' sub-section of the class XI Geography curriculum can be divided into two main phases: the theoretical phase (ATP 1.1–1.2) and the integrative phase (ATP 1.3–1.5). This study contributes to the theory of contextual instructional design by demonstrating that the integration of local wisdom can be systematically organised within the ATP structure, so that local culture functions not merely as an illustration of the subject matter, but as a primary source of knowledge in the design of environment-based geography learning. As illustrated in the following conceptual framework table for ATP integration.

Table 6. Conceptual framework for ATP integration

Phase	ATP Stage	Learning Focus	Integration of Local Wisdom	Learning Outcomes
Theoretical	ATP 1.1-1.2	Concepts of the environment and ecosystems	Not yet directly integrated	Ecological literacy
Integrative	ATP 1.3-1.5	Context-based conservation	*Sowan punden, ruwat sumber, bersih desa*	Environmental awareness and ecological character

The theoretical phase in stages ATP 1.1–1.2 serves to instil ecological literacy, such as a basic understanding of environmental and ecosystem concepts. Conversely, the integrative phase, covering stages 1.3–1.5, aims to link this scientific understanding to the cultural and social context of the local community in the Bajulan Traditional Village, such as through integration into traditional ceremonies like *sowan punden, ruwat sumber and bersih desa*, which will foster environmental awareness and ecological character in the pupils. This division into two phases aligns with the progressive principle in contextual learning, namely moving from conceptual understanding towards contextual application (Herman et al., 2025).

2.1 Theoretical Phase (ATP 1.1–1.2): Establishing a Scientific Foundation

The Theoretical Phase in ATP 1.2 and 1.2 focuses on conceptual understanding of the environment, ecosystems, and types of living environments. This learning is oriented towards strengthening basic ecological literacy that is universal in nature. The results of the study show that at this stage, teachers use a descriptive-conceptual approach, using digital media such as images, videos, and simple simulations to clarify relationships among environmental components. This type of learning is essential for shaping students' scientific thinking frameworks before they enter into socio-cultural analysis (Hassan, 2023).

This theoretical phase is in line with the principles of the environmental literacy framework (Eren et al., 2025), which emphasises that an understanding of ecology must be established before engaging students in complex environmental issues. In other words, understanding ecological systems is a prerequisite for local wisdom-based learning, because without a clear conceptual framework, students will find it challenging to interpret cultural practices as ecological adaptations.

2.2 Integrative Phase (ATP 1.3–1.5): Strengthening Contextual and Cultural Values

The results of the study show that environmental conservation material began to be directly linked to the local wisdom values of the Bajulan community, such as tandur bebarengan, nyadran alas, and bersih sendang. At this stage, learning shifted from concept-driven to context-driven, where students not only understood the theory but also saw how cultural values shaped the community's ecological behaviour (Damien et al., 2026).

This approach is in line with the concept of Contextual Teaching and Learning (CTL), which emphasises the importance of linking academic material to the real-life experiences of students (Perales & Ulla, 2025). By integrating local values, learning becomes more meaningful because students can relate geographical concepts such as conservation, ecosystems, and sustainability to the socio-cultural practices they are familiar with. In the context of Bajulan, for example, the tradition of tandur bebarengan not only reflects cooperation, but also reflects the community's adaptation to ecological conditions and natural cycles.

Furthermore, this integrative phase reinforces the ecopedagogy approach, an educational paradigm that combines ecological awareness, human values, and social action (Rodrigues, 2018). When students learn through cultural narratives such as nyadran alas, they not only understand the scientific function of forests but also internalise the ecological ethical values held by the Bajulan community: respecting nature as a living entity whose balance must be maintained. This approach shifts learning from a purely cognitive orientation to affective and ethical dimensions. This is important for building a sustainable environmentally conscious character, as emphasised by Mislikhah (2020) in her research on character education based on local wisdom in East Java.

Overall, the findings of this study demonstrate a systematic effort to integrate the local cultural values of the Bajulan community into the structure of the Geography (*Alur Tujuan Pembelajaran*/ATP), rather than merely treating local culture as a supplement or additional example in the learning process. The uniqueness of this study lies in the integration of digital teaching material development, an environmental conservation approach, and the local wisdom of indigenous communities within a single contextual learning framework. This approach positions local wisdom as a substantive source of knowledge in geography education, thereby having the potential to strengthen ecological literacy and foster an environmentally conscious character in students.

Conclusion

The research findings indicate that the need for digital teaching materials based on local wisdom is not only linked to innovation in learning media, but also reflects the importance of geography teaching that is more contextual and meaningful for pupils. The limitations of conventional media mean that learning is less able to connect geographical concepts with the social and cultural realities of the students' immediate environment. Therefore, the integration of digital technology with local cultural values is a relevant strategy for enhancing learning engagement, environmental awareness, and students' connection to their local culture.

Furthermore, the results of the content analysis indicate that the structure (*Alur Tujuan Pembelajaran*/ATP) in the Environmental Conservation module holds strong potential for integration with the local wisdom of the Bajulan Traditional Village community. Traditions such as sowan punden, ruwat sumber, and bersih desa not only represent local culture but also embody ecological values that align with environmental conservation concepts in geography education. These findings confirm that local wisdom can be positioned as a source of contextual knowledge in learning, rather than merely a supplement to the curriculum. This study also implies that teachers can utilise local culture as a learning resource to create more relevant and participatory learning experiences.

This study is still limited to the needs analysis and content analysis stages and has not yet progressed to the development and testing of the effectiveness of digital teaching materials. Therefore, further research is recommended to develop and test the effectiveness of digital teaching materials based on local wisdom on student learning outcomes, ecological literacy, and environmental awareness.

References

B. Miles, M., & Huberman, A. M. (1994). *Qualitative Data Analysis*. California: SAGE Publications Ltd.

Damien, J., Makanga, M., Serge, G., Minton, G., Akendengue, I., Collins, T., … Ridoux, V. (2026). *Socio-cultural and operational determinants of local ecological knowledge on cetaceans among artisanal fishing communities in Gabon : Implications for marine governance*. *191*(April).

Darmadi, H. (2018). Educational management based on local wisdom (descriptive analytical studies of culture of local wisdom in west kalimantan). *Journal of Education, Teaching and Learning*, *3*(1), 135–145.

Darmastuti, R., Purnomo, J. T., Utami, B. S., & Yulia, H. (2019). Literasi media berbasis kearifan lokal pada masyarakat bali. *Jurnal Studi Komunikasi*, *3*(3), 402–423.

Eloranta, V., Hakanen, E., & Shaw, C. (2024). *Teaching for paradigm shifts : Supporting the drivers of radical creativity in management education*. *45*(September).

Eren, R., Ulutas Deniz, E., & Sozen Sahne, B. (2025). Environmental Sustainability and Student Pharmacist: The Mediating Role of Environmental Health Literacy Between Green Self-Efficacy and Environmental Attitude. *American Journal of Pharmaceutical Education*, *89*(11), 101878. https://doi.org/https://doi.org/10.1016/j.ajpe.2025.101878

Hakiki, A. R. R., Bachri, S., & Mkumbachi, R. L. (2023). Pengembangan Media Pembelajaran Progressive Web App Berbasis Environmental Learning untuk Meningkatkan Ecoliteracy Siswa. *Jurnal Pendidikan Ilmu Pengetahuan Sosia*, *10*(1), 1–20. Retrieved from http://ejournal.uin-malang.ac.id/index.php/jpips

Hassan, O. A. B. (2023). Social Sciences & Humanities Open Dyslexia and learning in

view of the socio-cultural theory and development psychology. *Social Sciences & Humanities Open*, *8*(1), 100718. https://doi.org/10.1016/j.ssaho.2023.100718

Herman, K. C., Wiedermann, W., & Reinke, W. M. (2025). Conceptual and methodological advances for understanding contextual, identity, and cultural effects in intervention research: The contextually informed research model. *Journal of School Psychology*, *113*, 101505. https://doi.org/https://doi.org/10.1016/j.jsp.2025.101505

Lim, L., Tan, M., & Saito, E. (2019). Culturally relevant pedagogy: Developing principles of description and analysis. *Teaching and Teacher Education*, *77*, 43–52. https://doi.org/https://doi.org/10.1016/j.tate.2018.09.011

Misiaszek, G. W. (2023). *Ecopedagogy and ecopedagogical literacy* (R. J. Tierney, F. Rizvi, & K. B. T.-I. E. of E. (Fourth E. Ercikan, eds.). Oxford: Elsevier. https://doi.org/https://doi.org/10.1016/B978-0-12-818630-5.01088-5

Mislikhah, S. (2020). Pendidikan karakter berbasis kearifan lokal. *FALASIFA: Jurnal Studi Keislaman*, *11*(2), 17–34.

Musthofa, M. S., & Khowim, I. (2023). Pemberdayaan Masyarakat Desa Bajulan Melalui Optimalisasi Potensi Pertanian Dan Kekayaan Alam. *Ngaliman: Jurnal Pengabdian Kepada Masyarakat*, *2*(1), 46–56. Retrieved from http://ejurnal.iaipd-nganjuk.ac.id/index.php/ngaliman/article/download/646/406

Mutia, T., Aliman, M., & Sumarmi, S. (2023). Environmental Care Education: Utilization Of Forest Resources Based On Awiq-Awiq Local Wisdom. In *Atlantis Press* (pp. 372–383). Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-168-5_33

Mutia, T., Sumarmi, Budijanto, Bachri, S., Komang Astina, I., & Aliman, M. (2019). Local wisdom in Indonesia's customary forest management: Case studies in Sasak, Bali Aga and Minangkabau. *Ecology, Environment and Conservation*, *25*(3), 1077–1083.

Oktavianty, V., Hairida, H., Muharini, R., Masriani, M., & Lestari, I. (2022). Pengembangan Suplemen Bahan Ajar Berbasis Kearifan Lokal pada Materi Bioteknologi Konvensional. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(5), 6715–6723. https://doi.org/10.31004/edukatif.v4i5.3285

Perales, W., & Ulla, M. B. (2025). Technology in EFL contextual teaching and learning : Teachers ' practices and perspectives in a Thai university. *Heliyon*, *11*(17), e44169. https://doi.org/10.1016/j.heliyon.2025.e44169

Perkins, H. (2024). Beyond techno-solutionism : Towards critical perspectives in environmental education and digital technology . A critical-hermeneutic review. *International Journal of Child-Computer Interaction*, *42*(October), 100705. https://doi.org/10.1016/j.ijcci.2024.100705

Rahardjanto, A., Hudha, A. M., & Permana, T. I. (2025). Ecocultural practices in East Java , Indonesia : A hermeneutic phenomenological study on " Reresik Kali " as local wisdom for river conservation. *Social Sciences & Humanities Open*, *12*(November), 102176. https://doi.org/10.1016/j.ssaho.2025.102176

Rasyida, R., Ali Nurdin, E., & Rasim. (2023). Pembelajaran Berbasis Metaverse – Virtual Reality Menggunakan Spatial.io dengan Model Discovery Learning untuk Meningkatkan Pemahaman dan Minat Siswa . *Jurnal Pendidikan Tambusai*, *7*(2), 15875–15883.

Rodrigues, C. (2018). MovementScapes as ecomotricity in ecopedagogy. *Journal of Environmental Education*, *49*(2), 88–102. https://doi.org/10.1080/00958964.2017.1417222

Setiawati, R., Ningsih, E. S., & Lukitoaji, B. D. (2025). Inovasi Pembelajaran Digital : Solusi Mengatasi Keterbatasan Pendidikan di Daerah Terpencil. *BASICA ACADEMICA: Jurnal Pendidikan Anak Sekolah Dasar*, *1*(1), 53–59.

South, G., & Qiu, Y. (2025). Techno-optimism in the face of the digital divide : A systematic review on using mobile technologies for children ' s environmental

learning in the. *International Journal of Child-Computer Interaction*, *46*(November), 100786. https://doi.org/10.1016/j.ijcci.2025.100786

Sumarmi, Aliman, M., & Mutia, T. (2021). The Effect Of Digital Eco-Learning In Student Worksheet Flipbook To Environmental Project Literacy And Pedagogic Competency. *Journal of Technology and Science Education*, *11*(2), 357–370. https://doi.org/10.3926/jotse.1175

Supartono, A. R., Dwirizki, A., Irsyam, N. M. W., Suseno, B. R., Gatra, P., & Fonseca, B. (2024). Spiritualitas dalam Perspektif Pembangunan (Studi Kasus: Beberapa Daerah di Indonesia). *Syntax Literate ; Jurnal Ilmiah Indonesia*, *9*(5), 2952–2969. https://doi.org/10.36418/syntax-literate.v9i5.15233

Syafani, S. R. (2023). The Implementation of Interactive E-Books Based on Local Wisdom in Learning Biographical Texts. *Journal of Education and Humanities*, *1*(2), 16–22.

Wibowo, Sumarmi, N. A., Wulandari, F., Benardi, A. I., & Anindhyta, C. (2025). Pemanfaatan Teknologi Pembelajaran Dilihat Dari Perspektif Aksiologi Geografi. *Jurnal PIPSI: Jurnal Pendidikan Ilmu Pengetahuan Sosial Indonesia*, *10*, 73–82.