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Cultural Intelligence Meets EdTech: A Systematic Review on Integrating Local Wisdom into Digital Teaching to Foster Learning Engagement

Bening Mujianti Rahayu*, Asep Muhyidin, & Ujang Jamaludin

Doctoral Education, Universitas Sultan Ageng Tirtayasa, Indonesia

*Corresponding email: 7782230023@untirta.ac.id

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Abstract: Cultural Intelligence Meets EdTech: A Systematic Review on Integrating Local Wisdom into Digital Teaching to Foster Learning Engagement. Objectives: The advancement of educational technology has driven the emergence of innovative approaches that combine cultural intelligence with the use of digital technology in learning processes. This study aims to explore and map trends, types, and the impact of digital teaching materials based on local wisdom on student learning engagement. **Methods:** The research was conducted using a systematic literature review method with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach. The inclusion criteria include: (1) articles published between 2019–2024; (2) peer-reviewed journals and indexed proceedings; (3) relevant topics; (4) scientific research articles; and (5) written in international languages such as English. **Findings:** The findings show an increasing trend of publications in the last decade, particularly on culturally based learning using interactive digital media. Three main types of digital teaching materials identified include audio (such as narrations of local legends), visual (such as cultural infographics), and audio-visual (such as traditional animation videos). Synthesizing the findings across studies, these culturally grounded materials significantly enhance cognitive engagement by deepening conceptual understanding, strengthening affective engagement through the reinforcement of cultural identity and emotional connection, and supporting psychomotor engagement by fostering practice-based learning tied to local traditions. Implications for practice and policy include the need to support the dissemination of culture-based digital materials, prioritize the development of immersive audio-visual media, and promote learning designs that enhance cognitive, emotional, and practical student engagement. **Conclusion:** The review highlights that local wisdom, when effectively embedded into digital media, serves not only as an instructional aid but also as a cultural bridge that deepens student involvement and relevance in learning. Integrating culturally responsive content in digital formats enables educators to design more authentic and impactful learning experiences.

Keywords: local wisdom, digital teaching materials, learning engagement, a systematic literature review.

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INTRODUCTION

Over the last few decades, technology has changed the way people think about education in ways that were once hard to imagine. Digital platforms are no longer just supporting tools for teachers; they have become central to how knowledge is shared and experienced. With the help of these innovations, learning feels more open, more interactive, and better able to meet the diverse needs of today's students (Fajari &

Meilisa, 2022). Many scholars even argue that this shift represents one of the main strategies to prepare schools and universities for the realities of the 21st century (Chamdani et al., 2022). One of the benefits is the ease of accessing materials online. Students are no longer limited to the classroom but can study whenever and wherever they choose (Fajari et al., 2020; Nasution & Batubara, 2021). Another strength is the use of multimedia elements: videos, images, and animations that make abstract or difficult concepts easier to understand while also keeping students curious and engaged (Djono et al., 2024).

However, there are many challenges faced when implementing digital learning. One of which is that digital learning resources are not contextual or related to everyday life (Ramdiah et al., 2020). Many materials are designed to fit everyone, like a "one-size-fits-all" approach, but in doing so, they often skip over the local stories, traditions, and values that really help students understand themselves (Rosala & Budiman, 2020). When these cultural pieces are missing, it is easy for students to feel disconnected from what they learn. It can cause students have lack motivation, be passive in learning, and can not relate the lesson to their daily life (Brown et al., 2020; Longinou, 2020).

Education cannot be separated from culture. Based on UNESCO's Education 2030 Agenda, it is important to integrate local knowledge into classrooms to create learning that's inclusive, fair, and sustainable (UNESCO, 2016). The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) echoes this idea, reminding us that indigenous communities have every right to keep teaching their languages, heritage, and traditional ways of knowing through schools (UNDRIP, 2007). When lessons include indigenous perspectives, students not only have better scores, but they feel more rooted in their culture, they connect more with others, they care more about the environment, and they tend to participate more actively in class (Bhaw et al., 2025; Jilcha et al., 2025; Pawilen, 2021). Teaching that respects local culture will preserve cultural heritage while making learning more effective.

This aligns with the idea of Cultural Intelligence, or CQ (Gokalp, 2022). In simple terms, CQ is the ability to read cultural situations and respond wisely. It combines knowledge, reflection, motivation, and behavior to assist people in navigating diversity. By weaving local wisdom into digital lessons, educators can help students build CQ naturally (Basman & Bayram, 2024; Sternberg et al., 2022). They not only understand their culture better but also start seeing and respecting others' cultures. When teaching materials integrate local stories, customs, or familiar values, students are encouraged to reflect on their roots while also learning how to appreciate cultural differences (Gokalp, 2022; Kaya, 2022). This balance helps them connect local insights with global perspectives, promoting open-mindedness and flexible ways of thinking (Sternberg et al., 2022).

Given these realities, weaving local wisdom into digital education is often seen as one of the most effective solutions. Local wisdom, passed down from one generation to the next, contains the values, habits, and practices that shape the everyday lives of communities (Syamsi & Tahar, 2021). If such wisdom becomes part of instructional design, learning materials will feel more relevant and relatable for students (Asrial et al., 2022; Rasyid et al., 2023). Beyond academics, it also supports character formation, builds a sense of belonging, and safeguards cultural identity (Constantinus et al., 2009).

UNESCO's Education 2030 Framework for Action emphasizes how digital tools can help make learning more inclusive and sustainable. In Indonesia, the *Merdeka Belajar* program has a similar goal. It encourages teachers and schools to use e-learning, digital content, and even AI to

make lessons more engaging. Studies show that when digital transformation is done thoughtfully, it really can improve education quality. Salikhova et al. (2020) point out that technology gives students flexibility, letting them study on their own but also interact with others in the process. Syaputra & Hasanah (2022) add that digital learning opens doors to more resources, gives more chances to collaborate, and makes learning richer thanks to multimedia.

However, student engagement is still a problem, and integrating the technology in learning does not automatically make students more interested or motivated. Research by Þimþek & Yazýcý (2021) found that students in digital learning environments tend to experience decreased engagement compared to face-to-face methods, especially when learning materials are unengaging and do not accommodate individual needs. Another contributing factor is the lack of personalized content and limited social interaction in online learning environments (Rice & Ortiz, 2021). Moreover, currently available digital teaching materials still lack integration of local wisdom elements. Most digital content is universal and does not account for cultural contexts or local values relevant to students (Setiawan et al., 2017). This can lead to a reduced sense of ownership of the learning materials and decreased connection between learning and students' real lives (Aini & Yanti, 2023).

Culturally relevant content functions as a powerful pedagogical strategy to address the well-documented challenges of learner disengagement in digital environments. Theoretical frameworks such as culturally responsive teaching (Christensen & Knezek, 2025) and funds of knowledge argue that when learning materials reflect students' cultural backgrounds, everyday experiences, and community values, learners are more likely to perceive the content as meaningful and personally relevant (Kaya, 2022). This relevance fosters affective engagement by affirming identity, building emotional connection, and creating a sense of belonging in the learning process. When lessons touch on things students already know from their daily life or culture, they tend to stay more focused because the material feels familiar and easier to connect with. This connection does not just help them understand new ideas more clearly—it also gives the learning process a personal meaning. On top of that, students usually show more energy and persistence when they see their own world reflected in what they are studying. In digital classrooms, where many learners often feel distant or disconnected, bringing in elements of local wisdom can make a big difference. It adds a sense of closeness, softens the feeling of isolation, and makes online learning warmer and more inclusive (Basman & Bayram, 2024; Sternberg et al., 2022)

Many studies revealed that integrating local culture into lessons can improve a student's sense of belonging and make them more willing to engage deeply with the material. However, despite growing interest in this area, there is still a lack of systematic evidence regarding how local wisdom-based digital teaching materials are developed, categorized, and evaluated for their impact on learning engagement. Existing research tends to focus on localized practices or individual case studies, with limited comprehensive synthesis. This research gap underscores the need for a structured review to map current developments, classify emerging approaches, assess pedagogical impact, and identify policy-level implications of culturally responsive digital materials.

Systematic research plays an important role in analyzing various studies related to the use of local wisdom-based digital teaching materials. This review not only identifies trends and patterns in the development of digital teaching materials but also evaluates their effectiveness. Therefore, this study aims to conduct a systematic review of

various studies discussing the role of digital teaching materials based on local wisdom in enhancing learning engagement by identifying the types of materials developed, analyzing their effectiveness in learning, revealing implementation challenges and opportunities, and providing evidence-based recommendations for more contextual and effective digital teaching material development. Therefore, this study addresses the following research questions:

1. What are the current trends in the development and publication of digital teaching materials based on local wisdom?
2. What types of digital teaching materials based on local wisdom have been identified in recent research?
3. How do local wisdom-based digital teaching materials impact students' learning engagement in cognitive, affective, and psychomotor domains?
4. What are the implications of integrating local wisdom into digital teaching materials for educational practice and policy development?

METHOD

Research Design

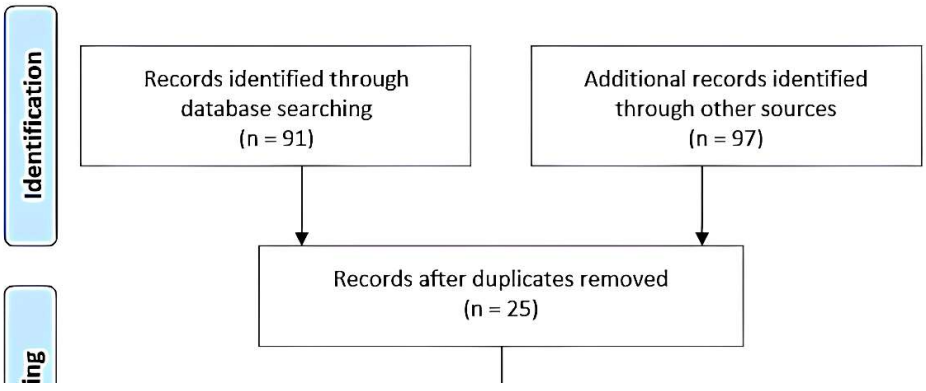
This study used a Systematic Literature Review (SLR) to dig into the research topic. Basically, SLR is a structured way to find, assess, and put together relevant studies while keeping everything clear and repeatable. It is like having a roadmap: you decide what counts, what does not, and then carefully look for patterns, trends, and main findings without letting personal bias creep in. SLR was chosen to ensure the study accurate and credible, especially when tracking digital learning materials that integrate local wisdom affect student engagement over time.

Students' engagement in this study refers to how students engage mentally, emotionally, and physically in learning. This follows Fredricks et al. (2004), who divide engagement into three types: cognitive engagement, which is all about the mental effort students put in to understand and master content; affective engagement, which covers feelings, interest, and attitudes toward learning; and psychomotor engagement, meaning the actual hands-on practice and physical actions that support learning.

Search Strategy

For gathering the studies, the PRISMA framework was used. Think of PRISMA as a guide that keeps the search transparent, consistent, and easy to replicate. It significantly contributes to ensuring the research is credible and the results gathered are robust.

To provide a clearer understanding of the paper selection process, the PRISMA diagram (Figure 1) demonstrates each step of how studies were screened, included, or excluded.



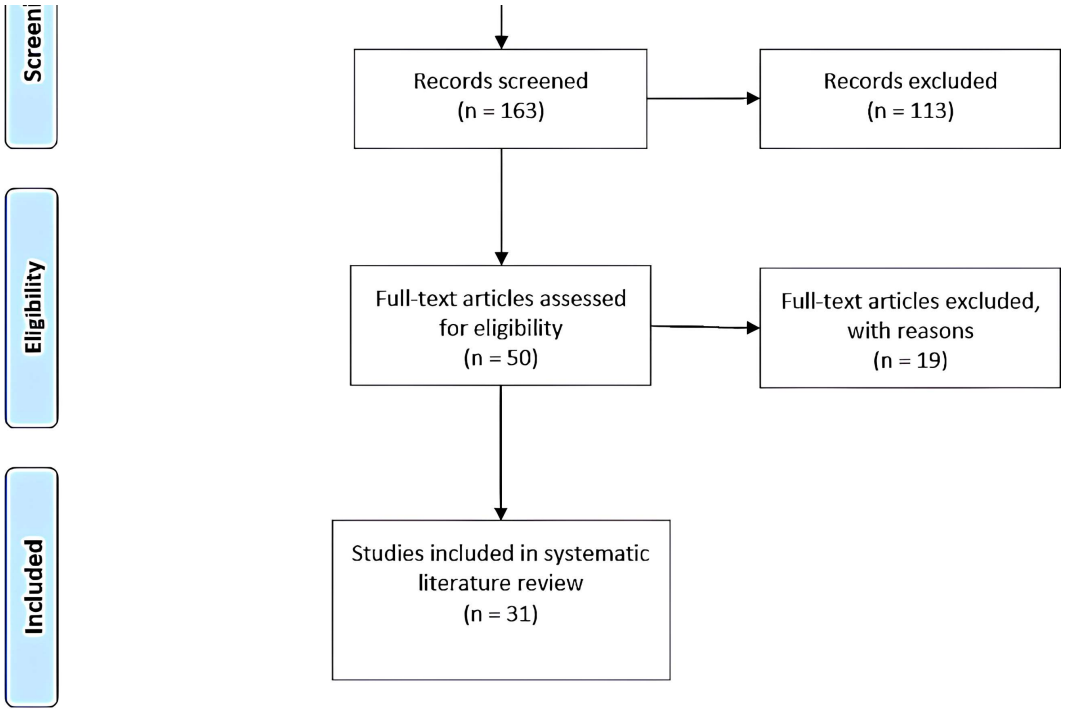


Figure 1. PRISMA diagram

Finding the right studies was not just a matter of typing a few words into a database. Boolean Operators were used to combine keywords carefully to focus on three main areas: local wisdom, digital learning materials, and student engagement. Some of the main terms included "local wisdom," "indigenous knowledge," or "traditional knowledge," paired with "digital teaching materials" or "digital learning resources," and then "learning engagement" or "student engagement." The terms like "cultural knowledge," "e-learning," and "technology-enhanced learning" were added. The searches were carried out across several major databases: Scopus, Web of Science, Google Scholar, ScienceDirect, and ERIC. Furthermore, the recurring terms were visualized using a word cloud, which helped us quickly spot patterns and trends in how local wisdom appears in digital learning materials.

Table 1. Summary of reviewed articles

No	Name	Year	Sample	Level	Method	Index	CASP Score	Quality Rating
1	Guslinda et al. (2024)	2024	10	Primary School	Research and Development	Scopus Q1	17	High
2	Tiyasmala, Andayani & Anindyarini (2023)	2023	30	Senior High School	Descriptive Qualitative	Scopus Q2	15	Medium
3	Suhartiningsih et al. (2024)	2024	30	Primary School	Research and Development	SINTA 2	16	High
4	Damayanti, Basuki & Hartiningsari (2024)	2024	22	University	Descriptive Qualitative	SINTA 2	14	Medium

5	Rahmawati, Margunayasa & Lasmawan (2024)	2024	20	Primary School	Research and Development	SINTA 2	16	High
6	Ramadhan et al. (2022)	2022	30	Senior High School	Research and Development	SINTA 2	16	High
7	Wewengkang et al. (2024)	2024	120	Senior High School	Research and Development	SINTA 2	17	High
8	Sarip, Ilham & Hendrawanto (2022)	2022	100	University	Mixed Method	SINTA 2	17	High
9	Rahmawati & Purwanti (2025)	2025	28	Primary School	Research and Development	SINTA 2	16	High
10	Yonanda et al. (2023)	2023	68	Primary School	Quasi Experiment	SINTA 2	17	High
11	Asrial et al. (2022)	2022	44	Primary School	Survey Quantitative	SINTA 2	15	Medium
12	Udiyana, Arnyana & Astawan (2022)	2022	36	Primary School	Research and Development	SINTA 2	16	High
13	Sriyanti et al. (2021)	2021	70	Senior High School	Research and Development	SINTA 2	16	High
14	Wibowo et al. (2023)	2023	10	Junior High School	Descriptive Qualitative	SINTA 2	14	Medium
15	Fitria et al. (2024)	2024	18	Primary School	Research and Development	SINTA 2	16	High
16	Daulay & Asrizal (2024)	2024	72	Senior High School	Research and Development	SINTA 2	17	High
17	Suherman (2021)	2021	23	Primary School	Education Design Research	SINTA 3	14	Medium
18	Malihah, Juansah & Yuhana (2024)	2024	30	Primary School	Research and Development	SINTA 3	15	Medium
19	Daryanti et al. (2024)	2024	40	University	Research and Development	SINTA 3	15	Medium
20	Latifah, Sulistyorini & Sumarti (2024)	2024	60	Primary School	Research and Development	SINTA 3	16	High
21	Damayanti, Handoyo & Suratno (2022)	2022	40	Primary School	Research and Development	SINTA 3	15	Medium
22	Santosa, Basuki & Puspita (2019)	2019	45	Primary School	Quasi Experiment	SINTA 3	16	High
23	Erawati & Rahmayanti (2021)	2021	15	Senior High School	Education Design Research	SINTA 3	14	Medium
24	Sofiyah, Suwandayani &	2025	30	Primary School	Descriptive Qualitative	SINTA 3	15	Medium
25	Indriyani, Kurniawati & Ramadhan (2023)	2023	118	Junior High School	Survey Quantitative	SINTA 3	17	High
26	Khosi'in et al. (2024)	2024	8	Junior High School	Case Study Qualitative	SINTA 4	12	Medium
27	Lase et al. (2022)	2022	5	Senior High School	Descriptive Qualitative	SINTA 4	10	Low
28	Ottu, Yundayani & Djahimo (2024)	2024	60	Junior High School	Descriptive Qualitative	SINTA 4	13	Medium
29	Hanifah, Suseno & Anwar (2022)	2022	15	Primary School	Quasi Experiment	SINTA 4	13	Medium
30	Hulu et al. (2024)	2024	30	Senior High School	Research and Development	SINTA 4	13	Medium
31	Adam et al. (2024)	2024	60	Junior High School	Descriptive Qualitative	SINTA 5	11	Medium

Inclusion and Exclusion Criteria

Not every paper met the criteria. Careful inclusion and exclusion rules were applied to ensure the studies analyzed were both relevant and credible. The included studies were published between 2019 and 2024, recent enough to reflect the latest trends, including the global push from SDG 4 and national moves toward digital learning. Only peer-reviewed journal articles from Scopus, Web of Science, ScienceDirect, ERIC, or Google Scholar made it in, along with selected reputable conference papers. Crucially, the studies had to examine how local wisdom was integrated into digital teaching resources and how this affected student engagement. They also needed to follow recognized research designs: quantitative, qualitative, mixed methods, or R&D. For practical reasons, only publications in widely recognized academic languages, especially English, were considered.

On the other hand, we left out studies that did not meet these standards. Publication outside the 2016–2024 period was ignored, as were non-scholarly sources like blogs, opinion pieces, or unpublished reports. Studies that did not focus on digital resources with local wisdom or on student engagement were excluded. Conceptual works, such as reviews, bibliometric studies, meta-analyses, purely theoretical papers, or editorials, were also set aside. Likewise, studies written in languages rarely used in international academia were left out.

Data Analysis

After selecting 31 studies, we dove into the analysis using a thematic synthesis approach. First, we carefully extracted important details: publication year, country, research goals, methods, types of digital resources, ways local wisdom was included, and the effects on students' engagement in cognitive, emotional, and physical domains. Three researchers coded the data independently at first. Later, they discussed emerging themes together to ensure consistency and reduce bias. We organized the findings by types of digital resources like audio, visual, and audio-visual and then examined how each type affected different engagement dimensions. Through multiple rounds of comparison and refinement, three main themes emerged: (1) categories of digital teaching resources incorporating local wisdom, (2) their influence on cognitive, emotional, and psychomotor engagement, and (3) implications for curriculum, teacher development, and policies supporting cultural preservation in tech-enhanced learning.

Finally, we checked the quality of each study using a modified CASP (Critical Appraisal Skills Programme) checklist. This checklist was tailored to handle qualitative, quantitative, and mixed-method studies. It looked at several things: clarity of aims, appropriateness of methods, transparency in data collection and analysis, ethical considerations, and validity of results. To make sure the scoring was fair, two reviewers independently rated each study, discussing and resolving any disagreements together. The table below shows the modified CASP scoring criteria we used for this review.

Scoring per domain:
0: Not met
1: Partially met
2: Fully met
Total domains assessed = 10 '! Maximum possible score = 20

Table 2. CASP scoring criteria

Quality Rating	Score Range	Category	Description
High	16–20	High Quality	The study meets most or all methodological rigor criteria with strong reliability.

Medium	11–15	Medium Quality	The study meets several quality criteria but shows some methodological limitations.
Low	≤10	Low Quality	The study has multiple methodological weaknesses and limited reliability.

RESULT AND DISCUSSION

Looking at the 31 studies collected from a variety of well-known national and international journals indexed by Scopus and SINTA among them, it is clear that the use of local wisdom in digital teaching materials is gaining momentum in Indonesia. The research shows a wide mix of methods, educational levels, and types of digital resources, but a common thread runs through them all: a serious effort to preserve local culture while leveraging technology for learning. Interestingly, primary school students make up the biggest group as participants, with 497 children involved. This suggests that innovations in digital teaching materials rooted in local wisdom are most commonly tested and applied at the elementary level. It seems like younger learners are at the forefront of experiencing how local culture can be woven into digital learning, making the lessons feel closer to their everyday lives.

Next, the senior high school level recorded 372 subjects, indicating that this topic is also relevant for students undergoing identity formation and cultural exploration. The junior high school level accounted for 256 subjects, showing continuity in integrating local values during the transition from primary to secondary education. Meanwhile, the higher education level recorded 162 subjects, suggesting that although smaller in proportion, local wisdom integration remains a concern in the development of tertiary education learning. Publication trends based on the number of subjects were present in Figure 2. Most of the research focusing on primary schools makes sense, considering that this stage is crucial for shaping students' cultural identity and character. According to psychosocial development theory (Bertling et al., 2016), being exposed to local values during childhood and early adolescence helps children build a positive sense of self and feel genuinely connected to their cultural roots.

Furthermore, the distribution of articles shows that in 2019, only one publication was found, indicating that the topic of integrating local

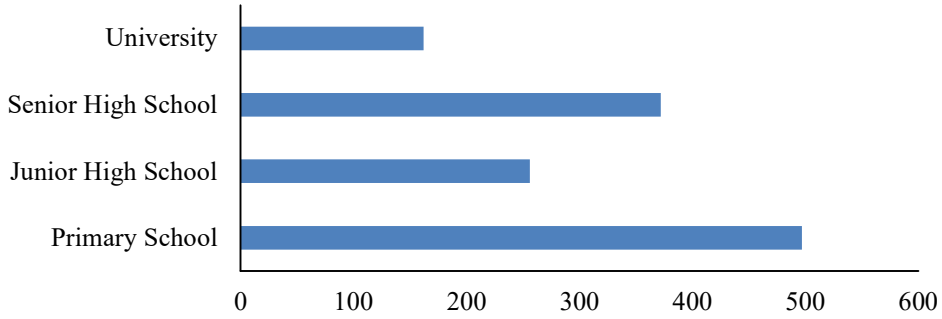


Figure 2. Publication trends based on the number of subjects

wisdom into digital teaching materials was still in its early development stage. No articles met the criteria in 2020, while 2021 began to show an increase with three articles, signaling growing interest in this theme. The trend continued to rise in 2022 with seven publications, then slightly declined in 2023 with four articles, but still indicated sustained interest. The year 2024 marked the peak of productivity with fourteen articles, reflecting a strong focus on educational

innovation based on cultural values. By mid-2025, two articles had been found, indicating that the trend is still ongoing and has the potential to continue growing. The growing trend in publications from 2021 to 2024 aligns with the global shift toward culturally responsive pedagogy and the increasing integration of digital tools in education post-COVID-19, which accelerated the adoption of e-learning innovations (Bitar & Davidovich, 2024). The number of publications by year can be seen in Figure 3.

Based on the indexing data of the articles in this systematic review, the majority were published in nationally accredited journals. The

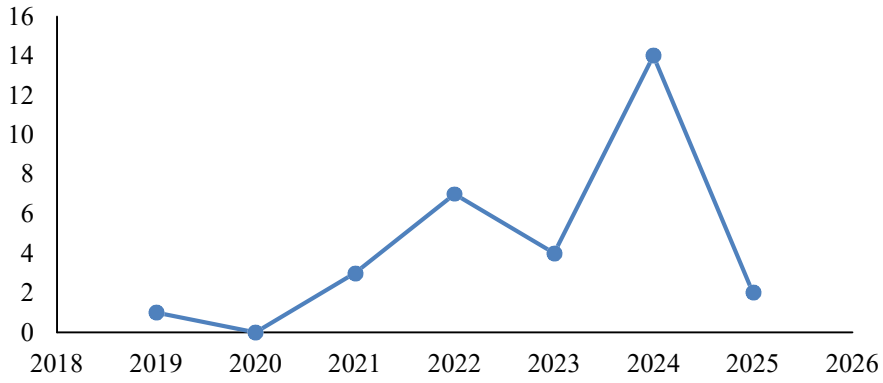


Figure 3. Number of publications by year

trend by article indexing can be seen in Figure 4. A total of 14 articles were published in journals indexed by SINTA 2, indicating a dominance of high-quality national research with a strong focus on the development of digital teaching materials based on local wisdom. Furthermore, nine articles were published in SINTA 3 journals, and five articles in SINTA 4 journals, reflecting significant contributions from various levels of nationally accredited journals in supporting this topic. Meanwhile, 1 article came from a SINTA 5 journal, suggesting that research from lower-accredited journals also contributes, albeit in smaller numbers. On the international front, only a couple of articles managed to appear in high-ranking Scopus journals, one in Q1 and another in Q2. This shows that global interest in weaving local wisdom into digital teaching materials is just beginning to emerge, though it is still quite limited. Most attention seems to be happening within Indonesia, but the potential for this topic to reach an international audience is definitely there. The fact that many studies are published in SINTA-indexed journals underlines Indonesia's commitment to embedding cultural values in education, reflecting priorities that are both locally relevant and nationally significant (Ariani et al., 2022).

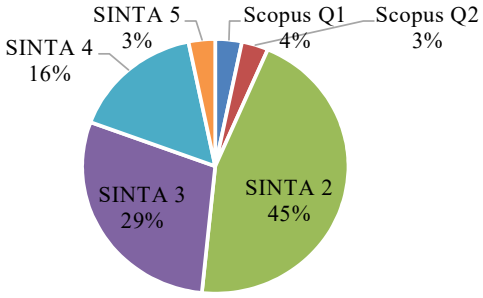


Figure 4. Trend by article indexing

Looking closer at the research designs, Research and Development (R&D) took the lead, appearing in 15 of the reviewed articles. The trend by research method can be seen in Figure 5. This suggests that many scholars are focused on creating, testing, and refining digital learning tools that incorporate local wisdom. Seven studies followed a Descriptive Qualitative approach, aiming to paint a detailed picture of how local knowledge is integrated, without changing the actual learning context. Quasi-experimental designs popped up in three papers, hinting at attempts to measure effectiveness more rigorously. Survey, Quantitative, and Educational Design Research appeared twice each, showing a mix of broad data collection and theory-driven development. Lastly, one study relied on a Case Study Qualitative approach and another on Mixed Methods, representing more targeted, comprehensive strategies. Looking at the bigger picture, it is clear that research and development (R&D) is not just happening for the sake of it there is a real drive to create practical, hands-on innovations that actually work in classrooms. This hands-on push fits neatly with the worldwide shift toward designing learning experiences that put users, in this case, students and teachers, at the center (Kazim et al., 2021).

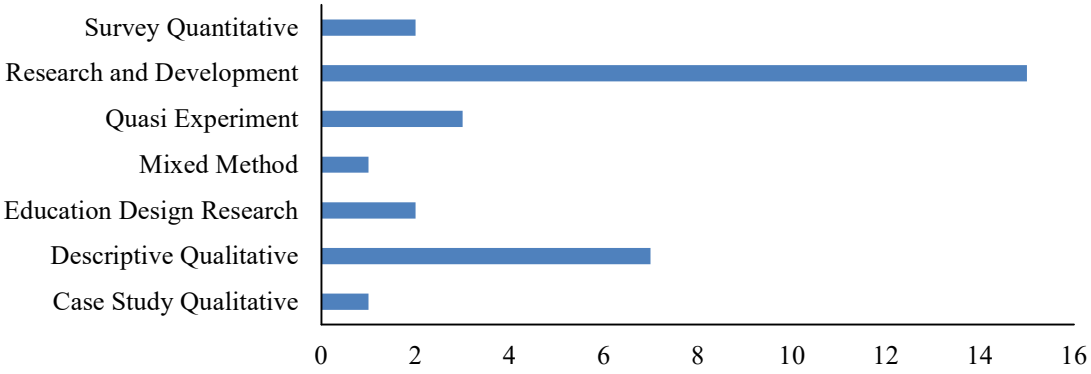


Figure 5. Trend by research method

Looking across the 31 studies, you get a sense of just how rich and varied local wisdom is throughout Indonesia. It is almost like a patchwork quilt of culture, environment, and social life. If you try to group it, three clusters stand out. First, Regional and Cultural Wisdom, this one takes center stage, with 18 studies exploring everything from folk tales and time-honored traditions to regional identities in spots like Banyuwangi, Tegal, Bondowoso, and Ternate. Some even dig into old relics, like Batu Lingga, or ancient manuscripts. Then comes Environmental and Ecological Wisdom, which pops up in nine studies. These focus on ways communities care for nature and keep agricultural practices alive, Ngubat Padi in Jambi, or culinary treasures like Nasi Peleng are prime examples. Some researchers also experiment with eco-friendly teaching methods. Finally, Social and Religious Wisdom appears in four studies, diving into family values, ethics, and spiritual teachings, including Islamic guidance, Pancasila-based approaches, and Ethno-PjBL methods.

Step back and look at the whole picture: this research is not just about cataloging traditions. It is about showing how culture, ecology, and ethics weave into daily learning, making knowledge tangible and alive. It also points to practical ways students can engage with environmental care, social ethics, and religious principles, while digital tools make the whole experience more interactive. It makes sense that regional and cultural topics take center stage; local languages, folklore, and traditions are easier to

adapt creatively into digital content for schools. Environmental and socio-religious knowledge, on the other hand, is often more abstract and layered, which makes it trickier to turn into engaging digital learning materials (Ramdiah et al., 2020; Tohri et al., 2022).

Figure 6. Trends in local wisdom studied

Types of Digital Teaching Materials Based on Local Wisdom

Lately, there has been a noticeable shift toward making learning more inclusive and closely connected to local culture. One way this happens is through digital teaching materials that carry local wisdom. Generally, these fall into three main buckets: audio-based, visual-based, and audio-visual. Each one opens a slightly different door for students to link technology with cultural knowledge. Audio-based media lean on sound to boost both language skills and cultural awareness. Think podcasts telling folk tales in regional dialects, readings from old manuscripts, chats with cultural experts, or performances of traditional poetry. These kinds of resources do not just deliver content, but they help students recognize the unique sounds of their community, maintain patterns, and preserve local linguistic identity (Abidinsyah et al., 2019; Yusuf, 2023).

Nowadays, teachers and students can create audio together with surprising ease. Platforms like Anchor and Soundtrap turn simple recordings into shared stories, podcasts, or cultural showcases. On top of that, modern text-to-speech tools that handle regional dialects are letting a richer variety of voices fill digital classrooms (Damayanti et al., 2022; Drew, 2017). Even AI-powered chatbots can now "speak" in local dialects, making interactions feel less robotic and more like a real conversation (Erawati, 2023; Widayanti et al., 2022).

Meanwhile, visuals tell culture through pictures, patterns, and design. Imagine a hero from a folktale popping off the page, a digital batik pattern swirling on screen, or a schematic of traditional architecture. Add ceremonial paintings or neat infographics condensing complex cultural facts, and suddenly learning becomes a feast for the eyes. Some innovators have even made interactive maps highlighting heritage sites or showing where traditions flourish (Constantinus et al., 2009; Guslinda et al., 2024). Comics are joining the scene too, playful, engaging, and informative all at once. With tools like Canva, Figma, or Adobe Illustrator, creators can design visuals that are not only attractive but they contain lessons about harmony, teamwork, and care for the environment (Kencana et al., 2024; Ottu et al., 2024; Yuliana et al., 2023).

Comics with cultural themes are popping up, too, adding fun to learning. Software like Canva, Figma, and Adobe Illustrator allows creators to craft visuals that not only look good but also communicate values like harmony, cooperation, and environmental respect (Damayanti et al., 2024; Satria et al., 2020). Some platforms go further, letting students tweak storylines based on values they choose, nudging them to think, reflect, and participate (Faldes Hulu et al., 2024; Khosi'in et al., 2024). Then there is cutting-edge tech, motion capture, or deepfakes that bring historical figures to life as narrators. It is not merely impressive; it resonates emotionally, thereby enhancing the retention of lessons (Indriyani et al., 2023). For instance, Schreiber et al. (2010) noticed that students tend to complete and retain content more when videos are short, well-paced, and visually engaging. Similarly, Shliakhovchuk & García (2020) also found that multimedia with cultural stories increased motivation and understanding, especially when students can see themselves in the narrative.

When engagement is measured, audio-visual formats often leave purely visual or audio-only materials behind. For instance, studies by Cevahir (2022) and Kaushal et al. (2020) showed stronger cognitive and emotional responses when learners interact with materials that combine animation, narration, and cultural storytelling. Seeing and hearing together improves focus, empathy, and memory, exactly what the Cognitive Theory of Multimedia Learning predicts (Pakpahan & Saragih, 2022). On the flip side, text-only or image-only materials can feel flat, failing to fully immerse learners or stir emotion (Laine et al., 2023). Every format has its place, but for embedding local wisdom, nurturing cultural identity, and prompting reflective thinking, audio-visual content clearly takes the lead. Looking forward, digital learning should aim for interactive, story-driven experiences that reach mind, heart, and hands all at once.

The Impact of Local Wisdom-Based Digital Teaching Materials on Learning Engagement

Integrating local wisdom into digital classrooms is not just a trendy add-on; it is transforming how students experience learning. Culture and technology here do not simply sit side by side; together, they change the rhythm of engagement. And engagement itself? It is not only about logging in or finishing a worksheet. It stretches across the mind, the heart, and even the hands. When cultural pieces are woven into lessons, students often recognize something of themselves in the material. Suddenly, schoolwork feels personal. On the intellectual side, Piaget's Constructivist Theory makes it clear why context matters (Ahmad et al., 2016), learning sticks when it is tied to meaning. Vygotsky's Sociocultural Theory highlights another layer our emotions and understanding grow out of interactions, traditions, and community (Jin, 2016). Moreover, if we look at the physical dimension, Bloom's Taxonomy reminds us that learning deepens when knowledge is applied in practice, not just talked about (Huitt, 2011).

Now, zoom in on cognition. Digital media rooted in local culture helps ideas feel solid instead of abstract. Think of a science lesson: instead of memorizing, students might hear a folktale about rivers or stories about how ecosystems balance themselves. Those narratives make concepts easier to understand (Santosa et al., 2019; Sofiyah et al., 2025). Picture a short video of local ceremonies or recipes suddenly, transformations of matter or life cycles do not feel distant; they are right there on the screen, connected to everyday life (Damayanti et al., 2022; Malihah et al., 2024). Some digital platforms even allow exploration at one's own pace. Simulations infused with local knowledge invite learners to test, tweak, and play with ideas (Eka et al., 2024). When culture is tied to academic content, Students are not merely accumulating facts; they are constructing knowledge that can be practically applied and

transferred to other contexts (Daulay & Asrizal, 2024). At the end of the day, this blend of culture and technology does more than brighten lessons; it strengthens memory and understanding by turning learning into a rich, multisensory journey (Longinou, 2020).

The affective side of engagement is equally striking. Students respond positively when their cultural values are recognized and included in the lesson. When teaching materials feature traditional dances, local musical instruments, or regional dialects, students feel acknowledged and included. This nurtures confidence and pride in their heritage (Fitria et al., 2024). Emotional reactions become warmer and more enthusiastic because learners feel connected to the content on a personal level (Rahmawati & Purwati, 2025). For example, Indonesian language lessons that include folktales from the students' own regions inspire them to engage in discussion, as the stories are already part of their family's collective memory. This sense of belonging naturally increases active participation and intrinsic motivation in learning (Udiyana & Arnyana, 2022). Digital content that expresses local experiences becomes not just a knowledge delivery medium but also an identity-affirming tool that strengthens students' emotional connections with the learning process (Constantinus et al., 2009; Wewengkang et al., 2024). When students see their own culture reflected in the learning materials, they stop feeling like passive observers. Instead, they become active participants in the learning process. Feeling like an active part of the story seems to deepen students' emotional connection to the material and keeps them engaged for more extended periods (Guslinda et al., 2024; Ramadhan et al., 2022).

Doing things with your own hands changes the game for psychomotor learning. It is not the same as just staring at a screen. When students roll up their sleeves making crafts, experimenting with cultural projects, or following along with apps and video guides they end up copying, tweaking, and practicing on their own terms. Take social studies, for instance. Making batik patterns, cooking a traditional dish, or trying out local instruments doesn't just pass down heritage. It sharpens motor skills, nurtures patience, boosts creativity, and even improves coordination (Suhartiningsih et al., 2024; Tiyasmala et al., 2023). Activities like these naturally slip into project-based learning. Theory does not float in the air anymore it lands in the doing. Students are not just sitting still; they are poking around, testing ideas, and actively shaping their understanding (Damayanti et al., 2024). Moreover, when those activities are backed up with digital tools designed around local wisdom, the benefits multiply. Collaboration grows, interaction feels more real, and the outcomes are tangible. Along the way, learners pick up cultural values while also strengthening skills that today's world keeps asking for: problem-solving, communication, and teamwork (Habibi et al., 2024). Technology in this setup does not erase tradition it actually helps preserve it, while also building digital fluency (Hadi et al., 2015; Udiyana & Arnyana, 2022).

This is not something happening only in Indonesia. In New Zealand, for example, weaving Mâori stories into digital storytelling helped students not just understand better but also connect more deeply with their identity (Rood & Barbour, 2024). Over in Malaysia, Sulaiman et al. (2023) found that incorporating traditional games and crafts into e-learning significantly increased students' motivation and hands-on skills. Likewise, a study in Canada by Nelles et al. (2011) highlighted that digital videos portraying First Nations traditions encouraged deep reflection and emotional engagement with ancestral values.

Implications for Practice and Policy

Next, several practical and policy-related implications arise from these findings regarding the use of digital teaching materials grounded in

local wisdom. First, in terms of publication trends and research methods, most studies were conducted after 2021, with a peak in 2024 (14 articles), and were dominated by the *Research and Development* method (15 out of 31 articles). This indicates that the topic is still emerging and primarily focused on the development of concrete instructional products. Therefore, the policy implication is the need for regulations that support the downstream implementation of research outcomes, such as funding schemes for the development of culturally grounded digital media and the integration of R&D products into national platforms like *Merdeka Mengajar*. Practically, teachers need comprehensive training that connects cultural literacy, digital skills, and instructional design grounded in local contexts.

Second, in terms of the types of digital teaching materials used, the reviewed articles classified media into three main categories: visual (text and images), audio (narration and music), and audio-visual (videos, animations, AR/VR). Audio-visual media emerged as the most frequently used and pedagogically rich format. This suggests that both teachers and educational technology developers should prioritize immersive and narrative-driven media that not only strengthen cultural identity but also enhance technological fluency. At the policy level, there is a need to establish development standards for digital learning materials that incorporate local cultural elements as part of the design requirements, rather than treating them as optional additions.

Third, regarding the impact on learning engagement, the integration of local wisdom in digital form was found to have positive effects on cognitive (clarifying concepts through cultural context), affective (instilling pride and a sense of belonging), and psychomotor domains (through project-based activities such as digital batik-making or documenting traditional practices). In practice, this highlights the importance of designing learning experiences that go beyond knowledge transmission to foster emotional involvement and active student participation. On the policy side, character education programs rooted in local culture can be scaled up through national digitalization policies that support the integration of local wisdom across diverse educational regions.

■ CONCLUSION

The results of this review show that the trend of publications related to local wisdom-based digital teaching materials has increased significantly in recent years, reflecting growing academic attention to the integration of local culture and educational technology. The dominant types of teaching materials include audio formats (such as folk tale recordings and traditional songs), visual formats (such as cultural infographics and images of local artifacts), and audiovisual formats (including documentaries, interactive animations, and culture-based simulations). These three media types have proven effective in encouraging students' comprehensive learning engagement: cognitively, students show improved conceptual understanding due to contextual and relevant content; affectively, a stronger sense of belonging and pride in cultural identity emerges; and psychomotor-wise, practice-based activities such as traditional craft making or cultural performances foster students' motor skills and creativity in real terms. These findings hold important implications for curriculum development and instructional innovation at both primary and higher education levels. The integration of local wisdom in digital teaching materials serves not only as a contextual pedagogical approach but also as a strategic tool for building student character and cultural identity in the era of globalization.

This study has several limitations. First, it only includes openly accessible publications indexed in selected academic databases, potentially introducing a representation bias by excluding relevant works published in local

languages or non-digitized formats. Second, while a general quality assessment was conducted, this review did not apply a formal, standardized quality appraisal framework in a detailed and systematic manner to assess the validity, reliability, and rigor of each study's methodology. Third, the considerable heterogeneity in geographical and cultural contexts across the studies limits the ability to make broad generalizations about the effectiveness of local wisdom-based digital teaching materials, as contextual variables may significantly influence outcomes.

Future researchers are encouraged to conduct comparative studies across diverse regions and countries, particularly those rich in indigenous traditions, to identify patterns, challenges, and best practices in the use of local wisdom within digital teaching materials, as this review highlights a gap in cross-contextual analyses. To address the current lack of robust measurement tools, it is also essential to develop standardized, multidimensional evaluation instruments that can holistically assess the cognitive, affective, and psychomotor impacts of culturally grounded materials. Additionally, interdisciplinary collaboration between education experts, curriculum designers, cultural anthropologists, digital technologists, traditional knowledge holders, and local artists is crucial to ensure the authenticity, sustainability, and ethical representation of cultural content. Adopting participatory development models that involve communities directly in the co-creation process will further enhance the relevance, acceptance, and long-term viability of digital learning resources rooted in local wisdom.

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