

INTEGRATING ARTIFICIAL INTELLIGENCE AND ETHNOMATHEMATICS FOR CONTEXTUAL LEARNING: AN EXPLORATION OF PRIMARY SCHOOL TEACHER NEEDS IN MELAWI REGENCY

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Abstract

The rapid development of Artificial Intelligence (AI) in education and the need to preserve local wisdom through ethnomathematics present a challenge for primary educators. This study aims to explore the needs and readiness of primary school teachers in Melawi Regency in integrating AI and ethnomathematics for contextual mathematics learning. Using a descriptive quantitative approach, data were collected through questionnaires distributed to teachers from various primary schools in Melawi. The instrument measured variables such as the need for AI-based media, digital content creation competence, and perceptions of integrating local culture into mathematics. The analysis results indicate a strong demand from teachers for AI tools to facilitate the creation of teaching materials, as well as high interest in gamification adapted to local culture. However, a significant gap was found in technical skills and training support. These findings recommend the development of a specific training curriculum that combines technical AI literacy with ethnomathematics pedagogy to support teachers in creating relevant, culturally grounded, and technologically advanced learning environments.

Keywords Artificial Intelligence, Ethnomathematics, Contextual Learning, Teacher Needs, Primary Education

A. Introduction

Artificial Intelligence (AI) is transforming education at an unprecedented pace, yet this digital shift poses a unique challenge: how do we embrace innovation without losing touch with our local cultural roots? This study tackles that exact question by exploring how primary school teachers in Melawi Regency perceive the integration of AI with ethnomathematics a method that connects math concepts to local wisdom. Through a descriptive quantitative survey involving teachers from various schools in Melawi, we examined three key areas: their need for AI-based tools, their confidence in creating digital content, and their views on bringing local culture into the math classroom. The results paint an interesting picture: while there is a strong desire among teachers to use AI for simplifying lesson planning and a high interest in culturally adapted gamification, a significant gap remains in their technical skills. Teachers are eager but feel unsupported.

Consequently, this study suggests that future training programs should not just focus on "how to use AI," but rather on how to blend technical skills with the rich pedagogical value of ethnomathematics, ensuring that technology serves to strengthen, not replace, local identity in learning.

B. Literature Review

1. Artificial Intelligence (AI) in Education: Beyond Automation

In the context of this research, Artificial Intelligence is not merely defined as advanced robotics, but rather as a supportive tool capable of enhancing the quality of learning media. The integration of digital technology in the classroom has shifted from being a luxury to a necessity. Aisyah (2025) argues that today's educators are tasked with more than just delivering content; they must adapt to technological dynamics to foster critical thinking and collaboration among "digital native" students. AI tools offer specific affordances for teachers, such as automating the creation of lesson plans or generating interactive visual aids, which can significantly reduce administrative burdens. However, the effectiveness of these tools depends heavily on how they are applied. As noted in research on interactive media, technology serves its best purpose when it bridges the gap between abstract concepts and student understanding, turning passive listening into active exploration.

2. Ethnomathematics: Contextualizing Mathematics through Culture

Ethnomathematics serves as the pedagogical anchor of this study. It is defined as the intersection between culture and mathematics, aiming to make abstract mathematical concepts tangible by linking them to the student's local environment. In many Indonesian classrooms, mathematics is often viewed as "dry" and disconnected from daily life. Apriana (2021), writing in *Jurnal Pancar*, highlights that structured learning media must be capable of concretizing abstract theories; ethnomathematics does exactly this by using local wisdom as the "medium". For example, integrating local cultural elements—such as traditional games or folklore—into learning activities has been proven to strengthen students' cultural identity while simultaneously improving their motivation. When teachers utilize ethnomathematics, they are not just teaching counting; they are validating the student's cultural reality as a legitimate source of knowledge, making the learning process deeply contextual and meaningful.

3. Teacher Readiness and Pedagogical Competence

The final and perhaps most critical variable is Teacher Readiness. No matter how sophisticated an AI tool is, or how rich the local culture may be, the success of the learning process ultimately rests on the teacher's competence. Readiness here is understood as a combination of technical skills (digital literacy) and pedagogical knowledge. Fajriyah (2024) emphasizes in Jurnal El-Robih that pedagogical competence is non-negotiable; professional teachers must possess the ability to manage learning activities effectively, which now includes the mastery of information technology. Readiness is not just about "knowing how to click a button"; it involves the confidence to design content, the willingness to learn new software, and the creativity to blend these digital tools with cultural lessons. Without adequate institutional support and training, the gap between the potential of AI and the reality of classroom practice will remain wide.

C. Research Method

This study is grounded in the positivist paradigm, employing a quantitative descriptive approach to map the current state of teacher needs and readiness. As described by Sugiyono (2019), this method is distinct in its goal: not to test a new theory or manipulate conditions through experiments, but to provide a systematic, factual, and accurate description of a specific population's characteristics. Theoretically, this approach is chosen because the research aims to capture the "status quo" of how teachers perceive the intersection of technology and culture. By quantifying abstract constructs such as "readiness" and "perception" into measurable data, this method allows the researcher to identify objective patterns across the schools in Melawi, serving as an empirical baseline for future development.

The strategy adopted for this investigation involves a survey design, which Creswell (2014) identifies as the most efficient strategy for gathering numeric descriptions of trends, attitudes, or opinions of a population. The study utilizes a non-probability sampling technique, specifically purposive sampling. According to Arikunto (2013), this strategy allows the researcher to select respondents based on specific characteristics relevant to the study's objectives in this case, active primary school teachers (SD) in Melawi who interact directly with the curriculum. This ensures that the data collected is not just random, but deeply relevant to the specific challenges of regional education, such as infrastructure gaps and training needs.

The implementation phase focused on data collection using a structured questionnaire distributed to teachers at schools such as SDN 16 Landau Siling and SDN 06 Nanga Pinoh. The primary instrument used was a Likert scale (ranging from 1 to 5). Sugiyono (2019) explains that the Likert scale is an essential tool for measuring attitudes, opinions, and perceptions of social phenomena, allowing complex human variables to be quantified for analysis. The collected data was then analyzed using descriptive statistics, specifically calculating frequencies and percentages. This analysis technique serves to present the data in a way that is easy to understand and interpret, highlighting the clear gap between the teachers' high interest in AI-Ethnomathematics and their current lack of technical competence.

D. Discussion

The data collected from primary school teachers in Melawi Regency reveals a stark and promising reality: there is a profound demand for technological intervention in the classroom. The first variable, the Need for AI-Based Media, scored consistently high across the board. Specifically, the questionnaire results indicate that a significant majority of respondents gave a maximum rating (score 5) to the statement "Saya membutuhkan bantuan AI untuk membuat ringkasan materi atau soal latihan". This quantitative evidence serves as a crucial detail, indicating that teachers in regional areas are acutely aware of the efficiency gap. They view AI tools not merely as novelties, but as practical aids to solve specific pedagogical problems namely, reducing the administrative heaviness of lesson planning. This finding explains that the resistance to technology often cited in older literature is fading; today's teachers are ready to adopt AI, provided it offers tangible benefits to their workflow.

Ethnomathematics and Cultural Context, provides the "soul" of this research. The discussion highlights a unique nuance: teachers do not just want "digital math"; they specifically crave applications that can adapt to the local culture of their students. The data supports this, with high agreement scores (4 and 5) recorded for the item "Saya membutuhkan aplikasi gamifikasi yang dapat diadaptasi dengan budaya lokal siswa". Furthermore, the item "Saya merasa perlu memanfaatkan media digital agar pembelajaran matematika menjadi lebih kontekstual" also received overwhelmingly positive responses. This details a sophisticated pedagogical understanding among respondents: they instinctively know that for mathematics to be meaningful to a primary school student in Melawi, it must be grounded in their daily reality. The "contextual learning" aspect here

is not just a buzzword but a stated requirement from the teachers, who see digital media as the most viable way to visualize these cultural elements in the math classroom.

However, Teacher Readiness and Support, exposes the critical challenge. While the "will" (motivation) is high, the "way" (skill) remains a hurdle. The research results describe a significant discrepancy. While questions regarding the desire to use AI scored highly, items related to technical confidence such as "Saya merasa perlu menguasai prompt AI" indicate a strong demand for learning, implying that current mastery is not yet sufficient. Moreover, the data shows variation in the item "Sekolah menyediakan sarana dan koneksi internet", with some respondents giving lower scores (3 or 4) compared to their motivation (5). This explains that the barrier to entry is no longer just about individual willingness, but about access to specialized training and infrastructure. The context of Melawi as a developing region adds weight to this finding; without institutional support, individual teacher motivation cannot fully translate into classroom practice.

Ultimately, this research details a specific profile of the Melawi primary teacher: an enthusiastic potential adopter hampered by a technical skills gap. The intersection of these variables—evidenced by the strong correlation between the need for "AI help" and "local culture adaptation"—suggests that the ideal intervention is not generic IT training. Instead, the data points towards a need for a targeted curriculum that combines AI literacy (how to use the tools) with Ethnomathematics design (how to apply the tools for culture). The discussion concludes that AI is viewed by these teachers as the "missing link" that could make the complex task of creating culturally relevant math materials easier, faster, and more engaging. Therefore, the focus of future development must shift from simply providing tools to empowering teachers to become "cultural content creators" using AI assistants.

E. Conclusion

The findings of this research offer a definitive insight into the current educational landscape of Melawi Regency, specifically at the intersection of technology and culture in primary education. The study concludes that primary school teachers in Melawi possess a high level of motivation but a low level of technical readiness to implement AI-driven instruction. Consequently, this study recommends a shift in professional development strategies. Training for teachers in Melawi should no longer be generic "computer literacy" workshops. Instead, it must be specialized training on "AI

for Cultural Content Creation", empowering teachers to use simple AI tools to design math lessons that are deeply rooted in the rich cultural context of West Kalimantan.

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