

THE ETHNOMATHEMATICS: TRADITIONAL MEASUREMENT SYSTEMS AS A CONTEXTUAL REPRESENTATION OF MATHEMATICS IN EDUCATION

Indri Nadia Sylindra¹, Desty Septianawati ^{2*}, Syamsul Kurniawan³

^{1,2*,3} Institut Agama Islam Negeri Pontianak, Indonesia

* *Jl. Letjend Suprpto No.14, Kota Pontianak, Kalimantan Barat 78243*

E-mail: indrisilajur@gmail.com ¹
destyyadi88@gmail.com ^{2*}
Syamsulkurniawan001@gmail.com ³

Received 07 April 2026; Received in revised form 05 July 2026; Accepted 11 September 2026

ABSTRACT

This study investigates traditional measurement systems employed by rice farmers in Tanjung Saleh, namely *depak*, *jengkal* (handspan), and lunar-cycle-based calculations, as tangible representations of ethnomathematical concepts in agricultural practice. The research is grounded in the argument that mathematics does not solely emerge from formal classrooms and symbolic abstractions but is also deeply rooted in everyday practices embedded within local cultures. Adopting a qualitative methodology with an ethnographic approach, this study explores how individuals lacking formal education nonetheless apply mathematical reasoning in farming activities, such as determining planting seasons, measuring land area, and organizing planting patterns. Through field documentation and interviews with three key informants, it was discovered that agricultural decision-making relies on calculations that integrate natural knowledge, empirical experience, and habitual practices. These practices reflect an implicit mastery of geometric concepts, numerical patterns, statistics, and even basic trigonometry. The study also incorporates insights from *Atomic Habits* to illustrate how small, repeated behaviors in daily life contribute significantly to the development of mathematical thinking. The significance of this study lies in its proposition to broaden the horizon of mathematics education through the integration of ethnomathematical knowledge into the curriculum. By bringing traditional measurement systems into the classroom, mathematics instruction becomes not only more contextual and inclusive but also plays a vital role in preserving indigenous knowledge that has long remained embedded in cultural practice.

Keywords: ethnomathematics; rice farming; traditional measurement systems.

ABSTRAK

Penelitian ini berfokus pada sistem ukur tradisional yang digunakan masyarakat petani di Tanjung Saleh—yakni *depak*, *jengkal*, dan perhitungan berdasarkan siklus bulan—sebagai representasi nyata dari konsep etnomatematika dalam praktik pertanian. Kajian ini dilandasi oleh argumentasi bahwa matematika tidak hanya lahir dari ruang kelas dan rumus-rumus formal, tetapi juga tumbuh dari praktik sehari-hari yang berakar pada budaya lokal. Dengan pendekatan kualitatif dan metode etnografi, penelitian ini mengeksplorasi bagaimana masyarakat tanpa pendidikan formal tetap menerapkan konsep-konsep matematis dalam aktivitas bertani, seperti penentuan waktu tanam, pengukuran lahan, dan pengaturan pola tanam. Hasil penelitian menunjukkan bahwa petani Tanjung Saleh memiliki pola berpikir matematis yang terstruktur dan konsisten, meskipun tidak terungkap dalam bahasa formal. Melalui dokumentasi lapangan dan wawancara dengan tiga informan utama, ditemukan bahwa keputusan pertanian didasarkan pada kalkulasi yang memadukan pengetahuan alam, pengalaman, dan kebiasaan yang berulang. Praktik-praktik tersebut mencerminkan penguasaan atas konsep geometri, pola bilangan, statistika, hingga trigonometri dasar. Pendekatan *Atomic Habits* turut memperkuat analisis bahwa kebiasaan kecil yang terinternalisasi dalam keseharian petani berkontribusi pada terbentuknya kebiasaan berpikir matematis. Signifikansi kajian ini terletak pada tawarannya untuk memperluas cakrawala

pendidikan matematika melalui integrasi etnomatematika ke dalam kurikulum. Dengan mengangkat sistem ukur tradisional ke dalam ruang belajar, pendidikan matematika tidak hanya menjadi lebih kontekstual dan inklusif, tetapi juga turut melestarikan pengetahuan lokal yang selama ini tersembunyi dalam praktik budaya.

Kata kunci: etnomatematika; pertanian; sistem ukur tradisional.



This is an open access article under the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

Introduction

A time will come when mathematics is no longer perceived merely as a set of abstract exercises divorced from daily life, but rather as a form of knowledge that arises organically from reality itself. Ideal education should not be limited to teaching children how to sum the lengths of sides or calculate the area of a field. It must guide them toward the realization that measurement, shape, and number are embedded in the rhythms of everyday life. What we need is an education that not only sharpens the intellect but also reaches into the roots of culture where numbers are not merely symbols, but echoes of tradition, lived experience, and inherited wisdom. Mathematics, ideally, is not something to be taught it is something to be discovered. In the soil, in the body, in time.

Yet reality rarely aligns with the ideal. In today's classrooms, mathematics often stands aloof and foreign, like an imported language stripped of its cultural anchorage. Children are taught formulas without context, haunted by numbers that have lost their meaning. Meanwhile, beyond the school walls, farmers in Tanjung Saleh continue to measure their fields using *depak* (hand-lengths) and *jengkal* (spans), determining planting seasons through lunar cycles and natural signs. There is an enduring irony: we teach modern mathematics without realizing that traditional communities have long practiced mathematics in its most authentic form, not as memorized formulas, but as a lived, embodied practice.

Engaging with *depak*, *jengkal*, and lunar-based calculations is not an exercise in nostalgia, but an effort to show that local knowledge is neither primitive nor obsolete; it is contextual, adaptive, and alive. Traditional measurement systems are cognitive artifacts: they reveal how communities construct their world through logic that is intuitive, efficient, and ecologically grounded. When *depak* becomes a unit of area, and the lunar calendar becomes a seasonal guide, we are witnessing deeply mathematical principles at work: sophisticated systems of reasoning expressed without formal notation. This is a form of numeracy born not of curricula, but of experience.

It is both appropriate and necessary to identify this knowledge as *ethnomathematics*, a lens through which mathematics is understood not as a culturally neutral, universal science, but as a body of knowledge that emerges within particular social and spatial contexts. First introduced by Ubiratan D'Ambrosio in 1985, ethnomathematics offers a contextual approach that honors cultural diversity in mathematical thought (Ambrosio, 1985). Contextual learning provides opportunities to connect mathematical concepts with students' real-life experiences, making mathematical learning more meaningful and relevant. The integration of contextual situations into mathematics teaching materials can therefore provide a foundation for representing mathematical concepts through

practices familiar to learners (Winarto et al., 2023). Through this framework, mathematics is seen not only in its formal formulations but also in the lived practices by which communities work, solve problems, and make sense of their environment. Ethnomathematical contexts can provide meaningful connections between mathematical concepts and students' cultural environments. Previous research has demonstrated that local cultural elements can be integrated into mathematics learning to create contextual learning experiences and strengthen students' awareness of local culture (Sugiharti et al., 2025). According to Indrawati & Sari (2024), cultural heritage is important for local identity because it reflects the history, values, and way of life of a community. Additionally, cultural heritage can also be utilized to boost the local economy through tourism, crafts, and performing arts.

Ethnomathematics explores the relationships between culture and the distinctive ways communities understand, construct, and apply mathematical reasoning. It is present in activities that are not typically labeled "mathematics," but which embody structures of calculation, measurement, and even modeling. In agricultural contexts, practices such as measuring rice fields with *depak*, estimating planting periods through lunar phases, calculating fertilizer quantities, or distributing harvest shares fairly, are living manifestations of mathematical principles embedded in tradition (Septia et al., 2024).

James Clear, in his book *Atomic Habits* (Clear, 2018), asserts that meaningful change begins with small, consistent habits. The application of ethnomathematics linking mathematical concepts to local culture may seem like a modest step, yet it can cultivate a powerful sense of ownership among students. When children in rural communities come to see that their parents' handspans carry mathematical logic, or that planting times aligned with lunar phases constitute a form of temporal modeling, their approach to learning becomes less alien and more natural. Mathematics transforms from a school subject into a generational habit of thinking.

This paper does not intend to romanticize the past or idealize the present. Rather, it offers a lens: traditional measurement systems are not merely cultural relics, but pedagogical tools. This is not simply an anthropological exploration, but a curricular proposition one that seeks to ground education in local realities to foster more meaningful and context-rich learning. What sets this study apart is its dual commitment: it records local wisdom and reimagines it as a foundation for pedagogical innovation in contextual mathematics education, emphasizing small habits cultivated from within the students' own cultural landscape. Contextual mathematics learning enables students to connect mathematical concepts with situations encountered in everyday life, thereby making mathematical knowledge more meaningful and relevant to learners (Rahmayani et al., 2022).

Tanjung Saleh is not merely the site of this research it is a living space of quiet yet profound wisdom. In this village, a single handspan can mark the boundary of a rice field, and the crescent moon can signal when to plant or to wait. The villagers do not call what they do "mathematics," yet every act from estimating seed volume to gauging rainfall through observation reflects a logic that can be read as a coherent system. Here, we come to understand that mathematics does not always emerge from the blackboard it may just as well emerge from the soil, the body, and the sky.

Education, therefore, need not always begin with theory. Sometimes, it begins with a single step across a wet rice field.

Beneath the vast rice fields and under skies that signal the seasons lies a system of thought older than calculus a traditional system that is seldom labeled as mathematics, yet is deeply mathematical in nature. Wahyudi & Putra (2022), Ethnomathematics is mathematics that grows, develops and is practiced by cultural groups such as urban and rural communities, children of certain age groups, labor groups, indigenous peoples, and others. Ethnomathematics that links culture, one of which is community activity and mathematical concepts, certainly has mutually supportive characteristics

Within this context, ethnomathematics emerges not merely as a subfield of mathematics, but as an alternative lens through which to interpret the cultural logic embedded in everyday practices. According to Saikanth et al. and Ewert et al., ethnomathematics investigates how mathematical concepts are present and integrated within various cultural practices, including agriculture (Ewert et al., 2023; Saikanth et al., 2023). Here, mathematics is not presented as a doctrine, but rather as a habit one that is born out of necessity.

In traditional agricultural practices, particularly those carried out by indigenous or local communities, we observe knowledge systems shaped by lived experience and deep-rooted connections to the natural environment. Units of measurement such as *depak* (the length of an outstretched arm) and *jengkal* (a handspan), used in Tanjung Saleh, did not emerge from classrooms but from the physical interaction between the human body and the land. These systems reflect complex spatial and numerical reasoning ranging from land arrangement and yield estimation to timing of planting based on lunar observations thereby signaling the existence of an ethnomathematical framework (Altieri, 2000; Ewert et al., 2023). Such traditions place the community at the center, employing strategies passed down through generations that have proven effective in sustaining local ecological systems.

Beyond the archival preservation of local wisdom, integrating ethnomathematics into educational systems offers a pathway to address pedagogical stagnation: connecting abstract theory with lived reality. Scholars such as Stripling & Roberts and Robinson et al. argue that agricultural education enriched with contextual mathematics can effectively bridge the gap between formal learning and practical experience (Robinson et al., 2018; Stripling & Roberts, 2013). When preservice teachers are trained using this approach, the result is a marked improvement in both their conceptual understanding and confidence in applying mathematical reasoning to real-world agricultural issues ((Stubbs & Myers, 2015)). This represents a form of education that closes the distance between equations and everyday existence.

In the context of agroecology, the relevance of this approach becomes even more pronounced. Researchers such as Altieri and Bisht highlight that traditional techniques such as crop rotation and companion planting are not only ecologically sound but also contain embedded mathematical structures that can be modeled analytically (Altieri, 2000). These systems operate through interdependent frameworks, where plants, soil, and time are in constant interaction. When modeled mathematically, these relationships yield predictive systems for agricultural

productivity that are both scientific and culturally grounded demonstrating that traditional knowledge is not inferior to modern science, but exists in parallel with it.

On another front, in the age of precision farming and smart agriculture, local knowledge systems are often undervalued. Yet as Sáiz Rubio and Rovira Más emphasize, the successful implementation of agricultural technology depends heavily on an in-depth understanding of the social and cultural landscape in which it is deployed (Saiz Rubio & Rovira Más, 2020). By incorporating ethnomathematical insight into digital agriculture frameworks, we do not merely improve the technical design of machines, but ensure that these systems remain grounded in the broader social realities they aim to serve.

In response to global challenges such as food insecurity, climate change, and ecological degradation, the integration of mathematical reasoning with agricultural education becomes increasingly urgent. Scholars like McNall & Rice and Getu et al. advocate for interdisciplinary approaches that combine quantitative competencies with ecological and social literacy (McNall & Rice, 2020). Such educational paradigms not only produce technically skilled graduates but also cultivate context-aware, adaptive thinkers capable of navigating the complexities of our changing world.

Consequently, contemporary literature provides a robust foundation for exploring traditional systems of measurement such as *depak*, *jengkal*, and lunar calendars as tangible manifestations of ethnomathematical knowledge. In spaces where the human body becomes the ruler, the sky becomes the calendar, and the rice field becomes the textbook, we witness how local knowledge is not merely worthy of preservation, but ripe for integration into how we teach and understand mathematics. This represents a convergence of science, culture, and education where, as James Clear proposes in *Atomic Habits* (Clear, 2018), small shifts in perspective can yield significant change. Major transformations begin with small, consistent habits that are recognized, valued, and embedded within the daily life of learners.

Research Methods

Indonesia's rich cultural diversity, stretching from coastal areas to remote inland regions, has provided fertile ground for the development of ethnomathematics research. Ethnomathematics is not merely an alternative approach, but rather a bridge that connects modern mathematics education with the lived realities of local communities. Within this framework, cultural values are not only preserved as heritage but revitalized as authentic and contextual sources of learning knowledge rooted in the very soil where people live and work. According to Budiarto (2022), ethnography is a qualitative research approach that aims to study the culture of a community. Marlisa et al., (2024) state that ethnomathematics research in Indonesia has produced two complementary approaches: as a learning tool and as a research framework.

It is within this conceptual framework that the ethnomathematical study of agricultural practices in Tanjung Saleh becomes significant. This research is not simply a record of traditional mathematical traces embedded in the daily rhythms of farming life, but also an evaluative effort to explore how such knowledge might be integrated into educational curricula grounded in local culture. It is part of a

broader endeavor to design an education system that is not disconnected from social reality but instead grows organically from within the communities it serves.

This study employed a qualitative approach using ethnographic methods. Ethnography is a methodology aimed at understanding and describing in depth the cultural and behavioral patterns of a community (Hammersley & Atkinson, 1995). This approach was selected due to its capacity to uncover the meanings and mathematical practices embedded in everyday life, particularly in rice farming, which is a vital component of local culture in Tanjung Saleh. The research focused on the rice cultivation practices of a community living in a geographically remote area, relatively untouched by urban modernity.

The research interest in this community stems from its traditional lifestyle and limited access to formal education, yet members continue to practice mathematics contextually through direct, experience-based engagement with the land. The participants in this study were rice farmers in the village of Tanjung Saleh who, despite lacking formal mathematical education, demonstrated the application of mathematical concepts through their habitual farming practices.

In accordance with qualitative research procedures proposed by John W. Creswell, data collection techniques in this study included field observation, in-depth interviews, and documentation (Creswell, 2013). Interviews were conducted with key informants representing traditional agricultural practices in Tanjung Saleh. These included: Ibu Nur, a farmer who determines planting times based on the lunar calendar and natural signs such as wind direction and animal behavior; Ibu Siti, who relies on the positions of stars and cardinal directions in planning farming activities; and Bapak Sumarman, who interprets daily weather patterns and seasonal cycles as the primary guides for managing planting and harvesting phases. In this study, the three informants are farmers who employ traditional methods, making them sufficient to illustrate how this system is practiced in local agriculture.

The data gathered through interviews were enriched by direct field documentation, including photographs of farming activities, observational notes from data collection sessions, and audio recordings of farmers narrating their methods of determining planting times, measuring land, and distributing harvest yields. Additionally, observations were made on cultural symbols and local elements that reflect mathematical thinking whether in traditional measurement practices, systems of resource allocation, or recurring patterns that consistently appear in the agricultural cycle. These materials serve as tangible evidence of a knowledge system that, though not formalized through mathematical notation, demonstrates internal logic and structural coherence when viewed through the lens of ethnomathematics.

Triangulation was conducted using source triangulation, specifically through interviews and observations. The observations were carried out during agricultural activities performed by the informants. To deepen the analysis of how this knowledge becomes internalized, the data were interpreted using James Clear's *Atomic Habits* framework (Clear, 2018). This perspective highlights how small, repeated actions such as tracking wind direction, counting handspans (*jengkal*), or observing lunar phases can lead to the formation of deeply embedded mathematical thinking. Interestingly, these patterns are not only intuitive for the farmers but also contain significant pedagogical potential.

Such practices offer valuable insights for mathematics education in formal settings. When educators succeed in integrating local contexts into the classroom, students learn not only through abstract formulas but also from real-life experiences that are familiar and meaningful to them. In this way, traditional measurement systems such as *depak*, *jengkal*, and lunar observations are not merely cultural artifacts, but authentic and relevant learning resources that cultivate logical and systematic thinking among students.

Results and Discussion

Traditional Measurement Systems as Contextual Representations of Mathematics

In the daily lives of the Tanjung Saleh community, agriculture is not merely an economic activity it is also a space for knowledge. Amid the muddy rice fields and the changing seasons, traditional habits, wisdom, and indigenous measurement systems have emerged, revealing a form of intelligence no less rigorous than scientific theories. This is what we call *ethnomathematics*: a bridge connecting how communities understand their world with the mathematical structures embedded in their cultural practices. Aulia & Rista (2019) say there are many ethnomathematics activities in farming activities carried out by the Blang Jruen Village community in North Aceh Regency. Ethnomathematics activities include counting, counting and measuring activities. These concepts can be used as inspiration and contextual learning reference material shows in Figure 1.



Figure 1. Concept of rows with a repeating square pattern

Ethnomathematics posits that each culture possesses its own distinctive ways of constructing and applying mathematical concepts (Ambrosio, 1985). Within the agricultural context, this is evident in the ways local farmers determine planting schedules, measure land areas, and divide crop yields (Septia et al., 2024). Although these practices may appear simple, they encapsulate complex, organized, and pedagogically valuable patterns of thought. Meanwhile, according to research conducted by Zakiah et al. (2023), in the process of planting rice, there are activities that have mathematical elements in geometry material, namely in the process of making lines for planting rice.

On April 19, 2025, interviews were conducted with three key informants in the village of Tanjung Saleh: Ibu Nur, Ibu Siti, and Pak Sumarman. Each of them employed different methods to determine planting times, but they shared a common feature: all relied on recurring natural patterns and observations. Ibu Nur, for example, used lunar calendars and nighttime temperatures as planting indicators,

with an estimated accuracy of around 75%. She noted that while this method usually yielded success, a previous crop had failed due to a sudden rise in sea levels.

Meanwhile, Ibu Siti relied on star constellations and wind direction. She believed that certain star patterns marked the most favorable planting periods. With decades of experience, her method reached an estimated 90% accuracy. On the other hand, Pak Sumarman based his decisions on rainfall patterns and daily weather changes. Although he had experienced crop failures, he observed that these were typically followed by abundant harvests a recurring phenomenon he referred to as *seasonal compensation* (*tukar musim*).

Beyond temporal calculations, the community also utilized local measurement units such as *depak* and *jengkal* based on the span of a hand or arm to measure land area. These units, while not directly translatable into square meters, exhibited a high degree of internal consistency. They were widely used in labor division, planting area estimation, and irrigation planning.

Mathematical concepts were also evident in the crop layout patterns. Many farmers arranged rice plants in evenly spaced, repetitive square rows. These formations facilitated irrigation, weeding, and harvesting. From an educational mathematics perspective, such patterns reflect an understanding of number sequences and spatial reasoning topics typically introduced in elementary school.

Furthermore, the community understood the importance of slope gradients in constructing irrigation systems. Although they did not use formal terminology such as "degrees" or "slopes," they intuitively recognized that water must flow from a higher elevation to a lower one to avoid stagnation. In effect, they were applying geometric and gravitational principles that are usually only introduced in formal science or mathematics instruction shows in Figure 2.

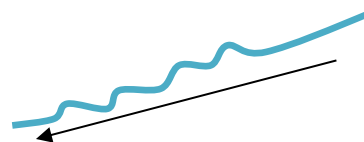


Figure 2. Application of geometry and physics

Figure 2 shows that constructing irrigation systems using principles of gravity and slope controls the direction of water flow, ensuring the water spreads out rather than pooling. These practices affirm that traditional communities develop *contextual mathematics*, a form of mathematics that arises from necessity rather than formulas. This knowledge is transmitted across generations and grounded in lived experience, rather than formal curricula. Ironically, it is precisely in this context that mathematics becomes most real and meaningful.

Even the symbolism embedded in agricultural culture carries mathematical substance. Rice paddies are often shaped as rectangles or trapezoids, adapted to

land contours and sun exposure. This spatial arrangement serves not just aesthetic purposes but also enhances irrigation efficiency and labor organization.

In planting practices, configurations such as the “four-row” or “zigzag” pattern are commonly used to arrange seedlings. These layouts embody order and symmetry, integral aspects of geometry. This demonstrates that aesthetic values and functional efficiency are intertwined with a form of intuitive mathematical logic.

Beyond spatial arrangements, the community also adheres to traditional systems for determining auspicious planting days. These include odd-even principles, avoidance of specific numbers, and adherence to traditional market-day cycles. While often regarded as spiritual or ritualistic, these practices also reveal patterns of number grouping and sequencing concepts aligned with foundational arithmetic taught in elementary education.

Depak, jengkal, and the Lunar Cycle as Contextual Representations in Mathematics Education

Depak, jengkal, and the lunar phases, three terms absent from standard mathematics textbooks, have long served as a living curriculum for the farmers of Tanjung Saleh. Though they never studied geometry in formal classrooms, they understand intuitively that rice planted in evenly spaced rows grows more uniformly and is easier to harvest. They may never articulate number patterns academically, yet they follow seasonal rhythms and star constellations with remarkable precision. Here, mathematics resides not in formulas, but in customs, inherited traditions, and unwritten conversations.

For farmers in Tanjung Saleh, measuring rice planting distances using *depak* and *jengkal* is common practice a skill passed down through generations from their parents. In fourth grade, students are introduced to number patterns learning that 2, 4, 6, 8 forms an arithmetic sequence. In Tanjung Saleh, these patterns are not taught at the blackboard, but embedded in agricultural cycles: harvest, pause, planting, pause, harvest again. They may not label this an arithmetic sequence, but the cycle is etched into their bodies and daily routines. In third grade, students learn about geometric shapes like triangles and squares. Yet in the rice fields, geometry appears first. The land is divided into rectangles, irrigation channels are constructed with carefully calculated slopes, and farmers know that the wrong angle will cause water to stagnate.

Formal education teaches formulas for area and perimeter, but traditional field-based knowledge teaches function. How long should the embankment be to hold enough water? How wide should a plot be to feed a family of five? These are not abstractions but real-life problems requiring mathematical solutions. Thus, when ethnomathematics is proposed as an educational approach, it is not merely a pedagogical option it is an act of epistemic justice. Tlonaen & Deda (2021) One solution to preserve regional culture is by integrating cultural elements into education, particularly mathematics education. One solution to preserve the culture that exists in each region is to introduce culture, especially mathematics education

Within the Madrasah Tsanawiyah curriculum structure, there is ample opportunity to integrate ethnomathematics. In grade 7, while students study linear equations, teachers can introduce traditional expressions such as “1 blek of rice for 1 rante of field” to illustrate variable relationships. In grade 8, when functions and

graphs are introduced, students can interpret rice growth charts or analyze the correlation between rainfall and yield. In grade 9, statistics becomes more than just abstract data. Harvest records, seasonal forecasts, and grain volumes become figures imbued with personal and cultural meaning.

When teachers open the door to context, mathematics ceases to be a subject of alien formulas it becomes a reflection of lived experience. Students will come to see that mathematics does not solely belong to textbooks, but also to the land they inhabit. Local knowledge is not an obstacle to science, but rather its gateway. In a world increasingly shaped by globalization, ethnomathematics is a courageous refusal to be uprooted from one's own origins. Dindin Abdul Muiz Lidinillah et al., (2025) conducted development research using picture storybooks containing ethnomathematics. The results of their research indicate that picture storybooks containing ethnomathematics are very valid and practical for fifth-grade elementary school students. The use of ethnomathematics in learning media provides students with a new experience that the things around them are related to learning.

Research by (Ayuningtyas & Setiana, 2019) The products produced are the ethnomathematics-based mathematics teaching materials in Yogyakarta in the form of Mathematics Modules and Student Activity Sheets. After going through the validation stage by experts, the products developed are included in the valid category. From the results of product trials, it is known that the products produced meet the practical and effective criteria. Another research by Dewi et al., (2025) show the development of PMRI-based worksheets in the context of ethnomatematics in SPLDV material was declared valid and practically used by students.

James Clear (Clear, 2018), in *Atomic Habits*, argues that transformative change does not arise from sudden revolutions, but from the consistent accumulation of small habits. We do not learn mathematics in a single semester, but through repeated acts: measuring, counting, matching, and revisiting. In Tanjung Saleh, the habit of planting in certain lunar phases, or measuring land by the span of a hand, forms a naturally embedded mathematical habitus. That is where its power lies.

Atomic Habits also teaches that environment shapes habit. If we want to foster students who love mathematics, we must place mathematics within environments they recognize. Rice fields, seasonal changes, and crop yields are their world. When educators embed these contexts into the classroom, they are not merely teaching formulas they are cultivating logical, structured thinking that grows out of lived experience. Ethnomathematics is mathematics applied by specific cultural groups, such as laborers/farmers, children from certain social classes, professional classes, and so on. This means that ethnomathematics is not simply about ethnicity or tribe. Because mathematics taught in schools and the mathematics children encounter in everyday life are very different, mathematics learning needs to provide content and bridge the gap between mathematics in the everyday world, based on local culture, and mathematics taught in schools (Abi, 2017).

Clear emphasizes that each meaningful action is like "casting a vote for the type of person you want to become." When students count using *depak* units or calculate the area of a field based on trapezoidal geometry, they are choosing to think mathematically without feeling alienated by it. They are forming an identity as learners who are simultaneously contextual, culturally rooted, and logically precise.

Stubbs & Myers, (2015) say science and technology were reliably integrated at high levels, but engineering and mathematics concepts were less consistently integrated across cases.

Ethnomathematics can be used to build students' mathematical concepts through local wisdom. We do not force students to memorize abstract theories detached from their lives; instead, we invite them to realize that mathematical principles are truly present in the life around them in the rice they plant, the air they channel, and the moon that consistently provides its signs.

Conclusion and Suggestion

This study reveals that the traditional measurement systems used by the farming community in Tanjung Saleh, such as *depak* (foot span), *jengkal* (hand span), and lunar-based calculations, constitute a tangible and living form of ethnomathematical practice embedded in everyday life. Although these systems are not codified within formal mathematical language, they demonstrate a logical and consistent mathematical reasoning structure. The processes of measurement, estimation, and decision-making in their agricultural activities are not merely intuitive but are grounded in habits that have been tested and refined across generations.

Field documentation reinforces the premise that mathematics does not exclusively emerge from blackboards or textbooks but also from the earth beneath one's feet, the sky above, and the rhythms of daily practice. When farmers arrange planting distances, align rows, or design irrigation systems, they are in fact applying principles of geometry, measurement, and spatial logic. These findings affirm that mathematics can grow from context rather than merely descend from abstraction.

The significance of this study within the discourse of ethnomathematics lies in its demonstration that local traditions are not merely reservoirs of cultural value, but legitimate sources of mathematical knowledge. Ethnomathematics should no longer be viewed merely as an alternative pedagogical approach; rather, it offers a vital framework for constructing mathematics education that is more inclusive, contextually relevant, and culturally rooted. Through traditional agricultural measurement systems, we uncover not only methods for calculating crop yields but also new ways of understanding how mathematics can be taught more meaningfully without sacrificing its intellectual rigor.

Although all forms of ethnomathematics can generally be integrated into learning, if not packaged well, they will actually hinder the mathematics learning process. Therefore, further, more in-depth research is needed to discuss mathematical concepts within a culture and to develop ethnomathematics-based teaching materials, which can then be used to measure the level of misconceptions in learning.

This research can be extended by developing ethnomathematics-based teaching materials that help students understand the subject matter in an enjoyable way. In this way, students can get to know their culture better while simultaneously understanding mathematics in its everyday applications.

Reference

- Abi, A. M. (2017). Integrasi Etnomatematika Dalam Kurikulum Matematika Sekolah. *JPMI: Jurnal Pendidikan Matematika Indonesia*, 1(1), 1-10. <https://doi.org/10.26737/jpmi.v1i1.75>
- Altieri, M. A. (2000). Developing sustainable agricultural systems for small farmers in Latin America. *Natural Resources Forum*, 24(2), 97-105. <https://doi.org/10.1111/j.1477-8947.2000.tb00935.x>
- Ambrosio, U. D. '. (1985). Ethnomathematics and its Place in the History and Pedagogy of Mathematics. *For Learning of Mathematics*, 5(1), 44-48. <https://flm-journal.org/Articles/72AAA4C74C1AA8F2ADBC208D7E391C.pdf>.
- Aulia, L., & Rista, L. (2019). Identifikasi Konsep Matematika Melalui Aktivitas Etnomatematika Petani Sawah. *Jurnal Pendidikan Matematika (JUDIKA EDUCATION)*, 2(2), 110-117. <https://doi.org/10.31539/judika.v2i2.857>
- Ayuningtyas, A. D., & Setiana, D. S. (2019). Pengembangan Bahan Ajar Matematika Berbasis Etnomatematika Kraton Yogyakarta. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, 8(1). <https://doi.org/10.24127/ajpm.v8i1.1630>
- Budiarto, M. T. (2022). *Etnomatematika: Teori, pendekatan, dan penelitiannya*. Zifatama Jawa. Sidoarjo.
- Clear, J.. (2018). *Atomic habits : an easy & proven way to build good habits & break bad ones* (p. 306). Avery, an imprint of Penguin Random House. New York.
- Creswell, J. W. . (2013). *Educational research : planning, conducting, and evaluating quantitative and qualitative research*. PHI Learning Private Limited. Boston.
- Dewi, A. M., Ramadhani, H. M., Sarirah, F. H., & Fahmy, A. F. R. (2025). Systematic Literature Review: Exploring the Ethnomathematics of Javanese Traditional Houses. *Ethnomathematics Journal*, 6(1), 18-32. <https://doi.org/10.21831/ej.v6i1.68128>
- Dindin Abdul Muiz Lidinillah, Muhammad Rijal Wahid Muharram, & Nurronnavisa, S. (2025). Development of Ethnomathematics-Filled Picture Storybooks As a Medium for Learning Mathematics in Elementary Schools. *EMTEKA: Jurnal Pendidikan Matematika*, 6(1), 83-95. <https://doi.org/10.24127/emteka.v6i1.6253>
- Ewert, F., Baatz, R., & Finger, R. (2023). Agroecology for a Sustainable Agriculture and Food System: From Local Solutions to Large-Scale Adoption. *Annual Review of Resource Economics*, 15(1), 351-381. <https://doi.org/10.1146/annurev-resource-102422-090105>
- Hammersley, Martyn., & Atkinson, Paul. (1995). *Ethnography : principles in practice*. Routledge.
- Indrawati, M., & Sari, Y. I. (2024). Memahami Warisan Budaya dan Identitas Lokal di Indonesia. *Jurnal Penelitian Dan Pendidikan IPS*, 18(1). <https://doi.org/https://doi.org/10.21067/jppi.v18i1.9902>

- Marlisa, I., Juandi, D., & Turmudi. (2024). Persepsi Etnomatematika dalam Pembelajaran Matematika. *Jurnal Inovasi Pendidikan Matematika*, 7(1), 148–159. <https://doi.org/https://doi.org/10.31851/indiktika.v7i1.16993>
- McNall, S., & Rice, A. H. (2020). Arizona Agriculture Teachers' Mathematical Content Knowledge. *Journal of Agricultural Education*, 61(4), 109–126. <https://doi.org/10.5032/jae.2020.04109>
- Nurniyati, T., Djafar, S., Putriyani, & Nurdin. (2024). Meta Analisis Pendekatan Etnomatematika dalam Meningkatkan Kemampuan Pemecahan Masalah Matematis. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 8(3), 1981–1993. <https://doi.org/https://doi.org/10.31004/cendekia.v8i3.3526>
- Rahmayani, R., Anwar, R. B., & Vahlia, I. (2022). Pengembangan Modul Matematika Berbasis Pendekatan Kontekstual Disertai QR Code Pada Materi Logaritma. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(1), 224–234. <https://doi.org/10.24127/ajpm.v11i1.4703>
- Robinson, K., Westfall-Rudd, D., Drape, T., & Scherer, H. (2018). Conceptualizing Integrative Agricultural Education: Introductory Framework for Integrating Mathematics in Agricultural Curriculum. *Journal of Agricultural Education*, 59(4), 253–269. <https://doi.org/10.5032/jae.2018.04253>
- Saikanth, D. R. K., Gupta, K., Srivastava, P., Saryam, M., Rani, K. S., Jena, P., & Rout, S. (2023). Environmental Sustainability and Food Security of Traditional Agricultural Practices in India: A Review. *International Journal of Environment and Climate Change*, 13(8), 1847–1856. <https://doi.org/10.9734/ijecc/2023/v13i82138>
- Saiz-Rubio, V., & Rovira-Más, F. (2020). From Smart Farming towards Agriculture 5.0: A Review on Crop Data Management. *Agronomy*, 10(2), 207. <https://doi.org/10.3390/agronomy10020207>
- Septia, T., Nuraini, A., & Wahyu, R. (2024). Eksplorasi etnomatematika pada aktivitas masyarakat petani di kecamatan gondanglegi kabupaten malang. *Jurnal Inovasi Pembelajaran Matematika: PowerMathEdu*, 3(2), 253–262. <https://doi.org/10.31980/pme.v3i2.1702>
- Stripling, C. T., & Roberts, T. G. (2013). Investigating the Effects of a Math-Enhanced Agricultural Teaching Methods Course. *Journal of Agricultural Education*, 54(1), 124–138. <https://doi.org/10.5032/jae.2013.01124>
- Stubbs, E. A., & Myers, B. E. (2015). Multiple Case Study of STEM in School-based Agricultural Education. *Journal of Agricultural Education*, 56(2), 188–203. <https://doi.org/10.5032/jae.2015.02188>
- Sugiharti, A., Vahlia, I., & Rahmawati, D. (2025). Pengembangan Aplikasi Android Berbasis Problem Based Learning Berorientasi Kebudayaan Lokal Materi Baris Dan Deret Aritmatika. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 14(2), 409–423. <https://doi.org/10.24127/ajpm.v14i2.10963>

- Tlonaen, M. A., & Deda, Y. N. (2021). Exploration Ethnomathematics on Traditional House Ume Kbubu in North Central Timor Districts. *Journal of Physics: Conference Series*, 1776(1). <https://doi.org/10.1088/1742-6596/1776/1/012016>
- Wahyudi, W., & Putra, A. (2022). Systematics Literature Review: Eksplorasi Etnomatematika Pada Aktivitas Masyarakat. *Jurnal Lebesgue: Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, 3(1), 173–185. <https://doi.org/10.46306/lb.v3i1.110>
- Winarto, W., Rahmawati, D., & Vahlia, I. (2023). Pengembangan Bahan Ajar Gamifikasi Berbasis Contextual Teaching Learning (CTL) Berbantu Android. *EMTEKA: Jurnal Pendidikan Matematika*, 4(1), 141–152. <https://doi.org/10.24127/emteka.v4i1.3156>
- Zakiah, R., Sunaryo, Y., & Ruswana, A. M. (2023). Etnomatematika Dalam Bidang Pertanian Sebagai Sumber Pembelajaran Matematika. *Proceeding Galuh Mathematic Conference*, 3(1), 122–126. <https://jurnal.unigal.ac.id/GAMMA-NC/article/view/14993>