

A Meta-Synthesis on the Challenges and Benefits of Integrating Ethnomathematics in the Philippine Mathematics Curriculum

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Abstract

This meta-synthesis critically examines the challenges and benefits of integrating ethnomathematics into the Philippine mathematics curriculum. The analysis reveals several significant challenges: teachers struggle to incorporate culturally diverse lessons into instruction due to differing cultural and teaching methods, lack of necessary skills, and insufficient resources. Many educators are resistant to change, and there is a notable scarcity of culturally relevant teaching materials. Furthermore, language barriers and traditional teaching methods complicate the integration process. Despite these challenges, the benefits of incorporating ethnomathematics are substantial. It enhances students' understanding and engagement by making math more relatable and meaningful within their cultural contexts. Ethnomathematics not only teaches mathematical concepts but also preserves and celebrates traditional knowledge, promoting inclusivity and diversity in the classroom. It promotes critical thinking, problem-solving skills, and appreciation of math by connecting it to real-life applications within students' cultural frameworks. Integrating ethnomathematics enriches the educational experience by making it more inclusive and effective for all students. It values their cultural heritage, promotes a love for learning beyond the classroom, and supports the development of a culturally relevant and inclusive math education in the Philippines.

Keywords: cultural relevance, education challenges, ethnomathematics, inclusivity, Philippine mathematics curriculum, traditional knowledge.

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1. Introduction

The Philippines is home to over 110 Indigenous communities, with a population ranging from 15 to 20 million, primarily located in Northern Luzon and Mindanao. These communities often struggle to access mainstream education due to historical discrimination, marginalization, and the erosion of their cultural identity (Alangui, 2017). Although the Indigenous Peoples Rights Act (IPRA) was enacted in 1997 to address these issues, its implementation has faced numerous challenges (Magdadaro and Sacramento, 2022; Abad, 2018). There is a lack of precise data on the extent to which Indigenous communities are reached by the public school system, especially since many live in remote, mountainous areas with limited access to basic social services. In response to these educational disparities, ethnomathematics has been introduced and adapted to the Philippine educational landscape.

Ethnomathematics explores the relationship between mathematics and cultural practices, beliefs, and traditions, acknowledging that mathematics is influenced by cultural contexts (Umbara et al., 2021). The concept was first introduced by D'Ambrosio in 1985 through the International Study Group of Ethnomathematics, focusing on how mathematics is used and understood in different cultural settings. This awareness of the social and cultural dimensions of mathematics education underscores the role of culture in mathematical concepts and problem-solving (Umbara et al., 2021).

In the Philippines, integrating ethnomathematics into the curriculum provides a perspective on the connection between mathematics and Filipino culture, tradition, and history. This integration has the potential to enhance students' learning experiences and foster a deep appreciation for their cultural identity (Alangui, 2017).

However, the integration of ethnomathematics into the Philippine mathematics curriculum presents both challenges and opportunities. Challenges include the need to shift Filipino teachers' perspectives toward

ethnomathematics, moving from traditional teaching methods to more culturally inclusive approaches. Teachers must familiarize themselves with the ethnomathematical practices of the diverse ethnic groups in the Philippines, which is a daunting task given the country's rich cultural heritage. Additionally, there is a significant lack of resources and training programs specifically designed to prepare teachers to effectively incorporate ethnomathematics into their teaching practices (Agup, 2020).

Despite these challenges, ethnomathematics offers substantial opportunities. Integrating ethnomathematics can promote cultural appreciation among students, demonstrating the relevance of mathematics within their cultural contexts. This approach supports social justice and equity in education by validating and incorporating the mathematical practices of various cultural groups, making mathematics more accessible and meaningful for all students. Furthermore, linking mathematics to real-life cultural practices can enhance student engagement and proficiency (Brandt and Chernoff, 2015; D'Ambrosio, 2007). This holistic approach enriches the learning experience and nurtures a sense of pride and identity among Filipino students.

As a teaching methodology, ethnomathematics aligns with students' cultural backgrounds, aiding in self-understanding, social interaction, and the conceptualization of mathematical knowledge (D'Ambrosio, 1990). It builds on and values the cultural experiences and knowledge of students from both dominant and non-dominant cultural systems, empowering them intellectually, socially, emotionally, and politically by using cultural references to impart knowledge, skills, and attitudes in the pedagogical work in schools. However, it is crucial to integrate ethnomathematics in a way that respects and explores diverse mathematical traditions while maintaining the academic rigor associated with the study of mathematics.

This meta-synthesis aims to critically examine the challenges and benefits of integrating ethnomathematics into the Philippine mathematics curriculum. By analyzing existing research and studies on ethnomathematics in the Philippine context, this study seeks to provide insights into the status of ethnomathematics in the Philippines and offer recommendations to promote culturally relevant and inclusive mathematics education.

2. Related Studies

2.1 *Indigenous people's community*

The study of Alangui (2017) discussed the role of ethnomathematics in Indigenous Peoples' Education (IP) education in the Philippines. It highlighted the challenges faced by teachers in developing cross-cultural, culturally relevant mathematics lessons. They suggest that ethnomathematics can be used as a theory for culturally relevant mathematics education within IP education initiatives. It also discusses the potential of a modified framework for an ethnomathematical curriculum model, which can support Indigenous students' mathematics education. They emphasize the need for more Filipino teachers to be trained in ethnomathematics theory. Moreover, it highlights the integration of ethnomathematics and culturally relevant mathematics in education, emphasizing the importance of connecting students' cultural practices with formal mathematics. It showcases the success of PAMANA KA school in implementing culturally relevant math education. The framework presented offers a structured approach to developing math lessons that incorporate cultural activities to deepen students' mathematical understanding. It gave emphasis on the significance of culturally responsive education in enhancing math learning experiences for students.

2.2 *Purposes on Ethnomathematics*

Validation of all forms of mathematical explaining and understanding formulated and accumulated by different cultural groups (D'Ambrosio, 1993; Gerdes, 1994; Duarte, 2004; Rios, 2000, Rosa & Orey, 2006) as cited by Rosa and Orey, 2011). Ethnomathematics assists students to become aware of how people mathematize and think mathematically in their culture, to use this awareness to learn about formal mathematics, and to increase the ability to mathematize in any context in the future (Duarte, 2004; Rios, 2000, Rosa & Orey, 2006). It is not just about the application of relevant contexts in learning and teaching mathematics, but is also about generating formal mathematics from cultural ideas (Gerdes, 1994)

Cultural Diversity, Inclusivity and Relevance (Brandt and Chernoff, 2015; Presmeg 1998). Understanding of cultural diversity is not an option but a necessity (Ogbu, 1995). Barton (1996) as cited by Rosa and Orey (2011) stated that, ethnomathematics is a program that investigates the ways in which different cultural groups comprehend, articulate, and apply concepts and practices that can be identified as mathematical practices. Teaching and learning of mathematics should reflect and embrace the cultural diversity found in mathematics classroom (Brandt and Chernoff, 2015). Ethnomathematical perspective infuses the students' cultural backgrounds in the learning environment in a holistic manner and students are given opportunities to relate their

new learning experiences to knowledge and skills they have previously learned. Ethnomathematical curriculum as an integration of the mathematical concepts and practices originating in the students' culture with those of conventional and formal academic mathematics (Lipka, 2002)

Ethnomathematics has the potential to help engage, inspire and empower Aboriginal children (Brandt and Chernoff, 2015) and increase diverse mathematical perspectives (Brandt and Chernoff, 2015; Pais 2010). D'Ambrosio (1993) as cited by Rosa and Orey (2011) stated that the mission of the ethnomathematics program is to acknowledge that there are different ways of doing mathematics by considering the appropriation of the academic mathematical knowledge developed by different sectors of the society as well as by considering different modes in which different cultures negotiate their mathematical practices. Orey (2000) stated that the application of "ethnomathematical techniques and the tools of mathematical modelling allows us to see a different reality and give us insight into science done in a different way. Mathematics shifts from the strictly domain of schools and universities and places it within the world of people, their cultures and everyday activities" (Pais, 2010). Math extends beyond classroom and that it has real importance in the real world" (Brandt and Chernoff, 2015). And that math is found everywhere one looks, we just need to find ways of including these alternative viewpoints into the classroom" (Urton, 2012)

Increased Motivation and Interest (Brandt and Chernoff, 2015, Mania and Alam, S. (2021). Including ethnomathematics, mathematics will be more meaningful (Mania and Alam, 2021). Ethnomathematical approaches are intended to make school mathematics more relevant and meaningful to students and to promote the overall quality of education. By incorporating ethnomathematics, educators can spark students' interest and motivation in mathematics. Learning about how mathematical concepts are used and applied in different cultural settings can make the subject more relatable and intriguing.

Promotes Social Justice (Brandt and Chernoff, 2015; D' Ambrosio 2007; Bsihop 1988). Ethnomathematics has the potential to create equity and social justice because mathematics is the universal mode of thought and the universal struggle of man is to survive with dignity" (D Ambrosio, 2007). Ethnomathematics is a cultural by product for the purpose of meaningful learning of the subject matter and for the sake of equity in culturally diverse classrooms – Bishop, 1988. This suggests that by embracing and incorporating diverse cultural perspectives in the teaching and learning of mathematics, we can contribute to a more inclusive and equitable society.

Help students of all kinds to develop their capacity for thinking "outside the box". When Students are exposed to many different lines of thinking, they begin to see that diversity in thought is valuable and can spark creativity. As a teacher it is the job to help students develop their creativity to solve problems using variety of strategies and then be able to express themselves through multiple methods".

Contextualizing Mathematics. Ethnomathematics encourages students to understand mathematics within its cultural context. This contextualization enhances their understanding of how mathematical concepts have evolved and been applied in different societies. According to Torres-Velasquez and Lobo (2004), it proposes that teachers contextualize mathematics learning by relating mathematical content to students' culture and real-life experiences. According to Rosa and Orey (2006), culturally relevant mathematics curriculum should focus on the role of mathematics in a sociocultural context that involves the ideas and concepts associated with ethnomathematics, using an ethnomathematical perspective for solving contextualized problems. Learning is greatly enhanced when teachers integrate students' backgrounds. Surely having students explore the mathematics in their own cultures is an effective way to bring life to mathematics and give students the possibility to see the relevance of mathematics.

Enhancing Teaching Practices. Ethnomathematics is a research program that guides educational pedagogical practices (D'Ambrosio (1993) as cited by Rosa and Orey, 2011) and an ethnomathematical curriculum brings a broader understanding about the importance of mathematics to pedagogical activities developed in the mathematics classrooms (Borba, 1993). For those pursuing careers in education, an ethnomathematics course can provide valuable insights into alternative teaching methods that resonate with students from different cultural backgrounds. It can enhance educators' ability to make mathematics more accessible and engaging. Educators who undergo ethnomathematics training can apply insights gained from the course to enhance their teaching practices. They may incorporate culturally relevant examples, teaching methods, and materials that better resonate with students from diverse backgrounds.

Promoting Cultural Awareness and Respect (D' Ambrosio (2007). The fundamental values of ethnomathematics are respect, solidarity and cooperation with others (Ambrosio, 2007). Zeichner (1996) as cited by Rosa and Orey (2011), in order for teachers to implement the principle of cultural congruence, they should have knowledge of

and respect for the various cultural traditions and languages of students in their classrooms. Introducing ethnomathematics promotes cultural respect and appreciation. It contributes to breaking down stereotypes about mathematical abilities associated with specific cultures and helps create a more inclusive and equitable academic environment. Ethnomathematics has the potential to help students feel accepted, become more accepting of others and even help in the fight against RACISM. Mathematics is everywhere; it is experienced and practiced by every culture and must be incorporated into the mathematics curricula. Bringing mathematics into future classrooms has the potential to change the way students view themselves, each other and their place within the world and students might even enjoy it.

3. Methodology

3.1 Research Design

This research employed meta-synthesis. The meta-synthesis is an important method which enriches research with valuable findings (Clemmens, 2003). One of the many purposes of meta-syntheses is understanding of existing knowledge (Atkins, et al., 2008). In their nature, qualitative meta-syntheses are exploratory-descriptive an interpretative, broaden the understanding of a phenomenon and associations with current theoretical postulations. This happens through integration of multiple inter-related qualitative studies (Chrastina, 2016).

The process begins with a broad literature search using specific keywords and phrases. From this search, relevant papers are selected for inclusion in the synthesis. These papers are then examined to identify large, overarching themes. After identifying the themes, the papers are re-examined to search for keywords that exemplify each theme.

3.2 Scope and inclusion criteria

This meta-synthesis aims to analyze and synthesize existing research on the integration of ethnomathematics within the Philippine mathematics curriculum, focusing on its challenges and benefits. The study started with a comprehensive search of academic databases using keywords like "ethnomathematics," "Philippine mathematics curriculum," "cultural relevance," and "educational challenges." Selected studies will include those published in peer-reviewed journals, conference proceedings, and academic theses relevant to the Philippine context.

The inclusion criteria prioritize research conducted in the Philippines and papers discussing the impact of ethnomathematics on the curriculum, teaching practices, and student outcomes. Thematic analysis will identify and categorize key challenges such as teachers' perspectives, lack of resources and training, curriculum adjustments, and cultural barriers. Similarly, benefits like enhanced cultural appreciation, promotion of social justice and equity, improved student engagement, and practical learning applications will be examined. Data from the selected studies will be synthesized to highlight patterns and insights. The results will be presented narratively, preserving the richness and voice of the original studies.

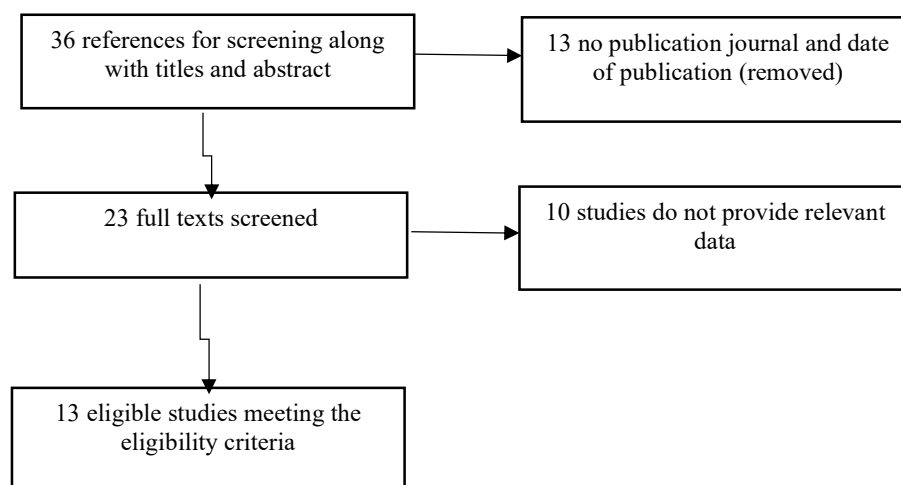


Figure 1. Flow chart of study selection process.

Figure 1 showed the flow chart of the study selection process of references to be considered in the meta-synthesis. The study selection process began with an initial 36 references to be considered, screening the titles and abstracts of these studies to quickly identify which ones might be relevant. During this initial review, 13 of the studies lacked crucial details like the publication journal and date of publication. These details are essential for verifying and tracking the studies, so those 13 were removed from consideration. This left 23 studies, which were then subjected to a more thorough review. The researcher read the full texts of these remaining studies to assess their relevance and quality in detail. During this step, it was discovered that 10 of the studies, while potentially interesting, did not provide the relevant data needed for their research. As a result, those 10 were excluded. Finally, the researchers identified 13 studies that met all their eligibility criteria. These selected studies had the necessary information, were from credible sources, and directly addressed the research questions.

4. Results and discussion

With careful analysis from the information gathered in the study using thematic analysis, themes were generated from the responses of the participants and the key findings are presented as follows:

Table 1. Challenges in incorporating Ethnomathematics in Philippine Mathematics curriculum.

Theme	Sub-theme	Description	Source
Curriculum Integration Constraint	Overcoming traditional teaching methods and curriculum structures	Mathematics teachers face difficulties in developing cross-cultural or culturally relevant mathematics lessons.	Alangui (2017)
		Overcoming traditional teaching methods and curriculum structures to accommodate cultural integration effectively.	Agup and Agup (2020).
		Incorporating ethnomathematics require significant changes to the existing curriculum and teaching methods.	Chua (2004)
Teacher Training Needs	Educators require additional training to effectively incorporate ethnomathematics into their teaching practices	There is a need for training more teachers in the theory of ethnomathematics to advance culturally relevant mathematics education	Alangui (2017)
		Teachers in the Philippines lack background on integrating Ethnomathematics into Mathematics teaching.	Janiola and De Los Santos (2021)
		Requires teacher training to effectively incorporate ethnomathematics	Vistro-Yu (2010)
		Educating teachers on how to effectively integrate ethnomathematics into their lessons pose a challenge due to the need for specialized training.	Arciosa and Tuando (2021)
		Educators need additional training to effectively incorporate ethnomathematics into their teaching practices.	Sulatra (2023)
Resource Availability	Developing appropriate instructional materials and resources that accurately represent ethnomathematical practices of diverse cultural groups in the Philippines	Despite efforts in Jose Panganiban, Camarines Norte, inadequate sources among teachers persists.	Janiola, Fe R., Maria Salud M. De Los Santos (2021).
		Access to resources and materials that accurately represent ethnomathematics from various indigenous communities in the Philippines may be limited, impacting	Arciosa, Ramil and Tuando, Rogie (2021)

		implementation.	
		Inadequacy of learning materials tailored to ethnomathematical approaches.	Abad, I. C. (2018)
		Developing appropriate instructional materials and resources that accurately represent ethnomathematical practices of diverse cultural groups in the Philippines.	Agup, R. M. and Agup, R. S. (2020)
Resistance and Acceptance	Resistance or lack of awareness among educators and policymakers hinders the integration of ethnomathematics.	Resistance or lack of awareness among educators and policymakers.	Catherine P. Vistro-Yu (2010)
		Resistance or inadequate receptiveness from educators towards incorporating ethnomathematics into the curriculum.	Agup, R. M. and Agup, R. S. (2020)
		Resistance to change in traditional curriculum structures, from stake holders and teaching methods hinder the integration of ethnomathematics.	Buan, A., Jackaria, P. M., and Yuenyong, C. (2018); Rubio, J. S. (2016)
		There are resistance or lack of awareness about the benefits of including ethnomathematics in the mathematics curriculum.	Bula, N. B., Solaiman, N. P., and Manalundong, M. Q. (2017)
Language and Cultural Barriers	Language barriers hinder effective integration of ethnomathematics within Indigenous Peoples' education initiatives	Implementing ethnomathematics within Indigenous Peoples' education initiatives requires overcoming barriers related to cultural differences and pedagogical approaches.	Alangui (2017)
		Language barriers hinder effective integration.	Capua, R. D. (2021)
		Addressing language barriers for effective learning.	Magdadaro, J. M D. and Sacramento, N. J. J. E. (2022).
Confusion and Conceptual Clarity	Some teachers mix up ethnomathematics with ethnic mathematics, which hinders conceptual clarity and precise integration strategies	Some teachers mix up ethnomathematics with ethnic mathematics.	Chua (2004)
		There is a lack of clear theoretical foundations in some studies can slow down progress in ethnomathematics integration.	Alangui (2017)

Teachers find it tough to weave in lessons that reflect different cultures in math teaching. It's hard to blend ethnomathematics into Indigenous Peoples' education due to differing cultural and teaching methods and some educators aren't fully on board with the idea of adding ethnomathematics to the curriculum (Alangui, 2017; Agup and Agup, 2020; Chua, 2004). More teachers need to learn about ethnomathematics to make math lessons more culturally relevant. Teachers in the Philippines might not know how to incorporate ethnomathematics into their lessons and many teachers feel they lack the necessary skills and background to teach ethnomathematics effectively (Alangui, 2017; Janiola and De Los Santos, 2021; Vistro-Yu, 2010; Arciosa and Tuando, 2021; Sulatra, 2023). Furthermore, teachers often struggle with a lack of resources when trying to introduce ethnomathematics. It's hard to find materials that accurately represent ethnomathematics from different indigenous communities. Updating teaching materials and methods to include ethnomathematics is a big task and creating instructional materials that truly reflect the math practices of diverse cultural groups is important (Janiola, et al., 2021; Arciosa, 2021; Abad, 2018; Agup, R. M. and Agup, 2020). Also, teachers and policymaker

push back against adding ethnomathematics to the curriculum resisting in changing existing teaching methods and curriculum structures. Not everyone understands the benefits of including ethnomathematics in math education (Vistro-Yu, 2010; Agup, R. M. and Agup, 2020; Buan, et al., 2018; Rubio, 2016; Bula, et al., 2017).

The traditional way of teaching math in the Philippines might not match up with ethnomathematics principles making sure that ethnomathematics fits well with the diverse cultures in the Philippines is crucial (Chua, 2004). Lastly, language differences can make it hard for students to grasp ethnomathematics concepts effectively. Teaching in different regional languages and overcoming language barriers is a real challenge. It's tough to keep math education consistent across different regions and cultures in the Philippines. The current curriculum might not be flexible enough to include ethnomathematics seamlessly (Capua, 2021; Alangui, 2017).

Table 2. Benefits of Integrating Ethnomathematics in the Philippine Mathematics Curriculum

Theme	Sub-theme	Description	Source
Cultural Relevance and Appreciation	Ethnomathematics provides a theoretical framework for culturally relevant mathematics education in the Philippines	Enhances the relevance and meaning of Mathematics for students	Alangui (2017); Sulatra (2023)
		Makes mathematics more relatable by connecting it to Filipino students' cultural heritage and traditions	Arciosa and Tuando (2021)
		Supports the preservation of indigenous knowledge and cultural heritage	Abad (2018)
Enhanced Learning and Engagement	Ethnomathematics enhances students' mathematical understanding and engagement	Makes school Mathematics more meaningful and promotes overall educational quality	Janiola and De Los Santos (2021)
		Helps students relate better to math concepts when seen in familiar cultural contexts	Arciosa and Tuando (2021)
		Enhances students' performance in standardized mathematics tests through relatable approaches	Sulatra (2023)
Promotion of Diversity and Inclusivity	Ethnomathematics promotes cultural relevance, diversity, and inclusivity in mathematics education (Vistro-Yu, 2010).	Acknowledges and respects the mathematical practices of diverse cultural groups in the Philippines	Arciosa and Tuando (2021)
		Fosters deeper understanding and appreciation of diverse tribal norms and practices	Chua (2004)
		Showcases unique mathematical perspectives of different indigenous communities	Rubio (2016)
		Helps students see the universality of mathematical concepts across different cultures	Magdadaro and Sacramento (2022)
Real-World Application and Practical Learning	Ethnomathematics supports capacity building and improves learning outcomes by engaging students with their cultural heritage (Vistro-Yu, 2010).	Promotes deeper understanding and appreciation of mathematics concepts through real-world contexts	Capua (2021)
		Provides a practical and relatable approach to learning mathematics, catering to diverse learning styles and abilities	Buan, Jackaria, and Yuenyong (2018)
		Provides opportunities for students to connect mathematical concepts with real-life cultural practices	Abad (2018)

Ethnomathematics helps teachers create math lessons that really resonate with Indigenous Filipino students, making math more than just numbers, it becomes part of their cultural identity and heritage. When students see math in the context of their own culture, it's like a lightbulb moment, they understand it better and feel more

connected to what they're learning (Alangui, 2017; Janiola and De Los Santos, 2021; Vistro-Yu, 2010; Arciosa and Tuando, 2021; Sulatra, 2023). By incorporating ethnomathematics, teachers are not only teaching math but also preserving and celebrating traditional knowledge and practices within the community. It's like passing down a piece of cultural heritage with every math lesson. Students from different cultural backgrounds feel seen and valued when they see their own traditions represented in the math curriculum, promoting inclusivity and diversity in the classroom (Vistro-Yu, 2010; Agup, R. M. and Agup, 2020; Buan, et al., 2018; Rubio, 2016; Bula, et al., 2017).

In addition to that, ethnomathematics provides a theoretical foundation for culturally relevant and inclusive math education, enhancing the relevance, meaning, and diversity of mathematics for students (Alangui, 2017; Capua, 2021; Janiola & De Los Santos, 2021; Vistro-Yu, 2010). Incorporating ethnomathematics enriches the curriculum by integrating traditional Filipino mathematical concepts and practices, acknowledging and respecting the mathematical practices of diverse cultural groups, and promoting cultural understanding and appreciation (Arciosa & Tuando, 2021; Sulatra, 2023; Agup & Agup, 2020). Also, ethnomathematics promotes diversity and inclusivity by recognizing and valuing different mathematical systems, fostering cultural relevance, and appreciating diverse tribal norms and practices (Bula, Solaiman, & Manalundong, 2017; Buan, Jackaria, & Yuenyong, 2018; Rubio, 2016; Magdadaro & Sacramento, 2022; Chua, 2004).

Learning math through ethnomathematics isn't just about numbers; it's about developing critical thinking, problem-solving skills, and understanding the world around us. Students get excited because they're learning about math in ways that relate to their own lives and experiences. Teachers see their students' confidence grow as they tackle math problems in familiar cultural contexts, and they know they're not just teaching math—they're helping students grow intellectually and emotionally (Capua, 2021; Alangui, 2017). Moreover, Ethnomathematics isn't just about teaching math, it's about empowering students to succeed academically and feel confident in their abilities. When students see themselves reflected in what they're learning, they're more motivated to excel. Teachers feel proud knowing they're creating an environment where every student feels valued and capable of achieving academic excellence, regardless of their background (Janiola, et al., 2021; Arciosa, 2021; Abad, 2018; Agup, R. M. and Agup, 2020). In addition to that, students light up when they realize that math isn't just about numbers on a page, it's about real-life applications and understanding the world around them. Ethnomathematics encourages them to think critically and creatively, solving problems in ways that are meaningful to them. Teachers see their students' excitement and curiosity grow as they explore diverse mathematical practices, fostering a love of learning that goes beyond the classroom (Magdadaro, et al., 2022).

5. Conclusion

Integrating ethnomathematics into the Philippine mainstream curriculum offers substantial benefits alongside notable challenges. Teachers struggle to incorporate culturally diverse lessons into math instruction and often lack the necessary skills and confidence to teach ethnomathematics effectively. This difficulty is compounded by a scarcity of accurate, culturally relevant materials and resistance from some educators and policymakers (Alangui, 2017; Agup & Agup, 2020; Chua, 2004; Janiola & De Los Santos, 2021; Vistro-Yu, 2010; Arciosa & Tuando, 2021; Sulatra, 2023; Janiola et al., 2021; Abad, 2018). The traditional math teaching methods and language barriers further complicate the integration process, making it challenging to maintain consistency across diverse regions (Capua, 2021; Alangui, 2017).

Despite these challenges, ethnomathematics offers significant advantages. It makes math more relatable and meaningful by connecting it to students' cultural contexts, thereby enhancing their understanding and engagement. This approach not only teaches mathematical concepts but also preserves and celebrates traditional knowledge, promoting inclusivity and diversity in the classroom (Alangui, 2017; Janiola & De Los Santos, 2021; Vistro-Yu, 2010; Arciosa & Tuando, 2021; Sulatra, 2023; Agup & Agup, 2020; Buan et al., 2018; Rubio, 2016; Bula et al., 2017).

Ethnomathematics promotes critical thinking, problem-solving skills, and a deeper appreciation of math as students see its real-life applications within their cultural frameworks. This engagement boosts their confidence and motivation, empowering them to succeed academically (Capua, 2021; Magdadaro et al., 2022). Lastly, integrating ethnomathematics enriches the educational experience, making it more inclusive and effective for all students by valuing their cultural heritage and promoting a love for learning beyond the classroom.

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