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ORIGINAL ARTICLE

Instructional Practices of Indigenous Schools: Contextualized Mathematical Learning in Focus

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ABSTRACT

This study examines how mathematics teachers in Indigenous schools incorporate cultural contexts into their instruction to support student learning and engagement. Recognizing that traditional teaching approaches often overlook Indigenous students' cultural experiences, the research explores how teachers adapt their practices to reflect local knowledge, language, and everyday realities. Using a qualitative phenomenological design, fourteen teachers from Indigenous schools in Kapalong, Davao del Norte, were purposively selected to share their experiences through in-depth interviews. The analysis uncovered key strategies such as drawing on traditional knowledge systems, using real-life community examples, and adapting lesson content to reflect cultural relevance. Despite these efforts, teachers face persistent challenges, including the lack of culturally appropriate teaching resources, language and dialect barriers, and limitations imposed by the national curriculum. In response, they rely on community collaboration, material improvisation, and professional learning to address these gaps. The findings suggest that culturally responsive teaching plays a significant role in fostering student confidence and making mathematics more accessible. This study points to the need for stronger institutional support in areas such as localized curriculum development, teacher training, and resource creation. It also recommends further research—especially using mixed methods—to explore how contextualized instruction affects learning outcomes in Indigenous communities.

Keywords: *contextualized learning, Indigenous schools, mathematics instruction, culturally relevant pedagogy, qualitative study, Philippines*

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INTRODUCTION

Though mathematics is viewed as a universal system of reasoning, its classroom delivery in Indigenous settings often overlooks cultural relevance, diminishing its accessibility to learners. However, in Indigenous school settings, instruction frequently lacks cultural relevance, resulting in diminished learner engagement and academic performance. Traditional approaches to teaching mathematics frequently overlook the cultural and linguistic diversity of Indigenous students, contributing to limited participation and lower achievement levels (Preston & Claypool, 2021). The absence of pedagogical strategies that reflect students' cultural contexts further compounds these issues, restricting their full access to meaningful learning experiences in mathematics.

A study in Zimbabwe illustrates the linguistic challenges encountered in Indigenous education, where English remains the primary language of instruction despite students primarily speaking Shona. This language disparity hinders comprehension, prompting educators to alternate between English and Shona during instruction. However, many teachers lack proficiency in Indigenous languages and face a shortage of instructional materials in Shona. The prevailing preference for English as a high-status language also discourages the effective use of Indigenous dialects, thereby impeding students' full academic participation (Chikodzi & Kaino, 2020).

In the Philippine context, particularly in Zambales, similar challenges affect the mathematics education of Indigenous Peoples (IP) students. Although teachers implement strategies to foster collaborative and supportive learning environments, student performance in subjects such as Algebra and Geometry remains only at a satisfactory level. Panes and Falle (2021) attribute this to the insufficient preparation teachers receive in delivering culturally responsive instruction. Limited access to relevant teaching materials and inadequate professional development in culturally adapted pedagogies contribute to instructional practices that fail to fully engage Indigenous learners. This highlights the urgent need for targeted teacher training and the integration of culturally grounded teaching methods.

Improving mathematics education for Indigenous learners is essential, given its long-term implications for academic success, social equity, and career pathways. Barriers in mathematics learning can perpetuate systemic inequities, making it imperative to adopt educational interventions that prioritize cultural relevance, inclusive pedagogy, and localized teaching resources. Effective instruction must consider the interplay of cultural identity, learning styles, and mathematical competence. The present study aims to inform curriculum development by identifying teaching strategies that are responsive to Indigenous learners' experiences and contexts, thereby equipping educators with tools to foster both academic success and cultural affirmation.

This research contributes to the limited body of literature on mathematics instruction in Indigenous schools by providing a contextualized analysis of teachers' practices. While previous studies, such as Pulumbarit (2022), highlight the positive effects of autonomy-supportive teaching on students' mathematics performance, they do not address the role of culturally responsive strategies in Indigenous settings. Similarly, the work of Creagar et al. (2022), which focuses on active learning in mathematics, lacks a cultural dimension tailored to Indigenous learners. This study fills that gap by exploring how teachers incorporate cultural context into mathematics instruction, thus advancing the discourse on inclusive and equitable mathematics education.

Additionally, Tay and Saleh (2019) conducted a study titled "Science Teachers' Instructional Practices in Malaysian and German Secondary Schools," which examined traditional and alternative teaching methods in both countries without specifically addressing the adaptation of mathematics instruction for Indigenous students. In contrast, this study is new in its focus on the lived experiences of mathematics teachers in Indigenous schools in the Philippines, highlighting how they use culturally rooted strategies to contextualize math instruction—an area not previously explored in local research.

Research Questions

This study explored the lived experiences of mathematics teachers in Indigenous Peoples (IP) schools as they implement contextualized learning strategies. Specifically, it attempted to answer the following questions:

1. What are the different contextualized learning strategies and techniques in mathematics teachers of IP schools?
2. What are the lived experiences do you face in finding culturally relevant materials for teaching math?
3. How do teachers in IP schools cope with the challenges of teaching math in a culturally relevant way?
4. What insights do teachers have regarding contextualizing mathematics learning?

Theoritical Lens

This study is grounded in Ladson-Billings' (1995) Culturally Relevant Pedagogy, Vygotsky's (1978) Sociocultural Theory, and Piaget's (1952) Constructivist Theory. Ladson-Billings highlights the importance of integrating students' cultural identities into academic content to foster engagement and achievement. Vygotsky emphasizes the role of social interaction and cultural tools in learning, particularly within the zone of proximal development. Piaget focuses on learners' active construction of knowledge through experience and reflection. Together, these theories provide a comprehensive lens to examine how mathematics teachers in IP schools contextualize instruction to promote culturally grounded, meaningful, and effective learning experiences.

METHODS

Study Design

This study adopted a qualitative design rooted in phenomenology to explore how mathematics teachers in Indigenous schools integrate cultural elements into their instruction. The choice of a qualitative approach was guided by the study's aim to understand participants' lived experiences rather than to measure outcomes through numerical data. As Crossman (2020) emphasizes, qualitative research provides space to examine how individuals construct meaning from their interactions within specific cultural and educational contexts.

A phenomenological lens was particularly appropriate for this inquiry, as it allowed for a deeper understanding of how teachers perceive and navigate the complexities of delivering mathematics instruction in culturally relevant ways. Rather than focusing on general trends, this approach made it possible to engage closely with individual narratives and identify shared patterns in the way teachers relate their instructional practices to Indigenous culture. Following Smith's (2004) conceptualization,

the study centered on participants' conscious experiences and how these are shaped by the social and cultural realities of their communities.

The methodology facilitated the identification of recurring themes that reflect both instructional strategies and the challenges encountered in culturally contextualized teaching by emphasizing teachers' firsthand accounts. This design helped ensure that the voices of educators working within Indigenous contexts were placed at the core of the analysis, providing insights that are both reflective and grounded in everyday practice.

Population and Sample

The participants in this study consisted of mathematics teachers from Indigenous schools who have actively implemented culturally contextualized instructional strategies in their teaching practice. A total of fourteen (14) teachers were selected to take part in the study through in-depth individual interviews (IDIs), allowing for the collection of rich, experiential data on how they integrate Indigenous cultural elements into mathematics instruction.

The sample size was determined following Creswell's (2012) guidance, which recommends a range of 3 to 15 participants for phenomenological research. This range facilitates the generation of meaningful insights while supporting data saturation. In this study, saturation was considered achieved after the twelfth interview, at which point participant responses began to exhibit significant repetition. By the fourteenth interview, no new themes or perspectives emerged, indicating that the data collected were sufficient for thematic analysis and interpretation. Although additional participants were considered, the recurrence of responses confirmed that further interviews would likely not yield novel information.

Participants were recruited through purposive sampling, a technique appropriate for qualitative inquiry that involves selecting individuals based on specific criteria relevant to the research objective. The participants were chosen based on their substantial experience teaching mathematics in Indigenous school settings and their demonstrated engagement with culturally relevant instructional approaches. As Creswell (2012) notes, purposive sampling is effective for identifying information-rich cases that can provide deep insight into the phenomenon under investigation.

Eligibility criteria required that participants be current mathematics teachers in Indigenous schools with a minimum of three years of teaching experience in such contexts. Moreover, participants were expected to have direct experience in contextualizing mathematics lessons to align with the cultural backgrounds, traditions, and everyday experiences of their learners. Efforts were also made to include diverse teaching profiles to capture a broad spectrum of instructional practices and contextual influences, thereby enhancing the depth and transferability of the study's findings.

Data Collection

The data collection method for this study, spanning from the pre-interview through post-interview phases, was executed in adherence to a written protocol followed by the researcher. Initially, the researcher formulated the interview guide questions, which were subsequently validated by a panel of validators. Following this validation, a letter of endorsement was acquired. The researcher then sought the adviser's permission to conduct the study, facilitated through the endorsement letter. Following this, the researcher secured permission from the Office of the College President of KCAST to conduct face-to-face interviews outside the school. Upon receiving the approval letter to conduct the study and address it to the Department of Education (DepEd), the researcher's process can officially proceed.

Consent forms were provided to these chosen participants for their signature, signifying their agreement to participate in the study.

The researcher then carried out the study with the panel's approval letter. Before commencing the interviews, an orientation session was conducted for each participant. During this orientation, the researcher outlined the study's objectives, methodology, and participants' legal rights. Additionally, authorization was obtained before recording the entire interview. The researcher subsequently transcribed the collected information. After transcription, participants validated the data, and the researcher translated and analyzed the data after verification. The findings obtained from this data analysis were utilized to formulate conclusions and provide recommendations.

Data Analysis

The data gathered in this study—centered on contextualized mathematical instruction in Indigenous schools—were analyzed in alignment with the study's objectives and the nature of the inquiry. The primary goal of the analysis was to derive meaningful interpretations from participants' narratives that illuminate how mathematics teachers incorporate Indigenous cultural elements into their instructional practices. Emphasis was placed on identifying recurring patterns, emerging themes, and significant trends that reflect the lived experiences of the participants.

Data analysis in this qualitative, phenomenological study involved a rigorous and systematic process of organizing, reviewing, and interpreting the data collected through interview transcripts and field notes. The researcher engaged deeply with the content to uncover both explicit and implicit meanings embedded in the responses. Given the interpretive nature of phenomenology, the researcher served as the primary instrument in the analytic process, actively engaging in reflective interpretation to capture the essence of participants' experiences.

Following the principles of content analysis, the analytical procedure included several key stages: data familiarization, initial coding, categorization, and theme development (Ravidran, 2019). The researcher first transcribed the interviews verbatim and thoroughly reviewed the texts multiple times to become intimately familiar with the data. Codes were then assigned to meaningful units of text, which were subsequently grouped into categories. From these categories, broader themes were constructed to represent the shared experiences and instructional practices of the participants.

To access information-rich cases, the study employed a snowball sampling technique at the onset of data collection. This method was selected due to the specialized nature of the target population—mathematics teachers in Indigenous schools with experience in contextualized instruction—who may be limited in number and geographically dispersed. Initial participants were asked to recommend other qualified individuals, enabling the researcher to reach suitable informants who met the inclusion criteria. Snowball sampling is consistent with the phenomenological aim of acquiring deep, reflective accounts from participants who have direct, meaningful engagement with the phenomenon under study.

Before each interview, the researcher would brief participants on the purpose of the study, the interview process, and the expected duration. Participants will be informed about the confidentiality measures in place and the recording process, with consent obtained for the use of audio-recording devices to capture their responses accurately. This process ensures that the interviews are conducted respectfully and transparently, giving participants the opportunity to share their experiences in a comfortable and secure environment.

RESULTS

Contextualized Learning Strategies in Mathematics Instruction

Research Question No. 1: What are the different contextualized learning strategies in mathematics and techniques of teachers in Indigenous schools?

The major themes and core ideas for this research question are presented in Table 1. Based on the participants' responses, five major themes emerged: Integrating Cultural Context in Mathematics Instruction, Utilization of Indigenous Knowledge Systems, Localization of Mathematical Content, and Application of Real-World and Community-Based Examples.

Table 1. Contextualized Learning Strategies in Mathematics and Techniques of Teachers in IP Schools

Emerging Themes	Supporting Statements
Integration of Cultural Context into Instruction	• *"I give examples they can see—like the perimeter of their farmland." – IDI-08* • *"I include their traditional practices in solving problems." – IDI-06*
Utilization of Indigenous Knowledge Systems	• *"We use weaving to explain symmetry and farming for area." – IDI-02* • *"Our ancestors' counting system helps explain numeracy." – IDI-04*
Localization of Mathematical Content	• *"I incorporate their counting systems and woven products into class." – IDI-13* • *"Local terms and measurements help them relate to the lesson." – IDI-10*
Application of Real-World and Community-Based Examples	• *"We explore surroundings to find shapes in geometry." – IDI-01* • *"We calculate areas using their farmland and house layout." – IDI-11*

The findings reveal that teachers in Indigenous schools employ a range of strategies to make mathematics instruction culturally meaningful. Integrating cultural contexts—such as using students' daily routines, traditional knowledge, and local environmental features—emerged as a key practice. Teachers often relied on community-relevant examples like farmland measurement and weaving to explain abstract concepts, improving engagement and comprehension. These approaches reflect Ladson-Billings' concept of culturally relevant pedagogy and align with Vygotsky's emphasis on using cultural tools in the learning process. Contextualization not only made math more relatable but also helped bridge the gap between students' lived experiences and formal academic content.

The first theme, *Integration of Cultural Context into Instruction*, aligns with the work of Luecke (2025), who highlighted that culturally integrated instruction helps students understand abstract mathematical ideas by relating them to familiar, everyday experiences.

The second theme, *Utilization of Indigenous Knowledge Systems*, is supported by Ferrer-Jarangue (2024), whose study found that culturally grounded teaching significantly enhances students' performance in mathematics and problem-solving tasks. Although Luevano and Collins (2020) focused

on English language learners, their findings also emphasize that instruction anchored in students' cultural and linguistic backgrounds promotes deeper understanding and classroom participation—underscoring the value of Indigenous knowledge in mathematics education.

The third theme, *Localization of Mathematical Content*, echoes the findings of Munthahana et al. (2023), who reported that linking mathematical instruction to cultural knowledge allows students to relate abstract ideas to real-life situations. This not only improves comprehension but also encourages active learning. Batiibwe (2024) further noted that culturally embedded classroom activities affirm learners' identities and make instruction more inclusive.

Finally, the fourth theme, *Application of Real-World and Community-Based Examples*, is supported by Madimabe et al. (2022), who found that using familiar cultural practices—such as beadwork and weaving—helps students develop a stronger understanding of complex mathematical concepts. Gula and Jojo (2024) similarly emphasized that when math lessons are connected to students' daily cultural practices, learning becomes more relevant, empowering, and transferable beyond the classroom.

Teachers' Experiences in Finding Culturally Relevant Materials

Research Question No. 2: What lived experiences do teachers face in finding culturally relevant materials for teaching mathematics?

The major themes and core ideas for Research Question No. 2 are presented in Table 2. Based on participants' responses, five key themes emerged: Insufficiency of Culturally Responsive Learning Resources, Linguistic and Dialectical Constraints, Demands of Instructional Planning and Preparation, Cultural Sensitivity and Access Limitations, and Misalignment between Curriculum Standards and Cultural Contexts.

Table 2. Lived Experiences of Teachers in Finding Culturally Relevant Materials for Teaching Math

Emerging Themes	Supporting Statements
Insufficiency of Culturally Responsive Learning Resources	• *"Most materials are from mainstream education, not IP traditions." – IDI-14* • *"We lack textbooks that reflect their community life." – IDI-09*
Linguistic and Dialectical Constraints	• *"Some words have different meanings in their dialect." – IDI-05* • *"Translating math terms into their dialect is very tricky." – IDI-12*
Demands of Instructional Planning and Preparation	• *"Gathering and preparing materials takes a lot of time." – IDI-12* • *"I often make my examples after school hours." – IDI-03*
Cultural Sensitivity and Access Limitations	• *"Communities are strict about sharing their culture." – IDI-06* • *"I can't just include stories without consulting elders." – IDI-07*
Misalignment Between Curriculum Standards and Cultural Contexts	• *"The curriculum is too general; I have to adjust it." – IDI-03* • *"Competencies often miss what's important in their culture." – IDI-01*

Teachers consistently reported difficulties in sourcing culturally aligned materials. Many pointed to the scarcity of textbooks that reflect Indigenous perspectives, alongside challenges with language translation and limited access to authentic cultural content. Moreover, some communities restricted the sharing of traditional knowledge, requiring teachers to consult elders and gain trust. These findings

highlight a pressing need for DepEd to support the development of culturally responsive resources and localized curricula. Despite these barriers, teachers showed initiative in modifying lessons and building their materials, echoing Piaget's view of educators as active facilitators of learning construction.

The first theme, *Integration of Cultural Context into Instruction*, aligns with Luecke (2025), who found that incorporating cultural background into mathematics instruction enhances student engagement and makes abstract ideas easier to understand. Similarly, Nur et al. (2021) observed that students showed stronger conceptual grasp and increased participation when lessons included traditional practices such as weaving and farming—an approach echoed by teachers in this study who contextualized math within their students' lived experiences.

The second theme, *Utilization of Indigenous Knowledge Systems*, is supported by Ferrer-Jarangue (2024), whose research demonstrated that contextualized, culture-based instruction improved students' academic performance and problem-solving abilities. Luevano and Collins (2020), while focusing on English language learners, also found that culturally aligned instruction led to deeper understanding and stronger student engagement, suggesting the broader benefits of embedding Indigenous knowledge in teaching practices.

The third theme, *Localization of Mathematical Content*, is reflected in the findings of Munthahana et al. (2023), who showed that linking math instruction to cultural knowledge allows students to make more meaningful connections between school and home life. This approach not only boosts comprehension but also enhances motivation. Batiibwe (2024) similarly emphasized that integrating Indigenous activities and examples affirms learners' identities and contributes to a more inclusive and engaging learning environment.

The fourth theme, *Application of Real-World and Community-Based Examples*, aligns with Madimabe et al. (2022), who reported that teachers using cultural tools—such as beadwork or traditional architecture—helped students understand complex concepts by grounding instruction in familiar practices. Gula and Jojo (2024) also noted that when math instruction reflects students' lived realities, it supports both academic development and community empowerment. These examples reinforce the idea that culturally responsive instruction is most effective when it reflects real-life applications drawn from students' environments.

Coping Mechanisms for Teaching Math in a Culturally Relevant Way

Research Question No. 3: How do teachers in Indigenous school's cope with the challenges of teaching mathematics in a culturally relevant way?

The major themes and core ideas for Research Question No. 3 are presented in Table 3. From the responses of the participants, five major themes emerged: Instructional Improvisation and Innovation, Collaboration with Cultural Knowledge Holders, Peer Mentoring and Resource Sharing, Adaptive Alignment of Curriculum and Indigenous Content, and Continuous Professional Learning and Development.

Table 3. Coping Mechanisms of Teachers in Finding Culturally Relevant Materials for Teaching Math

Emerging Themes	Supporting Statements
Instructional Improvisation and Innovation	• *"We improvise materials that are available." – IDI-02* • *"I use bamboo sticks and pebbles for visual aids." – IDI-10*
Collaboration with Cultural Knowledge Holders	• *"I consult elders to learn traditional practices." – IDI-14* • *"We ask tribal leaders to check if our examples are respectful." – IDI-06*
Peer Mentoring and Resource Sharing	• *"We plan lessons together and share materials." – IDI-07* • *"My co-teacher helps me localize unfamiliar topics." – IDI-13*
Adaptive Alignment of Curriculum and Indigenous Content	• *"I align examples with culture and competencies." – IDI-08* • *"We keep the standard but adapt the story problems." – IDI-09*
Continuous Professional Learning and Development	• *"Seminars and my master's help me teach better." – IDI-01* • *"I read about IP education during weekends." – IDI-05*

Faced with limited resources, teachers demonstrated remarkable resilience and creativity in contextualizing their instruction. Many improvised materials and consulted with community members to ensure cultural accuracy. Collaboration among peers and with elders served not only as a practical support system but also reinforced the sociocultural foundations of instruction, as outlined by Vygotsky. Teachers also expressed a strong commitment to professional growth through seminars and self-study, underscoring the importance of institutional backing for continuous development. These coping mechanisms reveal a dynamic interplay between individual agency and communal effort in addressing instructional challenges.

The first theme, *Instructional Improvisation and Innovation*, aligns with Naidoo (2021), who highlighted that traditional games and storytelling can help students connect with mathematical concepts in familiar ways, leading to higher engagement. Similarly, Mangila and Paculaba (2020) found that using culturally responsive approaches increased learners' motivation and participation. These findings support the experiences of teachers in this study, who adapted their instruction through creative and context-based methods to make math more accessible and engaging.

The theme of *Collaboration with Cultural Knowledge Holders* is reflected in the work of Garcia-Olp et al. (2019), who emphasized that Indigenous knowledge systems, when thoughtfully integrated into formal education, enhance students' understanding and appreciation of mathematics. Gula and Jojo (2024) further demonstrated that using community-rooted practices like farming and trade strengthens learners' analytical skills and cultural connections. These perspectives affirm the importance of involving elders and culture bearers in lesson planning to ensure that instruction remains both relevant and respectful.

For the theme *Peer Mentoring and Resource Sharing*, the findings are consistent with Pedroso et al. (2023), who showed that teachers benefit from mentorship and resource exchange when working toward culturally responsive goals. Watson (2021) also underscored the role of community partnerships in enriching instruction and fostering collaboration across formal and informal educational settings. Teachers in this study often relied on peers to co-develop materials and exchange ideas, viewing collaboration as an essential strategy for success.

In terms of *Adaptive Alignment of Curriculum and Indigenous Content*, Xu and Ball (2024) observed that teachers frequently adjust formal content to fit local cultural contexts, even when national standards limit flexibility. Stavrou (2021) found that educators often incorporated Indigenous systems, such as traditional numeracy, to make standardized lessons more meaningful. These findings mirror the experiences of teachers in this study, who worked to balance curriculum requirements with the cultural realities of their students.

The final theme, *Continuous Professional Learning and Development*, is supported by Creagar et al. (2022), who found that professional development enhances teachers' readiness to implement culturally contextualized instruction. Malinga et al. (2022) added that educators who received Indigenous-focused training were more confident in using native languages and cultural references in their teaching. However, both studies highlighted the scarcity of such programs. Teachers in this study similarly recognized professional learning as critical—not just for improving skills, but for ensuring that instruction remains both culturally grounded and academically rigorous.

Teachers' Insights on Contextualizing Mathematics Learning

Research Question No. 4: What insights do teachers have regarding contextualizing mathematics learning?

The major themes and core ideas for Research Question No. 4 are presented in Table 4. From the responses of the participants, five major themes emerged: Curriculum Development Aligned with Indigenous Realities, Enhancing Instructional Relevance through Cultural Integration, Strengthening Student Confidence and Identity, Promoting Situated Learning through Real-Life Contexts, and Institutional Support for Indigenous-Centered Instruction.

Table 4. Insights of Teachers in Finding Culturally Relevant Materials for Teaching Math

Emerging Themes	Supporting Statements
Curriculum Development Aligned with Indigenous Realities	• *"DepEd should develop a curriculum that fits the community." – IDI-04* • *"I read about IP education during weekends."* – IDI-05
Enhancing Instructional Relevance through Cultural Integration	• *"Math becomes relatable when connected to culture." – IDI-07* • *"Cultural integration makes abstract topics easier." – IDI-11*
Strengthening Student Confidence and Identity	• *"It boosts their confidence and eagerness to learn." – IDI-10* • *"They feel proud seeing their culture in math." – IDI-02*
Promoting Situated Learning through Real-Life Contexts	• *"Concepts must connect to their surroundings." – IDI-13* • *"I relate measurement to farming or weaving." – IDI-03*
Institutional Support for Indigenous-Centered Instruction	• *"We need culturally relevant workbooks and assessments." – IDI-09* • *"DepEd should provide support and materials for IP learners." – IDI-06*

Teachers expressed strong beliefs in the benefits of culturally contextualized math instruction. They emphasized that aligning lessons with community culture boosts students' confidence, interest, and

sense of identity. Furthermore, they called for systemic support from DepEd, particularly in funding, training, and material development. These insights affirm that contextualized learning is not merely a pedagogical adjustment but a necessary reform to promote equity and relevance in Indigenous education. The feedback also reveals that cultural integration can serve as a powerful motivator, transforming student attitudes and academic outcomes.

The theme of *Curriculum Development Aligned with Indigenous Realities* is reflected in the work of Mercado (2021), who reported that aligning formal curricula with Indigenous knowledge often requires collaboration with local elders and extensive adaptation. Tamana and Pagaddut (2024) also stressed that without supportive reforms and training, teachers face difficulty bridging standardized content with cultural perspectives. Similarly, Xu and Ball (2024) pointed out that strict curriculum frameworks can restrict teachers' ability to respond to students' cultural contexts, highlighting the need for flexibility and curricular responsiveness.

Findings related to *Enhancing Instructional Relevance through Cultural Integration* align with Johnson and Elliott (2020), who found that including Indigenous perspectives in math instruction enhanced students' engagement, confidence, and cultural pride. Rosa and Orey (2020) similarly emphasized that ethnomathematical strategies help demystify abstract concepts and make lessons more meaningful. These studies support the idea that cultural integration is not only about representation but also about improving academic clarity and learner motivation.

On the theme of *Strengthening Student Confidence and Identity*, Kurniawan et al. (2023) observed that students exposed to Indigenous systems in math gained both academic understanding and cultural affirmation. Rosa and Orey (2023) further showed that tying math to traditional practices helped learners connect with their heritage and strengthened their identity within the classroom. These perspectives resonate with the teachers in this study, who viewed culturally relevant instruction as a way to boost learners' self-esteem and sense of belonging.

The findings also support *Promoting Situated Learning through Real-Life Contexts*. Pedroso et al. (2023) documented how lessons based on familiar cultural activities—such as farming and weaving—help students relate to math concepts more effectively. Watson (2021) added that grounding instruction in students' daily lives improves both problem-solving skills and engagement. Teachers in this study similarly drew on community routines and local contexts to make mathematics more accessible and meaningful.

Lastly, *Institutional Support for Indigenous-Centered Instruction* remains a critical concern. Malinga et al. (2022) noted that the lack of training, funding, and culturally appropriate resources continues to hinder teachers from delivering inclusive instruction. Stavrou (2021) advocated for stronger partnerships between education authorities and Indigenous communities to ensure culturally responsive curricula are not only developed but properly supported. The calls from teachers in this study echo this, reinforcing that institutional commitment is essential to sustain culturally grounded math education.

Comparison with Literature

The findings of this study align with Preston and Claypool's (2021) observation that conventional instructional practices often overlook the cultural backgrounds of Indigenous learners, leading to disengagement and limited academic progress. Like their findings, participants in this study emphasized that mainstream educational materials fail to represent Indigenous contexts, which creates

a disconnect between mathematical content and students' lived experiences. However, while Preston and Claypool primarily highlight the problems within assessment practices, this study expands on teacher-led strategies that counter those issues through contextualization and cultural integration.

In contrast to Panes and Falle (2021), who noted that teachers lacked preparation for teaching IP students despite attempts to foster a supportive environment, this study shows that teachers—though under-resourced—employ a wide range of adaptive strategies such as collaboration, improvisation, and cultural consultation. This shows how teachers are taking their steps and adjusting creatively—something earlier studies may have missed.

Furthermore, while Pulumbarit (2022) focused on autonomy-supportive teaching styles to improve mathematics outcomes, this study addresses a gap in the literature by emphasizing the *cultural dimension* of instructional autonomy. Teachers not only adapted pedagogy to student needs but also actively shaped curriculum content to reflect Indigenous ways of knowing.

This research adds new insights into how math is taught in Indigenous contexts, underscoring that while teachers play a key role, they need help from the larger system—something that hasn't been studied in depth yet.

Theoretical Insights

The patterns identified in the findings reflect key principles from Ladson-Billings, Vygotsky, and Piaget, providing a cohesive theoretical lens for interpreting instructional practices. Ladson-Billings' (1995) Culturally Relevant Pedagogy is evident in how teachers intentionally integrated indigenous practices, language, and daily experiences into their mathematics instruction to affirm cultural identity and increase student engagement. This aligns with the principle that academic success and cultural competence can coexist.

Meanwhile, Vygotsky's (1978) Sociocultural Theory is reflected in the emphasis teachers place on collaborative learning and community involvement, especially through consultation with elders and cultural leaders. Teachers positioned themselves not only as knowledge transmitters but as co-learners who scaffold students' learning through culturally situated interactions within the Zone of Proximal Development (ZPD).

Additionally, Piaget's (1952) Constructivist Theory is visible in how teachers encouraged students to build understanding by connecting new mathematical concepts with their prior cultural experiences. By making learning more concrete and experience-based, students constructed mathematical meaning through the exploration of familiar practices like farming, weaving, and storytelling.

These theories show that using culture in teaching math goes beyond just method—it reflects teachers' deeper beliefs about how learning should happen.

CONCLUSION

The findings of this study offer significant implications for enhancing mathematics education in Indigenous schools. First, the Department of Education (DepEd) should implement pilot programs in select Indigenous Peoples Education (IPEd) schools to test and refine culturally contextualized mathematics modules. These pilot sites can serve as models for localized curriculum integration, allowing DepEd to gather feedback and gradually scale effective practices nationwide. Additionally, DepEd should allocate specific funding for the development of culturally relevant teaching materials, including localized math workbooks, visual aids, and digital content co-created with Indigenous educators and elders. To support teacher capacity-building, DepEd can institutionalize mandatory training sessions on culturally responsive pedagogy during INSET programs and offer community-based workshops led by local cultural practitioners.

Furthermore, DepEd should promote the establishment of regional resource hubs or "cultural curriculum centers" where teachers can access contextualized lesson plans and collaborate on instructional design. The curriculum should also be revised to include flexible competency standards that allow teachers to embed Indigenous knowledge systems without compromising learning outcomes. Schools should be encouraged to implement inquiry-based and real-life application projects, such as integrating math lessons with traditional weaving, farming, or budgeting practices.

Finally, DepEd could launch a monitoring and evaluation framework that tracks the effectiveness of contextualized instruction on student achievement and engagement, using both qualitative and quantitative metrics.

The study outlines practical steps that policymakers and educators can consider when aiming to improve mathematics instruction in Indigenous schools.

This study offered critical insights into how mathematics teachers in Indigenous schools implement contextualized instructional strategies. Through in-depth interviews, the research illuminated the specific ways teachers integrate cultural content into mathematics education, as well as the challenges and adaptations they encounter. The use of a phenomenological approach allowed for a detailed exploration of teachers' lived experiences, revealing essential patterns and themes that characterize culturally responsive pedagogy in Indigenous contexts. These findings contribute to the broader understanding of instructional practices that reflect the social and cultural realities of Indigenous learners.

Given these insights, future research may benefit from adopting a mixed-methods approach to further investigate the outcomes of contextualized mathematics instruction. While qualitative data capture the depth of teacher experiences, integrating quantitative methods can enhance the generalizability and empirical validation of findings. For instance, future studies could examine changes in student achievement through pre- and post-assessments, standardized test scores, or classroom performance metrics. Additionally, surveys utilizing validated instruments—such as the Mathematics Attitude Inventory or culturally adapted self-efficacy scales—could assess shifts in student attitudes, confidence, and engagement. Comparative analyses between students taught with culturally contextualized strategies and those receiving conventional instruction may offer valuable evidence regarding instructional impact. Longitudinal research designs could also track academic progress, retention, and

enrollment in higher-level mathematics courses to assess the sustainability of these teaching practices over time.

It is important to note the limitations inherent in the present study. The reliance on self-reported data, collected through interviews, introduces potential biases—particularly social desirability bias, wherein participants may report what they believe is favorable rather than what fully reflects their classroom practices. In addition, the researcher's interpretations during coding and analysis may carry implicit biases, despite efforts to ensure trustworthiness through peer review and member checking. Future studies could address these concerns by incorporating triangulation methods, such as classroom observations, document analysis, or student performance data, to validate and expand upon interview findings.

Moreover, the study was confined to a single locale—Kapalong, Davao del Norte—which limits the applicability of its findings to other Indigenous contexts. The cultural and linguistic diversity across Indigenous communities in the Philippines means that teaching strategies effective in one region may not directly transfer to another. Broader, multi-site studies involving educators from various Indigenous communities would provide a more representative understanding of contextualized instruction across the country.

In conclusion, the findings suggest that additional research is necessary to fully understand the experiences of teachers implementing contextualized mathematical learning in Indigenous schools. This future research should identify effective practices and recommendations that educational institutions can use to better support these educators. By delving deeper into the specific challenges teachers face, along with evaluating the impact of various support systems, future studies can provide more comprehensive insights. This will assist teachers in navigating their responsibilities effectively while ensuring that student learning and success remain the primary focus.

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