



## Article

# Contextualized Mathematics Instruction in an Indigenous Secondary School Setting: Evidence from a Kalanguya Community in Northern Philippines

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### Abstract

*Contextualization has been widely recognized as an effective pedagogical approach in enhancing learner engagement and conceptual understanding, particularly in culturally diverse and indigenous learning contexts. In the Philippines, indigenous learners often experience a disconnect between school mathematics and their lived realities, contributing to persistent achievement gaps. This study examined the implementation and impact of contextualized Mathematics instruction in an indigenous secondary school serving a Kalanguya community in Northern Philippines. Anchored in culturally responsive pedagogy and constructivist learning theory, the study employed a qualitative case study design involving classroom observations, semi-structured interviews with teachers and students, and analysis of instructional materials. Findings revealed that contextualized Mathematics instruction through the use of indigenous practices, community-based problem situations, and local linguistic references enhanced learners' conceptual understanding, participation, and confidence in Mathematics. The study further found that culturally grounded instruction fostered learner identity affirmation and strengthened teacher-student relationships. The paper argues that contextualized Mathematics instruction is not merely a pedagogical strategy but a culturally sustaining practice that supports equity and inclusion in indigenous education. Implications for teaching practice, curriculum design, and educational policy are discussed.*

**Keywords:** *contextualized instruction, Mathematics education, indigenous learners, Kalanguya community, culturally responsive pedagogy, secondary education*



## **1. Introduction**

Mathematics education has long been critiqued for its perceived abstraction and detachment from learners' everyday experiences, a challenge that is particularly pronounced in indigenous and marginalized communities. Conventional Mathematics instruction often privileges decontextualized symbols and procedures, which may conflict with the cultural knowledge systems, values, and lived realities of indigenous learners. As a result, many indigenous students experience difficulties in meaning-making, engagement, and sustained participation in Mathematics learning.

In the Philippine educational context, indigenous peoples (IPs) constitute a significant portion of learners in geographically isolated and disadvantaged areas. Among these groups is the Kalanguya community in Northern Philippines, whose cultural practices, livelihoods, and social organization differ markedly from the mainstream contexts assumed in standard Mathematics curricula. Despite policy mandates emphasizing contextualization and localization of instruction, there remains limited empirical research documenting how contextualized Mathematics instruction is enacted and experienced in indigenous secondary school settings.

This study addresses this gap by examining contextualized Mathematics instruction in a secondary school serving a Kalanguya community. Specifically, it explores how teachers integrate indigenous contexts into Mathematics lessons and how such practices influence learners' understanding, engagement, and sense of belonging. By foregrounding indigenous learners' voices and classroom practices, the study contributes to broader discourses on culturally responsive teaching, equity, and inclusive education in Mathematics.

## **2. Review of Related Literature**

### **2.1 Contextualized Mathematics Instruction**

Contextualized instruction refers to the deliberate integration of learners' real-life experiences, cultural practices, and community contexts into the teaching-learning process. In Mathematics education, contextualization has been shown to support conceptual understanding by enabling learners to connect abstract ideas with familiar situations. Research indicates that contextualized problem-solving enhances learners' motivation, sense-making, and transfer of learning, particularly in non-dominant and rural contexts.

### **2.2 Indigenous Learners and Mathematics Education**

Studies on indigenous education highlight systemic inequities rooted in curriculum misalignment, linguistic barriers, and cultural dissonance. Indigenous learners often possess rich mathematical knowledge embedded in daily practices such as farming, trading, construction, and environmental management. However, these knowledge systems are rarely recognized or valued in formal Mathematics classrooms, leading to disengagement and underachievement.

### **2.3 Culturally Responsive Pedagogy**

Culturally responsive pedagogy emphasizes the use of learners' cultural knowledge, experiences, and identities as resources for learning. In Mathematics education, this approach involves validating indigenous ways of knowing, incorporating community-based contexts, and fostering relational teaching practices. Empirical studies suggest that culturally responsive Mathematics instruction improves learner participation, achievement, and identity development.

## 2.4 Constructivist and Situated Learning Perspectives

Constructivist theory posits that learners actively construct knowledge through interaction with their environment, while situated learning emphasizes the social and cultural contexts of learning. These frameworks provide a strong theoretical basis for contextualized Mathematics instruction, as they underscore the importance of meaningful contexts and social interaction in knowledge construction.

Despite growing literature on contextualization and culturally responsive teaching, there remains a paucity of studies focusing specifically on indigenous secondary school Mathematics classrooms in the Philippine context, particularly among the Kalanguya community.

## 3. Theoretical Framework

This study is grounded in Culturally Responsive Pedagogy and Constructivist Learning Theory. Culturally responsive pedagogy frames teaching as a culturally situated practice that affirms learners' identities and leverages community knowledge as instructional capital. Constructivist theory complements this perspective by emphasizing learners' active role in constructing mathematical meaning through experience and interaction. Together, these frameworks guided the analysis of instructional practices and learner experiences in contextualized Mathematics instruction.

## 4. Methodology

This study adopted a qualitative case study research design to generate an in-depth and contextualized understanding of Mathematics instruction as enacted within an indigenous secondary school setting, particularly in a Kalanguya community in Northern Philippines. The case study approach was deemed appropriate because it allowed for a holistic examination of complex classroom practices, teacher pedagogical intentions, and students' lived learning experiences within their real-life sociocultural context. The research site was a public secondary school serving predominantly indigenous learners, and participants consisted of selected Mathematics teachers and Kalanguya secondary school students who were directly engaged in contextualized Mathematics instruction. Purposive sampling was employed to ensure that participants possessed rich, relevant, and experiential knowledge of the instructional practices under investigation. Data were collected using multiple qualitative methods, including classroom observations that focused on instructional strategies, learner participation, and the integration of contextualized and culturally relevant materials; semi-structured interviews with teachers to explore their pedagogical goals, decision-making processes, and implementation challenges; focus group discussions with students to elicit shared learning experiences, perceptions, and meanings attached to Mathematics learning; and document analysis of lesson plans and instructional materials to examine the alignment between planned and enacted instruction. Data analysis followed a thematic analysis procedure, wherein interview transcripts, observation notes, and documents were coded iteratively to identify recurring patterns and meanings. Emerging themes were continuously refined through constant comparison across data sources, and methodological triangulation was employed to enhance the credibility, dependability, and trustworthiness of the findings.

## 5. Results and Findings

### Theme 1: Contextualization through Indigenous and Community-Based Practices

Findings revealed that Mathematics teachers deliberately anchored lessons in indigenous and community-based practices familiar to Kalanguya learners, such as farming cycles, market

transactions, land measurement, and household budgeting. Teachers explained that these contexts were intentionally selected to bridge abstract mathematical concepts with learners' everyday realities. One teacher shared, "*Kapag ginamit ko ang taniman at pagbebenta sa palengke bilang halimbawa, mas mabilis nilang naiintindihan ang lesson dahil ito ang araw-araw nilang nakikita at ginagawa*" (When I use farming and market selling as examples, they understand the lesson faster because these are part of their daily lives). Classroom observations confirmed that problems framed around crop yields, planting schedules, and local trading practices elicited more spontaneous responses and peer discussions. This practice aligns with culturally responsive pedagogy, which emphasizes the use of learners' cultural knowledge as a foundation for academic learning. Studies on ethnomathematics and contextualized instruction have similarly shown that embedding Mathematics in local cultural practices enhances meaning-making and reduces learners' cognitive distance from abstract concepts.

### **Theme 2: Enhanced Conceptual Understanding and Engagement**

Students demonstrated clearer conceptual understanding and higher levels of engagement when Mathematics lessons were grounded in community realities. Learners consistently reported that contextualized problems were easier to comprehend because they could "see" and "imagine" the situations being described. One student noted, "*Mas madali ang Math kapag tungkol sa ani o pera sa bahay kasi alam ko na kung paano ito nangyayari sa totoong buhay*" (Math is easier when it is about harvests or household money because I already know how it happens in real life). Teachers also observed increased participation, with students more willing to ask questions, explain their solutions, and engage in group discussions. These findings support constructivist learning theory, which posits that learners actively construct knowledge by connecting new information to prior experiences. Related studies have found that contextualized and problem-based Mathematics instruction promotes deeper conceptual understanding, sustained engagement, and positive learning attitudes, particularly among learners from marginalized or indigenous communities.

### **Theme 3: Affirmation of Indigenous Identity and Confidence**

Another salient theme was the affirmation of indigenous identity and the development of learner confidence through contextualized Mathematics instruction. Students expressed a sense of pride when their cultural practices and community experiences were recognized as valid sources of mathematical knowledge. One learner stated, "*Parang mahalaga pala ang kultura namin sa pag-aaral, hindi lang pang-bahay o pang-bukid*" (It feels like our culture is important in learning, not just for home or farm life). This validation appeared to reduce anxiety and fear toward Mathematics, a subject often perceived as difficult or alienating. Teachers noted that students who were previously quiet became more confident in sharing answers when examples were drawn from their own lives. These findings resonate with literature on culturally sustaining pedagogy, which argues that affirming learners' identities fosters self-efficacy, motivation, and academic confidence. Prior studies in indigenous education contexts likewise indicate that culturally affirming instruction can counter feelings of marginalization and promote more equitable learning experiences.

### **Theme 4: Strengthened Teacher–Student Relationships**

The integration of indigenous contexts also contributed to stronger and more positive teacher–student relationships. Learners perceived teachers as more caring, supportive, and respectful when they demonstrated interest in local culture and community life. A student remarked, "*Mas naiintindihan kami ng teacher namin kasi alam niya ang sitwasyon at pamumuhay namin*" (Our teacher understands us better because she knows our situation and way of life). Teachers likewise

reported that learning about students' cultural backgrounds helped them communicate more effectively and design lessons that were responsive to learners' needs. This relational dimension of teaching is consistent with research highlighting the role of culturally responsive practices in building trust, mutual respect, and positive classroom climates. Studies have shown that strong teacher-student relationships are closely linked to improved engagement, persistence, and learning outcomes, particularly in culturally diverse and indigenous school settings.

## **6. Discussion**

The findings affirm that contextualized Mathematics instruction plays a critical role in promoting meaningful learning among indigenous secondary school students. Consistent with constructivist and culturally responsive frameworks, the use of indigenous contexts supported learners' conceptual understanding by linking abstract Mathematics to lived experiences. The study also highlights the socio-cultural dimensions of learning, demonstrating how contextualization fosters identity affirmation and relational teaching practices.

Importantly, the findings suggest that contextualization extends beyond instructional techniques; it represents a shift toward culturally sustaining education that challenges deficit views of indigenous learners. By recognizing indigenous knowledge systems as legitimate mathematical resources, teachers contribute to more equitable and inclusive learning environments.

## **7. Conclusions and Implications**

### **7.1 Conclusions**

This study provides empirical evidence that contextualized Mathematics instruction enhances conceptual understanding, engagement, and cultural affirmation among indigenous secondary school learners in a Kalanguya community. Contextualization serves as both a pedagogical and cultural strategy that bridges school Mathematics and indigenous lived realities.

### **7.2 Implications for Teaching Practice**

Mathematics teachers are encouraged to intentionally integrate indigenous contexts and community knowledge into instruction. Professional development programs should equip teachers with culturally responsive strategies and contextualization skills.

### **7.3 Implications for Curriculum and Policy**

Curriculum developers and policymakers should strengthen mandates for contextualization in indigenous education and provide instructional resources aligned with local cultures. Greater collaboration with indigenous communities is essential in curriculum design.

### **7.4 Directions for Future Research**

Future studies may employ mixed-methods or longitudinal designs to examine the long-term impact of contextualized Mathematics instruction on achievement and retention among indigenous learners. Comparative studies across different indigenous groups are also recommended.

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