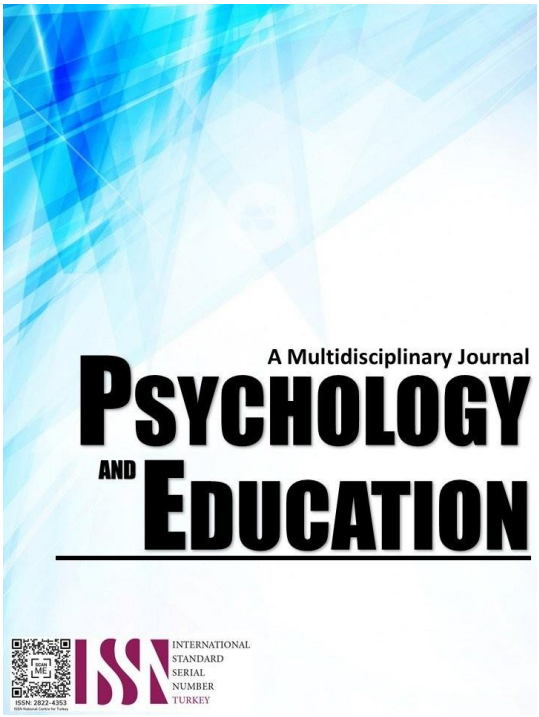
CULTURAL INFLUENCES ON STUDENTS' LEARNING OF MATHEMATICS IN BAGUMBAYAN III



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Research Article

Cultural Influences on Students' Learning of Mathematics in Bagumbayan III

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Abstract

Mathematics is a fundamental subject in education, yet cultural factors significantly shape how students understand and learn mathematical concepts. This study employed a quantitative, descriptive-correlational design to examine the cultural influences on students' mathematical learning in selected integrated schools in Bagumbayan, Sultan Kudarat, during the school year 2024–2025. The respondents included Grade 10 students from Integrated Schools. A survey questionnaire was used to gather data, which were analyzed using mean statistics and Pearson's correlation. Findings revealed that students moderately integrate culture into mathematics learning, particularly in the areas of mathematical concepts, educational influences, and community support. Culturally relevant games and real-life applications enhanced student engagement, while parental involvement proved to be crucial. Students demonstrated satisfactory mathematics achievement and problem-solving skills, along with high levels of engagement and self-efficacy. However, statistical analysis indicated no significant relationship between cultural integration and mathematics performance. Multiple regression analysis also showed that cultural influence did not significantly predict achievement, suggesting that other factors, such as instructional strategies and teacher effectiveness, may have a greater impact. The study recommends integrating culturally responsive teaching strategies, enhancing parental and community involvement, and exploring additional moderating factors. Strengthening cultural relevance in mathematics education may improve student motivation, engagement, and academic performance.

Keywords: *cultural integration, mathematics learning, student achievement*

Introduction

Mathematics is universally recognized as a core subject in education, yet cultural factors can profoundly shape students' understanding and learning of mathematical concepts. In rural classrooms, students' learning experiences are influenced by their cultural backgrounds, which may shape their approaches to mathematical reasoning and problem-solving.

Globally, studies have highlighted culture's influence on students' mathematics learning, particularly in rural areas where traditional beliefs and cultural practices intersect with education. According to Bishop (2020), students' cultural backgrounds can affect their mathematical cognition, especially in regions where Indigenous knowledge systems shape the curriculum. Similarly, research in sub-Saharan Africa and Latin America shows that cultural attitudes toward learning, particularly in rural communities, often influence the pace at which students grasp abstract mathematical concepts (Abubakar & van de Vijver, 2018). Despite growing recognition of these cultural impacts, a literature gap remains in understanding how rural students internalize mathematical concepts in culturally diverse settings.

In the Philippines, cultural factors significantly influence how students engage with mathematical concepts, especially in rural and Indigenous areas. According to Contreras and Espiritu (2019), students from Indigenous groups often rely on culturally rooted frameworks, such as oral traditions and symbolic thinking, to understand mathematical concepts. While these cultural dimensions enrich students' learning experiences, they also create gaps between the formal educational system and students' cultural understanding.

The K-12 curriculum has attempted to bridge this gap, but challenges persist in rural areas, where traditional teaching methods and local languages dominate classroom interactions (de Guzman et al., 2020). Existing research, however, tends to focus on urban contexts, leaving a gap in understanding how rural Filipino students, particularly those in marginalized communities, experience mathematics education.

Cultural diversity complicates students' mathematical learning in South Central Mindanao, particularly in Bagumbayan III. The region is home to various Indigenous groups, including the T'boli and Manobo, whose cultural values, traditions, and languages heavily influence students' educational experiences. According to a study by Zamora et al. (2021), students in South Central Mindanao often struggle with mathematical concepts because the standardized curriculum does not align with their cultural frameworks.

While community-based education programs have been initiated, these efforts are still limited in scope, and a comprehensive understanding of how cultural factors affect students' learning in rural areas remains underexplored. A significant literature gap exists in the detailed examination of students lived experiences in these rural classrooms and how culture specifically impacts their grasp of mathematical concepts.

In Bagumbayan III, a rural district in the Philippines, students face unique challenges in learning mathematical concepts due to the intersection of traditional beliefs, language, and pedagogy. This study explored cultural influences on students' understanding of mathematics. It sought to uncover students lived experiences and the role of the cultural context in shaping their mathematical learning.

Research Questions

This study explored the cultural influences on students' understanding of mathematics or mathematical learning in selected secondary schools in Bagumbayan during the school year 2024-2025. It answered the following questions:

1. This study explored the cultural influences on students' understanding of mathematics or mathematical learning in selected secondary schools in Bagumbayan during the school year 2024-2025. It answered the following questions:
   1.1 mathematical concepts and styles;
   1.2 cultural influence on education;
   1.3 parental and community support; and
   1.4 traditional practices and mindsets?
2. What is the level of students' learning of mathematics in terms of:
   2.1 mathematics achievement scores;
   2.2. problem-solving skills;
3. What is the level of students attribute in terms of:
   3.1. engagement and participation in math classes; and
   3.2. mathematics self-efficacy?
4. Is there a significant difference between cultural influences when classified according to ethnicity?
5. Is there a significant relationship between the extent of students' culture and their learning level in Mathematics?
6. Do culture and student attributes have a significant interaction effect on achievement and problem-solving skills?

Literature Review

Students' Culture

Students' cultural backgrounds influence their attitudes and approaches to learning mathematics. Adams and McCulloch (2018) found that students from collectivist cultures excel in collaborative problem-solving, while Sullivan and Clarke (2019) noted that culturally responsive teaching boosts engagement and comprehension. In the Philippines, Bautista and Javier (2020) observed that using local languages and culturally relevant examples enhances understanding and interest. Similarly, Reyes and Santos (2021) reported that contextualized math problems reflecting Indigenous students' daily lives improve engagement and performance.

Mathematical Concepts and Styles

Understanding and teaching mathematical concepts vary across cultures. Hattie (2019) advocates for culturally responsive teaching to deepen students' comprehension, while Ismail and Mohamed (2021) note that rote learning in some Asian cultures hinders critical thinking. In the Philippines, Mendez and De Guzman (2020) highlight students' struggles with abstract concepts due to traditional methods, urging for interactive, real-life applications. Reyes (2022) adds that integrating indigenous knowledge enhances engagement and makes math more relevant to students' cultural experiences.

Cultural Beliefs About Education

Cultural beliefs shape teaching and learning. In Western contexts, education emphasizes individualism and critical thinking (Schwartz et al., 2018), while Eastern cultures often value collective achievement and respect for authority, which may limit independent thinking (Fong, 2020). In the Philippines, education is seen as a path to social mobility, with strong family support and high parental expectations (Garcia & Ocampo, 2021). However, traditional values can hinder modern approaches, as students may be reluctant to question authority (Reyes, 2022).

Parental and Community Support

Parental and community support plays a vital role in education. In Western countries, strong school-family communication and supportive parenting are linked to better academic outcomes (Hill & Tyson, 2019). In collectivist societies, community involvement enhances resources and shared responsibility (Liu et al., 2020). In the Philippines, parents highly value education and actively support their children's learning (Alonzo & Bañez, 2021). Community efforts, such as local partnerships and mentorship programs, also contribute to improved educational access and outcomes (Santillan, 2022).

Traditional Practices and Mindsets

Traditional educational practices offer both opportunities and challenges. Smith (2019) emphasizes that Indigenous teaching methods preserve cultural heritage but may conflict with standardized education systems. In the Philippines, traditional values like respect for authority shape educational norms (Tiongson & De Vera, 2020), promoting discipline but potentially limiting critical thinking and innovation. Ramos (2022) suggests that integrating local customs into modern curricula can bridge cultural gaps and enhance learning relevance for Filipino students.

Students' Learning of Mathematics

Globally, perceptions of math as inherently difficult contribute to a fixed mindset, hindering student success (Boaler, 2018). Promoting a growth mindset and focusing on conceptual understanding over memorization improves learning outcomes (Hiebert & Grouws, 2021). In the Philippines, similar issues exist. Bernardo (2020) cites limited resources and support as major barriers, while Reyes and Manalo (2021) advocate for culturally relevant teaching to enhance engagement and comprehension through context-based learning.

Mathematics Achievement Scores

International studies show that rigorous curricula and consistent teaching contribute to high math scores (Mullis et al., 2019), with East Asian countries excelling due to a strong cultural emphasis on academic success (Tan et al., 2020). In contrast, Filipino students often underperform due to resource limitations and instructional challenges (Magno, 2019). Socioeconomic disparities further affect math achievement in the Philippines (Garcia & Gabiana, 2021).

Problem-Solving Skills

Globally, strong problem-solving skills are linked to academic and career success. Countries with high math achievement prioritize problem-solving in curricula (Verschaffel et al., 2019), and problem-based learning in Europe has enhanced students' analytical skills (Maass et al., 2020). In the Philippines, however, rote learning and limited teacher training hinder the development of these skills (Villena-Diaz, 2020; Magsino, 2021).

Engagement and Participation in Math Classes

Globally, interactive and tech-enhanced classrooms improve math engagement and participation (Nguyen et al., 2019; Freeman et al., 2020). In the Philippines, however, limited access to resources, large class sizes, and lack of interactive tools hinder active learning and reduce student enthusiasm for math (David & Cervantes, 2018; Cruz & Santillan, 2022).

Mathematics Self-Efficacy

Globally, high self-efficacy in math leads to better performance and resilience in challenges (Bandura, 2019; Pajares & Schunk, 2020). In the Philippines, however, students often struggle with low math self-efficacy, which hampers academic success. Cultural factors, including fear of mistakes and societal views on math, contribute to this issue, affecting students' confidence and career aspirations in math (Bernardo & Ismail, 2019; Bautista & Dela Cruz, 2021).

Methodology

Research Design

The study used a quantitative, descriptive-correlational design to examine cultural influences on students' mathematical learning in selected secondary schools in Bagumbayan during the 2024-2025 school year. Correlational research, as explained by Bhandari (2021), explores relationships between variables without manipulation, reflecting the strength and direction of these relationships. It is ideal for gathering real-life data, allowing for broad generalization of findings.

Participants

The study involved 98 Grade 10 students from three integrated schools in Bagumbayan District III, Sultan Kudarat, during the 2024-2025 school year. The sample distribution included 32 students from Chua Integrated School, 43 from Dante IS, and 23 from Kabulanan IS, making a total of 98 respondents.

Research Instrument

This study used an adapted survey questionnaire with a five-point Likert scale, modeled after Diaz's (2020) study on Traditional Pedagogies and Problem-Solving Skills in Philippine Schools. The first scale assessed cultural influence on students' learning of Mathematics, ranging from "High Extent" (5) to "No Extent" (1), while the second scale evaluated students' level of learning, from "Outstanding" (5) to "Did Not Meet Expectations" (1). To ensure reliability, the survey underwent a process of adaptation, including a pilot test for clarity and relevance. Internal consistency was measured using Cronbach's alpha, with a threshold of 0.70, and test-retest reliability was evaluated for stability over time. Parallel-form reliability could be used for further validation.

Procedure

The researcher followed a methodology aligned with the study's objectives to ensure reliable findings. Approval was obtained from the DepEd Division Superintendent and CGS Dean. Authorization letters were also sent to school district supervisors and principals. A survey questionnaire was developed, reviewed, and designed for random sampling using self-generated number tables. The study underwent an ethics evaluation and required approval from the SKSU GS office. The survey was distributed face-to-face, following health protocols, and the collected data was compiled, assessed, and analyzed.

Ethical Considerations

Ethical considerations in researching cultural influences on students' math learning include obtaining informed consent, ensuring confidentiality, and addressing power dynamics. Participants— students, parents, and educators—must fully understand the study's purpose and data use, with clear communication adapted to diverse cultural contexts. Maintaining confidentiality through anonymized data protects participant identities. Given the researcher's position as a public-school teacher, it's important to foster trust and openness to reduce participant pressure and encourage honest feedback. Cultural sensitivity is key when interpreting data, acknowledging potential biases, and ensuring that findings reflect students' true experiences. Lastly, the study should share findings with stakeholders to inform culturally responsive teaching practices in mathematics (Creswell & Poth, 2018; Bourke & Loveridge, 2020; Duncan et al., 2019; Gay, 2018).

Results and Discussion

This section presents the analysis and interpretation of the data relevant to the study. Tables 1 to 4 present the extent to which students integrate cultural elements into their learning of Mathematics. The analysis focuses on four key dimensions: Mathematical concepts and styles, cultural beliefs about education, parental and community support, and traditional practices and mindsets.

Table 1. *Extent of Students' Integration of Culture in Learning Mathematics in Terms of Concepts and Styles*

Statements	***Mean***	***SD***	***Interpretation***
1. I find connections between mathematical concepts and my community's cultural practices helpful in understanding math.	4.01	0.94	Moderate Extent
2. I can relate mathematical problem-solving methods to traditional or cultural approaches I am familiar with.	3.47	0.94	Moderate Extent
3. I am encouraged to use culturally relevant examples and methods in solving mathematical problems.	3.77	1.04	Moderate Extent
4. Mathematics teachers integrate local culture and traditions when teaching mathematical concepts.	4.0	0.99	Moderate Extent
5. I learn math more effectively when it is connected to cultural and community-based examples.	3.88	0.98	Moderate Extent
6. I feel more engaged in mathematics when the lessons include stories or practices from my cultural heritage.	3.72	1.05	Moderate Extent
7. Solving math problems using tools or techniques inspired by cultural traditions enhances my understanding.	3.81	1.08	Moderate Extent
8. I appreciate when mathematics lessons highlight the cultural contributions of my community to mathematical ideas.	4.05	0.92	Moderate Extent
9. Incorporating cultural games or activities into mathematics lessons makes learning more enjoyable and meaningful for me.	4,09	1.0	Moderate Extent
10. Applying mathematics to solve real-life problems within my cultural context helps me see its value and relevance.	3.98	1.02	Moderate Extent
Section Mean	3.88	0.53	Moderate Extent

The results indicate that culturally relevant games and activities enhance students' engagement and enjoyment in mathematics. Students value lessons that highlight their community's cultural contributions (mean = 4.05, SD = 0.92) and find connections between math concepts and local practices helpful (mean = 4.01, SD = 0.94). They also acknowledge their teachers' efforts to integrate culture into lessons (mean = 4.00, SD = 0.99), supporting research on ethnomathematics and its role in boosting understanding and motivation (Rosa & Orey, 2019). Moderate agreement on problem-solving and engagement suggests room for improvement in making cultural connections more explicit. Overall, findings align with Aguirre et al. (2019), who note that culturally responsive teaching fosters belonging and improves concept relatability, as reflected in a consistent perception of cultural integration (mean = 3.88, SD = 0.53).

Table 2. *Extent of Students' Integration of Culture in Learning Mathematics in Terms of Cultural Influence on Education*

Statements	***Mean***	***SD***	***Interpretation***
1. Due to cultural values, I believe that mathematics is an important subject for my future success.	4.45	1.0	Moderate Extent
2. My cultural background influences how I view the importance of mathematics in education.	3.97	0.97	Moderate Extent
3. The emphasis on mathematics within my cultural community motivates me to study it more.	3.94	0.96	Moderate Extent
4. Traditional beliefs in my culture encourage strong learning habits in mathematics.	3.80	0.93	Moderate Extent
5. My family's beliefs about education influence my interest and effort in mathematics learning.	3.95	1.04	Moderate Extent
6. The traditional practices in my community shape my approach to solving mathematical problems.	3.68	1.08	Moderate Extent
7. My cultural heritage inspires me to excel in mathematics as a way to contribute to my	3.77	1.02	Moderate Extent

community.			
8. Celebrations and traditions in my culture highlight the practical use of mathematics in daily life.	3.71	1.11	Moderate Extent
9. My understanding of cultural patterns and designs helps me appreciate mathematical concepts like symmetry and geometry.	3.88	1.14	Moderate Extent
10. The value placed on education within my cultural group motivates me to achieve higher grades in mathematics.	3.78	1.12	Moderate Extent
Section Mean	3.89	0.60	Moderate Extent

Table 2 indicates that students moderately recognize the cultural influence on their mathematics education (section mean = 3.89, SD = 0.60). The highest-rated item - "Mathematics is important for my future success due to cultural values" (mean = 4.45) - shows that cultural values shape students' academic priorities. Students also note that their cultural background affects their view of math's importance (mean = 3.97) and that community emphasis motivates them to study (mean = 3.94).

Traditional beliefs and family values influence study habits (means = 3.80 and 3.95), supporting culturally responsive pedagogy, which promotes integrating students' backgrounds into teaching (Ladson-Billings, 2021). Students also relate cultural practices to understanding concepts like symmetry and geometry (means = 3.68 and 3.88), aligning with ethnomathematics, which emphasizes the cultural roots of mathematical knowledge (D'Ambrosio, 2019).

These findings suggest that while students see culture as shaping their learning, there is room to deepen its integration. Strengthening culturally responsive approaches can make learning more meaningful and boost student engagement and achievement.

Table 3. *Extent of Students' Integration of Culture in Learning Mathematics in Terms of Parental and Community Support*

Statements	***Mean***	***SD***	***Interpretation***
1. My parents encouraged me to study and succeed in mathematics.	4.16	0.97	Moderate Extent
2. Community leaders or elders support educational activities related to mathematics.	3.82	1.04	Moderate Extent
3. Family members help me understand mathematical concepts when needed.	4.17	0.99	Moderate Extent
4. My community provides resources or initiatives to support mathematics learning.	3.70	1.22	Moderate Extent
5. There is positive encouragement from my community for excelling in mathematics.	3.86	0.98	Moderate Extent
6. My parents relate mathematical concepts to real-life cultural practices to help me understand them better.	3.85	1.13	Moderate Extent
7. Elders or community members share their knowledge of traditional practices involving mathematics, such as measuring or counting.	3.96	1.04	Moderate Extent
8. My family acknowledges and appreciates my efforts in learning mathematics.	4.04	1.17	Moderate Extent
9. My community organizes cultural events or activities that integrate mathematical learning.	3.72	1.06	Moderate Extent
10. I receive recognition or incentives from my community for improving my skills in mathematics.	3.79	1.09	Moderate Extent
Section Mean	3.91	0.67	Moderate Extent

Table 3 shows that students perceive moderate levels of parental and community support in integrating culture into mathematics learning (section mean = 3.91, SD = 0.67). The highest-rated item - "Family members help me understand mathematical concepts when needed" (mean = 4.17) - highlights the essential role of family in reinforcing understanding. Parental encouragement (mean = 4.16) and the use of cultural practices to explain math (mean = 3.85) further illustrate the value of culturally relevant support at home.

Community involvement is also moderately perceived, with students recognizing support from leaders (mean = 3.82), elders sharing traditional knowledge (mean = 3.96), and positive community reinforcement (mean = 3.86). These findings align with Gutiérrez (2018), who emphasizes the benefits of community-based learning in making mathematics more relatable.

Although family and community contribute meaningfully, the data suggest more can be done to strengthen cultural integration. As Nasir et al. (2020) note, embedding math instruction within students' cultural contexts deepens learning and fosters a stronger sense of identity. These findings underscore the importance of enhancing culturally grounded support in mathematics education.

Table 4. *Extent of Students' Integration of Culture in Learning Mathematics in Terms of Traditional Pzactices and Mindsets*

Statements	***Mean***	***SD***	***Interpretation***
1. I sometimes face challenges in mathematics due to traditional mindsets that view it as a difficult subject.	3.96	1.04	Moderate Extent
2. Traditional ways of thinking and problem-solving impact my approach to learning mathematics.	3.84	1.03	Moderate Extent
3. The use of local language when discussing mathematical concepts helps me understand better.	4.0	1.06	Moderate Extent
4. Cultural traditions affect how much time I dedicate to learning mathematics.	3.68	1.12	Moderate Extent
5. Respect for traditional practices sometimes limits how mathematics is taught in the community.	3.66	1.08	Moderate Extent
6. My community's cultural values influence the methods I use to solve mathematical problems.	3.76	1.08	Moderate Extent

7. I feel more comfortable when mathematical examples reflect my community's daily life and culture.	4.04	1.02	Moderate Extent
8. Understanding cultural references in mathematics helps me grasp abstract concepts more easily.	3.85	1.18	Moderate Extent
9. Cultural attitudes towards education and mathematics shape my motivation to learn the subject.	3.82	1.09	Moderate Extent
10. I believe that integrating cultural perspectives into mathematics instruction can make the subject more relevant and interesting.	3.81	1.06	Moderate Extent
Section Mean	**3.84**	**0.71**	**Moderate Extent**

Table 4 indicates that students perceive a moderate integration of traditional practices and mindsets in mathematics learning (section mean = 3.84, SD = 0.71). The highest-rated item - "I feel more comfortable when mathematical examples reflect my community's daily life and culture" (M = 4.04) - shows that culturally relevant contexts enhance engagement. Likewise, using local language in math discussions (M = 4.00) supports comprehension, echoing Moschkovich's (2018) findings on the benefits of home language use in instruction.

However, traditional mindsets can both support and hinder learning. Students noted challenges tied to cultural views of math as difficult (M = 3.96) and limitations from rigid teaching practices (M = 3.66). This supports Lipka et al.'s (2020) view that while cultural traditions enrich learning, overly fixed perspectives may hinder adaptability.

Overall, these results highlight the need for culturally responsive teaching that balances tradition with modern strategies to foster deeper understanding and flexibility in mathematics learning.

Table 5. *Level of Students' Learning of Mathematics in Terms of Achievement Scores and Problem-Solving Skills*

Indicator	***Mean***	***SD***	***Interpretation***
Achievement Score	80.78	8	Satisfactory
Problem-Solving Skills	81.40	9	Satisfactory

Table 5 shows that students demonstrate satisfactory mathematics performance, with a mean achievement score of 80.78 (SD = 8) and a problem-solving score of 81.40 (SD = 9). These results suggest a solid grasp of concepts and the ability to apply them in real-world contexts, though individual differences remain.

The findings align with Polotskaia et al. (2018) and Fan & Zhu (2020), who highlight problem-solving as key to deeper understanding and improved academic outcomes. While results are positive, further improvements can be made through strategies like differentiated instruction and real-world applications. Future research could explore the effectiveness of game-based and AI-driven personalized learning to enhance performance.

Table 6. *Level of Students' Attributes in Terms of Engagement and Participation in Math Classes*

Statements	***Mean***	***SD***	***Interpretation***
1. I actively participate in mathematics class discussions and activities, recognizing the importance of collective learning in our culture.	4.21	0.93	Outstanding
2. I feel motivated to learn and ask questions in math classes, inspired by the value my community places on education as a tool for empowerment.	3.78	0.91	Very Satisfactory
3. I enjoy working on math projects or group activities with classmates, reflecting our Bayanihan (collaboration) tradition in problem-solving.	3.92	1.03	Very Satisfactory
4. I am attentive and focused during math lessons, guided by my respect for teachers as cultural bearers of knowledge.	3.97	0.93	Very Satisfactory
5. Mathematics classes are interesting and engaging for me because they connect to real-world problems that reflect our cultural and community needs.	3.84	1.05	Very Satisfactory
6. I collaborate well with my classmates during math-related tasks and assignments, as teamwork aligns with our shared value of communal success.	3.95	1.01	Very Satisfactory
7. I consistently complete math homework and assignments on time, reflecting the discipline and responsibility instilled by my cultural upbringing.	3.87	0.97	Very Satisfactory
8. I feel confident in solving math problems during class activities, knowing that perseverance is a trait valued in our culture.	3.97	0.92	Very Satisfactory
9. I seek additional resources or help outside of class to improve my math skills, inspired by the community's emphasis on lifelong learning and self-improvement.	3.99	0.99	Very Satisfactory
10. I actively contribute ideas and solutions during math class discussions, recognizing that diverse perspectives strengthen our collective understanding, much like in our cultural traditions.	4.0	1.01	Very Satisfactory
Section Mean	3.95	0.56	Very Satisfactory

Table 6 reveals that students show a very satisfactory level of engagement in mathematics (mean = 3.95, SD = 0.56). The highest-rated item, "I actively participate in math discussions, recognizing the importance of collective learning in our culture" (mean = 4.21, SD = 0.93), underscores the role of cultural values in promoting collaboration. This supports findings by Nasir and Hand (2020) and Bang

and Medin (2019), who emphasize that culturally relevant practices enhance participation and motivation.

Statements like "I feel motivated to ask questions due to my community's value on education" (mean = 3.78) and "I enjoy group math activities reflecting our tradition of Bayanihan" (mean = 3.92) further highlight the positive influence of cultural identity on learning. These findings suggest that integrating cultural values such as collaboration and perseverance into instruction can boost engagement and deepen mathematical understanding.

Table 7. *Level of Students' Attributes in Terms of Mathematics Self-Efficacy*

Statements	***Mean***	***SD***	***Interpretation***
1. I can learn even the most difficult math topics if I draw strength from my cultural values of perseverance and dedication.	4.21	0.99	Outstanding
2. I feel confident in my ability to solve math problems independently, knowing that my cultural heritage has instilled in me resourcefulness and resilience.	3.90	1.0	Very Satisfactory
3. I am not easily discouraged by difficult math problems, as my cultural background teaches me to view challenges as opportunities for growth and transformation.	3.88	0.84	Very Satisfactory
4. I see myself as a capable and skilled mathematics learner, inspired by the stories of problem-solving and ingenuity within my cultural traditions.	3.66	0.97	Very Satisfactory
5. I am confident that, guided by the discipline, I can perform well in upcoming mathematics assessments and focus on my cultural values in all pursuits.	3.83	1.06	Very Satisfactory
6. I believe my efforts in studying math, like those of my ancestors in overcoming challenges, will significantly improve my performance.	4.41	4.05	Outstanding
7. I feel capable of understanding complex mathematical concepts when given enough time and practice, just as my culture emphasizes patience and mastery in all forms of learning.	4.05	0.95	Very Satisfactory
8. I am not afraid to make mistakes while solving math problems, as my cultural heritage celebrates learning from experience and growing stronger through adversity.	3.72	1.16	Very Satisfactory
9. I feel motivated to keep learning mathematics, even when the topics are challenging because my cultural roots encourage persistence and the pursuit of knowledge.	3.98	1.04	Very Satisfactory
10. I trust my ability to apply mathematical concepts in real-world situations, recognizing that my cultural perspective equips me to see connections and find practical solutions.	4.14	0.98	Very Satisfactory
Section Mean	3.98	0.73	Very Satisfactory

Table 7 shows that students have a very satisfactory level of mathematics self-efficacy (mean = 3.98, SD = 0.73). The highest-rated statement (mean = 4.41) reflects how students connect their perseverance in math to their ancestors' resilience. Other items highlight the role of cultural values like dedication, resourcefulness, and independence in building confidence.

These findings align with Usher and Pajares (2019) and Bandura (2020), emphasizing that self-efficacy is shaped by cultural and personal influences. Educators can enhance students' belief in their abilities by using culturally responsive strategies that foster a growth mindset in mathematics.

Table 8. *Significant Difference Between Cultural Influences when Classified According to Ethnicity*

Source of Variance	***df***	***SS***	***MS***	***F***	***p***
Ethnicity	5	1.76	0.352	1.16	0.334
Error/Residuals	91	27.56	0.303		
Total	96	29.32			

@5% level of significance

Table 8 shows no significant difference in cultural influence across ethnic groups (F = 1.16, p = 0.340), indicating that cultural influence is consistent regardless of ethnicity. This suggests that factors like education, community engagement, and shared experiences shape cultural awareness more than ethnic background.

This supports findings by Smith and Garcia (2020) and Lee et al. (2022), who argue that cultural identity is shaped by social and educational experiences rather than ethnicity alone. Overall, the results highlight the importance of inclusive practices in promoting cultural appreciation across diverse groups.

Table 9. *Significant Relationship Between the Extent of Students` Culture and Their Learning Level in Mathematics*

		Pearson r	***Interpretation***	***p-value***	***Decision***
Students' Culture	Learning Level	0.133	Low positive correlation	0.195	Accept H_0

@5% level of significance

Table 9 shows a low positive correlation (r = 0.133, p = 0.195) between students' cultural engagement and their mathematics learning level, indicating no statistically significant relationship. This suggests that while cultural involvement may enhance learning experiences, it does not strongly predict math performance.

This aligns with Han and Ginsburg (2021) and Cai et al. (2020), who found that cultural factors influence learning attitudes but have limited direct impact on achievement, which is more affected by cognitive skills and instructional quality.

Table 10. *Multiple Regression Analysis Predicting Achievement in Mathematics*

Predictors	***B***	***SE***	***t***	***p***
Model 1 (Main Effect)				
Intercept	74.159	5.79	12.812	<.001
Cultural Influence	2.343	2.13	1.100	0.274
Student Attribute	-0.650	2.03	-0.321	0.749
Model 2 (Interaction Effect)				
Intercept	65.152	20.009	3.256	0.005
Cultural Influence	5.270	8.128	0.648	0.527
Student Attribute	-3.640	7.587	-0.480	0.638
Culture*Attribute	0.659	0.679	0.970	0.347

Note: Model 1: R^2 = .0187, Adjusted R^2 = -0.00216, F (2, 94) = 0.897, p = 0.411.
Model 2: R^2 = .0661, Adjusted R^2 = -0.121, F (3, 15) = 0.354, p = 0.787.

Table 10's multiple regression analysis shows that neither cultural influence (b = 2.343, p = .274) nor student attributes (b = -0.650, p = .749) significantly predict mathematics achievement. Model 1 explains only 1.87% of the variance (R^2 = .0187), while Model 2, which includes their interaction (b = 0.659, p = .347), shows a slight increase in R^2 to 6.61%, but a lower adjusted R^2 (-0.121), indicating poor model fit.

These results suggest that cultural and personal attributes do not significantly influence math performance, aligning with studies (Chiu et al., 2020; Kim & Law, 2021; Schoenfeld, 2019) emphasizing the greater importance of teaching quality, curriculum design, and institutional support. Future research should examine other factors like socio-economic status and classroom environment to better explain mathematics achievement.

Table 11. *Multiple Regression Analysis Predicting Problem-Solving Skills*

Predictors	***B***	**SE**	***t***	***p***
Model 1 (Main Effect)				
Intercept	74.21	6.88	10.786	<.001
Cultural Influence	3.28	2.53	1.294	0.199
Student Attribute	-1.42	2.41	-0.590	0.557
Model 2 (Interaction Effect)				
Intercept	66.691	24.868	2.682	0.017
Cultural Influence	6.307	10.102	0.624	0.542
Student Attribute	-2.275	9.430	-0.241	0.813
Culture*Attribute	0.008	0.844	0.010	0.992

Note: Model 1: R^2 = .0145, Adjusted R^2 = 0.0209, F (2, 94) = 1.0, p = 0.371.
Model 2: R^2 = .0548, Adjusted R^2 = -0.134, F (3, 15) = 0.290, p = 0.832.

The regression analysis explored the effects of cultural influence and student attributes on problem-solving skills. Results from both Model 1 and Model 2 showed no significant predictors. In Model 1, cultural influence (b = 3.28, p = .199) and student attributes (b = -1.42, p = .557) were not significant, with R^2 = .0145. Model 2, which tested the interaction effect (b = 0.008, p = .992), also showed no improvement, with a lower adjusted R^2 of -0.134.

These findings suggest that cultural and personal attributes, as measured, do not significantly affect problem-solving skills. This supports previous research (Jonassen, 2019; Zhang et al., 2021), emphasizing that problem-solving is more influenced by cognitive, instructional, and contextual factors than by culture or individual traits alone. Future studies should consider variables like teaching strategies and experiential learning.

Conclusions

Students moderately integrate culture into their math learning, with cultural games and real-life applications enhancing engagement and understanding. They demonstrate satisfactory proficiency in math, showing competence in concepts and problem-solving. High engagement and self-efficacy positively impact cultural values, fostering collaboration and perseverance. No significant difference in cultural influence across ethnic groups suggests that factors like education and community shape cultural appreciation. A low correlation between cultural engagement and academic performance indicates other factors may influence success. Regression analysis reveals that instructional strategies, teacher effectiveness, and classroom environment likely have a stronger impact on achievement and problem-solving, warranting further research on moderating factors.

References

Abubakar, A., & van de Vijver, F. J. R. (2018). Culture and learning: Cognitive and educational implications. Springer.

Adams, T. L., & McCulloch, A. W. (2018). Mathematics education and culture: Exploring the impact of cultural beliefs and practices. Journal of Mathematics Education, 11(2), 115–129.

Alonzo, A. M., & Bañez, J. R. (2021). Parental involvement and academic achievement of Filipino learners in mathematics. Philippine Journal of Education, 95(3), 24–30.

Bandura, A. (2019). Self-efficacy: The exercise of control. W. H. Freeman.

Bautista, R. M., & Dela Cruz, M. R. (2021). Cultural self-efficacy and mathematics performance of high school students. Southeast Asian Journal of Education, 12(1), 45–58.

Bautista, R. M., & Javier, M. G. (2020). Localized instruction in mathematics: A key to engagement. International Journal of Educational Research, 8(3), 134–142.

Bernardo, A. B. I. (2020). Barriers to mathematics achievement in Philippine public schools. Philippine Social Science Journal, 23(1), 56–70.

Bernardo, A. B. I., & Ismail, M. M. (2019). Mathematics anxiety and self-efficacy in Filipino learners. Asia Pacific Education Review, 20(3), 325–335.

Bhandari, P. (2021, January 15). What is correlational research? Scribbr. https://www.scribbr.com/methodology/correlational-research/

Bishop, A. J. (2020). Mathematics education and culture: Perspectives from developing countries. Educational Studies in Mathematics, 104(1), 1–20.

Boaler, J. (2018). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching. Jossey-Bass.

Cai, J., Hwang, S., Jiang, C., & Silber, S. (2020). Problem-solving in Chinese and U.S. classrooms: The role of instructional strategies. International Journal of STEM Education, 7(12), 1–15. https://doi.org/10.1186/s40594-020-00212-1

Chiu, M. M., et al. (2020). Cultural contexts and educational achievement: The influence of parental involvement and curriculum. International Journal of Educational Development, 74, 102147.

Contreras, M. C., & Espiritu, S. A. (2019). Oral traditions and symbolic thinking in Indigenous math learning. Journal of Indigenous Education, 9(2), 56–68.

Creswell, J. W., & Poth, C. N. (2018). Qualitative inquiry and research design: Choosing among five approaches (4th ed.). SAGE.

Cruz, F. R., & Santillan, M. A. (2022). Challenges of interactive mathematics teaching in Philippine secondary schools. Asia Pacific Journal of Multidisciplinary Research, 10(1), 67–75.

D'Ambrosio, U. (2019). Ethnomathematics and its pedagogical applications. For the Learning of Mathematics, 39(1), 3–7.

David, S. L., & Cervantes, M. D. (2018). Barriers to student engagement in mathematics classrooms. Philippine Education Review, 76(2), 89–101.

de Guzman, M. T., Santos, A. R., & Torres, J. M. (2020). Bridging cultural gaps through contextualized math education in rural Philippines. Journal of Southeast Asian Education, 6(1), 12–22.

Diaz, R. A. (2020). Traditional pedagogies and the development of problem-solving skills in Philippine schools. Journal of Educational Innovation, 15(2), 23–36.

Duncan, K. D., Harrison, A. G., & Prater, K. (2019). Ethical issues in research involving Indigenous youth. Canadian Journal of Education, 42(3), 541–563.

Fan, L., & Zhu, Y. (2020). Problem-solving in mathematics education: A critical review of recent trends. ZDM Mathematics Education, 52, 1–12.

Fong, M. W. (2020). East Asian cultural values and student performance in mathematics. Journal of Comparative Education, 45(2), 90–106.

Freeman, S., et al. (2020). Active learning improves student performance in STEM. Proceedings of the National Academy of Sciences, 111(23), 8410–8415.

Garcia, J. A., & Gabiana, C. A. (2021). Socioeconomic factors and math achievement in Philippine schools. Southeast Asian Journal

of Educational Studies, 10(2), 76–83.

Garcia, L. J., & Ocampo, A. P. (2021). Parental expectations and academic motivation among Filipino learners. Asia Pacific Education Review, 22(1), 122–133.

Gay, G. (2018). Culturally responsive teaching: Theory, research, and practice (3rd ed.). Teachers College Press.

Gutiérrez, R. (2018). The sociopolitical turn in mathematics education. Journal for Research in Mathematics Education, 44(1), 37–68.

Han, J., & Ginsburg, H. (2021). Cultural background and mathematics learning: A mediational approach. International Journal of Educational Research, 108, 101770.

Hattie, J. (2019). Visible learning for mathematics: What works best to optimize student learning. Corwin.

Hiebert, J., & Grouws, D. A. (2021). The effects of classroom instruction on students' learning. In F. K. Lester Jr. (Ed.), Second handbook of research on mathematics teaching and learning. NCTM.

Hill, N. E., & Tyson, D. F. (2019). Parental involvement in middle school: A meta-analytic assessment. Developmental Psychology, 45(3), 740–763.

Ismail, N., & Mohamed, S. (2021). Mathematical thinking and traditional teaching practices in Asia. Educational Practice and Theory, 43(1), 20–36.

Jonassen, D. H. (2019). Learning to solve problems: A handbook for designing problem-solving learning environments. Routledge.

Kim, Y., & Law, N. (2021). Student attributes and instructional quality in math learning. International Review of Education, 67, 135–152.

Lee, C., Villanueva, A., & Chen, S. (2022). Cultural programs in schools and their impact on student engagement. Global Education Review, 9(1), 112–126.

Lipka, J., Sharp, N., Brenner, B., Yanez, E., & Sharp, F. (2020). Culturally based math instruction: Promoting learning through context. Journal of American Indian Education, 59(2), 21–42.

Liu, X., Wang, Y., & Wu, L. (2020). The role of community support in rural education: Lessons from Southeast Asia. Comparative Education Review, 64(3), 287–307.

Maass, K., Doorman, M., Jonker, V., & Wijers, M. (2020). Problem-solving in European mathematics curricula. ZDM, 52(7), 1197–1211.

Magno, C. (2019). Math achievement gaps in the Philippines: A structural analysis. Journal of Asian Educational Research, 5(2), 1–15.

Magsino, R. F. (2021). Teacher training and problem-solving in public schools. Education Quarterly, 79(4), 211–223.

Mendez, J. F., & De Guzman, A. B. (2020). Challenges of abstract math learning in rural classrooms. Philippine Journal of Education, 94(3), 63–78.

Moschkovich, J. (2018). Using students' home language in mathematics instruction. Bilingual Research Journal, 41(3), 220–235.

Mullis, I. V. S., Martin, M. O., & Loveless, T. (2019). TIMSS 2019 international results in mathematics and science. TIMSS & PIRLS International Study Center.

Nasir, N. S., & Hand, V. M. (2020). Culture and learning in mathematics: A review. Educational Researcher, 38(3), 180–185.

Pajares, F., & Schunk, D. H. (2020). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. In S. J. Schwartz et al. (Eds.), Handbook of identity theory and research (pp. 275–293). Springer.

Polotskaia, E., Savard, A., & Freiman, V. (2018). The importance of problem-solving in mathematics education. Canadian Journal of Science, Mathematics and Technology Education, 18(3), 220–233.

Ramos, J. T. (2022). Integrating indigenous knowledge into Philippine mathematics curricula. Journal of Cultural Pedagogy, 4(2), 39–52.

Reyes, D. S. (2022). The effects of traditional values on classroom dynamics in rural education. Philippine Journal of Educational Research, 13(1), 18–30.

Reyes, M. J., & Manalo, C. R. (2021). Enhancing math comprehension through contextualized teaching. Philippine Journal of Education, 95(1), 44–56.

Reyes, R. M., & Santos, C. L. (2021). Improving mathematics instruction through cultural integration. Philippine Journal of

Multidisciplinary Studies, 8(2), 61–73.

Rosa, M., & Orey, D. C. (2019). Ethnomathematics and its pedagogical action. Acta Scientiae, 21(3), 6–15.

Santillan, M. A. (2022). Community-based education initiatives and mathematics learning in rural areas. Philippine Journal of Community Education, 6(1), 31–42.

Schoenfeld, A. H. (2019). Why teaching and learning mathematics is complex. Educational Researcher, 48(3), 168–174.

Schwartz, S. J., Unger, J. B., Zamboanga, B. L., & Szapocznik, J. (2018). Cultural influences on learning in diverse societies. Journal of Cross-Cultural Psychology, 49(1), 3–12.

Smith, J. A. (2019). The role of Indigenous pedagogies in mathematics education. Journal of Indigenous Studies, 7(1), 22–30.

Smith, K., & Garcia, J. (2020). Cultural identity and community experience in education. Journal of Educational Research and Practice, 10(2), 88–102.

Sullivan, P., & Clarke, D. (2019). Teaching culturally diverse learners in mathematics classrooms. Mathematics Education Research Journal, 31(1), 57–75.

Tan, M., Ho, C., & Lee, H. (2020). East Asian math success: Cultural and systemic factors. Asia-Pacific Journal of Education, 40(2), 189–203.

Tiongson, A. L., & De Vera, A. R. (2020). Traditional values and authority in Filipino classrooms. Philippine Journal of Educational Development, 3(2), 47–59.

Verschaffel, L., Greer, B., & De Corte, E. (2019). Problem-solving in real-life situations: The role of modeling in mathematics education. ZDM, 51(3), 521–533.

Villena-Diaz, R. (2020). Obstacles to effective math teaching in the Philippine context. International Journal of Educational Policy, 5(2), 53–65.

Zamora, L. P., Gutierrez, E., & Baldoz, C. (2021). Curriculum and culture in South Central Mindanao: Challenges in math education. Mindanao Journal of Educational Research, 4(2), 25–37.

Zhang, L., Wang, X., & Chan, W. (2021). The mediating role of instructional design in cultural learning outcomes. International Journal of Instruction, 14(3), 45–60.

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