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Investigating the Relationship of Subanen Students' Perceived Exposure to Contextualized Teaching and Attitudes Towards Mathematics

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Abstract

This study examines the presence of contextualization in mathematics instruction and its relationship to Subanen students' attitudes towards learning mathematics. This descriptive-correlational survey research involved 125 Subanen respondents from two public national high schools in Don Victoriano, Misamis Occidental Division, Philippines. Data were collected using a three-part survey questionnaire: Part I gathered demographic data, Part II assessed respondents' attitudes toward mathematics based on four factors: self-confidence, value, enjoyment, and motivation, and Part III evaluated their perceptions of the degree of contextualized teaching approaches in their mathematics classes. The findings revealed that students have high exposure to contextualization in their mathematics classes. Respondents exhibited positive attitudes toward the value of mathematics but maintained neutral attitudes regarding self-confidence, enjoyment, and motivation in the subject. Also, the results show a significant difference between male and female respondents' attitudes towards learning mathematics ($U = 377.50$, $p = 0.0001$) with a medium effect size, $r = 0.488$. Spearman Rank correlation analysis showed weak yet positive correlations between contextualization and respondents' attitudes toward the value ($r_s = .292$, $n = 125$, $p = .001$), enjoyment ($r_s = .389$, $n = 125$, $p = .0001$), and motivation ($r_s = .385$, $n = 125$, $p = .0001$) in mathematics. The study concluded that contextualization holds the potential to positively influence Subanen students' value, enjoyment, and motivation in mathematics. Therefore, incorporating contextualized teaching approaches in mathematics instruction is encouraged to better engage and support Subanen students.

Keywords: contextualization; attitude towards mathematics; Subanen students

1. Introduction

Department Order No. 32, s. 2015 of the Department of Education introduced the Indigenous Peoples Education (IPEd) Framework to address the specific needs of Indigenous communities. Also, the Enhanced Basic Education Act of 2013, or RA 10533, mandates that the curriculum must be both contextualized and global. This is also aligning with DepEd's mission in promoting culture-based education. Thus, teachers, as core implementers of the curriculum, are contextualizing their instruction to be responsive to the cultural, social, and historical realities of Indigenous Peoples.

One of the best ways to meet the needs of IP students and support their culture in a math classroom is through contextualization, which makes the lesson relevant and meaningful to the students' lives by connecting the students' context to the mathematical content taught in school (Reyes et al., 2019). According to Agup & Agup (2020), mathematics education should become holistic, relevant, and connected with learners' everyday lives, including their culture. Contextualization involves connecting real-life contexts to the culture of the learners, ensuring both relevance and practicality (Madrazo & Dio, 2020). Contextualized teaching is a process that directly links lessons to concrete applications, making them appealing to students' interests. This approach facilitates the transfer of learning by bridging the gap between abstract mathematical concepts and their practical applications in everyday life (Nabila & Widjajanti, 2020).

Several studies have demonstrated the effectiveness of contextualization in education. Selvianiresa and Prabawanto (2017) found that contextualization improves learning outcomes in primary schools. Similarly, Diago and Dillo (2022) reported that contextualized teaching practices are effective across various educational levels, school types, and divisions. Contextualized instruction enhances student engagement, improves retention, and fosters better conceptual understanding (Madrazo & Dio, 2020). Furthermore, students with moderate self-efficacy beliefs in mathematics experienced an increase to high self-efficacy beliefs after exposure to contextualized instruction (Facunla & Tan, 2020). Additionally, the use of contextualized learning materials in mathematics instruction has positively influenced students' attitudes toward the subject (Verbo & Jimenez, 2020). Supporting this, Cambaya and Tan (2022) observed that students' mathematics engagement levels across cognitive, affective, and behavioral domains were high after implementing contextualized instruction.

In the Philippines, there are at least 40 main Indigenous Peoples' groups based on cultural and regional significance, mostly living on remote islands and hinterlands. Subanen is one of the indigenous groups in Western Mindanao, which is now divided into the provinces of Misamis Occidental, Zamboanga del Norte, Zamboanga del Sur, and Zamboanga Sibugay (UNESCO, 2022).

The Subanen people have a unique cultural heritage characterized by their language and traditions. However, like many Indigenous groups, they face significant educational challenges. As highlighted in DepEd Order No. 62, s. 2011 or the National Indigenous Peoples Education Policy Framework, IPs often encounter issues such as limited access to education services and institutions lacking the capacity to provide culturally appropriate education. To address these issues, the Department of Education (DepEd) has made efforts to provide adequate and culturally appropriate learning resources and environments for IP learners, including textbooks and supplementary materials. Despite these efforts, IPs remain some of the most vulnerable and marginalized groups in the Philippines (Rimando, 2013).

Studies on the education of Indigenous Peoples are limited. Challenges are evident in mathematics education, where the absence of instructional materials reflecting indigenous cultural practices often hinders student engagement and comprehension (Verdida et al., 2024). As cited in a study of Gutierrez & Candelario-Aplaon (2020), failures in educating IPs are often attributed to the lack of contextualization in lessons, weak connections

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between schools and indigenous communities, limited integration of indigenous cultural values in classrooms, and insufficient understanding of indigenous learning needs and support systems (Fiagoy, 2000). According to Ganal (2017), the integration of indigenous issues and knowledge into the curriculum depends heavily on teachers. Hence, teachers are encouraged to be resilient in incorporating relevant and culturally appropriate knowledge about Indigenous Peoples into their teaching practices through contextualized teaching approaches.

In the district of Don Victoriano, Division of Misamis Occidental, where this study was conducted, the majority of students belong to the Subanen community. In an interview with the teachers, they shared that they often employ contextualized teaching methods even in mathematics to make the lessons interesting and relevant to the lives of students and to align with the students' culture. This study aims to examine the extent to which contextualization is implemented in teaching mathematics, focusing on the aspects of localization and indigenization. Furthermore, it seeks to explore the relationship between contextualized teaching practices and Subanen students' attitudes toward learning mathematics.

This study assessed contextualized teaching in mathematics and attitudes of senior high subanen students in mathematics in public national high schools. Specifically, the study sought to (1) investigate the level of contextualization applied in teaching mathematics as perceived by Subanen students, specifically in terms of localization and indigenization; (2) explore the attitudes of Subanen students toward learning mathematics in terms of confidence, value, enjoyment, and motivation; (3) determine if there is a significant difference between students' attitudes toward learning mathematics when grouped according to gender; and (4) investigate the relationship between contextualized teaching and students' attitudes toward learning mathematics.

2. Framework of the Study

The K to 12 Program emphasizes curriculum contextualization. Contextualization was defined as "the educational process of relating the curriculum to a particular setting, situation, or area of application to make the competencies relevant, meaningful, and useful to all learners" (RA 10533). Contextualization is seen to be a significant strategy for the education of Indigenous Peoples. Through it, educational experiences will resonate with students' cultural contexts. Contextualization can be categorized into two primary degrees: localization and indigenization. Localization involves adapting the curriculum content to reflect local information, materials, and practices that are relevant to the learners' community. In teaching mathematics, localization may include using local resources or examples that Subanen students encounter in their daily lives. Indigenization goes further by enhancing educational competencies and resources to align with the biogeographical, historical, and socio-cultural contexts of Indigenous communities. This ensures that the curriculum not only respects but actively incorporates indigenous knowledge and cultural practices into the learning process (Atondo, 2022).

Learning mathematics is not solely about cognitive processes; it is also deeply influenced by students' attitudes toward the subject. McLeod (as cited in Ayob and Yasin, 2017) describes attitudes towards mathematics as emotional responses that can be either positive or negative. These attitudes are shaped over time through students' experiences and can significantly impact their performance in mathematics. According to Khoo and Ainley (2005), attitudes are not inherent but rather developed through interactions with the subject matter. There are three components of attitude: the cognitive component refers to beliefs about mathematics, such as recognizing its importance and relevance in everyday life (Mensah et al., 2013); the affective component pertains to emotions associated with learning mathematics, including enjoyment and motivation (Ingram, 2015); and the behavioral component involves the tendency to respond positively or

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negatively towards mathematics, including confidence levels and self-efficacy (Mensah et al., 2013).

Research supports the effectiveness of contextualized teaching methods in fostering positive student attitudes towards mathematics. For instance, Regis and Gomez (2023) found that extensive exposure to contextualized teaching significantly enhances students' problem-solving skills and critical thinking while facilitating real-world applications of mathematical concepts. Similarly, Facunla and Tan (2020) observed that students exposed to contextualized instruction experienced a notable increase in self-efficacy beliefs, moving from moderate to high levels following the intervention. Reyes et al. (2019) emphasized that contextualizing lessons based on students' lives makes learning more engaging and allows them to construct their own understanding of mathematical concepts.

Research indicates mixed findings regarding gender differences in attitudes towards mathematics. Some studies have reported generally positive attitudes toward mathematics among students. A longitudinal study by Ursini and Sanchez (2008) found significant gender differences favoring boys in attitudes towards mathematics among students using technology during grades 8 and 9. Conversely, Dukpa (2015) reported no significant differences in attitudes between male and female students.

As shown in the diagram, this study focuses on exploring these dynamics within the Subanen context to examine how contextualized teaching impacts students' attitudes toward learning mathematics. Specifically, the study sought to

(1) investigate the level of contextualization applied in teaching mathematics in as perceived by Subanen students, specifically in terms of localization and indigenization,

(2) explore the attitudes of Subanen students toward learning mathematics in terms of, confidence, value, enjoyment and motivation,

(3) determine if there a significant difference between students' attitudes toward learning mathematics when grouped according to gender, and

(4) investigate the relationship between contextualized teaching and students' attitudes toward learning mathematics.

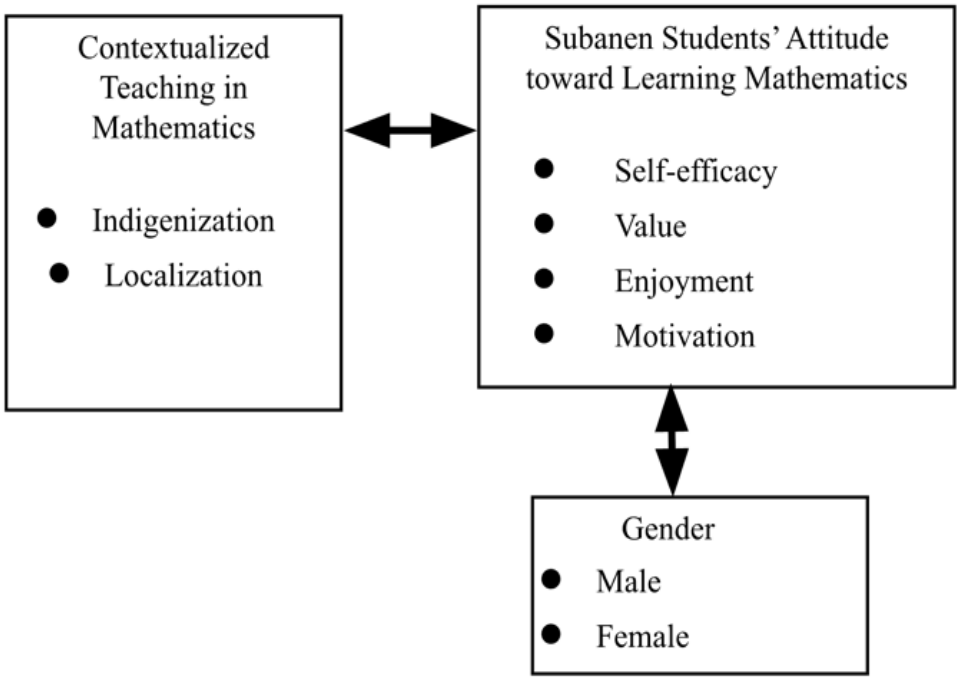


Figure 1. Schematic Diagram of the Study

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3. Methodology

3.1 Research Design

This study employed a descriptive correlational survey design. As defined by Creswell (2014), descriptive research focuses on detailing the characteristics of a population or phenomenon under investigation. It is primarily used to gain an understanding of a group or phenomenon through data collection methods such as surveys, interviews, and observations. Stangor (2011) states that descriptive correlational survey design will help see the relationship among variables and consent to the prediction of future events from present knowledge. By utilizing a descriptive correlational approach, the research will investigate whether contextualized teaching practices foster a more positive disposition of Subanen students toward the subject. The findings from this study could contribute to the growing body of research emphasizing the importance of curriculum contextualization in addressing the educational challenges faced by Indigenous learners.

3.2 Research Respondents

In the Division of Misamis Occidental, the Department of Education has been implementing the Indigenous Peoples Education (IPEd) Program to cater to the needs of students in indigenous communities, particularly the Subanen students. Schools in the Don Victoriano district have been involved in its implementation. Interviews with mathematics teachers indicated that they are contextualizing their instruction, when applicable, to emphasize the relevance of the mathematics concepts and to promote the Subanen culture. It was estimated that teachers were able to develop 4 contextualized lessons each quarter. This study involved two schools in the district, coded as NHSA and NHSB. These schools were selected due to the high enrollment of senior high Subanen students. The choice of these schools provides an opportunity to gather data from a group that has not previously been the focus of similar research. This setting ensures that the study is both contextually relevant and appropriate to address the research objectives.

Table 1 shows the frequency of the distribution of respondents.

Table 1 Frequency of the distribution of respondents

School	**Number of Subanen Respondents**		
	Male	**Female**	**Total**
National High School A (NHSA)	37	40	77
National High School B (NHSB)	25	23	48
Total	62	63	125

3.3 Research Instrument

Data were collected through a survey questionnaire completed by the students. The survey questionnaire is divided into three parts. Part 1 contains data of the demographic profile of the respondents, including their age, gender, grade level, and ethnicity. For Part 2, statements describing the attitudes of the respondents towards mathematics were adapted from the Attitudes Toward Mathematics Inventory (ATMI) by Tapia and Marsh (2000). This construct is measured using the following variables, such as self-confidence, value of mathematics, and engagement. Self-confidence in mathematics has 12 indicators with seven positively worded items and five negatively worded items, while the Value of Mathematics has seven positively worded items. Moreover, engagement is composed of enjoyment in mathematics with nine items with only one reversely worded item and motivation in mathematics with four items with one reversely worded item. All these indicators were measured using the 5-point Likert scale, wherein one is the lowest and five is the highest, which are interpreted as Very Negative Attitude to Very Positive Attitude,

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respectively. The ATMI was verified by two experts. A trial testing of validated ATMI was conducted on 48 senior high students at Carmen Integrated School, Jimenez, Misamis Occidental. To determine the measure of internal consistency of the ATMI, Cronbach's Alpha method was used to analyze the data obtained from the trial testing, and the reliability coefficient was 0.85, indicating good internal consistency. The ATMI is suitable for this study, as contextualized teaching aims to enhance the significance and relevance of mathematics for learners by linking mathematical concepts to their personal experiences, surroundings, and cultural backgrounds.

On the other hand, Part 3 evaluates students' perceptions of their mathematics teachers' use of contextualized teaching approaches. The assessment is adapted from the instrument developed by Regis and Gomez (2023), which focuses on two key variables: localization and indigenization. Localization was represented by the use of local information, materials, situations, practices, and community contexts in mathematics instruction, while indigenization was represented by the integration of appropriate Indigenous knowledge, cultural practices, and the bio-geographical, historical, and socio-cultural contexts of the Subanen community. These theoretical dimensions were translated into specific indicators and subsequently into observable mathematics-teaching practices that formed the questionnaire items. Each variable is measured using 10 statements, assessed on a 4-point Likert scale. The scale was interpreted as follows: 1 – Very Low Degree of Contextualization to 4 – Very High Degree of Contextualization. The questionnaire was submitted to three experts for face validation, including one who specializes in Subanen culture, to ensure cultural appropriateness for Subanen students. After validation, a trial test was conducted involving 48 senior high school students from Carmen Integrated School in Jimenez, Misamis Occidental. The instrument's reliability was assessed using Cronbach's alpha, resulting in a coefficient of 0.81. The result signifies good internal consistency, indicating that the tool is both reliable and suitable for assessing Subanen students' perceptions of contextualized teaching approaches.

3.4 Data Collection and Analysis

The study was conducted with the permission of the Office of the School Principal. Preliminary sessions were held to introduce the purpose of the study to the participants. Prior to participation, selected respondents were asked to provide their informed consent. They were assured that data will be used for academic purposes only. This study will utilize quantitative data collection methods. Survey questionnaires will be used. Instructions were read aloud by the researcher before the participants. An ample time of 30 minutes was given to fill in the questionnaire, after which it was collected from them by the researcher. Data collected from respondents' responses will be tabulated and organized before proceeding to statistical analysis.

The following statistical tools were used to interpret the data in the study. Frequency was employed to quantify the data related to the profile of the respondents. Mean and standard deviation were utilized to determine the average and variability of the students' responses in the survey questionnaire. The Mann-Whitney U test was used to compare attitudes towards mathematics between male and female students, serving as the primary grouping variables. The Kolmogorov-Smirnov test was applied to assess whether the datasets differed significantly or followed a normal distribution. Lastly, the Spearman rank correlation test was employed to examine the significant relationship between students' attitudes and the level of contextualized teaching, as well as to evaluate the strength and direction of the correlation.

3.5 Ethical Consideration

The students' rights and well-being were prioritized in this study. Steps were taken to explain the purpose of the study before inviting students to participate. The following

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statements describe the ethical considerations that were applied and observed throughout the conduct of the study.

The use of AI in this article is solely for grammar and to check references to be in APA format.

3.6 Informed Consents

The first step was asking permission via consent letters. These were provided to participants a few days before the event, allowing them ample time to consider their decisions. They had the opportunity to review the study's goals, benefits, and drawbacks and indicate their willingness to participate by signing the consent document. Participants could opt out, and voluntary cooperation and support were stressed.

3.7 Confidentiality

The researcher ensured that participants' personal information and identities were kept confidential and not disclosed to the public. Data collection procedures were designed to maintain the security and anonymity of the collected data. Following data collection, the researcher shall handle and dispose of any papers or electronic copies containing participants' data with utmost caution, ensuring their privacy and confidentiality are protected.

4. Results and Discussion

The students involved in the study were senior high school students who identified as Subanen. They were purposely selected to participate in the study because the senior high school curriculum had already experienced contextualized mathematics instruction from junior high school through senior high school.

4.1 Contextualized Teaching in Mathematics as Perceived by Students

Table 2 shows the status of contextualized teaching in mathematics in terms of localization and indigenization of the two schools as perceived by students.

Table 2 Status of contextualized teaching in mathematics

Degree of Contextualization	NHSA (n = 77)		NHSB (n = 48)		Overall Mean
	Mean	SD	Mean	SD	
Localization	2.52	0.85	2.59	0.96	2.55
Indigenization	2.68	0.79	2.49	0.95	2.59
Contextualization	2.6	0.81	2.54	0.96	2.57
Interpretation	High		High		High

Note: Hypothetical Mean Range: 1.00–1.75=Very Low; 1.76–2.50=Low; 2.51–3.25=High; 3.26-4.00=Very High

The overall mean score of 2.57 indicates a high appreciation for contextual teaching methods in mathematics, as reported by the students. Both schools received high ratings for their implementation of contextualized teaching, with scores of 2.60 and 2.54, respectively. This suggests that students feel positively engaged and exposed to the learning process through contextualized approaches in teaching mathematics. However, while categorized as high, the proximity of the scores to the lower end of the "high" range of 2.50 to 3.25 indicates there may still be room for improvement in fully integrating these methods into their mathematics classes.

For localization, the indicator “The teacher encourages students to answer questions in local contexts” received the highest ratings in both schools, with scores of 2.87 at NHSA

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and 3.17 at NHSB. Conversely, the lowest rating at NHSA was for the statement "The teacher utilizes locally available materials in making instructional aids and instruments" with a 2.29, while NHSB reported the lowest rating of 1.96 for "The teacher incorporates local stories during lesson discussions."

For indigenization, Subanen students of NHSA gave its highest rating of 2.82 for the indicator "The teacher uses an integrative teaching approach." In comparison, NHSB rated the indicator "The teacher respects the differences of the locally diverged culture and values of the students" highest at 2.81. Conversely, the lowest ratings were for the indicators "The teacher employs differentiated instruction to address different students' learning needs" at NHSA, which received a score of 2.46, and "The teacher develops endemic materials as instructional aids" at NHSB, which scored 2.00.

Based on the results, while mathematics teachers are making efforts to make lessons relevant to students' lives through contextualization, there is still a need to put in more effort to help students recognize and appreciate these efforts. Statements regarding the use of local instructional materials as teaching aids received lower ratings compared to others. To improve this, teachers can provide authentic tasks that allow students to apply their learning and showcase various outputs, including those that integrate cultural art and mathematics. Furthermore, it recommended that school administrators actively support this approach by organizing seminars on contextualization in mathematics and closely monitoring the application of these techniques in the classroom.

According to Diago and Dillo (2022), their study among public school teachers in the Surigao City and Surigao del Norte divisions found that teachers contextualized mathematics by using locally available resources, including indigenous materials. The strategies they employed were described as integrative, collaborative, and reflective. The study also emphasized the need for Surigaonon teachers to incorporate contextualization in mathematics teaching more frequently.

4.2 Students' Attitude towards Mathematics

The students' attitudes towards mathematics were collected using the four variables, such as self-confidence, value, enjoyment, and motivation.

Table 3 Self-confidence of students in mathematics

Indicators	Mean	SD	Interpretation
1. *Mathematics is one of my most hated subjects	3.33	1.31	Neutral
2. *My brain goes clear, and I am unfit to think obviously when working with mathematics.	2.88	1.2	Neutral
3. *Studying mathematics makes me feel nervous.	3.47	1.14	Positive
4. *Mathematics makes me feel uncomfortable.	3.13	0.9	Neutral
5. *When I hear the word math, I have a sentiment of disgust.	2.67	1.13	Neutral
6. Mathematics does not scare me at all.	2.55	1.08	Negative
7. I have a great deal of fearlessness with regards to mathematics.	3.05	1.13	Neutral
8. I am ready to take care of scientific issues without an excessive amount of trouble.	2.96	0.85	Neutral
9. I hope to do genuinely well in my mathematics class.	3.27	1.11	Neutral
10. I am puzzled continuously in my mathematics class.	3.02	1.03	Neutral
11. I learn mathematics easily.	2.56	0.96	Negative
12. I believe I am good at solving mathematics problems.	2.51	1.18	Negative
Overall	2.98	1.09	Neutral

Note: Hypothetical Mean Range: 1.00-1.80 – Very Negative, 1.81-2.60 – Negative, 2.61-3.40 – Neutral, 3.41-4.20 – Positive, 4.21-5.00 – Very Positive; * Reverse Coding

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Table 3 shows the overall mean score of 2.98 and a standard deviation of 1.09. This indicates that respondents have a neutral attitude towards their confidence in learning mathematics. This finding aligns with a study by Capuno et al. (2019), which also reported a neutral attitude among junior high school students regarding their confidence in mathematics. The study noted that mathematics is perceived as a complex and challenging subject. The result suggests that mathematics teachers should take steps to improve students' confidence in the subject. Studies have proven that self-confidence has influence and affects students' performance in the subject. Students with higher self-efficacy tend to exhibit greater motivation and approach mathematical challenges with a positive mindset, while those with lower self-efficacy often experience anxiety and avoidance (Mensah et al., 2013). Conversely, research indicates that low self-confidence can lead to increased math anxiety, which negatively impacts performance (Bowser, 2022). Based on the results, teachers should find strategies like contextualization to present a supportive learning environment that enhances students' confidence and addresses their emotional dispositions towards mathematics.

Table 4 Value of mathematics as perceived by students

Indicators	Mean	SD	Interpretation
1. Mathematics is an extremely advantageous and fundamental subject.	3.2	1.07	Neutral
2. I want to develop my mathematical skills.	3.93	1.04	Positive
3. Mathematics builds up the psyche and shows an individual to think.	3.43	1.03	Positive
4. Mathematics is essential in everyday life.	3.78	0.99	Positive
5. Mathematics is a standout amongst the most important subjects to consider.	3.51	0.95	Positive
6. High school mathematics subjects would be beneficial no matter what I decide to study.	3.46	1.02	Positive
7. I can consider numerous ways that I use math outside of school.	3.63	1.02	Positive
Overall	3.56	1.02	Positive

Note: Hypothetical Mean Range: 1.00-1.80 – Very Negative, 1.81-2.60 – Negative, 2.61-3.40-Neutral, 3.41-4.20 – Positive, 4.21-5.00 – Very Positive

Table 4 presents the result of the students' value of mathematics. Based on the analysis results, positive attitudes toward their value in mathematics were observed from the students. It results in an overall mean score of 3.56 and a standard deviation of 1.02. The results indicate that students recognize the value of mathematics and its role in helping them carry out daily activities. It can also lead them to desire to develop their mathematical skills. This means students acknowledge the practical applications of mathematics in everyday life. The positive perception suggests that students understand the significance of mathematics in various contexts. Studies revealed students' motivation in mathematics can increase if a student feels confident that he can do well with the subject. Thus, higher self-confidence will help them to engage more with the subject. This finding corresponds with research indicating that students' learning interest in mathematics partially mediated the relationships between mathematics learning motivation and performance in mathematics as well as between mathematics teaching quality and performance in mathematics (Arthur et al., 2022).

Another variable used to measure respondents' attitudes toward mathematics is the level of enjoyment they experience when engaging with the subject. As shown in Table 5, the overall mean score is 3.02, with a standard deviation of 0.95, indicating that respondents generally have a neutral attitude toward the enjoyment mathematics brings.

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Table 5 Value of mathematics as perceived by students

Indicators	Mean	StDev	Interpretation
1. I have for the most part appreciated considering math in school.	3.08	0.87	Neutral
2. *Mathematics is dull and boring.	2.8	1.09	Neutral
3. I like to take care of new issues in mathematics.	3.12	0.95	Neutral
4. I would want to complete a task in math than to compose an exposition.	3.31	0.93	Neutral
5. I like mathematics.	3.03	1.0	Neutral
6. I am happier in Mathematics class than in any other classes.	2.89	0.99	Neutral
7. Mathematics is a fascinating subject.	3.01	0.91	Neutral
8. I am open to communicating my thoughts on the most proficient method to search for answers for a troublesome issue in mathematics.	3.02	0.92	Neutral
9. I am comfortable answering questions in mathematics class.	2.93	0.92	Neutral
Overall	3.02	0.95	Neutral

Note: Hypothetical Mean Range: 1.00-1.80 – Very Negative, 1.81-2.60 – Negative, 2.61-3.40 – Neutral, 3.41-4.20 – Positive, 4.21-5.00 – Very Positive; * Reverse Coding

While many expressed interest in solving new mathematical problems, they also described the subject as boring. The analytical and critical thinking nature of mathematics often leads students to approach it with seriousness, which can overshadow its potential for enjoyment. This presents an ongoing challenge for mathematics teachers. Contextualized teaching is one strategy to make math lessons more engaging and enjoyable for students. Research has shown the significant impact of enjoyment in mathematics on student outcomes. Students' enjoyment of mathematics is positively associated with their perceived value of the subject and their perceived competence in mathematics, a pattern observed across six European countries (Radišić et al., 2024). A study involving 916 students from Grades 5 to 8 also found that activities designed to increase enjoyment can significantly boost students' confidence in their mathematical abilities (Christensen & Knezek, 2020). Additionally, the use of authentic mathematical tasks, cooperative learning strategies, and teachers' enthusiasm have been identified as key factors in promoting students' enjoyment of mathematics (Pekrun, 2006).

Table 6 Motivation of students in mathematics

Indicators	Mean	SD	Interpretation
1. I am sure that I could learn propelled mathematics.	3.27	0.98	Neutral
2. I might want to abstain from utilizing math in tertiary study.	3.24	0.95	Neutral
3. I will take more than the required measure of mathematics.	3.09	0.89	Neutral
4. I intend to take as much mathematics as I can in our class.	3.14	0.9	Neutral
Overall	3.18	0.93	Neutral

Students' motivation to learn mathematics is another variable that could measure their attitudes towards the subject. Table 6 presents the results of the data gathered on students' motivation to learn mathematics. The overall mean for motivation is 3.18 with a standard deviation of 0.93. This means that the respondents have neutral attitudes in their motivation towards learning mathematics. All four indicators received neutral ratings in the survey. This suggests that students feel neither particularly confident nor unconfident about learning advanced mathematics, nor are they strongly motivated to engage with

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mathematics beyond the required level. It indicates a neutral stance toward their ability to learn more complex math and their enthusiasm for further math study.

Based on Table 7, the value of mathematics received the highest mean score of 3.56, indicating that respondents generally hold positive attitudes toward the importance of mathematics in their lives. In contrast, their self-confidence in learning mathematics recorded the lowest mean score of 2.98, reflecting neutral attitudes in this area. Overall, the grand mean of 3.19 and a standard deviation of 0.997 suggest that respondents have neutral attitudes toward learning mathematics. Despite the presence of the implementation of contextualized teaching approaches in their mathematics classes, students' attitudes toward the subject remain neutral. This indicates that while students recognize the value of mathematics, their confidence in their ability to learn and excel in the subject requires additional support and encouragement. These findings align with those of Capuno et al. (2019), who studied attitudes, study habits, and performance among junior high school students in mathematics. Their research similarly found that respondents exhibited positive attitudes toward the value of mathematics but maintained neutral attitudes regarding self-confidence, enjoyment, and motivation. The study also concluded that there is a positive correlation between attitudes and academic performance (Capuno et al., 2019). Therefore, there is a clear need to enhance students' attitudes to improve their overall performance in mathematics.

Table 7 Motivation of students in mathematics

Indicators	Mean	SD	Interpretation
A. Self-Confidence	2.98	1.09	Neutral
B. Value	3.56	1.02	Positive
C. Enjoyment	3.02	0.95	Neutral
D. Motivation	3.18	0.93	Neutral
Overall	3.19	0.997	Neutral

4.3 Difference between Attitudes of Male and Female Respondents

The 125 students were composed of 62 males and 63 females. The Kolmogorov-Smirnov test for normality was performed, and the female dataset fails the normality test. It was followed by Levene's test for homogeneity of variances, and the result confirmed that the assumption of equal variance between the male and female datasets was satisfied (Levene's statistic = 0.86, df1 = 1, df2 = 113.019, p = 0.356). The non-normality of the distribution of the female dataset made it preferable to use the Mann-Whitney U test to compare male and female respondents' attitudes toward learning mathematics. Table 8 shows the results of the test.

Table 8 Motivation of students in mathematics

Indicators	Mean	SD	Interpretation
A. Self-Confidence	2.98	1.09	Neutral
B. Value	3.56	1.02	Positive
C. Enjoyment	3.02	0.95	Neutral
D. Motivation	3.18	0.93	Neutral
Overall	3.19	0.997	Neutral

The test revealed a significant difference between male students' (Mdn = 2.56, n = 62) and female students' (Mdn = 3.10, n = 63) attitudes toward learning mathematics (U = 377.50, p = 0.0001) with a medium effect size, r = 0.488. This suggests that female Subanen students have shown more positive attitudes toward learning mathematics

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compared to male respondents. Several studies have identified the same positive relationship between a higher proportion of female students in schools and their math performance (Nollenberger et al., 2016). However, this result contrasts with the findings of Ayebo and Dingel (2021), who reported a statistically significant gender difference in students' liking of mathematics, with male students scoring higher than female students.

4.4 Relationship between Students' Perceived Level of Contextualized Teaching and Attitudes in Mathematics

Datasets were tested for normality using the Kolmogorov-Smirnov test. The results indicated that the datasets were not normally distributed. Consequently, the Spearman rank correlation coefficient (Spearman's rho) was employed for the analysis. Table 9 shows the results of the test.

Table 9 Motivation of students in mathematics

Variables	Number of Participants	Mean	rs-value	p-value	Interpretation
Contextualized Teaching in Mathematics	125	2.57			
A. Self-Confidence	125	2.98	0.127	0.157	Not significant
B. Value	125	3.56	0.292	0.001	Significant
C. Enjoyment	125	3.02	0.389	0.0001	Significant
D. Motivation	125	3.18	0.385	0.0001	Significant
	125	3.19	.355	0.0001	Significant
Attitudes Towards Mathematics					

As shown in Table **9**, Spearman's correlation was conducted to examine the relationship between 125 respondents' perceptions of contextualized teaching approaches in their mathematics class and their attitudes toward learning mathematics. The analysis revealed significant relationships in the areas of value, enjoyment, and motivation, but the relationship with self-confidence was not significant ($p = 0.157$). Specifically, weak but positive correlations were observed between contextualized teaching and respondents' value of mathematics ($rs = .292$, $n = 125$, $p = .001$), enjoyment in mathematics ($rs = .389$, $n = 125$, $p = .0001$), and motivation in mathematics ($rs = .385$, $n = 125$, $p = .0001$). The test of whether a significant relationship exists between students' perceived level of contextualized teaching in their mathematics classes and their overall attitudes towards learning mathematics reflected a weak but positive correlation ($r = 0.470$, $p = 0.0001$).

These findings suggest that exposure to contextualized teaching approaches has the potential to influence students' attitudes toward mathematics, specifically in factors such as value, enjoyment, and motivation in mathematics. This result aligns with the study of Regis and Gomez (2023), which found a low correlation between senior high school students' attitudes toward problem-solving and contextualization. When mathematics teachers used available materials or local information in the community, lessons were observed to be delivered efficiently, which created better understanding and brought value to mathematical concepts being taught. Furthermore, it can create a lively and engaging space where students construct meaning of their learning on their own (Reyes et al., 2019). Thus, teachers who contextualize their mathematics lessons will have students who value and enjoy the subject more.

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5. Conclusion

Contextualization is crucial to addressing Indigenous students' needs and promoting their cultural identity within mathematics education. Diago and Dillo (2022) showed that contextualized teaching is effective across different educational settings and levels. Also, it enhances student engagement, improves retention, and promotes conceptual understanding (Madrazo & Dio, 2020). Moreover, students' attitudes toward learning mathematics are vital because it can directly affect how students perform in the subject (McLeod, as cited in Ayob & Yasin, 2017) and can determine how students engage with mathematical tasks (Mensah et al., 2013).

This study utilized a descriptive-correlational survey design to explore the relationship between contextualized teaching approaches in mathematics and Subanen students' attitudes towards learning mathematics. Data were collected from 125 senior high school students in two public high schools in Don Victoriano, Misamis Occidental. Contextualized teaching was assessed through the degrees of localization and indigenization, while attitudes toward mathematics were measured in terms of self-confidence, value, enjoyment, and motivation.

The findings revealed that contextualized teaching approaches were rated as high by the Subanen students. While students demonstrated positive attitudes toward the value of mathematics, recognizing its relevance to everyday life and future careers, their attitudes toward self-confidence, enjoyment, and motivation remained neutral. Additionally, a significant difference was found between male and female students, with female Subanen students exhibiting more positive attitudes toward mathematics than their male counterparts. Furthermore, weak but positive correlations were found between contextualized teaching and students' perceptions of value, enjoyment, and motivation, while no significant relationship was observed with self-confidence.

In conclusion, the teachers' high but borderline degree of contextualization needs improvement, especially since IPED schools are institutions designed to provide culturally relevant education to Subanen students. Additionally, a significant difference between female and male students' attitudes toward mathematics was established, indicating that gender plays a role in shaping students' attitudes. Finally, the results show the potential of contextualized teaching to improve Subanen students' mathematical experience, particularly in fostering value, enjoyment, and motivation in mathematics. These factors are crucial in influencing students' academic performance in the subject (Arthur et al., 2022; Zhou et al., 2023). Additionally, efforts should be intensified to address gaps in Subanen students' self-confidence in learning mathematics and improve their self-confidence, enjoyment, and motivation in mathematics through the integration of culturally relevant materials and practices into the classroom.

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