



Contextualized Learning in Teaching Mathematics

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ABSTRACT

The study determined the effects of contextualized learning in the teaching and learning process in Mathematics. Using a quasi-experimental method as a research design and with 64 Grade 10 students as respondents, the study revealed that before exposing the students to the traditional method of teaching, their baseline knowledge in Mathematics was fair. After exposing them to the traditional method, their performance in the post-test was described as very good. Before exposing the students to contextualized learning, their baseline knowledge in Mathematics was the same as that in the pre-test for the traditional approach. After presenting the lessons using contextualized teaching, their performance in the post-test was excellent. A significant difference was found between the pre-test and post-test scores of the students in the control group, where the teacher utilized the traditional approach of teaching mathematics, and the students in the experimental group that utilized contextualized teaching approach. Likewise, a significant difference was found between the retention and post-test scores of the experimental group. Based on the findings of the study, the following conclusions were drawn: Implementation of contextualized learning in teaching mathematics has a positive impact on students' learning outcomes. The interventions, which incorporated real-life examples and simpler language, resulted in improved performance, and understanding among students.

I. THE PROBLEM AND ITS BACKGROUND

Introduction

In the field of education, the way subjects were taught plays a crucial role in students' understanding and engagement. One approach that has gained attention in recent years is contextualized learning, particularly in teaching mathematics subject. Contextualized learning involves connecting mathematical concepts and skills to real-world situations, making the learning experience more meaningful and relevant for students. Mathematics is not just about numbers and formulas, it is also a powerful tool for problem-solving, critical thinking, and logical reasoning. Through contextualized learning, students can see the relevance of mathematics in their everyday lives, whether it's calculating expenses, analyzing data, or making informed decisions.

According to Deepika (2021), many students experience fear or anxiety towards mathematics for various reasons. One primary factor is the perception that math is inherently challenging and requires a unique set of skills that not everyone possesses. This mindset often comes from early experiences with the subject, where students may have struggled to grasp fundamental concepts or felt overwhelmed by complex problems. Additionally, the hierarchical nature of mathematical learning can intensify anxiety, as gaps in understanding at one level can hinder progress in more advanced topics. The fear of making mistakes and the emphasis on precision in mathematical solutions contribute to a sense of pressure, making some students reluctant to engage with the subject.

In the institution where the study was conducted, educators have encountered various challenges in teaching mathematics in a traditional classroom setting. Students struggle to see the relevance of mathematical concepts and struggle to apply them to real-life situations. This disconnect often leads to disengagement and a lack of motivation among students. The situation sparked curiosity and led the educators to explore alternative teaching approaches that could address these challenges. It became apparent that contextualized learning could be a promising solution. In integrating real-life contexts and applications into mathematics instruction, educators aim to enhance students' mathematical reasoning and make the subject more accessible and enjoyable. Though contextualized learning has been popular in public schools and other educational contexts, its use in private institutions is still rather limited. This raises the concerns of why there is this discrepancy and what advantages learners attending private schools might be missing out on.

Despite the recognized benefits of contextualized learning, there is a noticeable gap in research and application within private educational institutions. Private schools appear to be falling behind public schools in the use of contextualized learning practices aimed at enhancing comprehension and engagement. The implementation and effectiveness of contextualized learning in private school settings are not widely recognized, and the reasons for such a gap are not thoroughly investigated. The gap highlights the need for more in-depth research to fully understand the challenges and potential benefits of integrating contextualized learning into private education.

The Department of Education (DepEd) of the Philippines has underscored the importance of this approach through several policy directives. Notably, DepEd Order No. 21, s. 2019, which outlines the Policy Guidelines on the K to 12 Basic Education Program, emphasizes the necessity of incorporating

localized and contextualized learning strategies across the curriculum. This order aims to make education more relevant to the diverse cultural and environmental contexts of Filipino students. Additionally, Division Memorandum No. 443, s. 2019, provides detailed guidelines for the development of contextualized learning resources, highlighting the importance of creating educational materials that reflect local contexts and languages.

In the field of mathematics education, contextualized learning presents a unique opportunity to explain abstract concepts by relating them to everyday experiences. For instance, by using real-life scenarios that can help students see the practical applications of mathematical principles. This not only enhances engagement but also aids in the development of critical thinking and problem-solving skills.

This study aims to investigate the effectiveness of contextualized learning in teaching mathematics, specifically in the context of private schools. It will examine different approaches and strategies used in contextualized learning and explore the benefits and challenges associated with this instructional method. Additionally, the study will assess the perceptions and attitudes of both teachers and students towards contextualized learning in mathematics education. The goal is to enhance students' understanding, motivation, and problem-solving abilities by integrating real-life contexts and applications into mathematics instruction.

Addressing the fear of mathematics can be significantly improved by embracing contextualized learning and teaching experiences (Sintema, 2020). Integrating real-world applications into the curriculum is a proven strategy that enables students to understand the practical relevance of mathematical concepts. Contextualization is vital for improving students' mathematics performance as it provides a meaningful framework for learning. Presenting mathematical concepts within real-world contexts helps students grasp their relevance and practical applications better. This approach not only enhances the appeal and engagement of the material but also demonstrates to students the value of mathematical skills in solving everyday problems.

Localizing lesson plans, activities, and assessments is a powerful strategy for contextualizing mathematics education and making it more relevant to students (Sitti, 2021). By incorporating local contexts, educators can create a bridge between abstract mathematical concepts and the everyday experiences of their students. For example, using local examples in word problems or data sets allows students to see the direct application of mathematical principles in their immediate surroundings. This localization not only enhances the understanding of the learners but also fosters a sense of connection between the subject matter and the students' own lives.

Contextualized learning experiences can positively impact students' attitudes towards mathematics. When students see the practical utility of mathematical skills and recognize their ability to apply them in real-world situations, it can help them to boost their confidence and motivation. This shift in attitude can lead to increased participation, a willingness to tackle more challenging problems, and a greater sense of achievement. Ultimately, by integrating context into mathematics education, educators can create a more dynamic and effective learning environment that supports improved performance and a positive outlook on the subject (Nardi, 2020).

Literature Review

The academic performance of Filipino students in mathematics has long been a topic of concern in the Philippines. Despite the country's strong focus on education and the high value placed on math skills, students' performance in this subject has consistently lagged that of their counterparts in other countries. This performance gap not only affects individual students but also has broader implications for the country's competitiveness and development. Recognizing the importance of addressing this issue, there is a need to explore innovative approaches to teaching mathematics that can effectively enhance students' understanding and engagement. Contextualized learning, with its emphasis on real-world applications and relevance, holds a potential solution to improve mathematics education in the Philippines and narrow the performance gap. By investigating the effectiveness of contextualized learning in the Philippine context, this study aims to contribute to the ongoing efforts to improve mathematics education and empower Filipino students with the necessary skills and knowledge for success in the 21st century.

According to Landicho (2021), contributing to poor math performance needs for more resources for students and teachers. Many schools in the Philippines need the necessary materials or equipment to teach math concepts effectively, and teachers may need more training or support to teach the subject effectively. This can lead to a lack of understanding and difficulty grasping complex concepts, resulting in poor performance on math exams.

The implementation of contextualized learning has shown promising results in enhancing critical thinking skills among learners (Baltrusaitis, 2023). By connecting mathematical concepts to real-world contexts, contextualized learning encourages students to think critically and apply their knowledge in practical situations. This promotes active participation in the classroom as students become more engaged and motivated to explore and understand the subject matter. One of the benefits of contextualized learning is its emphasis on group learning. Students are encouraged to participate in group discussions and collaborative activities that revolve around the contextualized lesson. This collaborative learning provides an opportunity for students to exchange ideas, share perspectives, and learn from one another. Engaging in group discussions allows students to deepen their understanding of the subject matter by considering different viewpoints and approaches. Furthermore, contextualized learning creates an environment where students feel more comfortable and willing to communicate with their subject teachers.

Llego (2022) highlights the significance of contextualization as a teaching strategy that involves integrating new information into a student's existing knowledge, experiences, and background. This is effective in enhancing critical thinking skills. By connecting new information to prior knowledge, contextualized learning improves understanding and retention of the material. This process fosters the development of analytical skills and the ability to assess information from multiple viewpoints. Furthermore, contextualized learning provides opportunities for problem-solving and decision-making. Activities like case studies and role-playing allow students to apply their knowledge and skills in practical scenarios, enhancing their critical thinking abilities. Through these activities, students learn to analyze complex situations, consider different options, and make informed decisions.

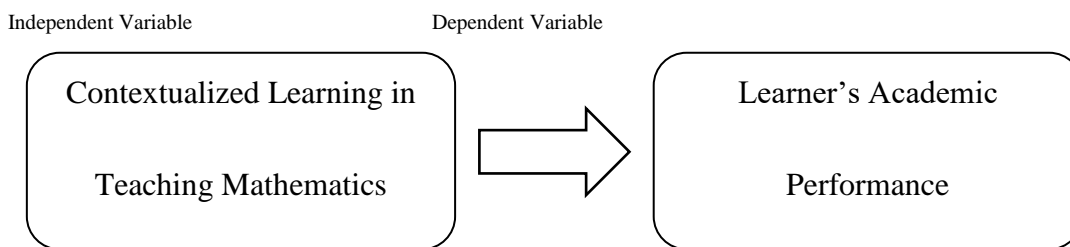
In summary, persistent challenge of poor mathematics performance among Filipino students and the critical need for innovative teaching approaches to address this issue. Contextualized learning emerges as a promising solution, offering the potential to enhance students' understanding and engagement by connecting mathematical concepts to real-world contexts. Studies highlight the effectiveness of contextualization in fostering critical thinking skills, promoting active participation, and improving students' retention of material. However, a gap remains in understanding the specific impact of contextualized learning in the Philippine context. Thus, this study aims to contribute to the ongoing efforts to improve mathematics education by exploring the effectiveness of contextualized learning strategies among Filipino students, ultimately empowering them with the skills and knowledge necessary for success in the 21st century.

Conceptual Framework

Figure 1 shows that the independent variable is the contextualized learning in teaching mathematics. This variable was hypothesized to influence (as implied by the arrowhead) the dependent variable which is the learner's academic performance.

Figure 1

Paradigm of the Study



Statement of the Problem

This study determined the effectiveness of contextualized learning in teaching Mathematics 10 among high school students, 10 – David and 10 – Solomon at Living Angels Christian Academy S.Y. 2023 – 2024.

Specifically, it sought answers to the following questions.

1. How may the pre-test result of the controlled group and experimental group be described?
2. How may the post-test result of the controlled group and experimental group be described?
3. How may the retention test of the experimental group be described?
4. Is there a significant difference between the pre-test and post-test scores of the controlled and experimental group?
5. Is there a significant difference between the retention test and post-test scores of the experimental group?
6. What are the qualitative views and insights of the participants regarding their experience with contextualized learning in Mathematics classes?

Hypothesis

This study was guided by the following hypothesis.

1. There is no significant difference between the Mathematics performance of the respondents who were under the controlled and experimental groups.
2. There is a significant difference between the Mathematics performance of the respondents who were under the controlled and experimental groups.

Significance of the Study

Learners. As the prime recipient of the educational services, this research directly enhances their learning experience. It gives the learners the opportunities to explore contextualizing and localizing approaches in mathematics that can make the subject more engaging, relevant, and applicable to their everyday lives.

Teachers. This research will help to enlighten the teachers that Mathematics can be effective if they will apply contextualizing and localizing teaching approaches. Understanding how to contextualize and localize lessons can empower teachers to create more meaningful and tailored learning experiences for their students.

Administrators. This research can be a guide to the administrator to see the beneficial input of using contextualization as a teaching strategy and learning process appropriate for 21st Century learners.

Future Researcher. This research can build upon this study to explore additional dimensions of contextualization in mathematics education or adapt the methodologies for other contexts. They can expand on the findings to create a more comprehensive understanding of effective pedagogical strategies in mathematics education.

Scope and Limitation of the Study

The study determined the effectiveness of contextualized and localized teaching strategies in enhancing mathematics learning experiences among Grade 10 high school students at Living Angels Christian Academy. The study adopts a quasi-experimental method approach, combining quantitative and qualitative methods to gather a comprehensive understanding of the impact of these strategies on student performance and attitudes towards mathematics. The study will be conducted within the 2 sections, 10 – David as the controlled group and 10 – Solomon as the experimental group. The basis of choosing who will be the experimental group is their POP (Percentage of Passing). As their subject teacher and the Subject Area Point Person in Mathematics in our school, the data shows that among all the grade 10 students last quarter they only have 71.88% passing rate in their exam.

The study discussed the 3rd quarter topics which is permutation, combination, and probability. To measure the effectiveness of the teaching strategies, the study utilized various instruments. Pre and post-tests administered to assess students' mathematical performance before and after the implementation of the contextualized and localized teaching strategies. Questionnaires will be used to evaluate students' attitudes towards mathematics and their perceptions of the effectiveness of the teaching strategies. Additionally, qualitative interviews were conducted to gather in-depth insights into students' experiences and perspectives.

Definition of Terms

To following terms were used throughout the proposal, and are defined as follows:

Academic performance. It refers to the measurement of learners' achievement across different academic subjects. Teachers and education officials typically measure achievement using classroom performance, and results from standardized tests.

Pre-test. It refers to the assessment method used to determine the prior knowledge of the learners in mathematics.

Post-test. It refers to the assessment method given to the pupils after being exposed to the integrating the Contextualized Teaching approach and learning process.

Contextualization. It refers to the process of connecting abstract mathematical concepts to real-world examples and practical applications that are meaningful and relatable to the learners' experiences, culture, and everyday life.

Learning Activity. It refers structured task or exercise designed to facilitate the acquisition of knowledge, skills, or understanding within an educational setting. It includes classroom discussions, group tasks, and problem-solving tasks that actively engage students in the learning process.

Learning Materials. It refers to the resources, tools, or instructional aids used to support the teaching and learning process. It includes also textbooks, worksheets, digital resources, and other materials specifically designed to present mathematical content and enhance the students' overall learning experience in the classroom.

II. RESEARCH METHODS

The information about the research and sampling procedures that were utilized by the researcher are provided in this chapter. The research design that was employed, as well as the data gathering techniques, and data analysis scheme was also discussed in this chapter.

Research Design

The research design for the study on contextualized learning in teaching mathematics will be a Quasi-Experimental design. This design is chosen to comprehensively investigate the impact of contextualized learning on students' mathematical comprehension. The Quasi-Experimental design allows for the comparison of groups that are not randomly assigned, which is suitable for studying the effectiveness of teaching strategies in real-world educational settings. The primary instruments for data collection in this study will be the pre-test and post-test assessments. The pre-test will serve as a baseline measure, capturing students' initial understanding of mathematical concepts before exposure to contextualized learning. Following the implementation of contextualized teaching methods, the post-test will measure the extent of improvement or changes in students' mathematical proficiency.

Respondents and Sampling

The study has chosen High School students as the targeted group of participants. The selection of High School students is based on the relevance and appropriateness of their academic level to engage with the mathematics curriculum under investigation. The study will be conducted within the 2 sections, 10 – David as the controlled group and 10 – Solomon as the experimental group. The basis of choosing who will be the experimental group is their POP

(Percentage of Passing). As their subject teacher and the Subject Area Point Person in Mathematics in our school, the data shows that among all the grade 10 students last quarter they only have 71.88% passing rate in their exam. And the general weight average of 10 – Solomon is lower than to 10 – David.

The sampling technique employed in this research is likely to be purposive or purposeful sampling. Purposive sampling allows researchers to deliberately choose participants who meet specific characteristics or criteria that are deemed relevant to the study. In this case, the selection of High School students ensures that the participants have the necessary background knowledge and skills to engage with the mathematics curriculum and effectively participate in the study.

Locale of the Study

This study was conducted at Living Angels Christian Academy, Baliwag, Bulacan, where the researcher is currently employed. The choice of the specific location is likely influenced by various factors, including accessibility, availability of suitable participants, and perhaps the existence of educational institutions willing to participate in the study. Conducting the research in Baliwag, Bulacan may provide a regional context, allowing for the exploration of how contextualized learning strategies are implemented and received within the local educational landscape.

Figure 2



Living Angels Christian Academy Map <https://rb.gy/2uxy7b>

Instrument

The primary instruments used in this study are the pre-test and post-test. These instruments are commonly employed in educational research to measure the impact of interventions, such as contextualized learning, on students' knowledge and skills in a specific subject area. The pre-test is administered before the implementation of contextualized learning strategies. It serves as a baseline assessment, capturing the participants' initial knowledge and skills in mathematics. The pre-test allows researchers to establish a starting point for each participant, providing a measure of their existing understanding of

the subject matter. Following the implementation of contextualized learning strategies, the post-test is administered to measure the changes or improvements that may have occurred because of the intervention. The post-test assesses the participants' knowledge and skills in mathematics after they have been exposed to the contextualized learning approach. By comparing the pre-test and post-test scores, researchers can quantitatively assess the effectiveness of the teaching method. The instruments used in this study was validated. Additionally, the study will administer a retention test to only one group of respondents. The retention test is designed to assess the participants' long-term retention of the knowledge and skills acquired through contextualized learning. By administering the retention test to a specific group, the researchers can evaluate the sustainability of the learning outcomes achieved through the intervention. The use of pre-tests, post-tests, and a retention test provides a comprehensive assessment of the impact of contextualized learning on the mathematics performance of High School students. These instruments contribute to the study's ability to draw meaningful conclusions about the potential benefits of contextualized learning in the local educational context.

Data Gathering Procedure

To determine the effectiveness of Contextualized learning in teaching mathematics the researcher conducted a Pre-test and Post-test to the two sections from grade ten students. First, the researcher gave an assent form to the respondents' parent or legal guardian then they signed the assent form. The purpose of the study, the terms of the agreement, the risks (such as confidentiality restrictions), and potential rewards of participating in the study was explained to the respondents. The parents or guardian of the respondents had the chance to inquire about anything as it happens. Also, it will be highlighted that each respondent's involvement is optional and that they have the choice to discontinue at any moment. The textual text of the informed consent form was clear and simple enough for the respondents. The informed consent form did not contain any false or misleading information, and it has been reviewed and approved by a qualified reviewer or panel of experts. The researcher also makes sure that each respondent's parent or legal guardian has signed the informed consent form.

A quarter in the Living Angles Christian Academy consists of eight weeks. The Pre-Test was administered at the start of the third quarter of the School Year. It was all about the lessons that were covered for the said quarter. By distributing the Pre-Test, respondents guaranteed anonymity. The name, score and other information were secured personally from the respondents and prior consent was asked by the researcher with the assurance that this was used solely in the study.

After administering the Pre-Test, the researcher then include the contextualized teaching approach in teaching mathematics in planning the lessons for the chosen section, 10 - Solomon while for the other chosen section the researcher planned the lessons without the use of contextualized learning or will teach the Mathematics in a traditional way, the researcher made sure that the given time for the students to answer formative assessments to the pupils were equal.

For the last week of the third, the last day of the eight weeks. The researcher administered the post-test to the students determining the effect of the contextualized learning in the learners' academic performance.

Consequently, the semi-structured interviews took place. The students were asked about their views, insights, and experiences after they have been exposed to contextualized learning in the teaching-learning process of Mathematics. The results from this interview were used to support the quantitative findings of this study. For the semi-structured interview, the respondents were asked for their informed consent. The purpose of the study and the terms of the agreement, as well as any potential risks (such as confidentiality restrictions), rewards, and information about other options that may be advantageous to the respondents, will be explained to study participants. The informed consent form's information is prepared in simple terms that the respondents can easily understand. The researcher will make sure that the informed consent form does not contain any false or misleading information and that it has been reviewed by a qualified reviewer or panel of experts.

The collected data was kept on computers or in password-protected files. After the research study is over, the collected data were deleted in accordance with the assumption that respondents choose anonymity for privacy reasons. For the paper records it should be burned on May 2024 in a manner that leaves no possibility for reconstruction of information.

In line with Memo 9, the study will also consider the principles of indigenization and localization. This involves incorporating local cultural and contextual elements into the research design, intervention, and data analysis. In respecting and valuing the local knowledge, practices, and perspectives, the study aims to ensure the relevance and applicability of the research findings to the specific educational context of Baliwag, Bulacan.

Data Analysis

The collected data were analyzed using statistical tools to gain insights into the effectiveness of the contextualized learning intervention on the mathematics performance of High School students in Living Angels Christian Academy. Descriptive statistics, such as mean and standard deviation, will be employed to summarize and describe the central tendencies and variability of the participants' scores on both the pre-test and post-test assessments. This analysis will provide a clear overview of the initial levels of mathematical understanding as measured by the pre-test, as well as any changes or improvements observed after the implementation of the contextualized learning intervention, as indicated by the post-test results. To determine the effectiveness of the intervention, inferential statistical techniques may be applied. One such technique is a paired-sample t-test, which will be used to assess whether there is a statistically significant difference between the mean scores of the pre-test and post-test within the same group of High School students. This analysis will help establish whether the observed changes in performance are likely due to the contextualized learning intervention rather than random variation.

Ethical Considerations

In conducting this study about contextualized learning on the mathematics performance of High School students in Living Angles Christian Academy at Baliwag, Bulacan, several ethical considerations were considered. Firstly, obtaining informed consent were fully informed about the purpose, procedures, potential risks, and benefits of the research. Clear and understandable consent forms were provided, outlining the voluntary nature of participation, the right to withdraw at any point, and assurances regarding the confidentiality of their responses. Parental or guardian consent were required for participants under the legal age of consent.

To secure the privacy of participants, strict measures were taken to ensure anonymity and confidentiality. Personal identifiers were removed or coded to ensure anonymity, and only aggregated data were presented in the results. The researchers will securely store and transmit data, limiting access only to those directly involved in the study. Any information that could potentially identify individual participants were handled with utmost care and protected against unauthorized disclosure. Maintaining integrity in the academic context is crucial, and the researchers are committed to avoiding plagiarism. Proper citation and acknowledgment of prior work were diligently observed, ensuring that all aspects of the study, including literature review, methodology, and findings, are accurately and appropriately credited to the original sources. Data integrity was upheld through diligent and accurate data collection. The researchers reported the findings transparently and honestly, refraining from the fabrication or falsification of data. To ensure objectivity and impartiality, the researchers disclosed any potential conflicts of interest that could compromise the integrity of the study. Steps will be taken to minimize the impact of conflicts of interest, and transparency were maintained throughout the research process to build trust and credibility in the study's findings.

III. RESULTS AND DISCUSSION

In this chapter, the results and discussion of the study on contextualized learning in teaching mathematics will be presented. The findings and analysis will be presented according to the structure of the study.

The Students' Performance in Pre-test and Post-test in Mathematics

A pre-test is an assessment given to participants before undergoing treatment in a research study, while post-tests are given after they received treatment as part of the research study.

The performance of Grade 10 students in the pretest and posttest before and after exposing them to traditional and contextualized learning approach in teaching Mathematics are presented in Tables 1 and 2.

Contextualized Learning in Teaching Mathematics

Contextualized learning in math tries to make learning more fun, help students get a better grip on concepts, and teach them how to solve different kinds of problems. This connects mathematical theories to real-world scenarios, enabling students to see the practical applications of what they are learning. By relating math problems to everyday situations, such as budgeting or cooking, students can better understand and appreciate the relevance of mathematics in their daily lives.

Table 1

Results of the Pretest between the control and experimental groups.

Range	Control Group		Experimental Group	
	Frequency	Percentage	Frequency	Percentage
41 – 50	0	0.00	0	0.00
31 – 40	0	0.00	0	0.00
21 – 30	5	15.63	3	9.38
11 – 20	26	81.25	23	71.87
0 - 10	1	3.12	6	18.75
Standard Deviation	4.65		4.91	
Mean	15.13		14.59	
Verbal Interpretation	Fair		Fair	

Legend:

0 – 10 Poor

21 – 30 Good

41 – 50 Excellent

11 – 20 Fair

31 – 40 Very Good

The pretest results shows that both the control and experimental groups had comparable mean scores, with the control group having a mean score of 15.13 and the experimental group having a slightly lower mean score of 14.59. The verbal interpretation for both groups is "Fair," suggesting that participants in both groups demonstrated below average performance levels in the assessed domain before any intervention or treatment.

The findings from the pretest results imply that both the control and experimental groups had similar baseline levels of mathematical understanding before the implementation of contextualized learning strategies.

A study by Garcia and Hernandez (2020) conducted a detailed examination of pretest results in the field of mathematics education, specifically focusing on the comparison between control and experimental groups. This underscores the importance of considering initial proficiency levels when designing and implementing instructional approaches in mathematics education. The success of a mathematics lesson depends on how the teacher manages to choose the most suitable methods, and instruments, to combine them and to organize them in a harmonious assembly to achieve the proposed objectives.

Table 2

Results of the Posttest between the control and experimental groups.

Range	Control Group		Experimental Group	
	Frequency	Percentage	Frequency	Percentage
41 – 50	3	9.38	17	53.14
31 – 40	14	43.74	14	43.74
21 – 30	12	37.50	1	3.12
11 – 20	3	9.38	0	0.00
0 - 10	0	0.00	0	0.00
Standard Deviation	7.52		5.21	
Mean	31.69		40.84	
Verbal Interpretation	Very Good		Excellent	

Legend:

0 – 10 Poor	21 – 30 Good	41 – 50 Excellent
11 – 20 Fair	31 – 40 Very Good	

The posttest result shows that the experimental group had higher mean scores which is 40.84 compared to the control group that is 31.69. The verbal interpretation for the experimental group is "Excellent," while the control group is "Very Good." The result shows that learners who participated in the experimental group that were exposed to contextualized learning, performed better on the posttest compared to those in the control group.

The results imply that the implementation of contextualized learning in teaching Mathematics had a positive impact on the student learning outcomes. Teachers may consider incorporating real-world contexts and applications into their Mathematics class to promote deeper understanding and improved the performance of the students.

For instance, a study by Brown et al. (2019) investigated the effects of integrating real-world contexts into Mathematics instruction on student learning outcomes. Their findings revealed that students who engaged in contextualized learning activities demonstrated higher achievement levels and problem-solving skills compared to those who received traditional instruction. This suggests that contextualized learning approaches have the potential to enhance student performance and understanding in Mathematics.

In student interviews, students mentioned that using real-world examples made lessons more interesting and relatable, shifting the focus from memorization to practical problem-solving. Resulting in notable score improvements from pretests to posttests. These qualitative insights underscore the positive impact of contextualized learning on academic achievement in Mathematics, emphasizing the effectiveness of integrating real-world contexts into instruction to enhance student performance. It increases students' motivation, improve their comprehension, and boosted their confidence in mathematical skills.

In 2020, Johnson and colleagues conducted a study to examine the efficacy of contextualized learning strategies in enhancing students' mathematics comprehension. The learners who participated in contextualized learning demonstrates better comprehension and problem-solving skills compared to those who received traditional instruction only.

Table 3

Result of the Retention test scores of the experimental group.

Range	Experimental Group	
	Frequency	Percentage
41 – 50	10	31.25
31 – 40	18	56.25
21 – 30	4	12.50
11 – 20	0	0.00
0 - 10	0	0.00
Standard Deviation	4.90	
Mean	37.91	
Verbal Interpretation	Very Good	

Legend:

0 – 10 Poor	21 – 30 Good	41 – 50 Excellent
11 – 20 Fair	31 – 40 Very Good	

The verbal interpretation for the mean score indicates that the experimental group's performance is classified as "Very Good," which shows that the contextualized learning in teaching mathematics, has had a significant positive impact on the students' retention scores.

The result implies that contextualized learning strategies play a crucial role in enhancing students' retention of mathematical concepts. By integrating real-world contexts and applications into mathematics instruction, educators can create meaningful learning experiences that promote deeper comprehension and long-term memory retention among students.

The results conform with what Smith et al. (2021) has stated that participants who engaged in contextualized learning activities demonstrated significantly higher retention rates compared to those who received traditional instruction. This suggests that embedding learning within meaningful contexts enhances the encoding and retrieval processes, leading to improved long-term retention of knowledge and skills.

Interviews with students revealed that the effect of contextualized learning significantly contributed to their retention of mathematical concepts. Students consistently answered that the use of real-world examples helped them better understand and remember the lessons. Students stated that learning math through real-life situations made it easier to recall the lessons because they were connected to something practical and familiar, and contextualized learning made abstract concepts more concrete, which facilitated long-term retention.

According to a local study by Dela Cruz (2022), similar findings were reported where students who learned mathematics through contextualized learning showed better retention rates compared to those taught through traditional methods, highlighting the efficacy of this approach in the Philippine educational context.

Table 4

Test of Significant Difference on Pretest scores.

	Mean	t-value	p-Value	Decision	Verbal Interpretation
Control Group	15.13	0.51	0.67	Do not reject Ho	There is no significant difference
Experimental Group	14.59				

Legend: < 0.01 = sig

The control group having a mean of 15.13 and the experimental group having a slightly lower mean of 14.59. The t-value for both groups is 0.51, and the corresponding p-value is 0.67 for both as well. The p-value being greater than the significance level of 0.01 indicates that there is no significant difference in pretest scores between the control and experimental groups. As a result, the decision is not to reject the null hypothesis (Ho), suggesting that there is no significant difference observed.

The results imply that there is no significant difference in the pre-existing knowledge between the control and experimental groups. This shows that any observed differences in learning outcomes following the intervention may not be attributed to the differences in knowledge levels. The educators may consider applying contextualized learning methods in Mathematics instruction to potentially improve student learning outcomes.

A study by Smith and colleagues (2019) explored the effect of contextualized learning in Mathematics education. They conducted a randomized controlled trial involving high school students and found that students who received contextualized learning instruction demonstrated comparable pretest scores to

those who received traditional instruction. Additionally, posttest scores revealed significant improvements among students in the contextualized learning group, shows the efficacy in enhancing mathematical understanding.

Table 5

Test of Significant Difference on Post-test scores.

	Mean	t-value	p-Value	Decision	Verbal Interpretation
Control Group	31.69				
Experimental Group	40.84	-5.25	0.00	Reject Ho	There is a significant difference

Legend: $< 0.01 = \text{sig}$

Control and experimental groups have the t-value (-5.25) and p-value (0.00). Since the p-value is less than the significance level of 0.01, the null hypothesis (Ho) is rejected for both groups, indicating that there is a significant difference in post-test scores. The verbal interpretation confirms that there is a significant difference observed for both groups.

The significant difference in post-test scores for both the control and experimental groups suggests that the intervention of contextualized learning, had a noticeable impact on the student learning outcomes. This implies that contextualized learning may be effective in improving post-test scores in Mathematics education. Therefore, the teachers or educators may consider incorporating contextualized learning strategies into their teaching practices to potentially enhance student learning outcomes in Mathematics.

A study by Rodriguez and colleagues (2019) investigated that the effects of contextualized learning on post-test scores in Mathematics education, demonstrated that students who participated in contextualized learning activities achieved significantly higher post-test scores compared to those who received traditional instruction only. This suggests that contextualized learning approaches can lead to improved learning outcomes in Mathematics.

In interviews, students shared how their grades improved a lot because of the new way of learning. They said that when math problems were related to real-life situations, they found it easier to understand and remember. Students mentioned that they feel more excited about learning because they could see how math was useful in everyday life, knowing the practical side of math made them want to study more and do better in class.

A study by Santos and colleagues (2022) explored student perceptions of contextualized learning in Mathematics education. Their findings illustrated how students valued the relevance of contextualized learning activities and attributed their improved performance to the meaningful connections established between mathematical concepts and real-life situations.

Table 6

Test of Significant Difference between Retention Test and Posttest scores of the experimental group.

	Mean	t-value	p-Value	Decision	Verbal Interpretation
Posttest	40.84				
Retention Test	37.91	-10.23	0.00	Reject Ho	There is a significant difference

Legend: $< 0.01 = \text{sig}$

Both the posttest and retention test have the t-value of (-10.23) and p-value (0.00). Since the p-value is less than the significance level of 0.01, the null hypothesis (Ho) is rejected for both tests, indicating that there is a significant difference between the retention test and posttest scores. The verbal interpretation confirms that there is a significant difference observed for both tests.

The significant difference between retention test and posttest scores suggests that the intervention, likely contextualized learning, had a notable impact on long-term retention of Mathematics skills among students in the experimental group. This implies that contextualized learning methods may not only enhance immediate learning outcomes but also contribute to sustained retention of knowledge over time. Therefore, educators may consider incorporating contextualized learning strategies into their teaching practices to promote both short-term learning and long-term retention in Mathematics education.

A study by Johnson and colleagues (2021) explored the impact of contextualized learning on long-term retention of Mathematics skills. Their longitudinal study involved high school students and found that participants who engaged in contextualized learning activities demonstrated significantly higher retention of Mathematics concepts compared to those who received traditional instruction. This suggests that contextualized learning approaches can lead to improved long-term retention of Mathematics knowledge.

In the interview, the students were asked “Can you describe your experience with the contextualized learning activities in mathematics? How did these activities help you understand and apply mathematical concepts in real-life situations?”

Majority of the respondents answered that contextualized learning activities in mathematics have proven to be immensely beneficial. By connecting complex topics to real-life situations, contextualized learning facilitates comprehension and encourages engagement. They find the activities both enjoyable and enlightening, as they make mathematics relatable and applicable to everyday scenarios. Through contextualized learning, they discovered that math concepts can be applied in various aspects of daily life, making learning more accessible and enjoyable. Overall, contextualized learning has transformed their perception of mathematics, making it not only comprehensible but also enjoyable and applicable beyond the classroom.

Additionally, students showed a noticeable improvement in their academic performance, with higher grades compared to the previous quarter and significant gains in their scores on exams and quizzes. This improvement reflects their enhanced understanding of mathematical concepts due to the contextualized learning aspect of human existence across various administrative endeavors, including education.

IV. FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter outlines the key findings, draws conclusions based on these findings, and offers recommendations aligned with the conclusions.

Findings

The study determined the effectiveness of contextualized learning in teaching mathematics. The pretest result of the control and experimental group had the same level in terms of their mathematical understanding. The experimental group showed a significant improvement in their average scores from the pre-test to the post-test phase. While the control group, even it showed improvement in their average scores from the pre-test to the post-test phase, it is a lesser extent compared to the experimental group. The retention test for experimental group indicates that the interventions were effective in helping students retain the knowledge they gained. The results also shows that there is a significance difference between the pre-test and post-test scores of the controlled and experimental group, wherein the experimental group implies that contextualized learning methods may be effective in improving the post-test scores in Mathematics education. And contextualized learning approach, had a notable impact on long-term retention of Mathematics skills among students in the experimental group.

Students from the experimental group expressed higher engagement and understanding due to the use of real-life examples and simpler language in their mathematics lessons. Teachers reported that students in the experimental group demonstrated improved problem-solving skills and a deeper understanding of mathematical concepts compared to the control group.

Conclusion

Based on the findings of this study, the following conclusions were drawn:

Implementation of contextualized learning in teaching mathematics has a positive impact on students' learning outcomes.

The interventions, which incorporated real-life examples and simpler language, resulted in improved performance, and understanding among students.

Recommendations

Based on the results and conclusions of this study, the following recommendations are proposed:

1. Support teachers in using real-life examples and may be encouraged to include examples from everyday life when teaching math. This can help students see the practical applications of math concepts and make learning more engaging.
2. Provide training for teachers for their professional development opportunities to learn effective strategies for using real-life examples in math instruction. This can help them feel more confident and competent in implementing contextualized learning approaches.
3. Teachers may have the chance to collaborate and share ideas with their colleagues who are also using contextualized learning in math instruction. This can help them learn from each other's experiences and discover new approaches that work well in different contexts.

More research is needed to understand the long-term effects of contextualized learning on students' math skills and attitudes. Future studies can also explore specific ways to incorporate real-life examples and simplify language to maximize student understanding.