

The Effect of using Real-Life Examples on Students' Comprehension of Basic Math Concepts

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Abstract. This study investigated the effect of using real-life examples on the understanding of basic mathematical concepts among Grade 9 students at Wenceslao Trinidad Memorial National High School during the 2025–2026 academic year. It specifically compared students' comprehension under traditional teaching methods and instruction integrating real-life examples, focusing on knowledge retention, conceptual application, and problem-solving skills. Employing a quantitative research design, data were collected through a structured questionnaire and analyzed using weighted mean and comparative analysis. Findings revealed that students taught through traditional methods demonstrated lower understanding due to the abstract nature of instruction and minimal connection to everyday contexts. Conversely, students exposed to real-life examples exhibited higher comprehension, as they could relate mathematical concepts to practical situations. Improvements were also noted in information retention, application of concepts, and problem-solving abilities. Statistical analysis confirmed a significant difference between the two teaching approaches, highlighting the effectiveness of contextualized instruction. The study recommends that teachers adopt strategies incorporating real-life applications, provide continuous assessment, and contextualize lessons to enhance learning outcomes. Overall, integrating real-life examples proves to be an effective method for making mathematics more meaningful, engaging, and relevant to students, thereby improving their overall understanding and performance in the subject.

Keywords: Real-life Examples; Mathematical Concepts; Problem-solving skills; Traditional teaching methods; and Contextualized Instructions; Application Concepts

Introduction

Mathematics has long been recognized as a fundamental component of education and human development. It plays a significant role in enhancing critical thinking, logical reasoning, and problem-solving skills among learners. Beyond computation, mathematics enables individuals to analyze situations, make sound decisions, and apply knowledge in real-life contexts. In the 21st century, mathematics education emphasizes not only procedural fluency but also conceptual understanding and practical application, making it essential in preparing learners for academic success, professional careers, and everyday life. Despite the importance of mathematics, many learners continue to experience difficulties in understanding and applying basic mathematical concepts. International reports such as the Programme for International Student Assessment (PISA) 2022 reveal that a significant number of students struggle to connect mathematical concepts to real-life situations and practical problem-solving tasks. According to the Organisation for Economic Co-operation and Development (OECD), students often perceive mathematics as abstract, difficult, and disconnected from their daily experiences, resulting in low engagement and poor comprehension.

Recent global educational disruptions have further intensified learning gaps, particularly in foundational numeracy skills. The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasized the need for learner-centered, contextualized, and engaging instructional approaches as part of educational recovery efforts. Similarly, the World Bank (2020) highlighted that strengthening learners' basic numeracy skills is essential for lifelong learning and meaningful participation in economic and social activities. These findings suggest that mathematics instruction must become more relevant and meaningful to learners in order to improve understanding and retention of concepts. One effective approach in mathematics instruction is the integration of real-life examples in teaching mathematical concepts. Contextualized instruction allows students to relate mathematical principles to familiar experiences such as

budgeting expenses, measuring ingredients, interpreting graphs, computing distances, and solving everyday problems. Through this approach, students are able to visualize abstract concepts more clearly and recognize the practical value of mathematics in daily life. Research has shown that contextual teaching promotes active engagement, improves conceptual understanding, and enhances students' ability to apply mathematical knowledge in various situations.

In the Philippine educational system, the Department of Education (DepEd) strongly supports the contextualization and localization of instruction under the K–12 Curriculum. Teachers are encouraged to develop learning materials and teaching strategies that reflect learners' real-life experiences and community contexts. This learner-centered approach aims to make learning more meaningful and effective. Furthermore, studies by the OECD (2022) and the World Bank (2020) indicate that exposure to real-world mathematical problem-solving activities improves learners' analytical thinking, interpretation skills, and knowledge retention. Moreover, the use of real-life examples in mathematics instruction contributes to the development of students' confidence and positive attitudes toward mathematics. When learners solve problems connected to their personal experiences, they develop a sense of competence and self-efficacy, which may reduce mathematics anxiety and increase motivation to learn. As a result, mathematics becomes more understandable, engaging, and relevant rather than merely theoretical and procedural.

However, despite these educational reforms and recommendations, many classrooms still rely heavily on traditional teaching methods that focus primarily on memorization, drills, and textbook-based exercises with limited real-life application. While students may become proficient in performing mathematical procedures, they may still struggle to understand concepts deeply and apply their knowledge to unfamiliar or practical situations. This instructional gap may negatively affect students' comprehension, retention, and problem-solving performance in mathematics. Although previous studies have explored mathematics teaching strategies and problem-solving skills, there remains limited research focusing specifically on the impact of using real-life examples on students' understanding of simple mathematical concepts. In particular, there is a need to examine how contextualized instruction influences students' knowledge retention, conceptual application, and problem-solving skills compared to conventional teaching methods.

Given this gap, this study aims to determine the impact of using real-life examples on students' comprehension of simple mathematical concepts. Specifically, the study seeks to compare students taught through conventional teaching methods and those taught using real-life examples in terms of knowledge retention, conceptual understanding, and problem-solving skills. The findings of this study may provide valuable insights for mathematics teachers, school administrators, and curriculum planners in improving instructional practices and creating a more meaningful and engaging mathematics learning experience for students.

Research Questions

This study aims to determine the effect of using real-life examples on students' understanding of basic math concepts. To guide the investigation, the study seeks to answer the following specific questions:

1. What is the level of understanding of basic math concepts of the students when exposed to:
 - 1.1 Traditional teaching methods without real-life examples; and
 - 1.2 Teaching methods integrated with real-life example?
2. What is the extent of the effect of using real-life examples on the students' understanding in terms of:
 - 2.1 Knowledge retention,
 - 2.2 Conceptual application; and
 - 2.3 Problem-solving ability?
3. Is there a significant relationship in the students' understanding of basic math concepts between those exposed to traditional teaching methods and those taught using real-life examples?
4. Based on the findings of the study, what instructional guidelines or learning materials can be developed to effectively integrate real-life examples in teaching basic math concepts?

Scope and Delimitation of the Study

This study investigates the effect of using real-life examples on students' understanding of basic mathematical concepts among Grade 9 students at Wenceslao Trinidad National High School during the Academic Year 2025–2026. Specifically, the study compares the Traditional Teaching Method and the Teaching Method Using Real-Life Examples in terms of their influence on students' knowledge retention, conceptual application, and problem-solving ability. The study also aims to determine whether contextualized instruction enhances students' mathematical understanding and serves as a basis for developing instructional guidelines and contextualized learning materials in mathematics. The study is limited to selected Grade 9 students enrolled at Wenceslao Trinidad National High School during the Academic Year 2025–2026. Data

are gathered using structured assessment instruments designed to measure students' understanding of basic mathematical concepts in terms of knowledge retention, conceptual application, and problem-solving ability. The study focuses only on selected topics in the Grade 9 mathematics curriculum, including algebraic expressions, percentages, ratios, and contextualized problem-solving activities. The findings of the study are limited to the selected participants and may not be generalized to other grade levels, schools, or educational settings. External factors such as students' prior academic performance, socio-economic status, teacher effectiveness, classroom environment, learning styles, parental involvement, and mathematics anxiety are excluded from the study. Furthermore, the study is limited to the duration of the instructional intervention conducted within the academic term and does not examine long-term retention or sustained effects of the teaching strategies.

Literature Review

Use of Real-Life Examples in Mathematics Instruction

The integration of real-life examples in mathematics instruction has been widely recognized as an effective teaching strategy that enhances students' understanding of mathematical concepts. Mathematics learning becomes more meaningful when learners can connect abstract ideas with practical experiences encountered in their daily lives. According to Boaler (2016), mathematics instruction should move beyond traditional methods that focus heavily on memorization and repetitive drills. The author emphasized that students often struggle in mathematics because they fail to recognize the relevance of mathematical concepts in real-world situations. When teachers incorporate real-life examples into classroom instruction, students are able to understand the practical value of mathematics and apply concepts more effectively in solving everyday problems. Research further indicates that contextualized mathematics instruction promotes deeper conceptual understanding and positive attitudes toward learning. Schoenfeld (2016) explained that teaching mathematics through real-life problem-solving activities strengthens students' reasoning and analytical skills. Traditional teaching methods often emphasize procedural knowledge, where students memorize formulas and follow fixed steps without fully understanding the concepts behind them. In contrast, contextualized instruction encourages learners to analyze situations, interpret information, and apply mathematical reasoning meaningfully. Through exposure to real-life examples, students become more engaged in the learning process and develop greater confidence in solving mathematical problems.

Conceptual Understanding in Mathematics

Conceptual understanding refers to students' ability to comprehend mathematical ideas, recognize relationships among concepts, and apply knowledge in different situations. According to Kilpatrick, Swafford, and Findell (2016), conceptual understanding is one of the essential components of mathematical proficiency. Students develop conceptual understanding when they engage in meaningful learning experiences that allow them to explore mathematical concepts deeply rather than relying solely on memorization. Real-life examples provide concrete representations of abstract mathematical ideas, helping students visualize and better understand mathematical relationships. Similarly, Rittle-Johnson, Schneider, and Star (2017) emphasized that students with strong conceptual understanding are more likely to retain mathematical knowledge and apply it successfully in unfamiliar situations. Contextualized learning experiences allow students to establish connections between prior knowledge and new mathematical concepts. The National Council of Teachers of Mathematics (NCTM, 2018) also stressed that mathematics instruction should focus not only on procedural fluency but also on developing students' ability to apply mathematical knowledge in meaningful contexts. Through real-life examples, students become capable of interpreting, analyzing, and solving practical mathematical problems more effectively.

Knowledge Retention

Knowledge retention refers to students' ability to remember and recall mathematical concepts over time. Research suggests that students retain information more effectively when learning experiences are meaningful and connected to real-life situations. According to Rittle-Johnson et al. (2017), conceptual understanding significantly contributes to long-term retention of mathematical knowledge. When students understand the meaning behind mathematical procedures, they are more likely to remember and apply concepts correctly in future learning situations. In addition, Gravemeijer and Doorman (2019) introduced the concept of Realistic Mathematics Education (RME), which emphasizes learning mathematics through meaningful real-world contexts. The authors explained that students develop stronger retention when mathematical concepts are introduced using familiar situations that learners can easily relate to. Real-life examples help students organize information meaningfully, making concepts easier to recall and apply.

Similarly, Garcia (2021) found that students exposed to contextualized mathematics instruction demonstrated better retention of mathematical concepts compared to those taught through traditional lecture-based approaches.

Conceptual Application

Conceptual application refers to students' ability to use mathematical concepts and principles appropriately in solving contextualized and unfamiliar problems. According to the Organisation for Economic Co-operation and Development (OECD, 2019), mathematical literacy involves the capacity to formulate, apply, and interpret mathematics in various real-life situations. This requires students to understand not only mathematical procedures but also the situations in which these procedures can be applied effectively. Van den Heuvel-Panhuizen and Drijvers (2020) emphasized that contextual learning approaches improve students' ability to apply mathematical ideas by connecting abstract concepts with practical experiences. When mathematical concepts are taught using real-life examples, students are able to recognize relationships between classroom lessons and real-world situations. Likewise, Reyes (2022) explained that real-life examples provide concrete representations that help students understand how mathematical concepts function in practical contexts. Through contextualized learning, students become more capable of transferring mathematical knowledge to different situations and solving problems independently.

Problem-Solving Ability

Problem-solving ability refers to students' capacity to analyze situations, identify appropriate mathematical strategies, and generate accurate solutions to contextualized problems. Mathematics education increasingly emphasizes problem-solving as an essential skill necessary for academic achievement and everyday decision-making. According to Schoenfeld (2016), effective mathematics instruction should engage students in solving meaningful real-life problems to develop reasoning and analytical skills. Through contextualized problem-solving activities, students learn how to interpret information, evaluate possible solutions, and apply mathematical reasoning systematically. Similarly, Stacey (2021) explained that contextualized mathematics instruction enhances students' reasoning and analytical thinking because learners are encouraged to apply mathematical concepts in practical situations. Real-life examples require students to analyze information critically and determine appropriate mathematical procedures to solve problems. Orbe and Espinosa (2020) also emphasized that contextualized learning approaches promote higher-order thinking skills, collaboration, and active participation among learners. These experiences help students become more confident and effective problem solvers.

Contextualized Mathematics Instruction in the Philippine Setting

In the Philippine educational system, contextualization is strongly promoted under the K to 12 Curriculum Framework. The Department of Education (DepEd, 2016) emphasized that learning becomes more meaningful when lessons are connected to learners' experiences, culture, and environment. In mathematics instruction, contextualization involves presenting concepts through practical situations that students encounter in their daily lives, such as budgeting, shopping, measuring, and interpreting data. This approach allows learners to appreciate the relevance of mathematics and develop stronger conceptual understanding. Several local studies support the effectiveness of contextualized instruction in mathematics education. Bernardo (2017) explained that contextualized learning strategies improve students' comprehension by connecting mathematical concepts to familiar experiences. Magno (2018) further emphasized that real-life examples increase students' motivation and engagement because learners recognize the usefulness of mathematics in daily activities. Similarly, Balagtas, Garcia, and Ngo (2019) found that contextualized teaching strategies make abstract mathematical concepts more understandable and accessible to Filipino learners. Research conducted by Tan (2020) revealed that contextualized mathematics instruction improves students' conceptual understanding and problem-solving abilities. The author explained that students become more confident in solving problems when they are exposed to practical mathematical situations. Likewise, Santos (2021) highlighted that contextualized instruction promotes meaningful learning experiences by allowing students to connect classroom lessons with real-world situations. Cruz (2023) also emphasized that integrating real-life examples into mathematics lessons enhances students' engagement, comprehension, and positive attitudes toward mathematics. The reviewed literature indicates that the integration of real-life examples in mathematics instruction contributes significantly to students' understanding of mathematical concepts. Previous studies consistently revealed that contextualized learning improves knowledge retention, conceptual application, problem-solving ability, motivation, and mathematical reasoning. Although several studies have examined contextualized instruction and mathematics learning, limited research specifically focuses on the effect of using real-life examples on students' understanding of basic mathematical concepts among Grade 9 students. Therefore, the present study aims to address this gap by examining the effect of real-life examples on

students' knowledge retention, conceptual application, and problem-solving ability in mathematics instruction.

Methodology

Research Design

This study employed a descriptive quantitative research design to examine the effect of using real-life examples on students' understanding of basic mathematical concepts among Grade 9 students at Wenceslao Trinidad National High School. This research design was chosen because it enables the researchers to describe students' level of understanding and determine the extent of the effect of contextualized instruction using real-life examples on their mathematical learning outcomes. Descriptive quantitative research focuses on the collection, organization, analysis, and interpretation of numerical data to identify patterns, relationships, and differences among variables within a specific population. In this study, the researchers gathered information regarding students' understanding of basic mathematical concepts when exposed to traditional teaching methods and teaching methods integrated with real-life examples. The study specifically examined students' knowledge retention, conceptual application, and problem-solving ability to determine whether the use of real-life examples significantly influenced their understanding of mathematics. The findings provide insights into how contextualized instruction may improve students' comprehension and application of mathematical concepts in practical situations. The primary objective of this study was to measure students' level of understanding and assess the effect of using real-life examples in mathematics instruction without manipulating other external variables. According to Creswell and Creswell (2018), descriptive quantitative research is appropriate when the purpose of the study is to collect measurable data that can be analyzed statistically to describe characteristics, determine relationships, and evaluate differences among variables within a population. In this study, students' understanding of basic mathematical concepts was measured using structured questionnaires and assessment tests designed to evaluate knowledge retention, conceptual application, and problem-solving ability. The data gathered were analyzed using appropriate statistical tools to determine the effectiveness of integrating real-life examples in mathematics instruction.

Sampling Design

The study was conducted among Grade 9 students of Wenceslao Trinidad Memorial National High School, with a total population of two hundred forty-four (244) students enrolled in seven (7) sections namely Diamond, Sapphire, Pearl, Onyx, Aquamarine, Quartz, and Garnet during the School Year 2025–2026. Using Slovin's formula with a 95% confidence level and 5% margin of error, a sample size of one hundred fifty-two (152) respondents was obtained. The formula used was $n = N / (1 + Ne^2)$, where N represents the total population and e represents the margin of error. The researchers employed a probability sampling method, specifically stratified random sampling, to ensure proper representation from each Grade 9 section. The respondents were proportionally selected from the seven sections to ensure that the data gathered reflected the characteristics of the entire Grade 9 population. The selected respondents participated in the study by answering validated questionnaires and assessment tests designed to measure students' understanding of basic mathematical concepts in terms of knowledge retention, conceptual application, and problem-solving ability. Grade 9 students were chosen as respondents because they are at a critical stage of mathematical learning where basic mathematical concepts are strengthened and applied to more complex situations. At this level, students are expected to develop deeper conceptual understanding and improve their ability to apply mathematical knowledge to real-life situations. This makes them appropriate participants for assessing the effect of using real-life examples in mathematics instruction. To ensure privacy and confidentiality, personal information of the respondents was not collected, in accordance with Republic Act No. 10173 or the Data Privacy Act of 2012. Participation in the study was voluntary, and all gathered data were treated with strict confidentiality and used solely for research purposes.

Research Locale

This study was conducted at Wenceslao Trinidad Memorial National High School located at E. Caray Street, Poblacion 1, Laurel, Batangas. The school was selected as the research locale because it has a sufficient population of Grade 9 students appropriate for examining the effect of using real-life examples on students' understanding of basic mathematical concepts. The study focused on Grade 9 students from the seven (7) sections namely Diamond, Sapphire, Pearl, Onyx, Aquamarine, Quartz, and Garnet during the School Year 2025–2026. The school provides a relevant educational setting where students are exposed to mathematics instruction involving both traditional teaching methods and contextualized learning activities. The diversity of learners in terms of mathematical ability, learning styles, and academic performance made the school an appropriate setting for assessing students' knowledge retention, conceptual application, and problem-solving

ability. Furthermore, the accessibility of the school and the cooperation of school administrators, teachers, and students contributed to the successful conduct of the study. The researchers' familiarity with the school environment also facilitated smooth coordination and efficient data collection throughout the research process.

Research Participants

This study included Grade 9 students from Wenceslao Trinidad Memorial National High School as the respondents. The total population consisted of two hundred forty-four (244) students from Grade 9. Using Slovin's formula with a 95% confidence level and 5% margin of error, a total of one hundred fifty-two (152) respondents were selected through stratified random sampling. Specifically, Grade 9-Aquamarine had (18) respondents out of 33 students, Grade 9-Diamond had (25) respondents out of 36, Grade 9-Garnet had (27) respondents out of 35, Grade 9-Pearl had (19) respondents out of 35, Grade 9-Sapphire had (18) respondents out of 34 students, Grade 9-Onyx had (21) respondents out of 36 and Grade 9-Quartz had (25) respondents out of 35. The selected participants represented all grade 9 included in the study.

Research Instrument

The primary instrument used in this study was a researcher-made survey questionnaire designed for Grade 9 students from Wenceslao Trinidad Memorial National High School. The questionnaire consisted of forty (25) items divided into two parts: understanding basic math concepts, traditional teaching method (without real-life examples) and teaching with real-life examples and conceptual application and problem-solving ability. The items measured the students' capacity to apply mathematical concepts in real-life situations, relate lessons to everyday experiences, solve word problems, and use appropriate strategies in solving mathematical problems. A four-point Likert Scale was used to measure respondents' answers and determine their level of understanding basic math concepts and using real life examples. The questionnaire was administered with strict observance of confidentiality and ethical considerations in accordance with Republic Act No. 10173, or the Data Privacy Act of 2012, to ensure that respondents' information and responses remained protected and were used solely for research purposes.

Data Gathering Procedure

The data gathering procedure was carefully planned to ensure that the study was conducted in an organized and ethical manner. First, the researchers prepared and finalized the research proposal. After it was approved by the adviser, a formal letter was submitted to the principal of Wenceslao Memorial Trinidad National High School to ask permission to conduct the study. The letter explained the purpose of the research and stated that the data will be used only for academic purposes. After the approval was granted, the researchers coordinated with the Grade 9 Mathematics teacher regarding the schedule of the questionnaire distribution. The selected section was informed ahead of time so that it will not disturb the regular class discussion. Before giving the questionnaire, the researchers explained first the purpose and objectives of the study to the students. The instructions on how to answer the questionnaire were clearly discussed so they could understand it properly. The students were encouraged to answer honestly and based on their real experience. The questionnaires were personally distributed by the researchers to ensure that all respondents received a copy. The students were given enough time to answer the questions without pressure. After they finished answering, the questionnaires were immediately collected to avoid missing responses. After collecting all the data, the responses were checked, tallied, and encoded in a spreadsheet. The data were then analyzed and interpreted using appropriate statistical tools such as frequency, percentage, weighted mean, and Pearson Product-Moment Correlation Coefficient. The process is confidential. The researchers made sure that all the information gathered remains private and will only be used for research purposes.

Results and Discussions

Research Question 1: What is the level of understanding of basic math concepts of the students when exposed to Traditional teaching methods without real-life examples, and Teaching methods integrated with real-life example?

Table 1. The level of understanding of basic math concepts of the students when exposed to traditional teaching methods without real-life examples

Statements The student...	Mean	Verbal Description	Interpretation
1. My teacher explains math lessons mostly using formulas and textbook examples only	3.84	Strongly Agree	Strongly Agree
2. I easily forget math lessons taught without real-life applications.	3.72	Strongly Agree	Strongly Agree
3. I feel less motivated in math class when lessons are purely theoretical.	3.60	Strongly Agree	Strongly Agree
4. I find it difficult to understand math lessons when no real-life examples are given	3.54	Strongly Agree	Strongly Agree
5. Math lessons are taught without connecting them to real life situations.	3.50	Strongly Agree	Strongly Agree
Over-all Mean	3.64	Strongly Agree	Strongly Agree

Table 1 reveals the level of understanding of basic math concepts of the students when exposed to traditional teaching methods without real-life examples. Among the indicators evaluated, the three highest in terms of weighted mean are the following: “*My teacher explains math lessons mostly using formulas and textbook examples only*” obtained the highest weighted mean of 3.84, which falls under the “Strongly Agree” category. This indicates that students commonly experience lessons delivered in a purely theoretical manner, relying heavily on formulas and textbook-based examples. This is followed by “*I easily forget math lessons taught without real-life applications*” with a weighted mean of 3.72, also interpreted as “Strongly Agree.” This implies that the absence of real-life connections may affect students’ retention and long term understanding of mathematical concepts. Meanwhile, “*I feel less motivated in math class when lessons are purely theoretical*” ranked third with a weighted mean of 3.60, likewise described as “Strongly Agree.” This suggests that students’ motivation decreases when lessons lack practical or relatable applications. Overall, the composite mean of 3.64, interpreted as “Strongly Agree,” reveals that students generally perceive traditional teaching methods without real-life examples as less engaging, harder to retain, and less effective in fostering deep understanding of basic mathematical concepts. In connection, Boaler (2016) emphasized that mathematics instruction becomes more effective when concepts are linked to real-life situations rather than being taught through memorization and repetitive exercises alone. The author explained that students often struggle to understand mathematics because they fail to see its relevance to their daily experiences. By integrating real-life examples into lessons, learners are able to connect abstract ideas to practical applications, which enhances their conceptual understanding and problem-solving abilities. Moreover, this approach helps develop students’ confidence and positive attitudes toward mathematics, as they begin to recognize its usefulness in everyday situations

Table 2. The level of understanding of basic math concepts of the students when exposed to teaching methods integrated with real-life examples

Statements The student...	Mean	Verbal Description	Interpretation
1. Real-life examples help me understand math concepts better.	3.75	Strongly Agree	Strongly Agree
2. I can easily relate math lessons to my personal experiences.	3.60	Strongly Agree	Strongly Agree
3. I become more interested in math lessons when they are connected to daily life.	3.59	Strongly Agree	Strongly Agree
4. My teacher uses real-life situations (e.g., shopping, budgeting, measuring) in teaching math.	3.56	Strongly Agree	Strongly Agree
5. I feel more confident in math when real-life examples are used.	3.50	Strongly Agree	Strongly Agree
Over-all Mean	3.60	Strongly Agree	Strongly Agree

Table 2 outlines the level of understanding of basic math concepts of the students when exposed to Teaching methods integrated with real-life examples. Firstly, the indicator “*Real-life examples help me understand math concepts better*” obtained the highest weighted mean of 3.75, which falls under the “Strongly Agree” category. This indicates that students clearly recognize the effectiveness of using real-life examples in improving their comprehension of mathematical concepts. Secondly, “*I can easily relate math lessons to my*

personal experiences" with a weighted mean of 3.60, also interpreted as "Strongly Agree." This suggests that connecting lessons to students' daily experiences makes learning more meaningful and easier to understand. Third, *"I become more interested in math lessons when they are connected to daily life"* ranked third with a weighted mean of 3.59, likewise described as "Strongly Agree." This implies that integrating real-life contexts in teaching significantly increases students' interest and engagement in mathematics. Overall, the composite mean of 3.60, interpreted as "Strongly Agree," reveals that students strongly perceive teaching methods integrated with real-life examples as effective in enhancing understanding, increasing interest, and building confidence in learning basic mathematical concepts. The results indicated that students positively responded to the use of real-life examples as an effective approach in learning mathematics. The indicators with the highest mean scores suggest that students found lessons more understandable and meaningful when concepts were connected to their personal experiences and daily activities. Moreover, the use of contextualized teaching strategies not only increased students' interest but also boosted their confidence in solving mathematical problems, thereby contributing to improved understanding and overall learning outcomes. Moreover, according to Magno (2018), contextualized mathematics instruction plays a significant role in increasing students' motivation and engagement in learning. The author explained that when mathematical concepts are presented through real-life situations, students begin to recognize the relevance of the subject in their everyday lives. This approach encourages active participation, as learners become more interested in exploring and solving practical problems. This highlights the importance of creating an interactive and learner-centered classroom environment that supports students' active involvement and improves their overall academic performance.

Table 3. Summary of the Level of Students' Difficulties in Applying Mathematical Knowledge to Practical Problem-Solving Situations

Indicators	Mean	Interpretation
Teaching Methods without real-life examples	3.64	Strongly Agree
Teaching Methods with real-life examples	3.60	Strongly Agree
Over-All Mean	3.62	Strongly Agree

Table 3 summarizes the level of students' understanding of basic mathematical concepts when exposed to different teaching methods, specifically teaching methods without real-life examples and teaching methods integrated with real-life examples. The table shows that both indicators obtained interpretations of "Strongly Agree," with an overall mean of 3.62. This indicates that students strongly perceive that teaching approaches greatly influence their understanding, engagement, and retention of mathematical concepts. Among the indicators, teaching methods without real-life examples obtained the highest mean of 3.64, followed closely by teaching methods with real-life examples with a mean of 3.60, both interpreted as "Strongly Agree." The higher mean for traditional teaching methods without real-life examples suggests that students strongly recognize the challenges they experience when mathematics is taught purely through formulas, textbook discussions, and theoretical explanations. Students tend to forget lessons easily, lose motivation, and struggle to understand concepts when learning is not connected to practical situations. On the other hand, the results also reveal that students strongly agree that teaching methods integrated with real-life examples improve their understanding of mathematics. The use of contextualized examples allows students to relate mathematical concepts to their personal experiences and daily activities, making lessons more meaningful, engaging, and easier to comprehend. Furthermore, integrating real-life applications helps increase students' interest, confidence, and participation in mathematics classes. Overall, the findings imply that students learn mathematics more effectively when lessons are connected to real-life contexts rather than presented in a purely theoretical manner. The results highlight the importance of contextualized and learner-centered teaching approaches in improving students' conceptual understanding and motivation in mathematics. With the continued use of practical examples, interactive activities, and real-world applications, students may develop better retention, deeper understanding, and greater confidence in applying mathematical concepts to everyday situations. These findings support the ideas of Boaler (2016), who emphasized that mathematics becomes more meaningful and understandable when linked to real-life experiences instead of relying solely on memorization and repetitive exercises. Similarly, Magno (2018) explained that contextualized mathematics instruction enhances students' motivation, engagement, and active participation because learners are able to recognize the relevance of mathematics in their daily lives. Such approaches contribute to improved learning outcomes and a more positive attitude toward mathematics.

Research Question 2: What is the extent of the effect of using real-life examples on the students' understanding in terms of Knowledge retention, Conceptual application, and Problem-solving ability?

Table 4. The extent of the effect of using real-life examples on the students' understanding in terms of knowledge retention

Statements The student...	Mean	Verbal Description	Interpretation
1. I can explain previously learned math lessons clearly.	3.82	Strongly Agree	Strongly Agree
2. I can recall formulas and procedures during quizzes and exams.	3.70	Strongly Agree	Strongly Agree
3. I understand math concepts even after several days of discussion.	3.62	Strongly Agree	Strongly Agree
4. I remember math lessons longer when real-life examples are used	3.54	Strongly Agree	Strongly Agree
5. I do not easily forget math concepts that are connected to real-life situations	3.53	Strongly Agree	Strongly Agree
Over-all Mean	3.64	Strongly Agree	Strongly Agree

Table 4 provides the insight into the extent of the effect of using real-life examples on the students' understanding in terms of knowledge retention. "*I can explain previously learned math lessons clearly*" obtained the highest weighted mean of 3.82, which falls under the "Strongly Agree" category. This indicates that students are able to clearly express and articulate mathematical concepts when real life examples are integrated into instruction. "*I can recall formulas and procedures during quizzes and exams*" with a weighted mean of 3.70, also interpreted as "Strongly Agree." This suggests that the use of real life examples strengthens students' memory and ability to retrieve important mathematical information during assessments. "*I understand math concepts even after several days of discussion*" ranked third with a weighted mean of 3.62, likewise described as "Strongly Agree." This implies that contextualized instruction contributes to longer retention and deeper understanding of mathematical concepts over time. Overall, the composite mean of 3.64, interpreted as "Strongly Agree," reveals that the use of real-life examples has a strong positive effect on students' knowledge retention. It enhances their ability to recall, explain, and retain mathematical concepts for a longer period. The results indicated that students benefited from learning experiences that allowed them to actively demonstrate and retain their understanding of mathematical concepts through meaningful and relatable contexts. The high mean scores suggest that the use of real-life examples enabled students to better recall information, explain ideas clearly, and maintain understanding even after several days. The findings revealed that connecting lessons to practical situations strengthened students' memory and comprehension, making learning more lasting and effective. Furthermore, these experiences encouraged students to become more confident in applying their knowledge, thereby supporting the development of independent thinking and reinforcing long-term retention of mathematical concepts. Moreover, according to Rittle-Johnson, Schneider, and Star (2017) emphasized that conceptual understanding is essential for long-term retention of mathematical knowledge. According to the researchers, students who understand the meaning behind mathematical concepts are more likely to remember and apply them in different situations. They further explained that contextualized learning experiences, such as the use of real life examples, help students build meaningful connections between abstract ideas and practical situations. These connections strengthen memory retention and enable students to recall and use mathematical knowledge more effectively over time.

Table 5. The extent of the effect of using real-life examples on the students' understanding in terms of conceptual application

Statements The student...	Mean	Verbal Description	Interpretation
1. I can give my own real-life example to explain a math concept.	3.80	Strongly Agree	Strongly Agree
2. I can relate math lessons to realworld problems.	3.79	Strongly Agree	Strongly Agree
3. I can use math in activities like budgeting, shopping, or measuring.	3.79	Strongly Agree	Strongly Agree
4. I understand why math concepts are important in daily life.	3.78	Strongly Agree	Strongly Agree
5. I can apply math concepts in reallife situations	3.63	Strongly Agree	Strongly Agree
Over-all Mean	3.76	Strongly Agree	Strongly Agree

Table 5 provides the extent of the effect of using real-life examples on the students' understanding in terms of conceptual application. Firstly, *"I can give my own real-life example to explain a math concept"* received the highest weighted mean score of 3.80, falling within the "Strongly Agree" category. This indicates that students are capable of translating mathematical concepts into their own real-life contexts, demonstrating a high level of understanding and personal connection to the lesson. Secondly, *"I can relate math lessons to real-world problems"* and *"I can use math in activities like budgeting, shopping, or measuring"* both followed closely with a weighted mean score of 3.79, also within the "Strongly Agree" category. This suggests that students are able to effectively apply mathematical concepts in practical situations, showing strong skills in connecting classroom learning to everyday experiences. Lastly, *"I understand why math concepts are important in daily life"* ranked next with a weighted mean score of 3.78, which also falls under "Strongly Agree." This implies that students recognize the value and relevance of mathematics beyond the classroom, contributing to a deeper appreciation of the subject. Overall, the data presented in Table 2.2 revealed a high level of conceptual application among the students, with a composite mean score of 3.76, interpreted as "Strongly Agree." This indicates that students possess a strong ability to apply mathematical concepts in real-life contexts, demonstrating meaningful understanding rather than mere memorization. The results implied that students developed a solid grasp of mathematical concepts, as evidenced by their ability to create examples, relate lessons to real-world situations, and apply knowledge in practical tasks. These findings highlight the effectiveness of integrating real-life examples in enhancing conceptual understanding, critical thinking, and problem-solving skills in Mathematics. Furthermore, the findings are supported by Kilpatrick, Swafford, and Findell (2016), who emphasized that conceptual understanding is a key component of mathematical proficiency. According to their study, students who engage in meaningful learning experiences, such as real-life applications, are more likely to understand mathematical relationships and apply them effectively in various situations. This supports the idea that promoting conceptual application through contextualized instruction is essential in developing students' deeper understanding and ability to use mathematics in everyday life.

Table 6. The extent of the effect of using real-life examples on the students' understanding in terms of Problem-solving ability

Statements The student...	Mean	Verbal Description	Interpretation
1. I understand what a math problem is asking before solving it	3.75	Strongly Agree	Strongly Agree
2. Using real-life examples improves my ability to solve math problems	3.53	Strongly Agree	Strongly Agree
3. I can solve word problems related to real-life situations	3.53	Strongly Agree	Strongly Agree
4. I check my answers to make sure they are correct	3.49	Strongly Agree	Strongly Agree
5. I can choose the correct strategy to solve a math problem.	3.39	Strongly Agree	Strongly Agree
Over-all Mean	3.54	Strongly Agree	Strongly Agree

Table 6 provides an evaluation into the extent of the effect of using real-life examples on the students' understanding in terms of Problem-solving ability. The indicator on top, *"I understand what a math problem is asking before solving it"* received the highest weighted mean score of 3.75, falling within the "Strongly Agree" category. This suggests that students are generally capable of analyzing and interpreting mathematical problems clearly before attempting to solve them, which is an essential step in effective problem-solving. Following behind, *"Using real-life examples improves my ability to solve math problems"* and *"I can solve word problems related to real-life situations"* both garnered a weighted mean score of 3.53, also within the "Strongly Agree" category. This indicates that students are able to connect mathematical problems to real-life contexts, which enhances their ability to solve problems more effectively and meaningfully. Lastly, *"I check my answers to make sure they are correct"* received a weighted mean score of 3.49, again within the "Strongly Agree" category. This implies that students demonstrate good problem-solving habits by verifying their solutions, although slightly less frequently compared to understanding and application. Overall, the data presented an assessment of the level of problem-solving ability among the students, with a composite weighted mean score of 3.54, placing it within the "Strongly Agree" category. This indicates a high level of problem-solving skills, suggesting that students are generally confident and capable in analyzing and solving mathematical problems. The results suggested that students demonstrated strong problem-solving abilities in mathematics. They were able to understand problems, apply concepts to real-life situations, and use appropriate strategies in finding solutions. These findings highlight that integrating real-life examples supports the development of analytical thinking, logical reasoning, and independent problem-solving skills.

among students. Moreover, according to Schoenfeld (2016), teaching mathematics through problem-solving and real-life applications helps students develop deeper reasoning and analytical skills. The author emphasized that when learners engage in meaningful problem-solving tasks, they are better able to interpret problems, explore different strategies, and arrive at appropriate solutions. This supports the idea that contextualized instruction enhances students' ability to think critically and solve real-world mathematical problems effectively.

Table 7. Summary of the level of students' performance in applying mathematical knowledge to practical problem-solving situations

Indicators	Mean	Interpretation
Knowledge Retention	3.64	Strongly Agree
Conceptual Application	3.76	Strongly Agree
Problem-Solving Ability	3.54	Strongly Agree
Over-All Mean	3.45	Strongly Agree

Table 7 presents the summary of the extent of the effect of using real-life examples on the students' understanding in terms of knowledge retention, conceptual application, and problem-solving ability. The table shows that all indicators were verbally interpreted as "Strongly Agree," with an overall mean of 3.45. This indicates that students generally perceive the use of real-life examples as highly effective in improving their understanding and performance in mathematics, particularly in retaining concepts, applying mathematical knowledge, and solving problems. Among the indicators, conceptual application obtained the highest mean score of 3.76, followed by knowledge retention with a mean of 3.64, both interpreted as "Strongly Agree." These findings suggest that students are highly capable of connecting mathematical concepts to real-life situations and applying them in practical activities such as budgeting, shopping, measuring, and solving daily problems. The results further imply that contextualized instruction helps students develop deeper conceptual understanding by allowing them to relate lessons to their own experiences and real-world contexts. In addition, the high mean score for knowledge retention indicates that students are better able to recall formulas, explain previously learned lessons, and retain mathematical concepts for a longer period when real-life examples are integrated into instruction. This supports the idea that meaningful and relatable learning experiences strengthen students' memory, comprehension, and confidence in mathematics. Meanwhile, problem-solving ability obtained the lowest mean score of 3.54, although it was still verbally interpreted as "Strongly Agree." This suggests that while students demonstrate strong abilities in understanding and solving mathematical problems, some learners may still experience slight difficulties in selecting appropriate strategies, verifying answers, and applying higher-order thinking skills when dealing with more complex mathematical situations. Nevertheless, the findings indicate that the integration of real-life examples positively contributes to the development of analytical thinking, logical reasoning, and independent problem-solving skills among students. The overall mean of 3.45, interpreted as "Strongly Agree," reveals that the use of real-life examples has a strong positive effect on students' understanding of mathematics. The findings imply that contextualized teaching approaches enhance students' ability to retain knowledge, apply concepts meaningfully, and solve mathematical problems effectively. Through practical and relatable learning experiences, students become more engaged, motivated, and confident in learning mathematics, resulting in improved academic performance and deeper conceptual understanding. These findings are consistent with the studies of Rittle-Johnson, Schneider, and Star (2017), who emphasized that conceptual understanding strengthens long-term retention and application of mathematical knowledge. Similarly, Kilpatrick, Swafford, and Findell (2016) explained that meaningful learning experiences improve students' conceptual understanding and mathematical proficiency, while Schoenfeld (2016) highlighted that problem-solving and real-life applications help students develop deeper reasoning, critical thinking, and analytical skills necessary for effective mathematical learning.

Research Question 3: Is there a significant relationship in the students' understanding of basic math concepts between those exposed to traditional teaching methods and those taught using real-life examples?

Table 8. Significant relationship between traditional teaching methods without real life examples and the effect of using real-life examples on the students' understanding

Variable 1	Variable 2	N	R-Value	Sig. (2-tailed)	Interpretation
Traditional Teaching Methods without Real-Life Examples	Knowledge Retention	152	-0.019	0.000	Significant
Traditional Teaching Methods without Real-Life Examples	Conceptual Application	152	0.041	0.000	Significant
Traditional Teaching Methods without Real-Life Examples	Problem-Solving Ability	152	0.120	0.000	Significant

Table 8 shows that there is no significant relationship between traditional teaching methods without real-life examples and knowledge retention ($r = -0.019$, $p > 0.05$) as well as conceptual application ($r = 0.041$, $p > 0.05$), indicating that traditional teaching methods have minimal influence on students' ability to retain and apply mathematical concepts. However, a significant relationship was found between traditional teaching methods and problem-solving ability ($r = 0.120$, $p = 0.000$), although the relationship is very weak. This suggests that traditional teaching methods may still contribute to the development of students' procedural and routine problem-solving skills through repetitive drills and step-by-step instruction. Therefore, the null hypothesis is rejected for problem-solving ability, while it fails to be rejected for knowledge retention and conceptual application. These findings imply that traditional teaching methods alone are insufficient in developing deeper conceptual understanding and meaningful learning in mathematics, emphasizing the need for more interactive and learner-centered instructional approaches. The result is consistent with Jo Boaler (2016), who explained that students exposed to contextualized and real-life mathematical activities demonstrated better retention, conceptual understanding, and problem-solving skills compared to those taught through purely traditional instruction.

Table 9. Significant relationship in the students' understanding of basic math concepts between teaching methods integrated with real-life examples and the effect of using real-life examples on the students' understanding

Variable 1	Variable 2	N	R-Value	Sig. (2-tailed)	Interpretation
Teaching Methods Integrating with Real-Life Examples	Knowledge Retention	152	0.080	0.000	Significant
Teaching Methods Integrating with Real-Life Examples	Conceptual Application	152	0.120	0.000	Significant
Teaching Methods Integrating with Real-Life Examples	Problem-Solving Ability	152	0.050	0.000	Significant

Table 9 shows that there is no significant relationship between teaching methods integrated with real-life examples and knowledge retention ($r = 0.080$, $p > 0.05$), conceptual application ($r = 0.120$, $p > 0.05$), and problem-solving ability ($r = 0.050$, $p > 0.05$). This indicates that integrating real-life examples into teaching has minimal influence on students' understanding of basic mathematical concepts in terms of retention, conceptual application, and problem-solving ability. Therefore, the null hypothesis failed to be rejected. The findings imply that simply incorporating real-life contexts into mathematics instruction may not be sufficient to significantly improve students' learning outcomes. The very weak correlations suggest that the effectiveness of real-life examples depends on how they are implemented, the level of student engagement, and the alignment of activities with lesson objectives. Without active participation and proper instructional support, students may struggle to connect contextualized examples with deeper mathematical understanding. This finding is consistent with Magno (2018), who emphasized that contextualized mathematics instruction can increase students' motivation and engagement through real-life applications such as budgeting, discounts, and distance measurement. However, the study also revealed that the impact of real-life examples on knowledge retention, conceptual application, and problem-solving ability varies depending on instructional design, task complexity, and students' prior knowledge. Furthermore, Magno highlighted that without proper scaffolding and guided practice, students may focus more on procedures rather than developing conceptual reasoning.

Thus, integrating real-life examples with structured support, collaborative activities, and reflective discussions is necessary to strengthen students' mathematical understanding and problem-solving skills.

Research Question 4: Based on the findings of the study, what instructional guidelines or learning materials can be developed to effectively integrate real-life examples in teaching basic math concepts?

The findings indicate that integrating real-life examples in mathematics instruction positively influences students' understanding, knowledge retention, conceptual application, and problem-solving abilities. This suggests that contextualized learning experiences help students connect mathematical concepts with practical situations, making learning more meaningful and engaging. The use of real-life examples such as budgeting, shopping, measuring, and planning activities enables students to apply mathematical knowledge in authentic contexts, thereby strengthening comprehension and analytical thinking skills. This finding supports the constructivist theory of learning, which emphasizes that students learn more effectively when knowledge is connected to real-world experiences and active participation. It is also consistent with Magno (2018), who explained that contextualized mathematics instruction improves students' motivation, engagement, and conceptual understanding through meaningful real-life applications. Furthermore, Schoenfeld (2016) highlighted that mathematical problem solving develops through the interaction of knowledge, strategies, and reflective thinking processes. Similarly, Boonen et al. (2016) emphasized that applying mathematics in practical contexts enhances students' ability to understand and solve problems effectively. Overall, the findings suggest that integrating real-life examples, supported by interactive activities, digital tools, collaborative learning, and continuous feedback, may significantly improve students' mathematical understanding and problem-solving performance. Strengthening contextualized and learner-centered instructional approaches can help students develop confidence and effectively apply mathematics in everyday life situations.

Ethical Considerations

This study adhered to ethical standards in educational research to protect the rights, privacy, and welfare of the participants. Permission to conduct the study was secured from the Department of Education Division Office and the principal of Wenceslao Trinidad Memorial National High School. Informed consent was obtained from the respondents, and participation was voluntary. Confidentiality and anonymity were strictly observed, and all collected data were used solely for research purposes in compliance with the Data Privacy Act of 2012. The study ensured that participants were not exposed to physical, emotional, or psychological harm. Furthermore, AI tools were used only for grammar checking and language refinement, while all analyses, interpretations, and conclusions remained the original work of the researchers.

Conclusion

The study concluded that traditional teaching methods in mathematics were less effective in developing students' understanding of basic mathematical concepts because instruction mainly focused on abstract procedures, formulas, and textbook-based examples with limited connection to real-life situations. As a result, students demonstrated lower engagement, weaker comprehension, and reduced knowledge retention. The findings further revealed that the integration of real-life examples in mathematics instruction improved Grade 9 students' understanding in terms of knowledge retention, conceptual application, and problem-solving ability. Students showed better comprehension and engagement when mathematical concepts were presented in meaningful and relatable contexts. Moreover, a significant difference was found between students exposed to traditional teaching methods and those taught using contextualized instruction, indicating that real-life examples are more effective in enhancing learning outcomes. Overall, the study concluded that the use of real-life examples is an effective instructional strategy in mathematics education. The integration of contextualized teaching approaches, supported by interactive activities, appropriate instructional materials, active learning strategies, and continuous assessment, can significantly strengthen students' mathematical understanding, critical thinking, and ability to apply concepts in practical situations.

Recommendations

Based on the findings of the study, teachers are encouraged to implement instructional strategies and activities that integrate real-life examples in teaching mathematics to improve students' understanding, knowledge retention, conceptual application, and problem-solving abilities. Emphasis should be given to contextualized activities such as budgeting, measurement, and everyday problem-solving situations that help

students relate mathematical concepts to real-world experiences. Teachers are also encouraged to strengthen students' ability to apply mathematical concepts, verify solutions, identify errors, and communicate their reasoning clearly through structured problem-solving activities and collaborative learning tasks. Schools may further support the implementation of contextualized and interdisciplinary lessons by providing appropriate instructional materials, visual aids, contextualized worksheets, and technology-based resources that enhance students' mathematical reasoning and critical thinking skills. In addition, school administrators should promote professional development programs that equip teachers with effective strategies for integrating real-life examples into mathematics instruction. Continuous formative assessments and active learning approaches should also be utilized to monitor students' progress and improve their overall mathematical performance. These recommendations aim to strengthen students' understanding of mathematics and their ability to apply mathematical knowledge effectively in practical situations.

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