



Pedagogical Approaches of Mathematics Teachers in Improving Students' Problem-Solving Skills in Modular Distance Learning

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Abstract

Modular distance learning emerged as the main educational delivery method amid ongoing challenges, prompting this study to examine the pedagogical approaches of mathematics teachers in Tabuelan District during School Year 2025–2026 using a descriptive-correlational design and total enumeration of 30 junior high school teachers. The structured survey questionnaire first underwent content validation by education experts, where items were clarified, revised, or removed based on feedback; it was then pilot-tested, yielding a Cronbach's alpha of 0.82 to confirm good reliability. It utilized a 5-point Likert-type scale ranging from 5 = Strongly Agree to 1 = Not Implemented, with results interpreted according to the defined scoring procedure; thus the weighted mean of 2.37 for technology integration was correctly described as "Seldom Implemented" instead of "Disagree." Statistical tools included frequency, percentage, weighted mean, Spearman rho, and Mann-Whitney U test, all evaluated at a significance level of 0.05; computed p-values above this threshold indicated no significant relationship between teachers' demographic profile and their instructional practices. Findings showed teachers performed well in strategies, assessment, and communication, but limited technology use highlighted the need for training programs to better support students' problem-solving skills in this learning setup.

Keywords: mathematics teachers, modular distance learning, pedagogical approaches, problem-solving skills, Tabuelan District

Introduction

Mathematics is widely recognized as one of the most essential disciplines in education because it develops critical thinking, logical reasoning, analytical abilities, and problem-solving skills among learners. It plays a significant role in preparing students for real-life situations that require decision-making, computation, and reasoning. Through mathematics, learners are trained to think systematically and solve problems efficiently, making it an important subject across all levels of education. Despite its importance, many students continue to perceive mathematics as difficult, complicated, and challenging to understand. Learners often encounter difficulties in comprehending abstract concepts, applying mathematical processes, and solving mathematical problems, particularly in word problems that require analytical thinking and comprehension. In addition, factors such as weak foundational knowledge, mathematics anxiety, lack of motivation, and limited instructional support further affect students' learning and performance in mathematics (Al-Kassab, 2023). These concerns emphasize the vital role of teachers in delivering effective instruction and creating meaningful learning experiences that can help students improve their mathematical understanding and problem-solving skills.

Teachers' pedagogical approaches greatly influence students' engagement, confidence, and achievement in mathematics. Effective instructional strategies can help simplify complex mathematical concepts, encourage active participation, and motivate learners to become more confident in solving mathematical problems. Teachers who utilize learner-centered approaches, guided instruction, collaborative activities, and appropriate learning resources are more likely to develop students' critical thinking and problem-solving abilities. Moreover, the way teachers present lessons



and facilitate learning activities significantly affects how students respond to mathematics and overcome learning difficulties. Thus, the instructional practices employed by mathematics teachers are considered important factors in improving students' mathematical performance and developing their problem-solving competencies.

The importance of effective pedagogical practices became more evident during the implementation of Modular Distance Learning. This modality was introduced as a key strategy to ensure the continuity of education when face-to-face classes were not feasible. It relies primarily on printed or digital self-learning modules that contain lessons, activities, and assessments designed to guide learners in studying independently at home. While it offers flexibility and accessibility, it also demands that teachers carefully design content and provide clear guidance so that students can follow instructions and master concepts without constant direct supervision. In this setup, teachers shift from being the main source of information to facilitators of learning, making the clarity and quality of their pedagogical decisions even more critical to student success.

The sudden shift from face-to-face classes to remote learning created numerous challenges for both teachers and students. During modular distance learning, teachers needed to modify their teaching approaches and utilize various learning modalities to ensure the continuity of education. Mathematics teachers were challenged to teach mathematical concepts and problem-solving skills without direct classroom interaction. Likewise, students experienced difficulties in understanding lessons independently, particularly in solving mathematical problems that required step-by-step guidance and teacher support. Limited access to learning resources, unstable internet connection, lack of immediate feedback, and minimal supervision also affected students' learning experiences during distance education. As highlighted in the UN Philippines Inclusive Education Report launched in 2020, the shift to distance learning exposed existing gaps in access to technology and connectivity; the report noted that only 17.7% of households in the Philippines had home internet access at that time, and millions of learners faced barriers to participation. It further emphasized that education systems must adapt modalities to be inclusive and responsive, ensuring that disadvantaged learners are not left behind despite limitations in resources and connectivity (UN Philippines & UNESCO, 2020).

And also, in the Department of Education also recognizes the need for relevant and context-appropriate teaching practices through DepEd Order No. 39, s. 2016, or the Basic Education Research Agenda. This policy prioritizes research that addresses teaching and learning challenges, improves instructional quality, and develops evidence-based interventions to support student achievement. It specifically encourages studies that examine effective pedagogical approaches, learning modalities, and factors affecting student performance, making investigations into teaching practices during distance learning fully aligned with the department's goals and priorities.

In the Philippines, the challenges in mathematics education remain evident. Results from the Programme for International Student Assessment (PISA) 2022 revealed that only about 16% of Filipino students achieved the minimum proficiency level in mathematics, which is significantly lower compared to the Organization for Economic Co-operation and Development (OECD) average (OECD, 2023). These findings indicate that many Filipino learners struggle in understanding mathematical concepts and applying problem-solving skills effectively. Such results emphasize the need for stronger instructional practices and interventions that can address students' learning difficulties and improve mathematics achievement. This situation calls for mathematics teachers to continuously adapt and strengthen their teaching approaches to meet the diverse learning needs of students, especially in challenging learning environments such as distance learning.

Teachers in Tabuelan District observed that students particularly struggled in solving mathematical word problems during the month-long suspension of face-to-face classes caused by the earthquake. To continue the delivery of instruction, mathematics teachers utilized modules, online discussions, recorded video lessons, and other distance learning strategies to support learners. Despite these efforts, students still encountered difficulties in understanding mathematical concepts and solving problems independently. These observations prompted the need to examine the pedagogical approaches used by mathematics teachers during modular distance learning and determine how these practices contributed to improving students' problem-solving skills.

Although several studies have already explored strategies for improving mathematics learning, there remains limited research focusing specifically on the pedagogical approaches of mathematics teachers in enhancing students' problem-solving skills during modular distance learning. Most studies primarily focus on students' performance and learning



outcomes, while fewer studies examine the actual teaching practices employed by mathematics teachers in remote learning settings. This gap in the literature emphasizes the importance of conducting further investigation on how teachers facilitate mathematics instruction and support students' problem-solving development during modular distance education.

For these reasons, the researcher would like to investigate this study that aims to determine the pedagogical approaches of mathematics teachers in enhancing students' ability to solve mathematical problems during modular distance learning. Specifically, the study seeks to identify the teaching approaches, strategies, and learning activities utilized by mathematics teachers in supporting learners' understanding and development of problem-solving skills. The findings of this study could provide valuable understanding that may help mathematics teachers improve their pedagogical approaches, strengthen mathematics instruction, and contribute to the enhancement of students' mathematical performance and achievement.

Theoretical and Conceptual Framework

This study on the pedagogical approaches of mathematics teachers in improving students' problem-solving skills during modular distance learning is anchored on the following theories: Cognitive Load Theory by John Sweller (1988), Metacognitive Theory by John Flavell (1979), Situated Learning Theory by Jean Lave and Etienne Wenger (1991), and Connectivism by George Siemens (2005). It is likewise supported by these legal bases: Republic Act No. 10533 (Enhanced Basic Education Act of 2013), Republic Act No. 10929 (Free Internet Access in Public Places Act), Republic Act No. 9155 (Governance of Basic Education Act of 2001), DepEd Order No. 37, s. 2022 (Guidelines on Cancellation/Suspension of Classes), and DepEd Order No. 16, s. 2023 (Policy on the Use of ICT in Teaching and Learning). Collectively, these frameworks provide a strong foundation for understanding how mathematics teachers design, implement, and adapt their approaches to enhance student learning.

Cognitive Load Theory

First, Cognitive Load Theory (Sweller, 1988) explains that learning becomes more effective when instructional materials are organized in ways that prevent students from becoming cognitively overloaded. Students learn better when information is presented clearly, gradually, and systematically. In this study, Cognitive Load Theory is connected to the variables on teaching strategies, assessment and monitoring of student progress, and students' problem-solving skills. Mathematics teachers who simplify lessons, divide problems into smaller steps, provide guided examples, and use clear instructional materials help reduce students' cognitive burden and improve their ability to solve mathematical problems. Similarly, effective assessment and monitoring practices allow teachers to identify students' difficulties and provide interventions that support learning. Sharma and Singh (2024) found that instructional designs that balanced intrinsic and extraneous cognitive load significantly improved students' retention and problem-solving performance. Likewise, Lee and Kim (2026) revealed that feedback designed to manage cognitive load improved immediate learning outcomes and long-term retention. These studies support the assumption that structured and well-organized pedagogical approaches enhance students' mathematical problem-solving abilities during modular distance learning.

Metacognitive Theory

Second, Metacognitive Theory (Flavell, 1979) emphasizes that learners become more successful when they are aware of and able to regulate their own thinking processes. Metacognition involves planning, monitoring, and evaluating one's understanding and performance during learning tasks. In relation to the study variables, this theory is connected to feedback and communication with learners, teaching strategies, and assessment and monitoring of student progress. Mathematics teachers who provide reflective questions, feedback, and guided problem-solving activities encourage learners to evaluate their own strategies and improve their solutions. Furthermore, effective communication and monitoring practices help students become more independent and reflective learners during modular distance learning. Hidayat et al. (2025) found that instructional approaches designed to foster metacognition significantly improved mathematics achievement and self-regulated learning. Similarly, Shah (2025) reported that students exposed to metacognitive teaching strategies such as self-questioning and reflection demonstrated stronger problem-solving performance and motivation. These findings support the study's assumption that feedback and reflective pedagogical approaches contribute to students' development of mathematical problem-solving skills.



Situated Learning Theory

Third, Situated Learning Theory (Lave & Wenger, 1991) asserts that learning becomes more meaningful when students engage in authentic and real-life situations. Learners understand concepts more effectively when they apply knowledge to practical experiences rather than relying solely on abstract instruction. In this study, Situated Learning Theory is connected to the variables involving teaching strategies and assessment practices. Mathematics teachers who integrate contextualized examples, practical applications, and real-life problem-solving activities help students connect mathematical concepts to everyday experiences. Through meaningful activities and authentic assessments, learners become more engaged and capable of applying mathematical concepts effectively. Zhao et al. (2025) demonstrated that situated learning activities improved learners' engagement and academic outcomes by grounding instruction in authentic contexts. Likewise, Wang et al. (2025) explained that situated learning supports the development of meaningful understanding through contextualized and experiential learning activities. These studies strengthen the assumption that contextualized pedagogical approaches enhance students' understanding and problem-solving performance in mathematics.

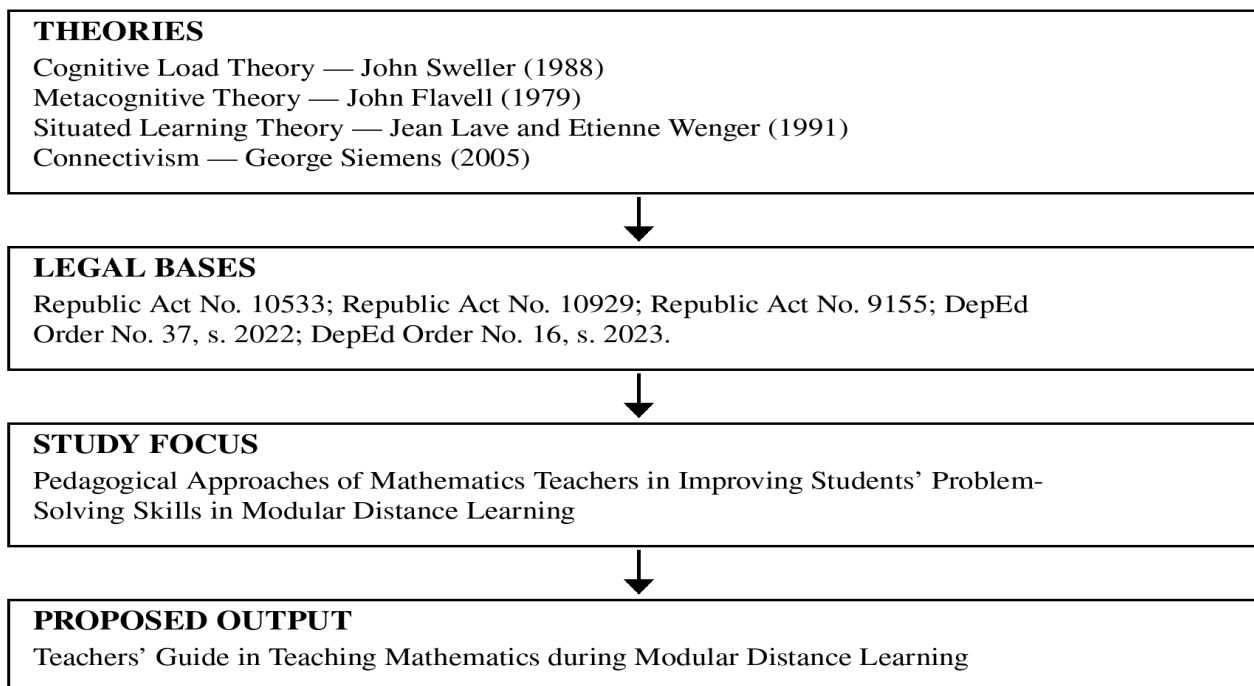


Figure 1

Theoretical and Conceptual Framework of the Study

Connectivism

Finally, Connectivism (Siemens, 2005) highlights that learning occurs through networks of information, technology, and social interaction. Knowledge is developed through connections among learners, teachers, digital tools, and online resources. This theory is directly connected to the study variables concerning technology integration, feedback and communication with learners, and assessment and monitoring of student progress during modular distance learning. Mathematics teachers who utilize online platforms, modules, recorded lessons, and digital communication tools help students access information and engage in collaborative learning experiences. In addition, technology integration enables teachers to monitor student progress and provide timely feedback despite the challenges of distance learning. Dziubaniuk et al. (2023) found that students developed knowledge through online interactions and digital learning networks.

Similarly, Khalid et al. (2025) revealed that connectedness, collaboration, and interaction in digital environments strengthened online learning experiences. These findings support the assumption that the effective use of digital



learning tools and communication platforms enhances students' mathematical understanding and problem-solving abilities in modular distance learning environments.

Legal Bases

Legally and institutionally, this study is anchored on several national mandates and educational policies that guide the use of technology in teaching and learning, particularly in the context of distance learning. These legal instruments provide a framework for understanding the roles and responsibilities of teachers, the use of instructional materials, and the accessibility of digital resources, all of which are central to enhancing students' problem-solving skills in mathematics.

Republic Act No. 10533 – Enhanced Basic Education Act of 2013 serves as the cornerstone of the K–12 curriculum in the Philippines. It emphasizes the development of critical thinking, creativity, and problem-solving skills as essential learning outcomes. This law strengthens the study by legitimizing the focus on instructional practices that enable students to understand, plan, and solve mathematical problems effectively. By mandating learner-centered approaches, RA 10533 emphasized the importance of instructional strategies that engage students actively, whether through guided practice, self-learning modules, or structured problem-solving activities. In distance learning, this legal basis emphasizes the necessity of designing instruction that scaffolds learning and ensures that abstract mathematical concepts are translated into practical and understandable steps.

Department of Education (DepEd) Order No. 37, s. 2022 – Guidelines on Cancellation/ Suspension of Classes. This is the main basis. Modular distance learning (MDL) is implemented when classes are suspended due to natural disasters, typhoons, floods, earthquakes, power outages/ interruptions, extreme heat conditions and other calamities/ human-induced hazards. The goal of the Department of Education (DepEd) in implementing modular distance learning is to ensure learning continuity when face-to-face classes is not safe. The safety of learners and teaching personnel takes absolute priority during severe weather disruptions (Department of Education [DepEd], 2022).

Department of Education (DepEd) Order No. 16, s. 2023 – Policy on the Use of ICT in Teaching and Learning provides specific guidance on the integration of technology in classroom and distance learning environments. Anchoring this study on this policy strengthens its relevance because it recognizes that digital tools, online platforms, and interactive modules are essential for maintaining instructional continuity and student engagement. DepEd's ICT policy promotes not only the accessibility of learning materials but also the enhancement of communication and feedback between teachers and learners. This legal basis supports the exploration of how mathematics teachers utilize technology to monitor student progress, provide timely feedback, and foster students' metacognitive skills in problem-solving during modular distance learning.

Republic Act No. 10929 – Free Internet Access in Public Places Act guarantees access to free internet services in public spaces, thereby facilitating equitable participation in online and modular learning environments. This law reinforces the study by emphasizing the role of connectivity in supporting students' interaction with digital learning resources. It strengthens the investigation into students' ability to access online modules, instructional materials, and digital communication tools that are critical for problem-solving activities. By ensuring students' access to information networks, RA 10929 directly supports the theoretical underpinnings of connectivism and situated learning, which emphasize learning through networks, collaboration, and real-life applications.

Republic Act No. 9155 – Governance of Basic Education Act of 2001 establishes the framework for the governance of schools and delineates the responsibilities of teachers, principals, and local education authorities. This act strengthens the study by providing a legal basis for examining teacher accountability, instructional quality, and monitoring of student outcomes. By defining the roles of educators in curriculum implementation and performance assessment, RA 9155 supports the exploration of the relationship between teachers' instructional practices and students' problem-solving abilities. It ensures that the study is anchored in national standards of educational governance and aligns with institutional expectations for effective teaching.

Together, these legal bases provide a strong foundation for the study. They justify the examination of mathematics teachers' instructional practices, the use of modules and ICT tools, and the assessment of students' problem-solving skills during distance learning. By grounding the research in these mandates, the study is institutionally supported,



aligns with national educational priorities, and underscores the relevance of technology-enhanced, learner-centered instruction in improving mathematical competencies.

Related Studies

Several studies have explored teachers' technological competence, pedagogical skills, and instructional practices across different learning areas, highlighting the role of effective teaching strategies, instructional materials, feedback, and assessment in supporting student learning. In line with this, the present study focuses on the instructional practices of mathematics teachers in enhancing students' ability to solve mathematical problems during distance learning. It aims to examine teachers' demographic profiles, the strategies and tools they use, how they provide feedback and monitor progress, and the relationship between these practices and students' problem-solving abilities. The findings will also inform the development of a teaching guide to improve mathematics problem-solving skills in a distance learning environment.

Globally, various countries employ different pedagogical approaches to improve students' mathematical problem-solving skills and overall achievement in mathematics. In the United States, K–12 students experience significant levels of math anxiety, which negatively affects their engagement and performance in mathematics. To address this concern, teachers utilize strategies such as fostering a growth mindset, providing consistent and supportive feedback, and integrating engaging problem-solving activities. These approaches help create a positive learning environment that strengthens students' confidence and improves their ability to solve mathematical problems (Heubeck, 2025). Similarly, in New Zealand, teachers who implemented problem-solving approaches in mathematics reported both challenges and successes. Although they experienced difficulties in addressing diverse learner needs and effectively applying instructional strategies, they also observed increased student engagement and improved critical thinking skills among learners (Kaur, 2023).

In Europe, efforts to improve mathematics achievement focus on differentiated instruction, individualized or small-group support, and peer mentoring. These pedagogical approaches aim to provide targeted assistance, encourage active participation, and strengthen students' problem-solving skills within inclusive learning environments (Montanari, 2025). Meanwhile, in Singapore, a mastery-oriented approach is emphasized, wherein teachers use structured lesson phases, worked examples, and guided practice to gradually develop students' deep understanding and proficiency in solving mathematical problems (Lee & Safii, 2021). Across Southeast Asia, challenges related to instructional quality, teacher preparedness, and limited learning resources continue to persist. As a result, educational initiatives in the region focus on strengthening teacher training and promoting effective teaching strategies that enhance conceptual understanding and student engagement in mathematics (International Mathematical Union, 2024).

In the United States, preservice teachers often experience math anxiety, which can reduce both their confidence and performance in mathematics. Mainali and Spalding (2025) found that practical teaching experiences and guided classroom interactions help preservice teachers manage anxiety and improve their mathematical understanding. Similarly, studies in the Philippines show that effective instructional strategies can boost students' confidence and engagement in mathematics. Ubat et al. (2024) reported that instructional quality, classroom management, social-emotional support, and cognitive engagement positively influenced Grade 10 students' interest in learning mathematics, with instructional quality having the strongest effect. Both studies highlight that supportive teaching methods and real-world practice can improve confidence, interest, and readiness in mathematics learning.

Other studies focus on how student-centered and contextualized teaching strategies improve problem-solving skills. Cambaya and Tan (2022) found that Contextualized Instruction (CI) significantly enhanced Grade 8 students' problem-solving skills and engagement, including cognitive, affective, and behavioral involvement. Bayarcal and Tan (2023) also showed that the Open-Ended Approach (OEA) increased achievement and problem-solving skills in Grade 8 students, especially in self-confidence, effort, and following correct procedures. Likewise, Mangilala and Cajandig (2025) emphasized that targeted instructional strategies improve students' problem-solving abilities, particularly in re-examining solutions, and that such strategies are well-received by both students and experts. These studies share the similarity of showing that teaching approaches that actively involve students and encourage exploration can strengthen problem-solving and analytical skills.



However, challenges in teaching mathematics can limit these outcomes. Karalı (2022) identified barriers such as high content density, limited lesson hours, misalignment with exams, low student readiness, lack of materials, distance learning issues, and math anxiety among students. Unlike the previous studies that measured positive effects, this research highlights obstacles that teachers must overcome to improve student engagement and problem-solving skills.

In addition, Alburo and Doronio (2025) examined how teachers' use of Collaborative Learning, Differentiated Instruction, Inquiry-Based Learning, Use of Visual Aids and Manipulatives, and Real-World Applications affects learners' critical thinking dispositions. They found a positive correlation, with Collaborative Learning and Real-World Applications being particularly effective. This complements the findings of Bayarcal and Tan (2023) and Mangilala and Cajandig (2025), showing that well-planned instructional strategies can simultaneously develop critical thinking and problem-solving skills.

These studies indicate that effective mathematics instruction requires strategies that actively engage students, build confidence, and address learning difficulties. While some research highlights challenges and barriers, the evidence consistently supports the use of student-centered, contextualized, and structured teaching approaches to enhance problem-solving, analytical thinking, and critical thinking in mathematics learning.

THE PROBLEM

This study examined the pedagogical approaches of junior high school mathematics teachers in improving students' problem-solving skills during modular distance learning in Tabuelan District for the School Year 2025–2026. The findings of the study served as a basis for developing a teaching guide to enhance mathematics teachers' pedagogical practices.

Specifically, this study sought to answer the following questions:

What is the demographic profile of the mathematics teachers in terms of:

- 1.1 age and gender;
- 1.2 highest educational attainment;
- 1.3 years of teaching experience; and
- 1.4 relevant trainings attended on pedagogical approaches in mathematics?

What is the extent of teaching practices of Junior High School mathematics teachers during distance learning in terms of:

- 2.1 teaching strategies;
- 2.2 use of technology integration in modular instruction;
- 2.3 assessment and monitoring of student progress; and
- 2.4 feedback and communication with learners?

Is there a significant relationship between the demographic profile of mathematics teachers and their pedagogical approaches during modular distance learning?

Based on the findings of the study, what teaching guide could be developed to enhance mathematics teachers' pedagogical approaches during modular distance learning?

Statement of the Null Hypothesis

Based on the objectives of the study, the null hypothesis is tested at a 0.05 level of significance:

H₀: There was no significant relationship between the demographic profile of mathematics teachers and their pedagogical approaches during modular distance learning.

Methodology

Research Design

This study used a descriptive–correlational research design. According to Creswell (2014), descriptive–correlational design is a quantitative method that first describes the characteristics of variables as they naturally exist, then determines the extent of statistical relationship between two or more variables without manipulating them. Similarly, Cohen et al. (2018) explain that this design allows researchers to outline the current status of a phenomenon and analyze associations between variables to identify patterns and trends.

The descriptive part allowed the researcher to describe the current status of mathematics teachers' demographic profiles and pedagogical approaches during modular distance learning. Specifically, it gathered information on



teachers' age, gender, highest educational attainment, years of teaching experience, and relevant training attended. It also described teachers' pedagogical approaches in terms of teaching strategies, use of technology during online classes, feedback and communication with learners, and assessment and monitoring of student progress.

The correlational part examined whether there was a significant relationship between the teachers' demographic profile and their pedagogical approaches during modular distance learning. This helped determine whether factors such as teaching experience, educational attainment, or training attended influenced how teachers implemented their instructional strategies.

Finally, the findings of the study served as the basis for developing a teaching guide aimed at improving mathematics teachers' pedagogical approaches during modular distance learning. By combining descriptive and correlational approaches, the design provided both a clear understanding of current practices and evidence of factors that may enhance teaching effectiveness in a modular distance learning environment.

Input–Process–Output Model

The flow of the study was anchored on the Input–Process–Output (IPO) model, which provided a systematic representation of how data were gathered, analyzed, and transformed into meaningful outputs. According to McGregor (2017), the IPO model served as a useful framework in research as it clearly illustrated the relationship between variables, research procedures, and expected outcomes in a structured manner.

The input of the study included the key variables on the pedagogical approaches of mathematics teachers in improving students' problem-solving skills during modular distance learning in Tabuelan District. Specifically, the inputs comprised the demographic profile of mathematics teachers in terms of age and gender, highest educational attainment, years of teaching experience, and relevant trainings attended on pedagogical approaches in mathematics. It also included the pedagogical approaches of mathematics teachers during modular distance learning in terms of teaching strategies, use of technology integration in modular instruction, assessment and monitoring of student progress, feedback and communication with learners. These inputs represented the essential variables that described the characteristics of mathematics teachers and their instructional practices in a modular distance learning environment.

The process of the study included several sequential steps. First, the researcher secured approval of transmittal letters from the concerned authorities such as the Schools Division Superintendent, Public Schools District Supervisor and School Heads. Second, the study employed a descriptive-correlational research design in examining the relationship between the variables. Third, data were gathered from the identified respondents using the appropriate research instrument. Fourth, the collected data were tabulated to organize the responses systematically. Fifth, the data were analyzed using appropriate statistical tools to determine the level of pedagogical approaches of mathematics teachers and the relationship between their demographic profile and pedagogical approaches. Finally, the results were interpreted to derive meaningful conclusions based on the findings of the study.

The output of the study was a proposed teachers' guide in teaching mathematics during modular distance learning. This output was based on the findings regarding the demographic profile of mathematics teachers, their pedagogical approaches as well as the relationship between these variables.



Pedagogical approaches: teaching strategies, technology integration, assessment and monitoring, feedback and communication.

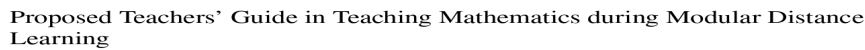
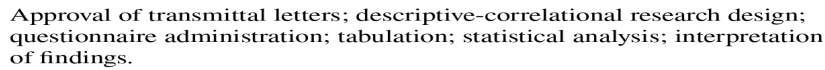




Figure 3

Location Map of the Research Environment

Figure 4

Schools in the Research Environment

Juan Pamplona National High School
Mabunao National High School
Casiano D. Gerona National High School
Kanluma Integrated School
Kantubaon Integrated School
Dalid Integrated School
Kabawan Integrated School

Respondents and Sampling

The respondents of the study consisted of thirty (30) Junior High School Mathematics Teachers in Tabuelan District. The researcher employed total enumeration as the sampling technique, wherein all members of the identified target population were included in the study rather than selecting only a subset of respondents. This approach was considered appropriate due to the small, defined, and manageable size of the population. By including all eligible respondents, the study ensured a more comprehensive and accurate collection of data, minimized sampling error, and provided findings that fully represented the instructional practices and conditions within the district.



The inclusion of these teachers was based on specific criteria. They were currently teaching mathematics in Tabuelan District during the conduct of the study and had sufficient teaching experience to ensure familiarity with classroom practices and instructional strategies, particularly under modular distance learning delivery. They were also willing to participate and provide informed responses. These criteria justified their inclusion, as they were directly involved in mathematics instruction and were able to provide reliable and relevant data aligned with the objectives of the study.

Table 1

Distribution of Respondents

School	f	Percentage (%)
Juan Pamplona National High School	11	36.37
Mabunao National High School	2	6.67
Casiano D. Gerona National High School	1	3.33
Kanluma Integrated School	2	6.67
Kantubaon Integrated School	2	6.67
Dalid Integrated School	2	6.67
Kabalawan Integrated School	2	6.67
TOTAL	30	100.00

Research Instrument and Validation

The instrument used in this study was a researcher-made questionnaire designed to gather relevant data on the demographic profile and pedagogical approaches of Junior High School Mathematics teachers during modular distance learning. It is divided into two parts: Part I consists of 5 items covering age, gender, highest educational attainment, years of teaching experience, and relevant training, which respondents answer by selecting options or filling in information. Part II is composed of 4 domains or dimensions, with 10 items per domain and a total of 40 items, measured using a 5-point Likert scale: 5 – Strongly Agree, 4 – Agree, 3 – Undecided, 2 – Disagree, and 1 – Strongly Disagree. The four domains are Teaching Strategies, Technology Integration in Modular Instruction, Assessment and Monitoring, and Feedback and Communication, each evaluating specific practices relevant to the learning modality.

Since the instrument was developed by the researchers, it underwent rigorous validation to ensure its quality and appropriateness. Content validity was assessed by three experts: a statistician from Cebu Technological University – Tuburan Campus and two Mathematics Master Teachers from Nangka National High School, who reviewed the items for clarity, relevance, and alignment with the research objectives. All their comments and recommendations were carefully considered and integrated to improve the questionnaire before it was administered.

To further test its functionality and consistency, the instrument was pilot tested to 15 Mathematics teachers from San Remigio District who were not part of the actual respondents but shared similar characteristics. The results were analyzed using Cronbach's Alpha, which yielded a reliability coefficient of 0.60, confirming that the instrument is reliable, consistent, and suitable for gathering accurate data for this study.

Data Collection and Analysis

Once the instrument was validated and tested for reliability, the researcher identified the respondents based on the inclusion criteria, which included mathematics teachers in Tabuelan District. The researcher then prepared a transmittal letter requesting permission to conduct the study, which was submitted to the Schools Division Superintendent, followed by the Public Schools District Supervisor, and the School Heads of the participating schools. Upon approval, the respondents were formally informed about the study and were provided with an informed consent form before their participation.

The validated questionnaire was administered to all junior high school mathematics teacher-respondents of Tabuelan District. Before answering the instrument, the respondents were oriented regarding the purpose of the study and were assured that their responses would be treated with confidentiality. They were also reminded to provide honest and accurate answers. The questionnaire was divided into two parts: the demographic profile and the pedagogical approaches of mathematics teachers during modular distance learning.



Once all data were collected, the responses were carefully compiled, organized, and tabulated for analysis. Appropriate statistical treatments were applied to interpret the gathered information and answer the specific problems of the study. After analysis, the results were interpreted based on the research objectives and supported by related literature. The findings were then presented to the School Heads and the Public Schools District Supervisor of Tabuelan District, and served as the basis for developing a teaching guide for Mathematics instruction during modular distance learning.

Frequency and Percentage. These tools were used to describe the teachers' profiles in terms of age, gender, educational attainment, years of teaching experience and relevant trainings attended on pedagogical approaches in mathematics. Frequency showed the number of respondents in each category, while percentage indicated their proportion relative to the total number of respondents.

Mean and Standard Deviation. These tools were used to determine the overall pedagogical approaches of Mathematics Teachers in improving students' problem-solving skills during modular distance learning. The mean provided the average score for each dimension of pedagogical approaches (teaching strategy, use of technology integration, as part of the instruction in the module, assessment and monitoring and feedback and communication), while the standard deviation indicated the variability of responses around the mean.

Shapiro-Wilk Test. This test was used to determine the normality distribution of the data, especially for small to moderate sample sizes. It identified whether variables such as age, gender, highest educational attainment, years of teaching experience and relevant trainings attended significantly deviated from a normal distribution curve.

Kolmogorov-Smirnov Test. This test was used to evaluate normality by comparing the empirical distribution against a theoretical normal curve. While it was appropriate for larger sample sizes, it was not primarily used since the Shapiro-Wilk test provided stronger statistical power for the dataset.

Levene's Test for Equality of Variances. This test was used to assess homogeneity of variances across groups. It verified equal variances for educational attainment ($p > .05$), supporting its suitability for parametric analysis, while indicating that the gender variable violated the assumption of homogeneity.

Spearman's Rank-Order Correlation (Spearman Rho). This non-parametric test was used because age, teaching experience, and training variables violated assumptions of linearity and homoscedasticity. It was applied to determine monotonic relationships between these profile variables and overall teaching techniques.

Mann-Whitney U Test. This non-parametric test was used because the gender variable violated assumptions of normality, outliers, and homogeneity. It was applied to compare the ranking of pedagogical approaches between male and female groups.

Point-Biserial Correlation. This test was used because the educational attainment variable was converted into two categories (dichotomous) and met the required assumptions, including normality, homogeneity, and absence of extreme outliers. It was used to determine the relationship between educational attainment and teaching techniques.

Independent Samples t-test. This test was used to compare mean scores between two independent groups. However, it was considered inappropriate for the gender variable when assumptions of normality and homogeneity were violated.

Scoring Procedure

Table S1

Scoring Procedure for Pedagogical Approaches

Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
5	4.20 – 5.00	Very High	The mathematics teachers consistently demonstrate highly effective pedagogical approaches in modular distance learning. Their teaching strategies, use of technology, feedback, and assessment practices are highly developed and always observed in their instructional delivery, resulting in strong support for students' problem-solving skills.



Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
4	3.40 – 4.19	High	The mathematics teachers demonstrate effective pedagogical approaches in modular distance learning. Their instructional strategies, integration of technology, feedback, and assessment practices are often observed and contribute positively to students' problem-solving development.
3	2.60 – 3.39	Moderate	The mathematics teachers demonstrate moderately effective pedagogical approaches in modular distance learning. Their teaching strategies, use of technology, feedback, and assessment practices are sometimes observed but inconsistent in supporting students' problem-solving skills.
2	1.80 – 2.59	Low	The mathematics teachers demonstrate limited pedagogical approaches in modular distance learning. Their instructional strategies, technology use, feedback, and assessment practices are rarely observed, resulting in weak support for students' problem-solving skills.
1	1.00 – 1.79	Very Low	The mathematics teachers demonstrate very limited or ineffective pedagogical approaches in modular distance learning. Their teaching strategies, use of technology, feedback, and assessment practices are not observed, and they provide minimal support for students' problem-solving development.

Ethical Considerations

This study was reviewed and approved by the Research and Ethics Committee of the Graduate School, Cebu Technological University. All participants were fully informed about the purpose, objectives, and nature of the study before their participation. Informed consent was obtained through a signed consent form, which clearly outlined their voluntary participation. Participants were assured that they had the right to withdraw from the study at any time without facing any form of penalty or consequence.

The confidentiality, privacy, and data protection of all participants were strictly maintained throughout the research process. In compliance with the Data Privacy Act of 2012 (Republic Act No. 10173), all personal information and collected data were treated as highly confidential and were stored securely by the researcher. Access to the raw data was limited solely to the researcher and was used only for academic purposes. All identifying details were removed, anonymized, or coded to ensure that participants could not be identified in any reports, presentations, or publications derived from the study.

Findings

Demographic and Professional Profile

Table 2

Cross-Tabulation Matrix of Age and Gender

Age Group	Male		Female		Total	Total
Age Group	f	%	f	%	f	%
50 to 59 years old	0	0.00	3	10.00	3	10.00
40 to 49 years old	2	6.67	11	36.67	13	43.33
30 to 39 years old	0	0.00	12	40.00	12	40.00
Below 30 years old	0	0.00	2	6.67	2	6.67
Sub-total	2	6.67	28	93.33	30	100.00

Note. Mean age = 39.57 years.

The data revealed that the majority of the mathematics teachers belong to the 30–49 age range, with the highest concentration in the 30–39 (40%) and 40–49 (43.33%) groups. Only a small proportion of teachers fall under the



below 30 years old category (6.67%) and 50–59 years old category (10%). In terms of gender distribution, the data showed a significant imbalance, with female teachers comprising 93.33% of the respondents, while male teachers only accounted for 6.67%. This distribution suggests that the teaching force in mathematics within Tabuelan District is predominantly composed of mid-career female educators. The clustering around the middle-age group also indicates that most teachers are in their productive teaching years, likely possessing substantial experience in classroom instruction and adaptation to curriculum demands.

Table 3

Highest Educational Attainment

Category	f	%
Master's Degree (graduate)	8	26.67
Master's Degree (units only)	22	73.33
Total	30	100.00

The results revealed that the majority of mathematics teachers (73.33%) had completed only Master's Degree units, while a smaller proportion (26.67%) had fully completed their Master's Degree. This indicates that most of the respondents are still in the process of pursuing advanced graduate studies, suggesting a generally moderate level of academic advancement among the teachers. The distribution further implies that while a significant number of teachers have already engaged in graduate-level education, completion rates remain limited. This may reflect constraints such as workload, time management, or access to graduate program completion opportunities, which may affect their full attainment of advanced academic qualifications.

Table 4

Years of Teaching Experience

Category	f	%
10 years and above	2	6.67
7 to 9 years	14	46.67
4 to 6 years	8	26.67
1 to 3 years	6	20.00
Sub-total	30	100.00

Note. Mean teaching experience = 6.30 years.

The results revealed that most of the Junior High School Mathematics Teachers (46.67%) have 7 to 9 years of teaching experience, followed by those with 4 to 6 years (26.67%) and 1 to 3 years (20.00%). Only a small proportion (6.67%) have 10 years and above of teaching experience. The computed mean years of teaching experience is 6.30 years, indicating that, on average, the respondents are moderately experienced in teaching mathematics. The distribution suggests that the majority of teachers are in the mid-level range of teaching experience, which reflects a relatively balanced mix of novice and experienced educators within the district. This implies that most teachers have gained sufficient exposure to classroom instruction but may still be in the process of refining and strengthening their pedagogical practices.

Table 5

Relevant Trainings Attended on Pedagogical Approaches in Mathematics

Category	f	%
6 trainings	6	20.00
5 trainings	9	30.00
4 trainings	3	10.00
3 trainings	3	10.00
2 training	3	10.00
1 training	6	20.00
Sub-total	30	100.00

Note. Mean number of trainings = 3.20.



The results revealed that the highest proportion of mathematics teachers (30.00%) attended five relevant trainings on teaching approaches in mathematics. This was followed by those who attended one training and six trainings, both with 20.00%. Meanwhile, 10.00% of the respondents attended two, three, and four trainings respectively. The computed mean number of trainings attended is 3.20, indicating that, on average, the respondents have participated in a moderate number of professional development activities related to mathematics pedagogy.

The distribution suggests variability in the level of training exposure among mathematics teachers, with some having extensive participation in professional development programs while others have relatively limited attendance. This reflects differences in opportunities, access, and engagement in training activities across the respondents.

Extent of Pedagogical Approaches

Table 6

Teaching Strategies

S/N	Indicators	Mean	SD	Interpretation
1	Provides step-by-step instructions for solving math problems	3.70	0.47	High
2	Uses examples that relate math concepts to real-life situations	3.83	0.38	High
3	Encourages students to explain their reasoning during problem solving	3.50	0.51	High
4	Implements collaborative learning activities (pair/group work)	3.60	0.50	High
5	Incorporates inquiry-based or exploratory learning tasks	3.50	0.51	High
6	Adjusts teaching strategies based on students' needs	3.50	0.51	High
7	Uses questioning techniques to check understanding	3.47	0.51	High
8	Provides challenges that stimulate critical thinking	3.73	0.45	High
9	Gives opportunities for students to practice independently	3.57	0.50	High
10	Connects previous lessons to new concepts effectively	3.43	0.50	High
	Overall	3.58	0.49	High

The results revealed that the overall mean score for teaching strategies is 3.58, interpreted as “High”, indicating that the junior high school mathematics teachers frequently employ effective instructional strategies during modular distance learning. In terms of the highest-rated indicators, the top three were Uses examples that relate math concepts to real-life situations with a mean score of 3.83, Provides challenges that stimulate critical thinking with a mean score of 3.73, and provides step-by-step instructions for solving math problems with a mean score of 3.70. These results suggest that teachers strongly emphasize contextualization, structured guidance, and the development of higher-order thinking skills in mathematics instruction. On the other hand, the lowest-rated indicators were Connects previous lessons to new concepts effectively with a mean score of 3.43, Uses questioning techniques to check understanding with a mean score of 3.47, and Encourages students to explain their reasoning during problem solving with a mean score of 3.50. Although these were still interpreted as “High”, the lower mean scores indicate that these strategies are comparatively less emphasized in instructional practice. Overall, the findings suggest that while mathematics teachers consistently apply a variety of teaching strategies, there are specific areas that may require further strengthening to ensure a more balanced and comprehensive instructional approach in modular distance learning.

Note. SD = standard deviation. Rating bands follow the source scoring procedure.

Table 7

Use of Technology Integration in Modular Instruction

S/N	Indicators	Mean	SD	Interpretation
1	Uses online platforms effectively for lessons (Zoom, Google Classroom, Teams)	2.97	0.56	Moderate
2	Provides clear instructions using digital tools	2.80	0.81	Moderate
3	Uses multimedia resources (videos, slides, simulations) to explain concepts	1.80	0.41	Low
4	Shares digital learning materials promptly	2.70	0.47	Moderate
5	Uses interactive tools (Kahoot, Quizizz, Padlet) to engage students	2.23	1.07	Low



S/N	Indicators	Mean	SD	Interpretation
6	Encourages students to submit their work digitally	2.00	0.00	Low
7	Monitors students' online activity to ensure participation	1.90	0.71	Low
8	Provides online support or tutorials for students who need help	2.57	0.50	Low
9	Integrates technology to explain abstract math concepts	2.57	0.50	Low
10	Adapts online teaching methods based on student feedback	2.20	0.41	Low
	Overall	2.37	0.71	Low

The results revealed that the overall mean score for use of technology integration in modular instruction is 2.37, interpreted as “Low”, indicating that the junior high school mathematics teachers have limited implementation of technology-based instructional practices during modular distance learning. In terms of the highest-rated indicators, the top three were Uses online platforms effectively for lessons (Zoom, Google Classroom, Teams) with a mean score of 2.97, Provides clear instructions using digital tools with a mean score of 2.80, and shares digital learning materials promptly with a mean score of 2.70. These findings suggest that teachers Moderately utilize basic digital tools primarily for lesson delivery and sharing instructional materials. On the other hand, the lowest-rated indicators were Uses multimedia resources (videos, slides, simulations) to explain concepts with a mean score of 1.80, Monitors students' online activity to ensure participation with a mean score of 1.90, and Encourages students to submit their work digitally with a mean score of 2.00. These results indicate Very Low use of interactive and monitoring-based digital practices that could enhance student engagement and learning support.

Note. SD = standard deviation. Rating bands follow the source scoring procedure.

Table 8

Assessment and Monitoring of Student Progress

S/N	Indicators	Mean	SD	Interpretation
1	Provides immediate feedback on students submitted work	3.43	0.50	High
2	Gives constructive comments to help students improve	3.60	0.50	High
3	Maintains clear and consistent communication with students	3.67	0.48	High
4	Responds to students' questions in a timely manner	3.53	0.51	High
5	Uses quizzes, assignments, and tests to monitor learning progress	3.53	0.51	High
6	Tracks students' performance regularly and systematically	3.60	0.50	High
7	Provides opportunities for students to self-assess their understanding	3.43	0.50	High
8	Adjusts teaching based on assessment results	3.67	0.48	High
9	Communicates students' progress to parents or guardians when necessary	3.87	0.35	High
10	Encourages students to reflect on their learning and problem-solving process	3.37	0.49	Moderate
	Overall	3.57	0.50	High

The results revealed that the overall mean score for assessment and monitoring of student progress is 3.57, interpreted as “High”, indicating that the junior high school mathematics teachers consistently implement assessment-related practices during modular distance learning. In terms of the highest-rated indicators, the top three were Communicates students' progress to parents or guardians, when necessary, with a mean score of 3.87, Maintains clear and consistent communication with students with a mean score of 3.67, and Adjusts teaching based on assessment results with a mean score of 3.67. These findings suggest that teachers prioritize communication of student performance, instructional responsiveness, and consistent engagement with learners. On the other hand, the lowest-rated indicators were Encourages students to reflect on their learning and problem-solving process with a mean score of 3.37, interpreted as “Moderate”, Provides immediate feedback on students submitted work with a mean score of 3.43, and Provides opportunities for students to self-assess their understanding with a mean score of 3.43, both interpreted as “High”. Although these indicators were still generally within acceptable levels, the lower mean scores indicate that reflective and self-assessment practices are less consistently emphasized. Overall, the findings suggest that while the junior high school mathematics teachers actively engage in monitoring and assessing



student performance, there is a need to further strengthen reflective learning and self-assessment strategies to enhance students' problem-solving development in mathematics.

Note. SD = standard deviation. Rating bands follow the source scoring procedure.

Table 9

Feedback and Communication with Learners

S/N	Indicators	Mean	SD	Interpretation
1	Provides timely feedback on students submitted modules and outputs	3.53	0.51	High
2	Gives clear and specific comments to help students improve their answers	3.83	0.38	High
3	Communicates regularly with students through group chats or messaging platforms	3.77	0.43	High
4	Responds promptly to students' questions and concerns	3.67	0.48	High
5	Provides instructions that are easy to understand for both students and parents	3.57	0.50	High
6	Uses multiple communication channels (e.g., text, chat, calls) to reach learners	3.17	0.38	Moderate
7	Monitors students' progress through regular follow-ups and updates	3.60	0.50	High
8	Encourages students to ask questions and express difficulties in learning	3.63	0.49	High
9	Involves parents/guardians in monitoring students' learning progress	3.60	0.50	High
10	Provides feedback that motivates students to continue learning despite challenges	3.57	0.50	High
	Overall	3.59	0.49	High

The results revealed that the overall mean score for feedback and communication with learners is 3.59, interpreted as "High", indicating that mathematics teachers consistently practice effective communication and feedback mechanisms during modular distance learning. In terms of the highest-rated indicators, the top three were Gives clear and specific comments to help students improve their answers with a mean score of 3.83, Communicates regularly with students through group chats or messaging platforms with a mean score of 3.77, and Responds promptly to students' questions and concerns with a mean score of 3.67. These results suggest that teachers prioritize clarity, regular communication, and responsiveness in supporting student learning. On the other hand, the lowest-rated indicators were Uses multiple communication channels (e.g., text, chat, calls) to reach learners with a mean score of 3.17, interpreted as "Moderate", Provides timely feedback on students submitted modules and outputs with a mean score of 3.53, and Provides feedback that motivates students to continue learning despite challenges with a mean score of 3.57, both interpreted as "High". Although still within acceptable levels for most items, the lower mean scores indicate that the diversification of communication channels is less consistently practiced. Overall, the findings suggest that mathematics teachers maintain strong communication and feedback practices, particularly in providing clear guidance and maintaining regular contact with learners, which are essential in supporting student learning in modular distance learning.

Note. SD = standard deviation. Rating bands follow the source scoring procedure.

Table 10

Extent of Pedagogical Approaches of Mathematics Teachers in Modular Distance Learning

No.	Sub-variables	Mean	SD	Interpretation
1	Teaching Strategies	3.58	0.49	High
2	Use of Technology Integration in Modular Instruction	2.37	0.71	Low
3	Assessment and Monitoring of Student Progress	3.57	0.50	High
4	Feedback and Communication with Learners	3.59	0.49	High
	Overall	3.28	0.76	Moderate



The results revealed that the overall mean score for the extent of pedagogical approaches of junior high school mathematics teachers during modular distance learning is 3.28, interpreted as “Moderate”, indicating a moderate level of implementation of instructional practices. In terms of the highest-rated sub-variables, the top three were Feedback and Communication with Learners with a mean score of 3.59, Teaching Strategies with a mean score of 3.58, and Assessment and Monitoring of Student Progress with a mean score of 3.57, all interpreted as “High”. These findings suggest that teachers demonstrate relatively strong performance in instructional delivery, learner communication, and assessment practices. On the other hand, the lowest-rated sub-variable was Use of Technology Integration in Modular Instruction with a mean score of 2.37, interpreted as “Low”, indicating limited integration of digital tools in instruction. This significantly lowers the overall composite rating of pedagogical approaches and reflects an area of concern in modular distance learning implementation.

Relationship Between Demographic Profile and Teaching Strategies

Table 11

Correlating the Demographic Profile of Mathematics Teachers and Their Teaching Strategy during Modular Distance Learning

Variables under inference	Comp. value	Strength of Correlation	p-value	Decision	Remarks
Age and Teaching Strategy	0.223a	Weak	0.236	Failed to reject Ho	No significant correlation
Gender and Teaching Strategy	0.001b	Negligible	0.864	Failed to reject Ho	No significant correlation
Highest Educational Attainment and Teaching Strategy	0.056b	Negligible	0.201	Failed to reject Ho	No significant correlation
Years of Teaching Experience and Teaching Strategy	0.220a	Weak	0.243	Failed to reject Ho	No significant correlation
Relevant Training Attended and Teaching Strategy	0.134a	Weak	0.480	Failed to reject Ho	No significant correlation

Significant at $p < 0.05$ (two-tailed); aSpearman rho; bMann-Whitney U test with report of the Rank-Biserial correlation coefficient (r) as the effect size

The results revealed that none of the demographic variables showed a significant relationship with the teaching strategies of junior high school mathematics teachers during modular distance learning, as all p-values were greater than 0.05. This led to the failure to reject the null hypothesis across all variables, indicating that age, gender, highest educational attainment, years of teaching experience, and relevant trainings attended do not significantly influence teaching strategies.

In terms of correlation strength, age, years of teaching experience, and relevant trainings attended showed weak positive correlations with teaching strategies, while gender and highest educational attainment showed negligible correlations. These results suggest that although slight associations exist, they are not strong enough to indicate meaningful relationships between the demographic profile and teaching strategies.

Output of the Study

The findings of the study revealed that junior high school mathematics teachers demonstrated strong pedagogical practices in terms of teaching strategies, assessment and monitoring of student progress, feedback and communication with learners. However, the results also showed that the use of technology integration during modular distance learning was limited, which contributed to an overall moderate level of pedagogical implementation. In addition, the study found no significant relationship between the demographic profile of the teachers and their pedagogical approaches, indicating that instructional effectiveness is not determined by age, gender, educational attainment, years of teaching experience, or training attended, but may be influenced by other instructional and contextual factors.



In response to these findings, the proposed output of the study is Proposed Teachers' Guide in Teaching Mathematics during Modular Distance Learning. This training program is designed to strengthen mathematics teachers' pedagogical practices, particularly in enhancing technology integration, improving instructional delivery, and reinforcing effective assessment and feedback strategies. The Teachers' Guide serves as a structured instructional support material that provides practical strategies, sample activities, and technology-enhanced approaches that can be used in modular distance learning environments.

Objectives of the Proposed Training and Teachers' Guide

The proposed In-Service Training Program with a Teachers' Guide in Teaching Mathematics during Modular

Distance Learning aims to achieve the following objectives:

To enhance mathematics teachers' pedagogical skills by strengthening their teaching strategies, feedback practices, and assessment and monitoring techniques to improve students' problem-solving skills in mathematics.

To improve teachers' competence in technology integration by providing training on the effective use of digital tools, online platforms, and multimedia resources to support mathematics instruction during modular distance learning.

To develop a structured Teachers' Guide in Mathematics instruction that provides practical, contextualized, and learner-centered strategies that teachers can use to effectively deliver mathematics lessons and improve students' learning outcomes in modular distance learning.

Proposed Implementation Plan

Implementation Matrix on the Proposed In-Service Training Program with a Proposed Teachers' Guide in Teaching Mathematics during Modular Distance Learning

Table 12

KRA 1: Strengthening Pedagogical Approaches

Planning component	Source plan details
Objectives	To enhance teachers' use of effective teaching strategies in improving students' problem-solving skills in mathematics
Strategies / Activities	Orientation on Teachers' Guide; workshop on contextualized and problem-solving strategies; demonstration teaching
Time Frame	2 Days
Resources Needed	Printed Teachers' Guide, modules, LCD projector, activity sheets
Persons Involved	School Heads, Master Teachers, Mathematics Teachers
Expected Outcome	Improved classroom instructional practices using varied teaching strategies
Success Indicators	At least 80% of teachers apply at least 3 new strategies in instruction
Budget	To be determined by school
Source of Fund	School MOOE / Training Fund

Table 13

KRA 2: Enhancing Technology Integration

Planning component	Source plan details
Objectives	To improve teachers' ability to integrate digital tools in modular and blended instruction
Strategies / Activities	Hands-on training on Google Classroom, Zoom, Quizizz, Kahoot; digital resource sharing workshop
Time Frame	2 Days
Resources Needed	Laptop, internet connection, projector, ICT tools
Persons Involved	ICT Coordinator, Trainers, Teachers
Expected Outcome	Increased use of ICT tools in lesson delivery and assessment
Success Indicators	At least 70% of teachers use digital tools in instruction
Budget	To be determined by school



Planning component	Source plan details
Source of Fund	School MOOE / LGU Support

Table 14

KRA 3: Improving Feedback and Assessment Practices

Planning component	Source plan details
Objectives	To strengthen teachers' feedback, communication, and assessment strategies for learner monitoring
Strategies / Activities	Seminar-workshop on feedback strategies, formative assessment, and learner tracking system
Time Frame	1 Day
Resources Needed	Assessment templates, printed modules, communication tools
Persons Involved	School Heads, Teachers, Parents (optional)
Expected Outcome	Improved quality of feedback and student monitoring practices
Success Indicators	Regular feedback logs and improved learner performance records
Budget	To be determined by school
Source of Fund	School MOOE

Discussion

The findings imply that the junior high school mathematics teachers demonstrate a high level of effectiveness in employing diverse teaching strategies during modular distance learning, particularly in providing structured guidance and contextualized learning experiences. This suggests that teachers are able to adapt their instructional practices to support learners' understanding of mathematical concepts despite the limitations of distance learning modalities. However, the slightly lower ratings in strategies such as questioning techniques and lesson integration indicate areas that may require further enhancement. Strengthening these aspects may further improve students' conceptual understanding and problem-solving abilities. Overall, the results suggest that the junior high school mathematics teachers maintain a positive and effective implementation of teaching strategies, which plays a significant role in supporting students' learning in modular distance learning environments.

Several related studies give empirical evidence that could present a better understanding of the effectiveness of teaching strategies in improving students' mathematical understanding and problem-solving skills. Cambaya and Tan (2022) found that contextualized instruction significantly enhanced students' problem-solving skills and engagement in mathematics, emphasizing the importance of relating mathematical concepts to real-life situations. Similarly, Bayarcal and Tan (2023) reported that the Open-Ended Approach improved students' achievement and problem-solving skills by encouraging exploration, critical thinking, and active participation in mathematics learning. In addition, Lee and Safii (2021) highlighted that mastery-oriented teaching approaches in Singapore utilized structured lesson phases, worked examples, and guided practice to help students gradually develop deeper understanding and proficiency in solving mathematical problems. These studies support the present findings by suggesting that structured guidance, contextualized instruction, and critical thinking activities are effective teaching strategies that enhance students' engagement, conceptual understanding, and problem-solving abilities in mathematics, particularly during modular distance learning.

The findings imply that while mathematics teachers are familiar with basic online platforms, the integration of more advanced and interactive technological tools remains limited, resulting in a generally low level of technology integration in instructional delivery.

Several related studies give empirical evidence that could present a better understanding of the integration of technology in mathematics instruction and its influence on students' learning engagement and problem-solving skills. Dziubaniuk et al. (2023) emphasized that learning in digital environments becomes more effective when teachers utilize online interactions, digital resources, and collaborative platforms to support student engagement and understanding. Similarly, Khalid et al. (2025) found that connectedness, openness, and interaction within digital learning environments contributed positively to productive online collaboration and learning experiences. In addition, the International Mathematical Union (2024) highlighted that challenges related to instructional quality, teacher



preparedness, and limited resources continue to affect the effective integration of technology in mathematics education across Southeast Asia. These studies support the present findings by suggesting that although teachers may be familiar with basic online platforms, limitations in technological skills, resources, and training may hinder the effective use of advanced and interactive digital tools in mathematics instruction during modular distance learning.

The findings imply that the junior high school mathematics teachers demonstrate a generally effective practice in assessing and monitoring student progress during modular distance learning, particularly in maintaining communication with learners and parents and in adjusting instruction based on assessment results. This indicates that teachers are responsive to learners' needs and are able to use assessment information to guide instructional decisions, which supports the continuity of learning in a distance education setup. However, the relatively lower emphasis on reflective learning, self-assessment, and immediate feedback suggests a gap in fostering students' metacognitive and independent learning skills. This implies that students may have fewer opportunities to critically evaluate their own learning and problem-solving processes, which are essential in developing higher-order thinking skills in mathematics. Therefore, strengthening reflective assessment practices and timely feedback mechanisms is necessary to further enhance students' autonomy, conceptual understanding, and problem-solving competence.

Several related studies give empirical evidence that could present a better understanding of the role of assessment and monitoring practices in improving students' learning outcomes and problem-solving skills in mathematics. Hidayat et al. (2025) found that metacognitive instructional strategies, particularly those involving reflection, self-monitoring, and feedback, significantly improved students' mathematics achievement and self-regulated learning processes. Similarly, Shah (2025) emphasized that metacognitive teaching strategies, including self-questioning and reflective activities, enhanced students' problem-solving performance and academic motivation in higher education mathematics contexts. In addition, Albuero and Doronio (2025) reported that instructional strategies such as differentiated instruction, collaborative learning, and real-world applications positively influenced learners' critical thinking dispositions, highlighting the importance of assessment-informed teaching practices in supporting student development. These studies support the present findings by suggesting that effective assessment and monitoring practices, particularly those that emphasize reflection, feedback, and instructional adjustment, are essential in strengthening students' conceptual understanding, independence, and problem-solving skills in mathematics during modular distance learning.

The findings imply that the junior high school mathematics teachers demonstrate a generally effective level of feedback and communication with learners in modular distance learning. Their consistent use of messaging platforms and provision of clear, specific feedback helps facilitate student understanding and supports continuous learning despite the absence of face-to-face instruction. However, the relatively lower use of multiple communication channels suggests a limited expansion of communication strategies, which may restrict accessibility for some learners. Enhancing the diversity of communication methods and further strengthening motivational feedback could improve student engagement and learning outcomes. Overall, the results highlight that effective teacher-learner communication plays a crucial role in sustaining mathematics learning in a distance education setting.

Several related studies give empirical evidence that could present a better understanding of the importance of feedback and communication in supporting students' learning and engagement in mathematics during modular distance learning. Ubat et al. (2024) found that instructional quality, classroom management, and social-emotional support positively influenced students' interest in learning mathematics, highlighting the importance of consistent teacher communication and support in maintaining learner engagement. Similarly, Heubeck (2025) emphasized that supportive feedback and positive learning environments help reduce students' math anxiety and improve their confidence and performance in mathematics. In addition, Hidayat et al. (2025) reported that instructional approaches promoting metacognitive awareness, such as guided reflection and targeted feedback, significantly enhanced students' mathematics achievement and self-regulated learning processes. These studies support the present findings by suggesting that clear communication, timely feedback, and consistent teacher responsiveness are essential instructional practices that strengthen students' understanding, motivation, and participation in mathematics learning during modular distance learning.

The findings imply that junior high school mathematics teachers generally demonstrate effective instructional practices in terms of teaching strategies, communication, and assessment; however, the overall extent remains only



moderate due to the weak integration of technology in teaching. This suggests that while teachers are competent in traditional pedagogical practices, they are less prepared or less equipped in maximizing digital tools for instruction. This further implies that enhancing teachers' technological competence is necessary to improve the overall effectiveness of teaching techniques in modular distance learning. Strengthening technology integration, alongside sustaining strong instructional and assessment practices, may lead to more balanced and effective teaching approaches that better support students' problem-solving skills in mathematics.

Several related studies give empirical evidence that could present a better understanding of the overall pedagogical approaches of junior high school mathematics teachers and how these influence instructional effectiveness and students' problem-solving development in modular distance learning. Ubat et al. (2024) found that instructional quality, classroom management, and cognitive engagement significantly influence students' interest and performance in mathematics, highlighting the importance of strong pedagogical practices in sustaining learning outcomes. Similarly, Cambaya and Tan (2022) emphasized that contextualized instruction enhances students' problem-solving skills and engagement, suggesting that effective teaching strategies play a crucial role in mathematics learning. In addition, Dziubaniuk et al. (2023) stressed that meaningful learning in digital environments depends on teachers' ability to integrate technology, communication, and collaborative tools effectively. These studies support the present findings by indicating that while mathematics teachers may demonstrate strong instructional, communication, and assessment practices, limited technology integration can constrain the overall effectiveness of teaching techniques, particularly in modular distance learning contexts.

The findings imply that the teaching strategies of junior high school mathematics teachers during modular distance learning are not significantly influenced by their demographic characteristics. This suggests that instructional practices may be more shaped by other factors such as institutional support, access to resources, school policies, or individual teacher adaptability rather than age, gender, experience, or academic qualifications.

Furthermore, the absence of significant relationships implies that teachers, regardless of their background, tend to employ relatively similar teaching strategies in modular distance learning. This may indicate a standardized approach to instruction within the district or the influence of common training programs and DepEd guidelines. Overall, the results suggest that improving teaching strategies may be more effectively achieved through targeted pedagogical and technological interventions rather than demographic-based considerations.

Several related studies give empirical evidence that could present a better understanding of the relationship between teachers' demographic profiles and their teaching strategies in mathematics. Karalı (2022) found that difficulties in teaching mathematics are often influenced more by contextual and instructional factors such as learner readiness, resource availability, and modular distance learning constraints rather than teacher background characteristics. Similarly, Mainali and Spalding (2025) emphasized that while teaching experience contributes to confidence and instructional readiness, it does not automatically determine the effectiveness of pedagogical approaches, as teachers still require practical exposure and adaptive strategies. In addition, Ubat et al. (2024) reported that instructional quality, classroom management, and learner engagement are more strongly associated with students' interest in mathematics than demographic variables such as age or experience. These studies support the present findings by suggesting that junior high school mathematics teachers' teaching strategies are less dependent on demographic characteristics and are more influenced by contextual, institutional, and pedagogical factors within the learning environment, particularly in modular distance learning settings.

Conclusion

Based on the findings, it can be concluded that the junior high school mathematics teachers in Tabuelan District demonstrate generally effective pedagogical approaches in teaching strategies, assessment and monitoring of student progress, and feedback and communication with learners, which support students' problem-solving skills during modular distance learning. However, their integration of technology in modular instruction remains limited and requires strengthening. It is also concluded that the pedagogical approaches of junior high school mathematics teachers are not significantly influenced by their demographic characteristics. This suggests that pedagogical approaches are more likely shaped by other factors such as institutional support, availability of instructional materials, school-based training, and personal adaptability to teaching demands during modular distance learning.



Recommendations

Department of Education (DepEd). It is recommended that the Department of Education strengthen existing policies and develop targeted professional development programs focusing on pedagogical approaches in mathematics, particularly in teaching strategies, feedback and communication, assessment practices, and technology integration. DepEd may also design specialized training and monitoring mechanisms to enhance teachers' capacity in integrating digital tools and improving students' problem-solving skills during modular distance learning.

School Heads. School heads are encouraged to conduct regular classroom observations and provide instructional supervision that focuses on enhancing mathematics teachers' pedagogical practices. It is further recommended that school leaders initiate school-based training sessions and mentoring programs that strengthen teachers' use of effective teaching strategies, improve feedback and communication systems, and promote better assessment practices to support students' problem-solving development.

Mathematics Teachers. Mathematics teachers are encouraged to continuously improve their pedagogical approaches by engaging in professional development activities, particularly those related to innovative teaching strategies, assessment practices, and learner-centered instruction. It is recommended that teachers further strengthen their use of technology integration in modular distance learning and consistently enhance feedback mechanisms to better support students' mathematical problem-solving skills.

Students. Students are encouraged to actively participate in learning activities and take advantage of the feedback, communication, and instructional support provided by their teachers. It is recommended that students develop independent learning habits, practice self-assessment, and engage in problem-solving exercises to maximize the benefits of improved pedagogical approaches in mathematics.

Parents. Parents are encouraged to establish a supportive learning environment at home that fosters positive attitudes toward mathematics. It is recommended that they actively monitor their children's academic progress, maintain open communication with teachers regarding performance, and guide their children in developing consistent study habits and time-management skills, particularly during independent problem-solving tasks and modular learning.

Researcher. Researcher is encouraged to further explore related variables such as school resources, teacher attitudes toward technology, and learner engagement to deepen understanding of factors influencing pedagogical effectiveness. It is also recommended that future studies expand the scope to other districts or educational levels to validate and enrich the findings of this study.

Future Researchers. Future researchers are recommended to use this study as baseline data for further investigations on mathematics teachers' pedagogical approaches and students' problem-solving skills. It is further suggested that they conduct comparative or longitudinal studies to examine changes in instructional practices over time, especially in relation to technology integration and distance learning modalities.

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