

Surfing the Mathematical Waves: Instructional Practices of Mathematics Teachers in Island Public Schools of Surigao City, Philippines

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Abstract This study explores the instructional practices of mathematics teachers in island public schools in Surigao City, Philippines. It examines the lived experiences of these educators, delving into their innovative approaches and strategies to enhance mathematics education in unique island school settings. The research focuses on how these teachers navigate the challenging and ever-changing waves of mathematical instruction, intending to empower students and cultivate a deep understanding of mathematical concepts. Additionally, the study highlights the struggles mathematics teachers face in adapting to new instructional strategies for island learners, considering the impact of the pandemic on students' foundational mathematics skills. This abstract provides insight into the captivating realm of instructional practices within Surigao City's island public schools, where teachers strive to ride the mathematical waves and create engaging and effective learning experiences for their students. The study uses a phenomenological research design and involves semi-structured, in-depth interviews with eight randomly chosen mathematics teachers. Braun and Clarke's thematic analysis examines and interprets the interview results. Five key themes are found in the study's findings, which are as follows: teaching competence and professional development; instructional methodologies and strategies; student competence and skills development; curriculum and contextualization; and integration of technology and instructional tools. The implications of this study for the Department of Education (DepEd), teachers, and school heads in Surigao City's island public schools include the need for targeted support and resources to address the unique challenges mathematics teachers face. The findings highlight the importance of professional development opportunities, tailored instructional strategies, and teaching methodologies among teachers to enhance mathematics education in island school settings.

Keywords: *lived experiences, instructional practices, island public school, mathematics teachers, mathematical waves*

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1. Introduction

This study explores the instructional practices of mathematics teachers in island public schools in Surigao City, Philippines. It examines the lived experiences of these educators, delving into their innovative approaches and strategies to enhance mathematics education in unique island school settings.

In a volatile, uncertain, complex, and ambiguous world undergoing rapid change, schools have to overcome the challenge of unlearning outdated paradigms, adopting relevant methodologies, and developing new strategies to ensure continuous learning. Schools are prioritizing both the continuity of knowledge and the quality of instruction during health crises. Considerations such as teacher preparation, instructional objectives, learning plans,

motivation, teaching strategies, and evaluation methods are necessary when evaluating and reviewing schools' curricula and instructional methods [1]. These components are collectively classified as instructional practices.

Baum suggests several effective teaching methods or instructional practices, such as connecting knowledge to real-world situations, prior knowledge, and vocabulary to develop background knowledge, facilitating meaningful interaction between students and teachers through content-rich discussions, and providing students with opportunities to apply newly acquired skills through a variety of activities [2].

Considering the challenges posed by a volatile, uncertain, complex, and ambiguous world, the public schools in Surigao are evaluating their current situation and implementing the necessary steps to establish enabling, engaging, and empowering instructional practices.

Mathematics teachers are struggling to adapt to new instructional teaching strategies for island learners, as many students have not developed a solid foundation in mathematics over the past two years due to the pandemic's disruption of learning. The insufficiency of teachers and resources to manage subjects outside their areas of expertise is presenting an additional obstacle. Teachers and students are making concerted efforts to adapt and find ways to continue education despite the challenges they face.

Consequently, the researcher intends to investigate the mathematics teaching experiences of teachers in the island public schools of Surigao City. This study is going to explore the instructional practices of mathematics teachers. The study is timely and pertinent because it can provide recommendations to improve the instructional practices in the island public schools of Surigao City, which will ultimately benefit the Surigaonons.

2. Methodology

This study utilized a phenomenological research design to explore the lived experiences of mathematics teachers in their instructional practices in the island public schools of Surigao City.

This study was conducted at the island's public schools in Surigao City. Surigao City is situated at the northeastern tip of Mindanao Island.

The researchers sought the district supervisor's and school head's assistance in selecting mathematics teachers for one-on-one, in-depth interviews with the participants based on the selection criteria. It involved the secondary public schools in Surigao City. These schools were at the island schools of Surigao City, with the principal's or school head's approval. The participants were chosen based on the following criteria: handling classes at different levels in high school and being full-time mathematics teachers with at least three years of teaching experience on the island. The participants were chosen based on availability.

The researchers conducted an interview based on the study's research objectives:

Grand Tour Question: What were the lived experiences of mathematics teachers in teaching math regarding the instructional practices employed in the island public schools in Surigao City?

Guide Question:

1. Could you give a specific instructional practice you used in teaching and how it impacted your student's understanding of mathematics?
2. What were your experiences when you implemented your instructional practices in your classroom?
3. How did the island culture and community influence your use of instructional practices in your teaching?
4. Could you explain a specific instance in which you had to modify or change an instructional practice you used in your teaching and why?
5. How did you stay current with and incorporate new instructional practices and strategies into your teaching on the island?

Conducting in-depth interviews with the participants served as the main technique of data collection in this

study, which used a phenomenological approach [3]. Phenomenological interviews are conducted to elicit a common interpretation of a phenomenon shared by several participants [4].

To demonstrate the honesty, rigor, and reliability of the study's completion, we considered the following ethical practices: Permission to involve participants was sought from the Schools Division Superintendent, Public School District Supervisor, and Principal/School Head to allow the researchers to conduct the one-on-one, in-depth interview among teachers through audio recording. In addition to interviews, an observation method was used to observe the research learning environment. The personal information and identities of the participants were treated with the utmost confidentiality. The researchers sought the assistance of the Principal's office or School head in looking for faculty members to participate in the interview. It was made clear among the participants that they had the right to withdraw from the interview without prejudice or being coerced to give reasons.

The conduct of interviews was scheduled to suit the preferences and convenience of the participants. The researchers gave all the participants unsigned copies of the informed consent documents. They had to affix their signatures at the bottom of the page, signifying their respective permissions to participate in the interview. The provisions of RA 10173, otherwise known as the Data Privacy Act of 2012, were strongly observed throughout this study.

The data underwent thematic analysis following Braun and Clarke's procedure, which involved several steps. These steps included becoming familiar with the data, coding, generating themes, reviewing themes, defining and naming themes, and finally, writing up the analysis. In this study, the researchers gained familiarity with the data by repeatedly listening to the participants' interview recordings and transcribing them verbatim. Once transcribed, the data was translated into English, and the researchers used the translated transcripts for coding. From the coded data, themes were generated and reviewed, with extra attention given to ensuring accuracy in the translated transcripts. The emerging themes were then named and defined based on the translated transcripts and coded data. Lastly, the researchers compiled the data analysis, incorporating the gathered data and the identified themes.

This study utilized two validation procedures for qualitative research, including triangulation and member checking. In this study, the researcher specifically employed *data triangulation* by incorporating various complementary data sources, such as face-to-face interviews, document analysis, and direct observation. The purpose was to gather diverse perspectives and cross-reference the information to ensure the reliability and validity of the interpretations.

In addition, *member checking*, also known as results verification, is a crucial step in qualitative research where the researcher seeks feedback and confirmation from participants on the research findings or interpretations. It serves as a means of ensuring the credibility and authenticity of the research by involving participants in the validation and verification processes of the findings.

Ethical considerations were manifested to prevent any threats from considerably harming the informants throughout the study. The informants' responses remained confidential to protect their anonymity. Various aliases were employed, employing pseudonyms to distinguish individuals within a specific context while concealing their identity in other contexts.

3. Results and Discussion

The findings of the study on mathematics teachers and their instructional practices in the island public school of Surigao City yielded five (5) central themes: teaching competence and professional development; instructional methodologies and strategies; student competence and skills development; curriculum and contextualization; and lastly, integration of technology and instructional tools.

3.1. Teaching Competence and Professional Development

These themes highlighted the instructional practices of mathematics teachers on the island of Surigao City. Researchers gained insights into the teachers' experiences, providing valuable information about their teaching competence and professional development. The themes had subthemes, including teacher competence and pedagogy, teaching strategies and merging tools, and professional development. The study affirmed that teachers possessed strong math knowledge and were adept at explaining concepts to their students. They demonstrated various ways to support student learning and continuously pursued personal growth and improvement, staying updated with the latest teaching practices and math understanding.

The first subtheme, teacher competence and pedagogy, focused on the expertise and knowledge of mathematics teachers on the island. It explored their pedagogical skills, subject-matter knowledge, and instructional effectiveness. Teachers demonstrated competence by employing effective teaching methods, displaying a deep understanding of mathematical concepts, and fostering student engagement and learning. In the unique context of island teachers, they showcased subject matter expertise by recognizing the importance of basic operations in learning. They employed effective pedagogical strategies, such as conducting recalls and reviewing previous lessons, to cater to students' learning needs. Additionally, they exhibited adaptability by addressing the challenges of modular learning and integrating scaffolded learning approaches, building on prior knowledge to facilitate a more comprehensive understanding. Teachers effectively applied proven pedagogical methods by reviewing past lessons and utilizing sequential, scaffolded learning techniques, contributing to an enhanced student learning experience [5].

The second subtheme, Teaching Strategies and Emerging Tools, examined teachers' instructional approaches and tools in their mathematics classrooms. Researchers analyzed teachers' lived experiences to understand their strategies for making mathematics accessible and engaging for students. Teachers employed

creative methods and tools to facilitate student learning. They utilized colorful materials to make math exciting and understandable and employed flashcards to promote quick thinking and information retention. In summary, the teachers incorporated engaging materials and quick-review tools to make lessons practical and appealing. Sharma's study emphasizes the value of creativity, innovation, and integrating emerging tools in education, promoting more meaningful learning through experiential learning and dialogue-based teaching strategies [6].

The final professional development subtheme focused on mathematics teachers' continuous growth and learning. Professional development involves acquiring new knowledge and improving teaching practices. The island teachers accomplished this through their participation in programs and seminars. They successfully implemented new ideas, such as teaching geometry with shapes, while acknowledging the challenges arising from their island location that may limit the adoption of certain strategies. Avalos' research highlights professional development as activities and programs to enhance teachers' knowledge, skills, and practices. It encompasses various approaches, including workshops, mentoring, and collaboration, to assist teachers in enhancing their instructional practices, expanding their knowledge base, and ultimately improving student learning outcomes [7].

3.2. Instructional Methodologies & Strategies

This theme encompassed various teaching approaches and innovative strategies employed in the teaching-learning process. Instructional Methodologies and Strategies in the Instructional Practices of Mathematics Teachers on the Island refer to the specific approaches and techniques used by teachers to teach mathematics. This theme explored the various methods and strategies teachers employ in their classrooms to facilitate student learning and understanding of mathematical concepts. This theme encompassed subthemes such as instructional methods, instructional techniques and tools, and innovative approaches.

The first subtheme was about instructional methods and focused on mathematics teachers' overall approaches and frameworks. This could have included methods like direct instruction, problem-based learning, or inquiry-based instruction. The instructional methods used by teachers on the island primarily involved lecturing, where the teacher shared information verbally. However, there was also recognition of the importance of hands-on and participatory approaches, which engaged students and improved their knowledge retention. According to Ertmer and Newby, cognitive instructional methods involve strategies that focus on how the mind learns and processes information. They included problem-solving, guided discovery, and scaffolding. The aim was to actively engage learners, encourage metacognition (thinking about their own thinking), and help them organize knowledge effectively. These methods promoted meaningful learning and better retention of information by actively involving learners in the learning process [8].

The second subtheme, Instructional Techniques and Tools, explored the specific techniques and tools employed by mathematics teachers to enhance instruction.

This could have involved using manipulatives, visual aids, technology-based resources, or cooperative learning strategies. Instructional techniques and tools employed by teachers on the island involved using models for teaching abstract concepts and visual aids for effective communication during reporting or presentations, considering the limited resources available. These approaches aim to enhance students' comprehension and engagement with the subject matter. Hattie defined instructional tools as the various strategies and techniques used in teaching to enhance student learning. These tools encompassed a wide range of approaches, such as feedback, classroom discussions, self-assessment, teacher clarity, and other evidence-based practices. Hattie's work emphasized the importance of understanding the impact and effectiveness of different instructional tools to guide educators in making informed decisions about their instructional practices [9].

Lastly, the innovative instructional approaches focused on exploring new or creative methods employed by mathematics teachers. It investigated the implementation of these innovative approaches, the rationale behind their adoption, and their potential impact on student learning outcomes. Innovative instructional approaches on the island involved the integration of digital literacy and the promotion of project-based learning and hands-on activities. Teachers strove to keep up with new trends, embraced digital tools, and provided engaging learning experiences that went beyond traditional teaching methods. These approaches aim to enhance student learning, motivation, and real-world skill development. Innovative instructional approaches involve flexible, personalized, and active learning experiences. Teachers employed strategies such as tailored instruction, interactive activities, and the use of diverse resources. Data-driven instruction informs teaching decisions. Integrating technology and varied instructional approaches fostered innovation and enhanced the learning experience [10].

3.3. Student Competence & Skills Development

This theme captured student abilities, learning outcomes, and skills enhancement elements. "Student competence and skills development" in the instructional practices of mathematics teachers on the island focused on students' abilities, knowledge, and growth in mathematics. This theme explored how teachers aimed to enhance students' competence and skills in the subject through their instructional practices. It encompassed subthemes such as student competence and knowledge, Skills development and assessment, and learning loss.

The first subtheme, student competence, and knowledge, explored how mathematics teachers assessed and supported students' understanding of mathematical concepts. It delved into how teachers identified students' prior knowledge, addressed misconceptions, and provided opportunities for students to deepen their understanding. Researchers sought to understand how teachers nurtured students' mathematical competence and promoted a solid foundation of mathematical knowledge. Within teachers' instructional practices on the island, student competence and knowledge were fostered by stimulating prior

knowledge, incorporating humor and engagement, actively introducing new lessons, and promoting student participation and hands-on learning. These approaches aimed to create an engaging and effective learning environment that supported students' knowledge retention and competence development. Effective instructional practices enhance students' competence and knowledge. This included setting clear learning goals, using evidence-based instructional strategies such as cooperative learning and formative assessment, providing meaningful feedback, and fostering positive relationships. By implementing these practices, educators could support students in developing proficiency in skills and deepening their understanding of content [11].

The second subtheme was skills development and assessment, which focused on how mathematics teachers helped students develop essential mathematical skills. It investigated the instructional strategies and activities teachers employ to cultivate skills such as problem-solving, critical thinking, reasoning, and mathematical reasoning. It also explored how teachers assessed these skills through formal assessments or ongoing feedback and observation. Within teachers' instructional practices on the island, skills development and assessment involved a progressive approach to building skills, assessing understanding through student reasoning, and emphasizing the importance of mastering the basics. These practices aim to support students in acquiring and applying essential skills and knowledge effectively. Heritage highlighted the connection between skills development and assessment in her study on formative assessment. The study emphasized the importance of ongoing feedback and monitoring to support skill growth. Practical strategies were provided for implementing formative assessment to assess and promote skills effectively [12]. Integrating formative assessment into daily instruction was emphasized as crucial for enhancing skills development.

Lastly, the learning loss addressed the impact of gaps or setbacks in students' learning progress. It examined how mathematics teachers addressed learning loss and provide targeted support to help students catch up. This involved differentiated instruction, individualized interventions, or additional resources tailored to students' specific needs. The instructional practices on the island, "learning progress or loss," referred to the use of strategies such as rapid problem presentation to stimulate students' thinking and revisiting fundamental concepts to address any learning gaps. These practices aimed to support students' progress in their learning journey and mitigate any potential learning loss they may have experienced. Learning progress or loss denotes the improvement or decline in students' knowledge and skills. Learning progress signified growth and advancement, while learning loss indicated a lack of progress or regression. The study emphasized the importance of visible learning and offered strategies to enhance progress and minimize loss, such as creating a positive environment, setting clear goals, providing feedback, and promoting student engagement [13].

3.4. Curriculum & Contextualization

This theme focused on the curriculum, its adaptation, and the relevance of teaching content to the students' context. In the lived experiences of mathematics teachers on the island, the theme "Curriculum and Contextualization" in instructional practices denoted how teachers on the island designed and adapted the curriculum to make it relevant and meaningful for their students. It encompassed subthemes such as contextualization in teaching and curriculum evolution and adaptation.

The first subtheme, contextualization in teaching, focused on how mathematics teachers on the island made the curriculum more relevant and meaningful for their students. It explored how teachers connected mathematical concepts to real-life examples, local contexts, and students' experiences. By incorporating contextualization, teachers aimed to enhance student engagement, understanding, and application of mathematics in practical situations. In the instructional practices on the island, "contextualization in teaching" was derived from the deliberate effort of teachers to relate the learning material to local scenarios and utilize relevant resources that resonated with the students' context. This approach aimed to enhance students' understanding, relevance, and content application. Contextualization was essential for engaging students in the teaching and learning process. It involved connecting the lesson to students' real-life situations, making it meaningful and relevant to their lives. Math teachers used students' life experiences and local materials to create a context that enhanced understanding. This strategy helped teachers deliver effective and engaging lessons with the support of reference materials and training. Teachers created a lively and constructive learning environment by relating math concepts to students' lives [14].

The last subtheme was about curriculum evolution and adaptation and explored how mathematics teachers on the island modified and updated the curriculum to meet the changing needs of students and educational standards. It investigated how teachers identified areas for improvement in the curriculum, made adjustments better to align it with students' needs and local contexts, and incorporated innovative approaches and resources. It examined teachers' experiences navigating curriculum changes and adapting their instructional practices accordingly. In the instructional practices on the island, "curriculum evolution and adaptation" described the continuous modification and adjustment of instructional materials and lesson plans. Teachers utilized resources with simplified explanations and adopted a pedagogical approach that started with specific examples, gradually building toward general concepts. This approach aimed to enhance students' understanding and promote effective learning. Curriculum evolution and adaptation denote the continuous process of revising and updating educational programs to meet the changing needs of learners and society. They emphasized the importance of moving beyond traditional approaches and developing curricula focused on critical thinking, problem-solving, and other essential skills [15].

3.5. Integration of Technology & Instructional Tools

This theme captured the role of technology and other tools in facilitating teaching and learning. In the lived experiences of mathematics teachers on the island, the theme "integration of technology and instructional tools" in instructional practices stated how teachers incorporated technology and various tools into their teaching to enhance mathematics instruction. It encompassed subthemes such as tools and technology in instruction and teaching modalities.

The first subtheme, Tools and Technology in Instruction, focused on how mathematics teachers on the island incorporated various technological resources and instructional tools into their teaching. It explored how teachers utilized educational apps, interactive software, digital platforms, or specialized equipment to enhance mathematics instruction. Teachers on the island incorporated various tools and technologies into their instruction to enhance teaching and learning experiences. They encouraged students to use specific applications and tools to stay updated with current trends in teaching and learning but for a limited time. By integrating tools and technology into their instruction, teachers on the island aimed to enhance student engagement, support conceptual understanding, and facilitate access to resources. These instructional practices leverage the power of digital tools and applications to enrich learning experiences and promote students' mathematical skills and knowledge. Tools and technology were various digital resources and technological innovations that could be utilized in educational settings. These tools and technologies encompass various digital devices, software applications, online platforms, and other resources that could enhance teaching and learning experiences [16].

Lastly, the subtheme of teaching modalities explored mathematics teachers' different approaches and methods when integrating technology and instructional tools. It explored how teachers provided guidance and support to students when using technology and how they created a balanced instructional environment that combined both technology-based and traditional teaching strategies. Teachers on the island employed various teaching modalities or approaches to facilitate instruction and engage students in the learning process. These modalities included using technological tools and platforms to enhance teaching and learning experiences. These teaching modalities helped teachers on the island create interactive and dynamic learning environments. They leveraged technology tools to improve instructional delivery, promote student engagement, and facilitate access to relevant learning materials. By utilizing PowerPoint presentations, teachers enhanced the effectiveness and efficiency of their instruction, catered to diverse learning needs, and fostered active participation in the learning process. Teaching modalities describe educators' various approaches and methods to deliver instruction and engage students in learning [17].

4. Conclusion

In conclusion, the study “Surfing the Mathematical Waves: Instructional Practices of Mathematics Teachers in Island Public Schools of Surigao City” provides valuable insights into the instructional practices employed by mathematics teachers in the island public schools of Surigao City. By exploring their methods and approaches, this research illuminates these educators’ unique challenges and highlights their innovative strategies to facilitate effective mathematics instruction in their classrooms.

The mathematics teachers in Surigao City demonstrate commendable commitment to enhancing their teaching competence and professional development. They implement engaging teaching strategies effectively and remain up-to-date with the latest educational practices. However, geographical challenges present specific difficulties for these teachers since the island has no electricity and no proper physical environment. Therefore, providing these educators with additional resources, targeted interventions, and tailored professional development opportunities is crucial to enhance their instructional effectiveness further.

Despite limited resources, these teachers show resilience and creativity by blending traditional and innovative teaching strategies. This balanced approach, which incorporates visual aids, hands-on learning, and digital tools, significantly boosts their teaching effectiveness. Providing more support in terms of resources and professional development opportunities can greatly aid these teachers in expanding their range of instructional methodologies.

These teachers’ approach to education underscores a strong commitment to developing students’ competence and skills. They effectively foster student development by using interactive techniques, emphasizing core skills, and providing personalized support to address learning loss. Additional resources and professional development opportunities can further enhance these strategies and boost student outcomes.

Furthermore, Surigao City teachers adeptly integrate the curriculum and contextualization into their mathematics instruction. This successful integration results in an engaging learning environment made possible through their strategic approach to curriculum adaptation and contextualized teaching. The emphasis on continuous transformation and teaching relevance implies that additional support and resources can yield significant benefits.

Lastly, these teachers effectively harness technology and instructional tools in their teaching methods. The study reveals the potential of these tools to create an interactive and engaging learning environment. Despite some limitations, their practices affirm the importance and advantages of technology integration and varied teaching modalities in contemporary education. Thus, further training and resources in these areas can serve to enhance these practices even more. This comprehensive understanding of Surigao City’s mathematics teachers provides valuable insights into how additional support and resources can significantly impact their teaching effectiveness and student outcomes.

This research highlights the immense value of mathematics teachers in Surigao City who strongly

commit to their professional development and instructional effectiveness despite geographical challenges and limited resources. They employ various teaching strategies, prioritize student competence and skill development, and integrate technology and contextualized curriculum into their practices. However, additional support in terms of resources and professional development opportunities is needed to enhance their teaching methodologies, facilitate curriculum adaptation, and promote limited, effective technology use. These teachers’ resourcefulness, who utilize limited solar energy and generators, demonstrates their dedication to providing a conducive learning environment. Providing the necessary support can empower these teachers and improve student outcomes, fostering quality education in challenging circumstances. This research inspires educators and policymakers, emphasizing the importance of investing in teacher development and resources to overcome constraints and create impactful learning experiences. The researchers wrote a letter and asked government agencies to donate instructional materials to assist island teachers in their teaching efforts, addressing resource limitations and enhancing the quality of education.

Therefore, the study implies that DepEd should allocate resources and professional development initiatives targeting geographical challenges. Teachers should pursue growth, adapt strategies, and request more resources. School heads must secure additional support for teachers, advocate for funding, and nurture a learning-centered environment. In summary, the findings emphasize the necessity for increased support, ongoing professional development, and strategic resource allocation to boost educational outcomes.

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