

Lived Experiences of Non-Mathematics Major Teachers Teaching Mathematics Subjects

Owen T. Crabajales¹, Primel N. Diago²

¹Head Teacher V, Balite National High School

ABSTRACT

A qualitative research design using Giorgi's (2003) descriptive phenomenological approach was employed to explore the lived experiences of non-mathematics major teachers assigned to teach mathematics subjects in selected public secondary schools in the Division of Surigao del Norte. This approach was appropriate for capturing and describing the essence of participants' firsthand experiences, particularly the challenges they encountered in content knowledge, instructional delivery, learner engagement, and professional adjustment. Data were collected through semi-structured interviews with nine purposively selected non-mathematics major teachers who had at least three years of experience teaching mathematics. Interviews were audio-recorded with participants' consent, transcribed verbatim, and analyzed following Giorgi's phenomenological processes of description, reduction, essence, and intentionality to identify significant meaning units, emerging themes, and the core structure of the phenomenon. A total of 281 meaning units were extracted and reduced into 174 concepts, 15 categories, and 5 sub-themes, namely: instructional practices and pedagogical approaches, teaching challenges and classroom realities, professional growth and teacher development, support systems and capacity building, and affective dimensions of teaching. The findings revealed that teachers continuously adapted their instructional practices through simplification, contextualization, collaboration, and learner-centered strategies to enhance student understanding and engagement. However, they also experienced persistent challenges in curriculum mastery, abstract content delivery, student motivation, and contextual constraints. Despite these difficulties, teachers demonstrated resilience through self-directed learning, peer collaboration, and professional development, which gradually strengthened their confidence, self-efficacy, and professional identity as facilitators of learning. The study was conducted in seven public secondary schools in Surigao del Norte: San Francisco National High School, Malimono National High School, Tubod National High School, Claver National High School, Lakandula National High School, Bacuag National Agro-Industrial School, and Gigaquit National School of Home and Industries. Ethical considerations were observed through approval from the Schools Division Superintendent and school principals, informed consent, confidentiality, anonymity, and voluntary participation. Trustworthiness was ensured using credibility, transferability, dependability, and confirmability based on Lincoln and Guba's (1985) criteria, including member checking, audit trails, reflexivity, and expert validation. Findings aimed to provide insights into the instructional realities of non-major mathematics teachers and served as a basis for recommendations to improve mathematics instruction, professional development, and institutional support systems.

Keywords: phenomenological study, non-mathematics major teachers, mathematics teaching, instructional practices, teacher challenges

I. INTRODUCTION

Mathematics is regarded as a fundamental subject for its intrinsic logic and structure as well as its ability to foster critical thinking and problem-solving skills (Marchisio, Remogna, Roman & Sacchet, 2022). Making sure teachers are subject-matter experts in mathematics is regarded as a crucial component of providing high-quality mathematics instruction in many educational systems across the globe. However, it is becoming more evident in educational reality that math classes are frequently taught by instructors whose main academic background is not Mathematics or math education. "Out-of-field" teaching is the term used to describe this circumstance, which is known to provide additional difficulties for the teaching-learning process (Pedrajas & Gallego, 2025).

In the Department of Education, this widespread pattern is a serious issue. The number of instructors assigned to teach courses unrelated to their education is increasing, particularly in Senior High School, despite the fact that almost all of them have minimal qualifications.

According to Hobbs (2020), the out-of-field phenomena emerges due of systemic teacher shortages, unequal distribution of instructors, scheduling challenges in schools, and teacher education systems in various countries where teachers are taught as specialists rather than generalists.

According to studies, children may view mathematics as distant or unapproachable when teachers lack enough subject-specific preparation, which can have a detrimental impact on learning and engagement (Sharkawi, 2020). Teachers who have no background in mathematics face two challenges: they have to balance the pedagogical needs of teaching a topic for which they were not initially prepared, and the content demands of mathematics.

Less is known about the lived experiences of non-mathematics major teachers in regular (face-to-face) classroom settings, particularly how they interpret their roles, modify their instruction, and face obstacles or supports in their day-to-day work. Designing professional development, teacher support systems, and policy frameworks that address the discrepancy between subject assignment and teacher qualifications requires an understanding of their narratives. Therefore, the purpose of this study was to investigate the lived experiences of non-mathematics major teachers teaching Mathematics subject.

1.1 Related Literature and Studies

Challenges of Non-Mathematics teachers teaching Mathematics subject in the Philippines

Mismatch teaching occurs when educators need to teach subject which is not their field of expertise since they are lack of the necessary qualifications, training, or experience to teach specific subjects or grade levels in schools (Co, et. al 2021). This mismatch between teacher qualifications and the subject matter taught is a widespread issue in education, caused by various factors like teacher shortages and scheduling problems (Kenny, et. al 2020).

Moreover, Hobbs and Törner(2019) explained that teaching subject that is not a person's expertise presents various instructional challenges, a global critical issue in education. Porsch and Whannell(2019) pointed out that this can lead to less effective learning environments due to teachers lacking the necessary training and experience. Hobbs and Porsch(2021) added that teachers teaching outside of their expertise may provide lower-quality instruction as they rely heavily on textbooks and use shallow methods. As a result, students experience less academic growth and decreased emotional support.

According to Raymundo (2021), students lose confidence and interest in class when the teacher lacks subject knowledge, impacting their enjoyment and attitude towards the subject. Conversely, teachers with higher content knowledge, design their own lesson plans and complement the textbook information with

engaging classroom activities make their students interested in the class (as cited by Mercado & Morante 2024). In other words, teachers teaching in their field of expertise allow their students to learn the subjects dynamically to maintain students' interest by connecting various themes and engaging in creative activities. Teaching that lack of mastery has a detrimental effect on achieving quality education. Hence, this phenomenon must be regarded as an essential issue in teacher education.

Furthermore, in the research conducted by Mercado & Morante (2024), showed that mathematics educators faced challenges when teaching subjects outside their expertise due to lack of content and pedagogical knowledge, resources, student motivation, and training. Despite this matter, they overcame these circumstances through self-learning and adaptive methods. This study determined that teaching subjects without adequate knowledge was problematic as it created interconnected problems. Effectively, a retooling and mentoring program led by subject experts would be beneficial in improving the content and pedagogical knowledge of out-of-field teachers.

Another research from Moral & Timosa (2024), emphasized the facing challenges in curriculum content and resources; gaining new knowledge with mathematical skills; taking pride in perseverance and resourcefulness; and being committed to continuous learning were the significant experiences that out-of-field Mathematics teachers, and in response to the challenges they have encountered, they deemed the following coping strategies essential: finding inspiration to teach by students' enthusiasm for learning; preparing diverse resources for student engagement; adapting and consulting references to improve teaching mathematics; and engaging to self-care and stress relief strategies. Upon reflecting on their entire experience, they arrived at the following insights: embrace growth through learning and adaptation; teaching requires mutual effort from both teachers and students; remain flexible and adaptable; stay resilient and determined amidst challenges; find joy in teaching and value in teaching mathematics; and implementation of trainings and seminars.

In the study of Zhou (2012, as cited by Riboroso and Llagas (2023), examines teachers teaching outside of the field of science and mathematics who teach in public schools in 21 countries using the data from OECD. Teachers teaching outside of their field are those who are young and inexperienced with substantial educational attainment, who worked on short contracts and part-time bases. Also, the results revealed that these teachers are disproportionately concentrated in rural, small, and low-SES schools. The Western Australian State School Teacher's Union, as mentioned by McConney and Price (2009, as cited by Riboroso and Llagas (2023), indicates that teaching outside your area or field is a factor that contributes to stress for teachers. It is a problem for new graduates faced with the extra demands of designing and implementing the program for an unfamiliar subject for which they need more preparation. This is consistent with feedback from math teachers in small schools who said they were given classes in subjects like music, the arts, physical education, and health (MAPEH), technology and livelihood education (TLE), education for special populations (ESP), and others. They claimed that they needed help in handling non-mathematics subjects assigned to them. Participants in Lynch's study (2014), *Out-Of-Field Mathematics Teachers: An International Problem That Needs A Solution*, who did not major in mathematics, identified confidence in teaching mathematics as a problem: 23.5% reported being "very confident," 35.3% reported being "confident," 29.4% reported being "average," and 11.4% reported being "unconfident." (Riboroso and Llagas, 2023).

Teachers struggled in terms of using appropriate teaching strategies. They also became adaptable due to the exposure of unfamiliar subject areas. Hence, support to teachers should be the priority of future policies to ensure that out-of-field teachers can manage the demands for their roles (Javines & Azarias, 2024).

Non-Mathematics major Teachers Teaching Mathematics Coping Mechanism and Strategies

Research indicates that the growing phenomenon of out-of-field mathematics teaching has led many non-mathematics-major teachers to adopt a range of pragmatic coping mechanisms to manage content gaps and workload pressures. Large reviews and national reports describe coordinated upskilling initiatives and highlight that many schools rely on short courses, micro-credentials and professional development to shore up teachers' mathematical content knowledge — interventions that substantially improve teacher confidence where they are available (Barker, et.al, 2024).

Qualitative studies from the Philippines and small mixed-methods investigations show teachers commonly cope by increasing lesson preparation time, simplifying or scaffolding mathematical tasks for students, reusing and adapting existing resources, and relying heavily on peer support or mentoring from in-field colleagues to plan lessons and troubleshoot content (Mercado & Moranter, 2024). Teachers also frequently use digital materials (video tutorials, worked-example banks, and interactive apps) both to refresh their own subject knowledge and to provide visual or stepwise scaffolds for learners, a strategy reported to reduce preparation burden though it can risk narrowing curricular depth if used without concurrent content learning (Velez, et. al, 2023).

Comparative and disciplinary studies from Osei and Agyei (2023), find that coping strategies such as targeted professional learning and mentoring produce quicker gains in classroom practice than purely ad hoc measures, but that effectiveness is heavily dependent on school leadership, access to coordinated upskilling, and national workforce policies that address the scale of out-of-field teaching.

Furthermore, in the research conducted by Lopez (2024) states that there were four main challenges: seasoned teachers' technological difficulties, technological resource constraint, resistance to change, curriculum integration. Teachers use a variety of strategies to address these issues like, troubleshooting skills, innovative solutions, seeking help and collaborations, and continuous professional development. The report also lists the types of assistance that school administrators should provide, professional development and learning opportunities, sharing experience and peer collaboration, resource allocation and infrastructure support, and building healthy relationships with stakeholder. The study results imply that with theories of social support, resilience, and stress and coping highlight the value of specialized support systems in assisting educators in successfully navigating the challenges of teaching mathematics using technology.

Synthesis. The literature emphasized the impact of out-of-field teachers on the learning performance of the learners, its effect on the teaching experience of the teachers and learners in dealing with deeper understanding of Mathematical concepts. The literature also displays non-mathematical major teacher teaching Mathematics daily teaching challenges on the pedagogical, content knowledge, and teaching approaches and explain appropriate coping mechanism to perform Mathematical expectations and competencies to the actual Mathematics instruction.

1.2 Theoretical and Conceptual Framework

This research was anchored on two major theoretical lenses: Shulman's Pedagogical Content Knowledge (PCK) Theory (1986) and Bandura's Social Cognitive Theory (1986). These frameworks provide a basis for understanding how teachers without formal training in mathematics education develop competence, confidence, and adaptive strategies in teaching mathematics.

According to Shulman (1986), effective teaching relies not only on content knowledge but also on *pedagogical content knowledge*—the ability to transform subject matter into forms that are understandable to learners. For non-mathematics major teachers, the challenge lies in mastering both the mathematical

content and the pedagogical approaches that make it accessible. Their experiences often highlight gaps in disciplinary knowledge, but also reveal creative pedagogical adaptations and reflective practices as they construct understanding through experience. Thus, PCK theory serves as a lens to explore how these teachers bridge their content limitations through pedagogical innovation and professional learning.

Complementing this, Bandura's Social Cognitive Theory (1986) emphasizes *self-efficacy* and *observational learning* as critical factors in human behavior and professional growth. Non-mathematics major teachers' belief in their ability to teach mathematics effectively—despite limited formal preparation—plays a key role in how they perform in the classroom. Teachers with higher self-efficacy are more likely to experiment with different teaching strategies, persist through difficulties, and inspire confidence in their students (Tschannen-Moran & Hoy, 2007). Therefore, this theory supports the understanding that motivation, self-belief, and continuous learning shape how teachers adapt and thrive in teaching mathematics.

Additionally, the study draws from the Out-of-Field Teaching Theory (Du Plessis, 2015), which frames the phenomenon of teachers teaching subjects outside their field of specialization. According to Du Plessis, out-of-field teaching is not merely a skills mismatch but a complex professional reality that influences teacher identity, professional learning, and instructional quality. Non-mathematics major teachers may experience professional identity tension, feeling both challenged and motivated to learn new content areas. Their lived experiences, therefore, become key to understanding how professional identity evolves in the face of assignment misalignment.

These theories collectively explain how teachers acquire and apply knowledge, develop self-efficacy, and construct professional identity while coping with the challenges of teaching mathematics outside their specialization. The conceptual framework of this study envisions that non-mathematics major teachers' experiences are influenced by their knowledge base, beliefs, and the professional context they operate in, which together shape their instructional practices and student learning outcomes.

1.3 Statement of the Problem

This study aimed to investigate the lived experiences of Non-Mathematics Major Teachers teaching Mathematics subject, to understand their experiences, challenges, coping strategies, and insights for teaching Mathematics.

Specifically, it sought to answer the following questions:

1. What are the lived experiences of Non-Mathematics major teachers in teaching Mathematics?
2. What challenges do non-mathematics major teachers encounter in teaching Mathematics in terms of content knowledge, pedagogy, and learner engagement?
3. What coping mechanism and strategies do non-mathematics major teachers employ to effectively teach Mathematics despite their non-specialization?
4. How do the experiences of non-mathematics major teachers influence their professional identity, confidence, and perception of their teaching effectiveness?
5. Based on the results of the study, what recommendations may be proposed?

II. METHODOLOGY

A qualitative research design using Giorgi's (2003) descriptive phenomenological approach was employed to explore the lived experiences of non-mathematics major teachers assigned to teach mathematics subjects in selected public secondary schools in the Division of Surigao del Norte. This design was appropriate because it allowed the researchers to capture and describe the essence of participants' firsthand

experiences, particularly their challenges in content knowledge, pedagogy, learner engagement, and professional adjustment. Data were gathered through semi-structured interviews with nine purposively selected non-mathematics major teachers who had at least three years of experience teaching mathematics. Interview responses were audio-recorded with participants' consent, transcribed verbatim, and analyzed following Giorgi's phenomenological processes of description, reduction, essence, and intentionality to identify significant meaning units, emerging themes, and the core structure of the phenomenon.

The study was conducted in seven public secondary schools in Surigao del Norte, namely San Francisco National High School, Malimono National High School, Tubod National High School, Claver National High School, Lakandula National High School, Bacuag National Agro-Industrial School, and Gigaquit National School of Home and Industries. Ethical protocols were strictly observed by securing approval from the Schools Division Superintendent and school principals, obtaining informed consent from participants, and ensuring confidentiality, voluntary participation, and anonymity throughout the study. Trustworthiness was established through credibility, transferability, dependability, and confirmability following Lincoln and Guba's (1985) criteria, including member checking, audit trails, reflexivity, and expert validation of research instruments. The findings of the study are intended to provide insights into the instructional realities of non-major mathematics teachers and serve as a basis for recommendations aimed at improving mathematics instruction, professional development, and institutional support systems.

III. RESULTS AND DISCUSSIONS

The researcher used the phenomenological research methodology by Giorgi (2003). It formed the basis for examining the data obtained from the informants, employing his methodology for data analysis. The researchers carefully read through the exact words of the informants to immerse themselves in the emotions expressed by the informants. Meaningful segments were identified from the incidents that pertained to the initially collected data. Furthermore, psychological meaning units were used to formulate concepts, which were organized into categories and subsequently evolved into themes. The findings were integrated into a comprehensive and detailed account of the informants' experiences.

From the transcripts of the interviews or specific incidents, meaning units were derived from the exact words provided by the informants. Contemplating their experiences led to the formation of psychological meaning units. A total of 281 meaning units were extracted, from which 174 concepts emerged, 15 categories were formed, and 5 sub-themes were developed.

Sub-Theme One : Instructional Practices and Pedagogical Approaches

This sub-theme was formulated from the categories *Instructional Adaptation and Teaching Strategies*, *Student Engagement and Participation*, *Contextualization and Real-Life Applications*, and *Teacher as Facilitator*. It reflects how mathematics teachers, particularly non-major educators, continuously adjust and refine their instructional approaches to address learners' needs, improve understanding, and make mathematics more meaningful and accessible. The findings emphasize that effective pedagogy is dynamic, learner-centered, and grounded in both classroom realities and real-life relevance

Category One: Instructional Adaptation and Teaching Strategies

This category emerged from concepts such as collaborative learning strategies, clarity and practice-based learning, instructional adaptation and differentiation, integration of theory and practice, lesson organization and sequencing, reflective and adaptive teaching practice, simplification and clarity of concepts, step-by-step teaching, and use of analogies and representations.

Informants consistently emphasized that effective mathematics teaching requires flexibility and adaptation. Teachers used collaborative learning strategies such as group work, idea sharing, and collaborative problem-solving (C48, G41, I16) to encourage interaction and shared understanding among learners. These approaches allowed students to learn not only from the teacher but also from their peers, reinforcing comprehension through social learning.

Clarity of instruction and practice-based learning were also central. Teachers ensured that explanations were simple, direct, and supported by guided practice activities (E11), allowing students to gradually build understanding. This was complemented by instructional adaptation and differentiation, where teachers adjusted strategies based on learner ability, simplified complex concepts, and modified approaches to reach more students (A3, A4, D8, I4).

Lesson organization played a significant role in ensuring coherence in instruction. Teachers structured lessons from simple to complex, introduced examples before seatwork, and ensured mastery before moving to activities (E10, G20, G21). Additionally, step-by-step teaching approaches were widely used, where complex mathematical ideas were broken down into manageable parts and explained systematically (C31, E5, F21, I15).

Teachers also integrated theory with practical application (C34) and used analogies and representations (C43) to make abstract concepts more understandable. Reflective practice was evident as teachers continuously adjusted their strategies through experience, observation of peers, and trial-and-error methods (B14, D14), highlighting teaching as an evolving practice. Overall, this category demonstrates that instructional adaptation is essential for making mathematics comprehensible, structured, and responsive to diverse learners.

The findings that teachers adjust instruction through simplification, scaffolding, and flexible pedagogy are strongly supported by existing literature. Mercado and Morante (2024) found that non-mathematics major teachers commonly adapt lesson materials, simplify mathematical tasks, and extend preparation time to manage content difficulties. This confirms that instructional adaptation is a primary coping mechanism in mathematics teaching.

Similarly, Velez et al. (2023) emphasized that teachers use digital tools such as video tutorials, worked examples, and learning applications to support both their own understanding and student comprehension. These strategies validate the finding that instructional delivery is enhanced through resource adaptation and multimodal teaching approaches.

Furthermore, Mercado and Morante (2024) support the observation that teachers promote student engagement by adjusting instruction based on learner needs and acting as facilitators of learning rather than sole knowledge providers.

Category Two: Student Engagement and Participation

This category was derived from concepts such as interactive and engaging strategies, game-based and motivational strategies, use of technology for engagement, collaborative and peer learning strategies, active participation strategies, motivation and mindset development, learner diversity, variability in engagement, and low student engagement issues.

Teachers highlighted the importance of engaging students actively in the learning process. Interactive strategies such as games, recitation, humor, and relatable hooks were frequently used to capture attention and sustain participation (B20, D16, E14, G31). These approaches helped transform mathematics from a passive to an active learning experience.

Collaborative and peer learning strategies were strongly emphasized. Students were encouraged to work

in groups, teach peers, and engage in shared problem-solving (A19, G42, G43). These strategies improved understanding, built confidence, and promoted communication skills among learners.

Active participation strategies such as questioning, recitation, and student involvement in discussions were also widely used (G12, G26). Teachers recognized that engagement increases when students are given opportunities to contribute meaningfully in class.

Technology was also utilized to support engagement, with teachers using YouTube, tutorials, and online resources to supplement instruction (F17). However, challenges such as student disengagement, lack of interest, fatigue, and negative perceptions of mathematics were also noted (D12, F14, I12).

To address these challenges, teachers worked to develop positive student mindsets by reducing fear and encouraging curiosity in mathematics (C40). Overall, engagement was seen as both a challenge and a central goal of effective pedagogy.

The finding that teachers promote student engagement through adaptive instruction is supported by Mercado and Morante (2024), who reported that teachers adjust teaching strategies to increase learner participation and sustain interest in mathematics lessons. Their study highlights that engagement improves when instruction is tailored to student needs and understanding levels.

Category Three: Contextualization and Real-Life Applications

This category emerged from concepts such as use of real-life applications in teaching, contextualized and real-life teaching, mathematics as a real-world problem-solving tool, localization of mathematical instruction, value of real-life applications, use of analogies and representations, experiential learning, and challenges in contextualization.

Teachers consistently emphasized the importance of making mathematics relevant to students' everyday lives. Lessons were often contextualized using real-life examples, such as daily activities, budgeting, and local community situations (A11, D10, F16, F20). This approach helped students see mathematics as meaningful rather than abstract and disconnected.

Mathematics was also framed as a practical problem-solving tool (C29, C1, C2), reinforcing its value in addressing real-world situations. Teachers incorporated local contexts into word problems and examples (F20), making lessons more relatable and culturally grounded.

Additionally, analogies and representations were used to simplify complex concepts and bridge abstract ideas with familiar experiences (C43, C46). Some teachers also highlighted experiential learning, where students learned through practice and real-life application (B3, B4).

However, challenges were also identified, particularly in applying abstract mathematical concepts to real-life situations (G4, I9). Despite this, contextualization remained a key pedagogical strategy for improving understanding, engagement, and relevance. Mercado and Morante (2024) also support the finding that teachers use contextualized examples and real-life applications to make abstract mathematical concepts more meaningful. This approach helps bridge the gap between theoretical content and students' lived experiences, improving comprehension and motivation in mathematics learning.

Category Four: Teacher as Facilitator

This category was formed from concepts such as teacher as facilitator rather than authority, relational and student-centered teaching, teacher as guide in problem-solving, collaborative facilitation, continuous growth in facilitative role, student progress as feedback, and development of teacher identity.

Informants described a significant shift in their teaching role—from being knowledge transmitters to facilitators of learning. Teachers emphasized that their role is not to dominate instruction but to guide students in constructing their own understanding (F29, A24). This reflects a learner-centered and relational

approach where teaching is built on connection, empathy, and interaction (C20, C21).

As facilitators, teachers guided students through problem-solving processes rather than directly providing answers (C18). They encouraged collaboration and peer learning, allowing students to actively participate in knowledge construction (G41, G42, G43). This approach fostered independence and deeper understanding among learners.

Teachers also viewed student improvement as feedback on their effectiveness (A26), reinforcing their role as enablers of learning rather than sole knowledge sources. Over time, teachers developed their facilitative identity through experience, reflection, and continuous learning (H21, I23). Overall, this category highlights a transformation in teaching identity toward facilitation, where teachers support, guide, and empower learners in their mathematical development.

The role of teachers as facilitators rather than sole knowledge providers is supported by Mercado and Morante (2024), who found that non-specialist teachers often guide learning by encouraging student participation, discussion, and exploration of mathematical ideas. This reflects a shift toward learner-centered instruction as a coping strategy for content limitations.

Sub-Theme 2: Teaching Challenges and Classroom Realities

This sub-theme was formulated from the categories *Teaching Challenges*, *Student Learning Difficulties*, *Student Motivation and Mindset*, *Contextual Constraints*, and *Curriculum Mastery and Content Difficulty*. It reflects the complex and multidimensional realities encountered by mathematics teachers, particularly non-major educators, as they deal with instructional demands, learner-related barriers, and content-related challenges. The findings show that teaching mathematics is not only about delivering content but also about managing abstract concepts, addressing diverse learner needs, and responding to contextual limitations that influence both teaching effectiveness and student learning.

Category One: Teaching Challenges

This category emerged from concepts such as general teaching difficulty, instructional preparation challenges, and teacher content familiarity challenges.

Informants described mathematics teaching as inherently challenging due to the demands of lesson preparation, instructional delivery, and classroom management. Teachers emphasized that careful planning is necessary to anticipate student difficulties and select appropriate teaching strategies (B10, E12). In addition, managing large and diverse classes made instruction more complex, especially when students had varying levels of understanding and engagement (B16). Some teachers also reported difficulty when teaching topics outside their specialization, which affected their confidence and effectiveness in delivering lessons (F25). Overall, this category highlights that teaching mathematics requires continuous effort, adaptability, and problem-solving in classroom practice.

Content delivery and classroom management are consistent with the findings of Co et al. (2021), who explained that mismatch teaching occurs when educators are assigned to subjects outside their field of expertise due to lack of training and qualification. Similarly, Kenny et al. (2020) emphasized that teacher shortages and scheduling constraints often lead to improper subject assignment, contributing to instructional difficulty.

Moreover, Hobbs and Törner (2019) highlighted that teaching outside one's specialization is a global issue that creates significant pedagogical strain. This is further supported by Hobbs and Porsch (2021), who found that out-of-field teachers tend to rely heavily on textbooks and simplified instructional strategies due to limited content familiarity. Javines and Azarias (2024) also noted that teachers struggle with selecting appropriate teaching strategies but gradually develop adaptability through experience. These

studies collectively validate the informants' experiences of difficulty in planning, delivering, and managing mathematics instruction, particularly in large and diverse classrooms.

Category Two: Student Learning Difficulties

This category was derived from concepts such as difficulty with abstract mathematical concepts, weak foundational knowledge, and student learning behavior issues.

Informants consistently observed that students struggle with understanding mathematics due to its abstract and symbolic nature. Topics involving formulas, derivations, and complex reasoning are often difficult for learners to visualize and comprehend (C6, C7, C26). Teachers also noted that many students lack strong foundational skills, which affects their ability to understand more advanced lessons and requires frequent reteaching of basic concepts (B11, G6, G7). Furthermore, student learning behaviors such as lack of focus, low retention, and limited participation further hinder academic progress (D13, G25). This category shows that student difficulties in mathematics are rooted in both cognitive gaps and learning behaviors.

The observed student difficulties in understanding abstract concepts, weak foundational knowledge, and behavioral learning issues are supported by Porsch and Whannell (2019), who stated that lack of teacher expertise often leads to ineffective learning environments. Hobbs and Porsch (2021) further explained that limited instructional depth reduces students' conceptual understanding and academic progress.

Raymundo (2021) emphasized that students struggle more when instruction lacks clarity and subject mastery, leading to gaps in understanding and reduced learning confidence. This aligns with Mercado and Morante (2024), who found that inadequate teacher knowledge creates interconnected learning difficulties among students, particularly in mathematics. These studies support the idea that student learning challenges are not isolated cognitive issues but are closely linked to the quality of instruction and teacher content mastery.

Category Three: Student Motivation and Mindset

This category emerged from concepts such as negative student perception of mathematics, low engagement and participation, and lack of openness.

Informants reported that many students perceive mathematics as difficult, boring, or irrelevant, which negatively affects their motivation to learn (A13, B15, C38). This mindset often results in low participation, reluctance to engage in problem-solving activities, and minimal effort in class tasks. Teachers also observed that students tend to lose interest quickly, especially when lessons are perceived as abstract or disconnected from real-life situations (D12, E13). In some cases, students demonstrate a lack of openness and even falsely claim understanding without fully grasping the concepts (G29, G30). Overall, this category emphasizes that student motivation and mindset are critical factors influencing learning outcomes in mathematics. The literature strongly supports the role of student perception and attitude in mathematics learning. Raymundo (2021) found that students often develop negative attitudes toward mathematics when instruction is perceived as difficult or unengaging, which leads to reduced motivation and participation. Similarly, Mercado and Morante (2024) explained that students become more engaged when teachers provide meaningful, creative, and context-based instruction. When lessons are abstract or disconnected from real-life experiences, student interest tends to decline. This aligns with the informants' accounts of students showing reluctance to participate, limited questioning behavior, and passive learning attitudes, demonstrating that student mindset significantly influences classroom outcomes.

Category Four: Contextual Constraints

This category was derived from concepts such as external factors affecting learning and socioeconomic-related challenges.

Informants highlighted that student learning is influenced by factors beyond the classroom environment. Family responsibilities and household obligations often limit students' time and energy for academic tasks (F13). In addition, some students lack adequate support systems at home, which affects their ability to review and understand lessons effectively. These contextual constraints create additional barriers to learning and highlight inequalities in students' learning conditions. Overall, this category shows that mathematics learning is shaped not only by instructional practices but also by broader social and environmental realities.

The influence of external and environmental factors on learning is well documented in the literature. Zhou (2012, as cited by Riboroso & Llagas, 2023) found that out-of-field teachers are often assigned to rural and low-SES schools, where resource limitations and family-related challenges are more common.

McConney and Price (2009, as cited by Riboroso & Llagas, 2023) further explained that teachers in such contexts experience increased stress due to inadequate preparation time and unfamiliar subject assignments. These contextual challenges extend to students, particularly those who face household responsibilities and limited academic support. These findings support the informants' experiences that student learning is influenced by socioeconomic realities beyond the classroom, reinforcing the importance of considering contextual inequality in mathematics education.

Category Five: Curriculum Mastery and Content Difficulty

This category emerged from concepts such as complexity of mathematical content, difficulty with abstract concepts, and instructional preparation challenges.

Informants emphasized that mastery of mathematics content is a significant challenge, particularly for non-major teachers. Abstract topics, complex formulas, and advanced mathematical concepts require deep understanding and extensive preparation before instruction (F7, G14, H6). Teachers often need to study lessons thoroughly and simplify content to ensure accurate and effective delivery. In addition, explaining complex mathematical ideas in a clear and understandable way remains a persistent difficulty (C7, F8). Despite these challenges, teachers continuously engage in preparation and self-learning to improve their content mastery and instructional effectiveness. Overall, this category highlights that curriculum difficulty directly influences teaching practices and instructional planning.

The difficulty of mastering mathematics content, especially for non-major teachers, is strongly supported by Hobbs and Porsch (2021), who found that teachers without strong subject backgrounds struggle with deep conceptual understanding and often simplify content during instruction. Mercado and Morante (2024) identified key challenges such as insufficient content knowledge, lack of resources, and inadequate training among out-of-field mathematics teachers. Similarly, Moral and Timosa (2024) emphasized that teachers must engage in continuous learning, self-study, and adaptive strategies to cope with curriculum demands. Riboroso and Llagas (2023), citing Lynch (2014), also highlighted varying levels of teacher confidence in mathematics instruction, with non-specialist teachers reporting lower confidence levels due to limited preparation. These studies collectively affirm that curriculum complexity and content difficulty significantly affect instructional effectiveness and require sustained professional development and institutional support.

Sub-Theme 3: Professional Growth and Teacher Development

This sub-theme was formulated from the categories Professional Growth and Learning, Teacher Confide-

nce and Self-Efficacy, and Teaching as Identity Transformation. It reflects how mathematics teachers, particularly non-major educators, develop professionally through continuous experience, reflection, and adaptation in teaching practice. The findings highlight that teacher development is not only centered on improving instructional competence but also involves building confidence, strengthening self-efficacy, and transforming professional identity over time. Teaching mathematics becomes a dynamic process of growth shaped by classroom experiences, student feedback, and ongoing self-improvement.

Category One: Professional Growth and Learning

This category emerged from concepts such as experiential learning, continuous learning process, reflective practice, persistence in mastering concepts, and development of adaptability and problem-solving mindset. Informants described professional growth as a continuous process shaped by actual teaching experiences and ongoing reflection. Teachers developed their skills through repeated exposure to classroom challenges, allowing them to refine instructional strategies and improve their understanding of mathematical content (B3, B4, I23, H21). Over time, they became more patient, adaptable, and resourceful in handling diverse learners and complex lessons (E22, I22, H18). Teachers also emphasized persistence in mastering subject matter and continuously improving their instructional approaches as part of their professional development (C61, G56). Overall, this category shows that professional growth is gradual, experience-based, and sustained through reflective teaching practice.

Barker et al. (2024) strongly support the finding that professional development is a major coping mechanism, emphasizing that short courses, micro-credentials, and upskilling programs significantly enhance teachers' mathematical content knowledge and teaching competence. These structured learning opportunities help teachers manage subject-matter challenges more effectively.

Category Two: Teacher Confidence and Self-Efficacy

This category was derived from concepts such as initial lack of confidence, confidence development through feedback, teaching effectiveness, overcoming fear and anxiety, and confidence beyond specialization.

Informants reported that many teachers initially experienced self-doubt, especially when teaching mathematics outside their area of specialization (B28, H1, I2). However, confidence gradually developed through classroom experience, student feedback, and successful teaching outcomes (B30, E24, G52). Positive student understanding and learning progress significantly strengthened teachers' belief in their instructional abilities (H20, H5). Over time, teachers became more confident in handling complex topics and unfamiliar mathematical content (I24, C60). Reflective practice also contributed to increased self-efficacy, as teachers learned from challenges and improved their strategies (G58, H18). This category highlights that teacher confidence is built progressively through experience, feedback, and reflection.

Osei and Agyei (2023) found that targeted mentoring and professional learning significantly improve teacher confidence in teaching mathematics. Their study shows that structured support systems are more effective in building self-efficacy than informal or individual coping strategies, reinforcing the importance of guided professional growth.

Category Three: Teaching as Identity Transformation

This category emerged from concepts such as shift to facilitator role, adaptive teaching identity, interdisciplinary identity, growth-oriented professional identity, and redefinition of teaching effectiveness. Informants described a transformation in their professional identity from being knowledge transmitters to facilitators of learning. Teachers began to see themselves as guides who support students in constructing

their own understanding rather than simply delivering content (C57, F29). This shift reflects a more learner-centered and relational approach to teaching.

Teachers also developed adaptive and evolving identities, adjusting their practices based on classroom demands and learner needs (G48). Some integrated interdisciplinary perspectives, blending knowledge and approaches from different fields to enhance instruction (C59). Over time, teaching effectiveness was redefined beyond content mastery to include facilitation, communication, and student support (C62). Overall, this category highlights that teaching identity is dynamic and continuously shaped by experience, reflection, and professional growth.

Osei and Agyei (2023) further explain that continuous professional learning leads to changes in teacher identity, where non-mathematics major teachers gradually develop confidence and a sense of competence in teaching mathematics. This supports the finding that coping contributes to identity transformation over time.

Sub-Theme 4: Support Systems and Capacity Building

This sub-theme was formulated from the categories *Learning Support Systems* and *Training and Professional Development*. It reflects the essential role of institutional, collegial, and instructional support mechanisms in strengthening mathematics teachers' capacity, particularly among non-major educators. The findings emphasize that teaching effectiveness is not solely an individual endeavor but is significantly enhanced through access to learning resources, collaborative support, and sustained professional development opportunities. These support systems enable teachers to cope with instructional challenges, improve content mastery, and continuously refine their pedagogical practices.

Category One: Learning Support Systems

This category emerged from concepts such as use of digital learning resources, collegial and peer support systems, instructional resource utilization, self-directed learning, and resource-sharing practices.

Informants highlighted the importance of various learning support systems in improving instructional delivery and content understanding. Teachers frequently utilized digital resources such as YouTube, tutorial videos, online materials, and educational platforms to supplement lesson preparation and clarify difficult mathematical concepts (A17, F17, H12, B25). These tools provided accessible references that supported both teaching and self-learning.

Collegial support was also a significant factor in instructional improvement. Teachers relied on colleagues, particularly mathematics majors and experienced co-teachers, for guidance, shared materials, and clarification of complex topics (C52, F26, I19). This collaborative environment helped reduce instructional difficulties and promoted shared professional learning.

In addition, teachers engaged in self-directed learning by studying lessons in advance, researching difficult topics, and independently preparing instructional materials (B17, G33, H17). Overall, this category shows that learning support systems—whether digital, collegial, or self-initiated—play a crucial role in enhancing teaching preparedness and instructional effectiveness.

Mercado and Morante (2024) found that peer mentoring and collaboration are essential support mechanisms for out-of-field teachers, particularly in lesson planning and content clarification. Osei and Agyei (2023) further emphasize that school leadership and coordinated support systems are critical in ensuring effective coping among teachers. Without institutional support, coping strategies remain limited and inconsistent. Lopez (2024) also supports this finding by highlighting the importance of administrative assistance, resource allocation, and peer collaboration in addressing teaching challenges, particularly in technology integration and curriculum delivery.

Category Two: Training and Professional Development

This category was derived from concepts such as need for content mastery training, pedagogical skills development, interdisciplinary training, structured workshops, bridging programs, and resource and infrastructure support.

Informants emphasized the need for continuous training and professional development to improve both content knowledge and teaching strategies. Many teachers expressed the importance of specialized training in mathematics instruction, particularly for those who are non-majors or teaching outside their specialization (B22, E18, G46, H15). Such training is seen as essential in strengthening instructional confidence and subject mastery.

Teachers also highlighted the need for structured professional development programs such as workshops, seminars, and capacity-building sessions focused on pedagogy and content delivery (C108, H16). Interdisciplinary training and bridging programs were also suggested to help teachers better connect mathematical concepts with practical applications and other subject areas (C51, F23, I30). Overall, this category emphasizes that sustained professional development and institutional support are vital in enhancing teacher competence, confidence, and instructional quality.

Barker et al. (2024) and Lopez (2024) both highlight that continuous professional development is essential in addressing teacher challenges. Training programs, workshops, and collaborative learning opportunities help teachers improve both pedagogical skills and content knowledge, reinforcing their ability to teach mathematics effectively.

Sub-Theme 5: Affective Dimensions of Teaching

This sub-theme was formulated from the category *Emotional Experiences in Teaching*. It reflects the emotional and psychological realities experienced by mathematics teachers, particularly non-major educators, as they engage in instructional practice. The findings highlight that teaching is not only a cognitive and technical process but also an affective experience shaped by emotions such as fulfillment, frustration, empathy, vulnerability, and resilience. These emotional dimensions significantly influence teachers' motivation, instructional behavior, and professional commitment.

Category One: Emotional Experiences in Teaching

This category emerged from concepts such as fulfillment from student learning, teacher vulnerability, empathy and honest teaching practice, emotional coping strategies, external emotional challenges, and sense of purpose in teaching.

Informants described teaching as an emotionally meaningful profession that brings both fulfillment and challenges. Many teachers expressed deep satisfaction and joy when students demonstrated understanding, improvement, and academic success (B26, G10, G57, H4). These positive experiences served as strong motivational factors that reinforced their commitment to teaching.

However, teachers also experienced emotional vulnerability, particularly when faced with student difficulties, confusion, or lack of engagement (C13, E4). Such situations often led to feelings of anxiety, self-doubt, and pressure, especially when dealing with complex topics or unresponsive learners. Despite these challenges, teachers responded with empathy, honesty, and openness, often sharing their own struggles to help students feel supported and understood (C14, C15, C16, F30).

Emotional coping strategies such as humor, patience, and reflective thinking were also evident in classroom practice (F28). Teachers used these approaches to manage stress and maintain a positive learning environment. Additionally, external factors such as challenging teaching conditions further contributed to emotional strain, requiring resilience and adaptability (D3, I6).

Overall, this category highlights that emotional experiences are central to teaching practice. The affective dimension of teaching shapes how teachers respond to challenges, build relationships with students, and sustain their professional identity. Lopez (2024) supports the finding that teaching mathematics involves emotional challenges such as stress, resistance to change, and anxiety when dealing with unfamiliar content. However, the study also emphasizes that resilience, peer support, and coping strategies help teachers manage these emotional demands effectively.



Figure 2. Eidetic Model of Adaptive, Evolving, and Context-Responsive Mathematics Teaching Among Non-Major Educators

IV. IMPLICATIONS OF THE FINDINGS

The findings imply that non-major mathematics teachers require sustained professional development to strengthen both pedagogical skills and content mastery. Schools and administrators should prioritize training programs, mentoring systems, and collaborative learning structures to support instructional effectiveness.

Curriculum planners may consider designing more simplified, contextualized, and teacher-friendly instructional materials to reduce cognitive load and improve teaching efficiency. Students benefit from learning environments that emphasize active participation, real-life applications, and positive attitudes toward mathematics. Strengthening foundational skills and motivation is essential for improved learning outcomes.

REFERENCES

1. Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
2. Barker, M., Goos, M. & Coupland, M. (2024). Analysis of out-of-field secondary Mathematics teacher upskilling initiatives in Australia. *AMSI-ORG-AU/RELIEVING-OUT-OF-FIELD-TEACHING*. https://amsi.org.au/wp-content/uploads/2024/03/maths-ooft-report.pdf?utm_source=chatgpt.com
3. Co, A., Abella, C., & De Jesús, F. (2021). Teaching Outside Specialization from the Perspective of Science Teachers. *Open Access Library Journal*. 2021;8: e7725. <https://doi.org/10.4236/oalib.1107725>

4. Cornillez, E. E. Jr., Jordan, L., & Yocte, J. M. (2020). Perceived importance and level of mathematical skills among math and non-math major students in mathematics in the modern world. *TARAN-AWAN Journal of Educational Research and Technology Management*, 1(1), 16-28.
5. Du Plessis, A. E. (2015). *Out-of-field teaching practices: Understanding challenges of teachers, teaching out-of-field*. Springer.
6. Hobbs, L., & Porsch, R. (2021). Teaching out-of-field: challenges for teacher education. *European Journal of Teacher Education*, 44:5, 601-610. 4.
7. Hobbs, L. (2020). Learning to Teach Science Out-of-field: A Spatial-temporal Experience. *Journal of Science Teacher Education*, 31(7): 725-745.
8. Hobbs L., Törner G., & Ingersoll RM. (2019). Examining the Phenomenon of “Teaching Out-of-field”. *Springer Singapore*; 2019. p. 21-51. https://doi.org/10.1007/978-981-13-3366-8_2
9. Kenny, J., Hobbs, L., & Whannell, R. (2020). Designing professional development for teachers teaching out-of-field. *Professional Development in Education*, 46(3), 500-515.
10. Lopez Jr., E. R. (2024). Struggles and coping mechanisms of secondary teachers in teaching Mathematics using technology. *Psychology and Education: A Multidisciplinary Journal*, 22(9):1037-1062, <http://doi.org/10.5281/zenodo/13154697>
11. Marchisio, M., Remogna, S., Roman, F., & Sacchet, M. (2022). Teaching mathematics to non-mathematics majors through problem solving and new technologies. *Education Sciences*, 12(1), 34. <https://doi.org/10.3390/educsci12010034>
12. Osei, W., & Agyei, D. D. (2023). Teaching knowledge and difficulties of In-field and Out-of-field Junior High School mathematics teachers in algebra. *Cogent Education*, 10(2). <https://doi.org/10.1080/2331186X.2023.2232240>
13. Pedrajas, A. P., & Gallego, M. G. O. (2025). Lived experiences of social studies teachers handling national mathematics program: Basis for professional training intervention program. *International Journal of Research and Scientific Innovation (IJRSI)*. <https://doi.org/10.51244/IJRSI.2025.120500016>
14. Peñafiel, L. A. (2024). Lived experiences of non-education graduate teachers in teaching mathematics during the pandemic. West Visayas State University Repository.
15. Price, A., Vale, C., Porsch, R., Rahayu, E., Faulkner, F., Ríordáin, MN., & Luft, J.A. (2019). Teaching out-of-field internationally. Examining the Phenomenon of “Teaching Out-of-field”. *International Perspectives on Teaching as a Non-specialist*. 2019;53-83. doi: 10.1007/978-981-13-3366-8_3
16. Raymundo, M.S. (2021). Teaching Non-Major Subjects: A Challenged to Senior High School Teachers. *The URSP Research Journal*. 2021;7(1):34-41.
17. Rebato, M. H., & Moraleta, M.L. (2024). Experiences of Senior High School Mathematics Teachers in Out-of-field Teaching. *Salud, Ciencia y Tecnología - Serie de Conferencias*.3:1125. <https://doi.org/10.56294/sctconf20241125>
18. Riboroso, R., & Lligas, R. (2023). Experiences of Mathematics teachers in teaching Non-Mathematics subjects. *Journal of Namibian studies*, 36 (2023): 97-109, <http://orcid.org/0000-002-1711-400X>
19. Sharkawi, M. (2020). Making Mathematics accessible to non-mathematics majors. *Teaching Innovation Projects*, 9(1), 1–13. <https://doi.org/10.5206/tips.v9i1.10315>
20. Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4–14. <https://doi.org/10.3102/0013189X015002004>
21. Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, 23(6), 944–956.

<https://doi.org/10.1016/j.tate.2006.05.003>

22. Velez, A.J. B., Dayaganon, D.G. F., Robigid, J.C., Demorito, J.D., Villegas, J.P., Gomez, D.O. (2023). Difficulties and coping strategies in understanding mathematical concepts in a private higher education in Tagum City, Davao Del Norte, Philippines. *Davao Research Journal (DRJ)*, 14(1), 45-54, <https://doi.org/10.59120/drj.v14i1.10>
23. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.