

Language Transition in Instruction: Experiences of Mathematics Teachers

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Abstract. This phenomenological study explored the lived experiences of Mathematics teachers as they navigated the challenges of language transition in instruction. Grounded in Vygotsky's Zone of Proximal Development (ZPD) and Cognitive Load Theory (CLT), the study aimed to uncover the pedagogical realities that arise when linguistic and conceptual demands intersect in the mathematics classroom. Data were collected through In-Depth Interviews (IDIs) and Focus Group Discussions (FGDs) with ten Mathematics teachers, selected through purposive sampling. Thematic analysis was employed to derive meaningful patterns from the participants' narratives. Three major themes emerged regarding teachers' lived experiences: conceptual misunderstandings due to language barriers, increased cognitive load for learners, and lack of training in multilingual pedagogy. In response, teachers adopted coping strategies such as using code-switching. From an educational management perspective, three key insights were identified: the need for proactive professional development, access to multimodal teaching materials, and flexible curriculum frameworks. These findings emphasize the importance of institutional support in equipping teachers with multilingual instructional competencies and adaptable tools. Overall, the study highlighted the critical role of linguistically responsive pedagogy and systemic support in enhancing mathematics instruction.

KEY WORDS

1. language transition in instruction 2. experiences 3. mathematics teachers

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1. Introduction

Globally, the facilitation skills of teachers in mathematics instruction encounter various challenges that can severely impact the effectiveness of classroom learning experiences. One of the most prevalent and concerning issues is the insufficient emphasis on pedagogical training and continuous professional development for teachers, resulting in significant gaps in their ability to employ diverse facilitation techniques. Furthermore, limited exposure to innovative teaching methodologies and a lack of awareness about integrating modern technologi-

cal tools into mathematics instruction contribute to significant challenges in keeping pace with evolving educational practices. In Singapore, Matabane and colleagues (2023) emphasize that classroom size and student diversity can create challenges for teachers. Larger class sizes may make it challenging for teachers to provide personalized attention and individualized support that meets the diverse learning needs of students. This can be especially challenging in situations where students have varying levels of mathematical proficiency. In addition, many

students are afraid of making mistakes or feel ashamed of struggling with mathematics, which can lead them to avoid actively participating in the learning process. Teachers are tasked with creating a supportive and inclusive learning environment that encourages students to take on challenges, accept mistakes as part of the learning process, and view them as opportunities for growth. Rinneheimo and Suhonen (2022) shared that integrating real-world applications and contextualizing mathematical concepts can also be challenging for teachers. Bridging the gap between abstract mathematical ideas and practical, real-world scenarios requires a nuanced approach to facilitation that not all educators may feel adequately equipped to deliver. Harbour et al. (2022) noted that professional development is essential to support and empower teachers in meeting the high-stakes demands of mathematics teaching, thereby ensuring equitable, accessible, and high-quality instruction for all students. Focused on high-quality mathematics tasks and co-teaching models, we explored changes in instructional and collaborative practices. With knowledge in hand that teaching mathematics through active engagement leads to better student learning outcomes, the field of mathematics is now tasked with researching effective facilitation of professional development for faculty. Soto and Marzocchi (2021) initiated an initial year of active learning professional development for mathematics faculty, implementing and researching various professional development formats. Authors conjectured that effective faculty professional development, similar to effective mathematics instruction for students, would engage faculty in active learning experiences. In the Philippines, one significant challenge is the variability in the quality of facilitation across different educators. Inconsistencies in teaching methods, clarity of explanations, and the ability to engage students effectively can lead to disparities in learning outcomes among students, impacting

their overall mathematical proficiency (Mania Alam, 2021). Moreover, suppose teachers predominantly focus on procedural aspects without fostering a deep comprehension of mathematical concepts. In such cases, students may resort to rote memorization, which hinders their ability to apply mathematical knowledge flexibly in various contexts (Chen, 2023). However, assessment practices that can further impact learning outcomes have also been a problem, along with the results of teaching facilitations. Suppose assessments primarily focus on memorization and procedural skills rather than critical thinking and problem-solving. In that case, students may prioritize rote learning to meet assessment requirements, neglecting the more profound understanding necessary for long-term retention and application (Nalipay et al., 2023). Mati City and its Schools have adapted to the integration of technology and real-world applications in mathematics instruction, which poses both opportunities and challenges. While technology can enhance engagement and provide interactive learning experiences, not all teachers can effectively leverage these tools. Similarly, relating mathematical concepts to real-world scenarios requires skilled facilitation to bridge the gap between theory and practical application. Addressing these issues requires a concerted effort to enhance teacher training, professional development, and the adoption of research-based pedagogical practices. Creating a supportive learning environment that encourages inquiry, fosters conceptual understanding, and embraces diverse learning styles is crucial for optimizing students' mathematical learning outcomes.

In summary, the study has the potential to inform decision-making at various levels within the education system. It can guide improvements in curriculum design, teacher training programs, and resource allocation, ultimately contributing to enhanced mathematics instruction and student achievement. Additionally, the study lays the groundwork for future research

endeavors in the field of mathematics education. This study outlines the terms that are conceptually and operationally defined to establish a clearer understanding and facilitate reference when discussing the results presented in the preceding chapters of the study.

Teachers' Facilitation Skills in Mathematics

Refer to the ability of educators to guide and support the learning process effectively, creating an environment that fosters understanding, engagement, and active participation in mathematical activities. These skills go beyond simply presenting information and involve the strategic use of teaching methods, communication, and instructional tools to enhance students' mathematical learning experiences.

Mathematical Learning Outcomes

Mathematical learning outcomes play a crucial role in assessing the effectiveness of mathematics education and guiding curriculum development. These outcomes are often outlined in educational standards or curriculum frameworks and serve as a foundation for designing instructional materials, assessments, and edu-

cational programs that promote mathematical literacy and proficiency among students. In this study, indicators of the variable include problem-solving proficiency, conceptual understanding, communication of Math ideas, representation and visualization, and critical thinking and reasoning.

1.1. Purpose of the Study—This phenomenological study aimed to describe the evolution of learning outcomes in mathematics instruction for Grades 3–4. At this stage in the research, teachers' lived experiences of teaching mathematics, challenges encountered, and insights are generally defined as stakeholders' expectations of learners' mathematical comprehension ability and development, despite all interventions delivered. The consideration of where learning generally happens is also being explored.

1.2. Research Questions—This study wished to understand and describe the experiences of Mathematics teachers from a newer perspective and approach. It sought to answer the following inquiries

- (1) What are teachers' lived experiences in language transition in instruction, and experiences of mathematics teachers?
- (2) How do mathematics teachers cope with the challenges of language transition in instruction? What are their experiences?
- (3) What lessons are learned by the teachers in language transition instruction, and what are the mathematics teachers' experiences?

1.3. Review of Significant Literature—This section presents a synthesis of relevant literature exploring the relationship between teachers' facilitation skills and the mathematical learning outcomes of students. Reviewed studies span both local and international contexts, addressing various instructional components such as clarity, questioning, adaptability, tool usage, and engagement, and their impact on learners' mathematical proficiency.

1.3.1. Facilitation Skills in Mathematics Instruction—Facilitation skills encompass

teachers' capacity to promote active learning, clarity, engagement, and individualized instruction. Effective teachers tailor strategies to student needs, use a variety of teaching tools, and adapt to classroom dynamics (Acharya, 2021).

1.3.2. Clarity of Explanation—Clarity in teaching enhances comprehension by simplifying complex ideas into structured, digestible parts (Chen, 2023; Nalipay et al., 2023). Studies show that clear instruction supports students' math self-concept and lowers confusion (Juman et al., 2022; Bird, 2022).

1.3.3. Use of Mathematical Tools—Math tools—including manipulatives, visuals, and digital platforms—enhance student understanding and interest. Platforms like My Math Academy have been found effective in increasing foundational math skills and confidence among early learners (Thai et al., 2022; Johnston, 2023).

1.3.4. Questioning Techniques—Strategic questioning fosters deeper thinking and promotes mathematical discourse (Alexander et al., 2022; Wong, 2021). High-quality questions—especially open-ended ones—encourage students to justify answers and explore multiple solution paths, thus enhancing critical thinking.

1.3.5. Adaptability—Adaptability enables teachers to shift strategies in real-time based on student needs. Research links adaptable instruction to increased student engagement and psychological well-being, especially in diverse classrooms (Datu et al., 2021; Miele et al., 2022; Thelen Sen, 2022).

1.3.6. Student Engagement—Engaged learners show greater persistence and achievement. Engagement is fostered through autonomy-supportive environments, interactive teaching, and technology integration (Liu et al., 2021; Bang et al., 2023; Schrank et al., 2021). Self-efficacy and outcome expectations strongly predict math engagement (Miller et al., 2021).

1.4. Mathematical Learning Outcomes—Mathematical learning outcomes refer to measurable student competencies in conceptual understanding, problem-solving, critical reasoning, communication, and representation. These reflect not only academic mastery but also the ability to apply knowledge in varied contexts (Driscoll Cheeseman, 2022).

1.4.1. Problem-Solving—Problem-solving involves analyzing novel tasks, formulating strategies, and applying logic. It is central to mathematical proficiency and is linked to higher-order thinking (Palmér van Bommel,

2023; Gholami, 2023; Jacinto Carreira, 2023).

1.4.2. Conceptual Understanding—This denotes comprehension of the "why" behind procedures. Embodied learning and movement-based methods have shown positive effects on early math understanding (Cartwright Way, 2023; Hunt et al., 2023).

1.4.3. Communication of Mathematical Ideas—Mathematical communication includes the verbal and written articulation of reasoning. It supports collaboration, metacognition, and deeper learning (Umay, 2004; Vale Barbosa, 2023; Matabane et al., 2023).

1.4.4. Representation and Visualization—Visualizing concepts via graphs, diagrams, or symbolic forms aids comprehension. Spatial modeling and visual reasoning frameworks support this skill (Pollard Birdsall, 2021; Geçici Türnüklü, 2021; Hatisaru, 2020).

1.4.5. Critical Thinking and Reasoning—These cognitive skills involve logical evaluation and decision-making. Flipped learning and inquiry-based approaches have been found effective in cultivating such abilities (Wakhata et al., 2023; Chimmalee Anupan, 2023).

1.5. Synthesis—The transition from Grade III to Grade IV in mathematics instruction is crucial in developing learners' mathematical abilities. This transition has a significant impact on their learning outcomes and academic growth. A comprehensive synthesis of research findings and educational practices suggests that this period significantly influences learners' mathematical proficiency and conceptual understanding. The shift from Grade III to Grade IV in mathematics education is critical in advancing students' mathematical skills. This transition has a notable influence on their academic growth and learning outcomes. A thorough review of research studies and educational practices reveals that this time frame significantly influences students' mathematical proficiency and conceptual understanding. Curriculum standards, instructional methods, and assessment practices often

change during the transition from Grade III to Grade IV. As a result, educators must adapt their teaching approaches to align with these evolving requirements, while also considering the diverse needs and learning styles of their students. During this transitional period, providing effective mathematics instruction that focuses on developing essential mathematical skills is important. These skills include numeracy, problem-solving, critical thinking, and mathematical reasoning. To achieve this, educators should allow students to participate in hands-on activities, collaborative learning experiences, and real-world applications of mathematical concepts. This approach will help students develop a deeper conceptual understanding of mathematical concepts and promote mastery of mathematical skills. As students transition from Grade III to Grade IV, their readiness and proficiency levels in mathematics may vary. Therefore, educators must use differentiated instruction strategies such as flexible grouping, tiered assignments, and personalized interventions. By doing so, they can meet the individual needs of each student and provide equitable access to high-quality mathematics education. The successful transition in mathematics instruction from Grade III to Grade IV is closely linked to learners' learning outcomes and academic achievement. Research indicates that students who receive effective mathematics instruction during this critical period demonstrate higher levels of mathematical proficiency, improved problem-solving abilities, and increased confidence in their mathematical skills. In conclusion, the synthesis of research and educational practices underscores the significance of the transition in mathematics instruction from Grade III to Grade IV in shaping learners' learning outcomes. By implementing evidence-based instructional strategies, fostering a supportive learning environment, and addressing the diverse needs of students, educators can facilitate a smooth transition and promote positive learn-

ing outcomes in mathematics for students in Grades III-IV.

1.6. Theoretical Lens—This study is grounded in Cognitive Load Theory (CLT), a theoretical framework that examines the cognitive demands placed on a learner's working memory during the learning process. Developed by John Sweller, CLT posits that cognitive resources are limited, and effective instructional design should manage the cognitive load to optimize learning. The theory distinguishes between intrinsic, extraneous, and germane cognitive load. Intrinsic load relates to the task's inherent complexity, extraneous load pertains to the cognitive burden imposed by irrelevant information, and germane load involves the mental effort invested in understanding and learning. In the context of education, particularly in mathematics instruction, CLT has practical implications for designing instructional materials and activities that reduce extraneous load, enabling learners to focus on the intrinsic load and promote a deeper understanding (Chimmalee Anupan, 2023). Teachers who employ CLT principles aim to structure learning experiences to align with learners' cognitive capacities, thereby facilitating more efficient and effective learning. This theory has gained prominence in educational research and instructional design, offering insights into how cognitive processes impact learning outcomes and providing strategies to enhance instructional effectiveness. Cognitive Load Theory (CLT) is highly applicable in the study, particularly when investigating teachers' facilitation skills in mathematics instruction and their impact on students' learning outcomes. CLT posits that learners have limited cognitive resources, and instructional design should effectively manage the cognitive load. In the context of the study, understanding how teachers' facilitation skills impact students' cognitive load during mathematical learning is crucial. Teachers who can effectively manage cognitive load create instructional environments

that align with students' cognitive capacities. Geçici and Türnüklü (2021) shared, for instance, that by minimizing extraneous cognitive load — such as irrelevant information or overly complex presentations — teachers can optimize the intrinsic cognitive load related to the complexity of the mathematical content. Additionally, CLT provides insights into how instructional strategies, such as the use of appropriate mathematical tools or questioning techniques, can influence cognitive load and subsequently impact learning outcomes. By incorporating CLT principles, the study can explore how teachers' facilitation skills either alleviate or exacerbate cognitive load, shedding light on the factors that contribute to effective mathematics instruction and enhanced learning outcomes. The Zone of Proximal Development (ZPD) is a significant concept in educational psychology, introduced by Lev Vygotsky. It refers to the range of tasks that a learner is capable of performing with the help of a more knowledgeable person, such as a teacher, mentor, or peer. The ZPD lies between what the learner can do independently (actual developmental level) and what they cannot do, even with assistance (potential developmental level). Mania and Alam (2021) suggest that educators should optimize their teaching strategies to promote optimal learning outcomes for their students. The Zone of Proximal Development (ZPD) is highly relevant in the context of studying teachers' facilitation skills in mathematics instruction and their influence on students' learning outcomes. By understanding and applying the concept of ZPD, researchers can explore how teachers guide students through tasks that are just beyond their current level of understanding but achievable with appropriate support. According to Datu et al. (2023), teachers who effectively apply ZPD principles tailor their teaching strategies to challenge students without overwhelming them. They provide the necessary support to bridge the gap between what students can do independently and what

they can achieve with assistance. By examining how teachers identify and navigate their students' ZPD during math instruction, valuable insights into practical teaching skills can be gained. This sheds light on the dynamic interplay between teacher guidance and student development, highlighting the importance of tailoring teaching approaches to meet students' learning needs. The insights from ZPD can contribute to a better understanding of how teaching skills impact students' math learning outcomes by considering the pivotal role of guided support and tailored instruction in the educational process (Iacono et al., 2021). Figure 1 presents the conceptual framework of the study. The study investigates teachers' facilitation skills in mathematics instruction and their association with mathematical learning outcomes among elementary students in the North East District of Mati City Schools Division. Both Cognitive Load Theory (CLT) and the Zone of Proximal Development (ZPD) are highly applicable. CLT provides a framework for understanding how teachers can manage students' cognitive load during mathematical learning. In the North East District of Mati City Schools Division, teachers play a crucial role in helping students learn mathematics. To do this effectively, they must ensure that the difficulty of mathematical tasks aligns with students' abilities. This concept is known as the Zone of Proximal Development (ZPD), which enables teachers to determine how to challenge students while providing them with the necessary support effectively. By investigating how teachers identify and guide students within their ZPD, we can gain insights into the tailored scaffolding and instructional adaptability that characterize effective teaching. This study combines the principles of ZPD and Constructivist Learning Theory (CLT) to gain a comprehensive understanding of how teachers' facilitation skills influence mathematical learning outcomes.

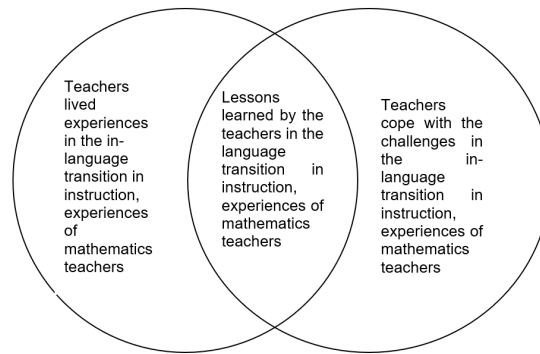


Fig. 1. Conceptual Framework of the Study

2. Methodology

This chapter presents the method, research participants, data collection, role of the researcher, data analysis, trustworthiness of the study, and ethical considerations. As elaborated in this chapter, exploring facts and knowledge in this study necessitates the consequent design and implementation.

2.1. Philosophical Assumptions—The philosophical assumption of the study was based on the following principles.

Ontology

According to Creswell (2012), reality is subjective and multifaceted, as perceived by the study's participants. The ontological issue addresses the nature of reality for the qualitative researcher. The reality was constructed by individuals involved in the research situation. Thus, multiple realities exist, including those of the researcher, the individuals being investigated, and the reader or audience interpreting the study. This study will explore teachers' experiences, coping with challenges, and insights into the newer approaches to teaching Filipino Reading. In this study, I relied on the voices and interpretations of the participants through extensive quotes and themes that reflected their words and provided evidence of different perspectives. The participants' answers to the study were coded and analyzed to identify the commonalities and discrepancies in their responses. The participants' responses were carefully coded to ensure the reliability of the result. I ensured the authenticity of the responses and prevented them from

being influenced by personal biases as the study progressed.

Epistemology

This refers to the awareness of how knowledge claims are justified by staying as close to the participants as possible during the study to obtain firsthand information. Guba and Lincoln, as cited by Creswell (2012), state that, based on the epistemological assumption, the researcher attempted to lessen the distance between themselves and the participants. I identified phenomenology, using thematic analysis, as the best approach for this type of study. In this regard, I "hold explicit belief." I ensured that close interaction with the participants was established to gain direct information that would shed light on the knowledge behind the inquiry, particularly on the experiences and coping mechanisms in the newer approaches to teaching Filipino Reading during limited face-to-face modality.

Axiology

Creswell (2012) avers that the role of values in a study is significant. Axiology suggests that the researcher openly discuss values that shape the narrative and include their interpretation in conjunction with participants' interpre-

tation. I ensured the dignity and value of every information obtained from the participants. The researcher understands the personal and value-laden nature of the information gathered from the study. Therefore, I preserved the merit of the participants' answers and carefully interpreted them in light of their interpretation. Rhetoric

It means reporting what reality was through the eyes of the research participants. This was important because I meant that the research would objectively report what was observed and heard from the participants. I used a personal voice and qualitative terms, and provided limited definitions. In the study context, I used the first person to elucidate teachers' experiences as they adapt approaches in teaching Filipino reading during a limited face-to-face modality.

2.2. Qualitative Assumptions—The qualitative assumptions that underpin this study serve as fundamental principles that guide the research approach and shape the methodological choices made throughout the investigation. These assumptions acknowledge the subjective nature of reality, recognizing that individuals construct their interpretations and meanings based on their unique experiences and perspectives. This assumption serves as the basis for examining the intricate interplay of factors that influence the phenomenon under study. The study is based on the principle that phenomena can be best understood when analyzed within their specific contexts. This contextual understanding recognizes the impact of social, cultural, historical, and environmental factors on individuals' experiences and behaviors. Researchers aim to gain a deeper understanding of the intricacies of the phenomenon being investigated by immersing themselves in the context of the participants. Researchers use open-ended interviews, observations, and document analysis to reveal layers of meaning and illuminate various aspects of the subject matter. The qualitative research in this study is interpretive. The researchers acknowledge their subjectivity and its impact on the

research process and data interpretation. They embrace reflexivity, meaning they critically examine their biases, assumptions, and preconceptions. They strive for transparency and rigor in their approach to the study. The researchers also employed an inductive approach, allowing theories and insights to emerge from the data rather than imposing them beforehand. By closely analyzing the data and identifying patterns, themes, and relationships, the researchers aim to gain a deeper understanding of the phenomenon under study. The main focus of this study is to obtain the participants' views and experiences. To achieve this, researchers will actively engage with participants through various methods, including interviews, focus groups, and participant observation. This collaborative approach ensures that the study remains grounded in the real-life experiences of those directly involved, thereby enriching the depth and validity of the findings. To summarize, the qualitative assumptions of this study create a strong foundation for exploring the intricacies of the phenomenon being studied. By embracing subjectivity, understanding context, providing detailed descriptions, cultivating self-awareness, employing inductive reasoning, and considering participants' perspectives, researchers aim to discover valuable insights that help advance knowledge in the field.

2.3. Design and Procedure—In designing and conducting my qualitative research study, I employed a methodological approach that prioritized in-depth exploration and understanding of the phenomenon under investigation. The study employed a qualitative research design, which enabled me to explore the complexities of the subject matter and gain rich insights from participants' perspectives. The research procedure involved several vital steps. Firstly, I identified a straightforward research question that aligned with the study's goals and addressed the phenomenon of interest. This question served as a guiding framework for the entire research pro-

cess. Next, I employed purposive sampling techniques to select participants who could provide valuable insights into the phenomenon under study. I sought diversity among participants to capture a range of perspectives and experiences relevant to the research question. Data collection was conducted through semi-structured interviews, which provided a flexible yet focused approach to gathering information. The interview questions were designed to elicit detailed responses and encourage participants to reflect on their experiences and perspectives related to the phenomenon. I maintained reflexivity throughout the data collection process by critically reflecting on my assumptions, biases, and preconceptions. This reflexivity helped ensure that my interpretations remained grounded in the data and were not unduly influenced by my perspectives. After collecting participant data,

I conducted a thorough data analysis process. This involved coding the interview transcripts, identifying themes and patterns, and iteratively refining my interpretations through constant comparison and triangulation of data sources. Ultimately, I synthesized the study's findings into a comprehensive narrative that highlights key insights and implications. I contextualized the findings within existing literature and theoretical frameworks, providing a deeper understanding of the phenomenon under investigation. Overall, the design and procedure of my qualitative research study were guided by a commitment to rigor, depth, and reflexivity. By employing a systematic approach to data collection and analysis, I aimed to generate meaningful insights that contribute to advancing knowledge in the field.

2.4. Ethical Considerations—The ethical considerations of this study will focus on safeguarding the rights, privacy, and well-being of the mathematics teacher-respondents as they share their experiences with language transition in instruction. This includes maintaining strict confidentiality by anonymizing responses and protecting personal information. Informed consent will be obtained by clearly explaining the study's objectives, procedures, and potential implications, allowing teachers to make an informed decision about their participation. Furthermore, participation will be entirely voluntary, with respondents given the freedom to withdraw at any stage without consequences.

2.5. Research Participants—In conducting my qualitative research study on mathematics instruction, I carefully selected ten mathematics teachers as the primary participants to ensure a comprehensive understanding of their experiences with language transition in teaching. These educators provided invaluable insights into the complexities of mathematics instruc-

tion, offering firsthand perspectives on the challenges, strategies, and adaptations they employ to facilitate student learning. Six of these teachers participated in Key Informant Interviews (KII) to gather diverse and in-depth data, allowing for a deeper exploration of their individual experiences, instructional practices, and perceptions of language transition in mathematics education. Meanwhile, the remaining four teachers engaged in a Focus Group Discussion (FGD), fostering collaborative dialogue and shared experiences on how language transition influences teaching effectiveness and student comprehension. Integrating individual narratives and group perspectives, this study aims to capture a well-rounded and meaningful analysis of the realities of mathematics instruction in language transition. In selecting mathematics teachers as research participants, I aimed to capture diverse perspectives and instructional practices to gain a comprehensive understanding of the complexities of mathematics education. To ensure the study's depth and relevance, I established three

key inclusion criteria for participants in the In-Depth Interviews (IDI) and Focus Group Discussion (FGD). First, participants were required to have at least three years of experience teaching mathematics. This criterion ensured that they had developed a substantial understanding of pedagogical strategies, student learning behaviors, and the challenges associated with language transition in mathematics instruction. Teachers with this experience level were more likely to provide meaningful insights into how language affects mathematical comprehension and instructional effectiveness. Second, participants needed to have direct experience with language transition in teaching mathematics. This meant that they had encountered shifts in the language of instruction, whether due to curriculum changes, policy implementation, or the linguistic diversity of their students. Selecting teachers who had actively navigated these transitions, the study could gather firsthand perspectives on the impact of language on mathematics instruction and the strategies they employed to support student learning. Lastly, participants had to actively engage in professional development or pedagogical discussions related to mathematics instruction. This ensured that they were reflective practitioners, continuously seeking to improve their teaching approaches and adapt to instructional challenges. Their engagement in professional learning communities, training programs, or curriculum development activities further enriched the study by providing insights into how teachers respond to changes in instructional language and seek support for their evolving teaching needs. These inclusion criteria guided the selection of participants for the study, with six teachers participating in IDI to provide in-depth, individualized accounts of their experiences, and four teachers joining the FGD to engage in collaborative discussions that highlighted shared challenges and strategies. The perspectives of these mathematics educators played a central role in shaping the study's find-

ings, ultimately contributing to a deeper understanding of language transition in mathematics instruction and informing recommendations for future educational practices.

2.6. Role of the Researcher—My role as a researcher in conducting my qualitative study was multifaceted and dynamic, encompassing various responsibilities and tasks throughout the research process. As the primary investigator, I was responsible for designing the study, collecting and analyzing data, interpreting the findings, and disseminating the results. A commitment to rigor, reflexivity, and ethical integrity guided my research approach. One of my primary roles as a researcher was to conceptualize and design the study. This involved identifying a research question or objective aligned with the study's goals and addressing existing gaps in the literature. I also developed a research plan outlining the methodology, data collection procedures, and analysis techniques to be employed. In collecting data, I actively engaged with participants through interviews, observations, or other qualitative methods. I approached data collection with sensitivity and empathy, creating a supportive environment where participants felt comfortable sharing their experiences and perspectives. I also maintained reflexivity throughout the process, critically reflecting on my biases, assumptions, and positionality as a researcher. Data analysis was another critical aspect of my role as a researcher. I employed systematic and rigorous techniques to analyze the data, such as coding, thematic analysis, or narrative analysis, depending on the nature of the data and research questions. I remained open to emergent themes and interpretations, allowing the data to guide the analysis process. Interpreting findings required me to synthesize the data into meaningful insights and conclusions. I drew upon theoretical frameworks, existing literature, and participants' perspectives to contextualize the findings and generate new knowledge. I also considered alternative explanations and interpretations to

ensure the validity and credibility of the findings. Ultimately, as a researcher, I played a crucial role in disseminating the study's results to relevant stakeholders and the broader academic community. This involved writing research reports or articles, presenting findings at conferences, and engaging in scholarly dialogue with peers. I remained transparent about the study's limitations and invited feedback and critique from others to enrich the research discourse. My role as a researcher in the qualitative study was characterized by intellectual curiosity, methodological rigor, ethical responsibility, and a commitment to advancing knowledge in the field. By effectively fulfilling these roles, I aimed to produce meaningful, impactful, and socially relevant research.

2.7. Data Collection—Data collection was a crucial step in conducting my qualitative research study, engaging with participants, and gathering rich, nuanced information to address the research questions. I employed various methods to collect data, each tailored to the study's specific needs and the nature of the phenomenon under investigation. One of the primary methods of data collection I utilized was semi-structured interviews. These interviews allowed me to have in-depth conversations with participants, exploring their perspectives, experiences, and insights related to the research topic. I developed an interview guide comprising open-ended questions that served as prompts for discussion while also allowing flexibility for participants to share their unique viewpoints. Prior to conducting interviews, I obtained informed consent from participants and assured them of their confidentiality and privacy. I also established rapport and built trust with participants to create a comfortable and supportive environment for open dialogue. Throughout the interviews, I employed active listening techniques and asked probing questions to elicit detailed responses and uncover underlying themes. In addition to interviews, I also utilized other meth-

ods of data collection, such as participant observation, document analysis, or focus groups, depending on the nature of the research question and the context of the study. Participant observation allowed me to immerse myself in the natural setting and observe firsthand the behaviors, interactions, and dynamics relevant to the research topic. Document analysis involves examining written or visual materials such as reports, transcripts, or artifacts to gain additional insights or corroborate findings from other data sources. Throughout the data collection process, I remained mindful of ethical considerations and maintained reflexivity to critically reflect on my biases, assumptions, and positionality as a researcher. I also kept detailed field notes and recorded observations to document the data collection process and facilitate later analysis. As data collection progressed, I constantly compared and triangulated data sources to ensure the credibility and trustworthiness of the findings. I also remained open to emergent themes and unexpected insights, allowing the data to guide the research process and inform subsequent data collection efforts. Overall, the data collection process in my qualitative research study was characterized by flexibility, responsiveness, and a commitment to capturing the complexity of the phenomenon under investigation. By employing multiple methods and engaging with participants in meaningful ways, I could gather rich, contextualized data that formed the basis for analysis and interpretation in the study.

2.8. Data Analysis—In my qualitative research study, data analysis was a rigorous and iterative journey aimed at uncovering patterns, themes, and insights from the collected data. I approached data analysis with a systematic and reflexive mindset, employing various techniques to interpret the rich, nuanced information gathered from participants. The first step in data analysis involved familiarizing myself with the data by reading and re-reading transcripts, field notes, or other data sources. This initial

immersion allowed me to understand the data holistically and identify critical themes or patterns that emerged across participants or data sources. Next, I engaged in coding, a fundamental technique in qualitative data analysis. I used both deductive and inductive approaches to coding, drawing on existing theoretical frameworks or concepts while allowing new themes to emerge from the data. I applied descriptive codes to label and categorize segments of data based on their content or meaning, using a combination of inductive open coding and deductive thematic coding. As coding progressed, I organized codes into broader themes or categories, grouping related codes together to capture overarching patterns or concepts. This process of thematic analysis involved constant comparison and refinement as I iteratively revisited the data to explore relationships between codes and identify connections among themes. Throughout data analysis, I remained reflexive, critically examining my assumptions, biases, and interpretations. I engaged in reflexivity by documenting my thought process, reflecting on my positionality as a researcher, and considering alternative explanations or perspectives that may influence my analysis. In addition to coding and thematic analysis, I employed techniques such as memo-writing and diagramming to explore the data further and refine my understanding. Memo-writing allowed me to capture my insights, questions, and interpretations as they arose during analysis. At the same time, diagramming techniques such as mind maps or network diagrams helped visualize relationships among themes or concepts. Finally, I synthesized the data analysis findings into a coherent narrative or argument, drawing on the rich insights from the data to address the research questions or objectives. I contextualized the findings within existing literature, discussed their implications, and identified areas for further research or inquiry. Overall, the data analysis process in my qualitative research study was charac-

terized by systematic, reflexive, and iterative approaches aimed at uncovering meaning, generating insights, and contributing to advancing knowledge in the field. By engaging in rigorous data analysis, I was able to derive rich, nuanced findings that shed light on the complexities of the research topic and provided valuable contributions to the scholarly discourse.

2.9. Analytical Framework—The analytical framework in my qualitative research study was a guiding structure facilitating systematic and rigorous data analysis. It provided a framework for organizing, interpreting, and making sense of the rich, complex information gathered from participants. The development of the analytical framework involved a thoughtful consideration of theoretical perspectives, research objectives, and the nature of the data. The first step in developing the analytical framework was identifying relevant theoretical concepts or frameworks that could inform the analysis. I drew upon existing literature, theoretical models, or conceptual frameworks that offered insights into the research topic and provided a theoretical lens through which to interpret the data. These theoretical perspectives guided the selection of key themes, concepts, or variables to explore in the data analysis. Next, I considered the research objectives and questions guiding the study. I identified the critical areas of inquiry or dimensions of the research topic that needed in-depth exploration. These research objectives served as a roadmap for developing the analytical framework, helping to focus the analysis on relevant aspects of the data. Based on the theoretical perspectives and research objectives, I developed a preliminary list of codes or categories that captured the key themes, concepts, or phenomena of interest. These codes were derived from the data through an inductive open coding process and from the theoretical frameworks guiding the analysis. As data analysis progressed, I refined and expanded the analytical framework in response to the emerging pat-

terns and insights from the data. This iterative process involved revisiting the data, revising codes or categories, and exploring connections among themes or concepts. I remained open to new insights and alternative interpretations, allowing the analytical framework to evolve in response to the data. Throughout the analysis, I remained reflexive, critically examining my assumptions, biases, and interpretations. I documented my thought process, reflected on my researcher position, and considered alternative explanations or perspectives that may influence the analysis. This reflexive stance helped ensure the credibility and trustworthiness of the analysis.

Finally, I synthesized the analysis findings into a coherent narrative or argument, drawing on the insights generated from the data to address the research objectives and contribute to the scholarly discourse. I contextualized the findings within existing literature, discussed their implications, and identified areas for further research or inquiry. Overall, the analytical framework in my qualitative research study provided a systematic and rigorous approach to analyzing the data, guiding the interpretation of findings, and generating insights that contributed to advancing knowledge in the field. By grounding the analysis in theoretical perspectives and research objectives, I could derive meaningful conclusions that shed light on the complexities of the research topic and offer valuable contributions to the scholarly discourse.

2.10. Trustworthiness of the Study—Ensuring the trustworthiness of my qualitative research study was paramount, as it directly influenced the credibility and validity of the findings. I employed several strategies to enhance the study's trustworthiness, drawing on established criteria within the qualitative research tradition. One key aspect of trustworthiness was credibility, which refers to the degree to which the findings accurately represent the experiences and perspectives of participants. To enhance

credibility, I employed various techniques such as prolonged engagement, member checking, and triangulation of data sources. Prolonged engagement involves spending sufficient time in the field, building rapport with participants, and developing a deep understanding of the research context. Member checking allowed participants to review and provide feedback on the preliminary findings, ensuring their perspectives were accurately represented. Triangulation involves using multiple data sources or methods to corroborate findings, thereby strengthening the credibility of the conclusions drawn from the data. Another important aspect of trustworthiness was dependability, which refers to the consistency and reliability of the research findings over time. I employed audit trails, peer debriefing, and reflexivity to enhance dependability. Audit trails involved keeping detailed records of the research process, including field notes, coding decisions, and analytical memos, to provide transparency and facilitate study replication. Peer debriefing involved seeking feedback from colleagues or experts to validate the interpretation of findings and ensure methodological rigor. Reflexivity involved critically reflecting on my biases, assumptions, and perspectives throughout the research process, thereby minimizing potential sources of bias and enhancing the study's dependability. Additionally, ensuring the confirmability of the study was essential for establishing the objectivity and neutrality of the research findings. Confirmability refers to the degree to which the findings are free from researcher bias or influence. I employed techniques such as bracketing, maintaining an audit trail, and employing a reflexive stance to enhance confirmability. Bracketing involved setting aside preconceived notions or biases that could influence the interpretation of findings, allowing for a more objective data analysis. Maintaining an audit trail ensured transparency and accountability in the research process, allowing for an independent evaluation of the findings.

Finally, adopting a reflexive stance involved critically examining my assumptions, biases, and perspectives throughout the research process, thereby minimizing the potential for researcher bias and enhancing the confirmability of the study. In summary, ensuring the trustworthiness of my qualitative research study involved employing strategies to enhance credibility, dependability, and confirmability. By employ-

ing techniques such as prolonged engagement, member checking, triangulation of data sources, audit trails, peer debriefing, bracketing, and reflexivity, I sought to ensure that the findings accurately represented the experiences and perspectives of participants, were consistent and reliable over time, and were free from researcher bias or influence.

3. Results and Discussion

This chapter presents the study's findings, addressing the research questions through detailed accounts of the participants. It focuses on the lived experiences of Mathematics teachers as they navigate the complexities of language transition in instruction. This chapter explores the strategies employed, the challenges encountered, and the perceived impact of switching between languages on student comprehension and learning outcomes in mathematics. The discussion connects these findings to existing literature and theoretical frameworks on bilingual education, language in content areas, and mathematics pedagogy, providing a comprehensive understanding of the participants' unique professional realities.

3.1. *Lived Experiences of Mathematics Teachers in Language Transition of Instruction*

—The shift in language used for instruction in mathematics presents a unique set of challenges and insights, particularly for educators navigating multilingual or transitioning language policies. Mathematics teachers often face difficulties in maintaining conceptual clarity when transitioning from one instructional language to another, especially when technical terms and abstract reasoning are involved. This was supported by the indicator, the attitudes and perceptions of both teachers and students significantly influence the success of language transition. Teachers report that student resistance or anxiety toward a new language can limit engagement, while teachers themselves may feel less confident teaching in a non-native or second language. Supportive school leadership and collaborative practices among faculty can mitigate these challenges. (Anders et al., 2020). One of the key issues is the cognitive load on students who must simultaneously process mathematical

content and language comprehension. Teachers report that students' problem-solving abilities may be hindered when they are unfamiliar with the instructional language, requiring educators to adjust their teaching strategies (Benson et al., 2021). This highlights the necessity for scaffolding techniques that bridge language and content.

]Conceptual Misunderstanding Due to Language Barriers.

The transition in the language of instruction, particularly in mathematics education, presents significant challenges for both learners and teachers. Language barriers often contribute to conceptual misunderstandings that hinder students' mathematical reasoning and problem-solving skills. These barriers are not merely linguistic but are deeply cognitive, affecting students' ability to make sense of mathematical vocabulary and structures. The study's findings align with those of several studies that have documented how mathematics teachers themselves face difficulties in effectively conveying concepts when operating in a language

that is not their native language. These challenges include difficulties in translating complex terms, reduced fluency during explanation, and the loss of meaning in mathematical discourse (Johnson Lee, 2022). Furthermore, the transition to a second or third language in instruction can negatively affect teachers' confidence, thereby influencing the quality of mathematics teaching. Conceptual misunderstanding among learners is often observed when there is a disconnect between mathematical terminology and its application in real-world problems. Teachers reported that students often memorize procedures without understanding concepts due to language gaps, especially when unfamiliar vocabulary is introduced without contextual grounding (Nguyen Foster, 2024). Some of the participants' responses on conceptual misunderstanding among learners during the interview. With the narration above, I analyzed how (P1) underscored the challenge in teaching Mathematics revolved around language barrier, noting that students struggled with English academic vocabulary, making code-switching to Bisaya essential to ensure their conceptual understanding and emotional security, while Participant 4 (P4) highlighted the social need for students to express themselves in their native language during Math discussions, especially given their prior Bisaya instruction, leading them to gradually integrate English and encourage multilingual Math journals to facilitate comprehension. Mathematics teachers also shared that language transition requires additional instructional time and scaffolding strategies to ensure students' understanding. They employed code-switching, visual aids, and simplified language, although these strategies do not always bridge the conceptual gap. Moreover, teachers observed that students who were fluent in the language of instruction performed better, not necessarily due to mathematical ability but due to linguistic competence (Garcia Thomas, 2022). There is also evidence that language transition dispro-

portionately affects students with limited language proficiency, contributing to educational inequity (Peterson Wang, 2025). Thus, the integration of language-sensitive teaching practices in mathematics is increasingly recommended to reduce conceptual misunderstanding and promote inclusive education. As teachers observe their own growth and improvement, Participant 7 (P7) highlighted that students' academic needs varied during the transition to Math language, with English proficiency being a key factor, leading her to use diverse visual aids, rephrase, and employ synonyms alongside patience to aid understanding. Meanwhile, Participant 9 (P9) observed that students' emotional need for security and fear of making mistakes significantly impacted their engagement during Math language transition, prompting her to foster a supportive classroom environment, encourage peer collaboration, and celebrate small victories to boost their self-efficacy. Recent research highlights the critical role of language in the teaching and learning of mathematics, particularly in contexts where teachers and learners operate in a language that is not their native language. Conceptual misunderstandings often occur when learners fail to grasp mathematical ideas due to challenges in processing the language used during instruction.

3.1.1. Increased Cognitive Load for Learners—The transition in the language of instruction in mathematics classrooms often leads to an increased cognitive load for learners, especially when they are required to process both mathematical concepts and unfamiliar language simultaneously. This dual-processing demand can overwhelm working memory and hinder understanding. Mathematics involves not only symbolic reasoning but also language-mediated thinking, and when learners are not fully proficient in the language of instruction, cognitive overload becomes a significant barrier. The foregoing results of the study were consistent with the findings of learners experiencing

language transitions often report confusion and mental fatigue due to the need to decode linguistic structures before interpreting mathematical meaning (Harris Ong, 2022). Students expend considerable mental effort translating and comprehending the instructional language, leaving fewer cognitive resources for engaging with the actual mathematical content. Likewise, the study's findings are also supported that teachers have shared that even highly capable students struggle when they cannot access instructional content in a familiar language. These challenges are compounded during assessments, where students' answers may reflect linguistic limitations rather than actual mathematical understanding. In such contexts, the perceived underperformance may be a result of language processing rather than a true reflection of mathematical ability (Chen Patel, 2024). As I analyzed the narration from the lived experience of teachers, Participant 3 (P3) noted that language transition in Mathematics significantly increased students' cognitive load, requiring them to process both concepts and English terminology. This led her to prioritize clear, consistent bilingual presentations, creating glossaries, and emphasizing visual representations to reduce mental fatigue and enhance understanding. Further, it can be gleaned from the responses of the participants that P8 observed that students processed information more slowly due to increased cognitive load during English and Math instruction, highlighting their social need to feel comfortable asking questions even when they didn't understand. This led her to adjust teaching pace and implement partner work to facilitate comprehension. Similarly, Participant 10 (P10) found that students' emotional need for security from making mistakes was paramount during Math language transition, noting that the increased cognitive load heightened their anxiety. This prompted her to create a non-threatening classroom environment where open communication and encouragement were prioritized

over perfect grammar to reduce student stress. This corroborates on the findings that teachers have shared that even highly capable students struggle when they cannot access instructional content in a familiar language. These challenges are compounded during assessments, where students' answers may reflect linguistic limitations rather than actual mathematical understanding (Yusuf Lin, 2023). In such contexts, the perceived underperformance may be a result of language processing rather than a true reflection of mathematical ability (Chen Patel, 2024). To manage the cognitive demands, some educators use scaffolding strategies such as visual aids, simplified texts, and bilingual glossaries. While these can reduce initial overload, they may not be sufficient to support deeper conceptual understanding without consistent language integration (Baker Neal, 2021).

3.1.2. Lack of Training in Multilingual Pedagogy. —One of the critical challenges in the language transition of mathematics instruction is the lack of teacher training in multilingual pedagogy, which significantly affects instructional effectiveness. Teachers often enter the classroom with limited exposure to strategies tailored for linguistically diverse learners, resulting in uncertainty and inconsistency in their practice. The absence of formal preparation in multilingual teaching approaches leaves educators ill-equipped to navigate the complexities of teaching mathematics in a second or third language. The findings were also supported, as mathematics is a subject that depends heavily on precise language and logical structure; the lack of multilingual pedagogical training increases the risk of miscommunication and concept loss (Ali Barrett, 2022). In many cases, mathematics teachers express discomfort in adapting their lessons for multilingual classrooms due to a lack of professional development opportunities in this area. This gap is further intensified when educational policies mandate language transitions without providing adequate

teacher preparation (Kim Duarte, 2020). The study's findings were supported by the teachers themselves, who acknowledged the need for continuous training that integrates content and language instruction in meaningful ways (Santiago Wells, 2025). However, professional learning models for this purpose remain scarce and inconsistently implemented across schools (Park Leonard, 2022). This void contributes to teacher stress, low self-efficacy, and decreased student engagement in mathematics classrooms undergoing language transition. The participants' responses from the in-depth interview captured the lack of training in multilingual pedagogy. As I analyzed the narration of teachers, Participant 2 (P2) noted that during the transition to English in Math, students' social need was for inclusivity despite diverse languages, a challenge exacerbated by their lack of formal training in multilingual settings and school guidelines; this led them to spontaneously implement small group activities where students could use any language to help each other and foster a safe, language-respecting classroom. Meanwhile, Participant 5 (P5) observed that students' emotional needs varied during the transition to Math language, with some easily losing motivation due to a lack of immediate English comprehension, and attributed this challenge to their limited training in multilingual pedagogy. In response, researchers recommend institutionalizing multilingual pedagogy in both pre-service and in-service teacher training programs to support the realities of increasingly diverse learning environments (Evans Montero, 2021). Without such measures, language transition efforts in mathematics are unlikely to succeed, particularly in schools serving linguistically marginalized populations. The transition of instruction from a first language to a second or third language in mathematics education presents significant challenges, particularly when teachers lack formal training in multilingual pedagogy. This deficiency often results in

instructional inefficiencies and communication gaps in the classroom (Allen Brooks, 2020). Teachers without adequate preparation are less likely to recognize or address the linguistic complexities that multilingual learners face when interpreting mathematical concepts (Singh Howell, 2021). As mentioned, the teacher expressed that transitioning Math instruction from Bisaya to English was a major challenge due to a lack of formal multilingual pedagogy training and specific resources, necessitating her personal development of bilingual materials, such as visual dictionaries and worksheets, to provide structured support and ensure student learning despite the language barrier. According to research, the issue is exacerbated by the minimal emphasis on multilingual strategies in teacher education programs. Educators often report that their professional preparation does not include sufficient exposure to second-language acquisition theories or practical strategies for supporting learners in language-diverse classrooms. This lack of training forces many teachers to rely on monolingual instruction methods that may not align with the linguistic realities of their students (Liu Fraser, 2023). A study found that educators frequently encounter difficulties when trying to adapt curriculum materials to meet the needs of multilingual students, especially when instructional resources are not designed with language transitions in mind. Without formal training in translanguaging, code-switching, or visual scaffolding techniques, many mathematics teachers are unprepared to bridge language barriers effectively during instruction (Hassan Cole, 2024). Based on the figure below, three themes emerged from the participants' responses: conceptual misunderstandings due to language barriers, increased cognitive load for learners, and a lack of training in multilingual pedagogy. A significant theme among Mathematics teachers was the prevalence of conceptual misunderstandings due to language barriers during instruction. Teachers reported that

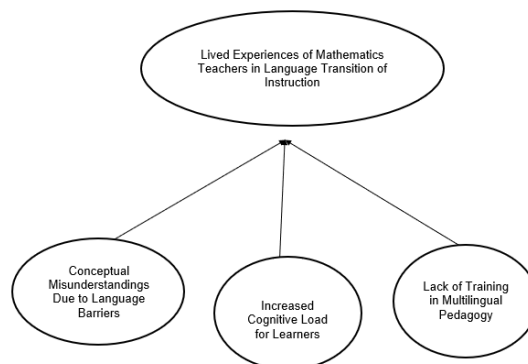


Fig. 3. Emerging Themes on the Lived Experiences of Mathematics Teachers in Language Transition of Instruction

even when students grasp basic mathematical operations, linguistic nuances often hinder their comprehension of complex problem statements or higher-order thinking skills. While a 2021 study by Acharya explored mathematics teachers' perceptions regarding Higher-Order Thinking Skills (HOTS), language barriers can directly impede students' understanding and practice of such skills, demonstrating how linguistic challenges fundamentally disrupt conceptual clarity in math. Another prominent theme highlighted was the increased cognitive load for learners when mathematics is taught in a language that's not their native language, or when there is a transition from a familiar language to a new one. Students are required to simultaneously process mathematical concepts and translate linguistic information, resulting in mental overload. Chen (2023) examined the relationship between instructional clarity and student constructs, such as mathematics self-concept and enjoyment, indicating that a lack of clarity,

often exacerbated by language transition, significantly impacts students' affective experiences in mathematics. This dual burden can severely impede learning and foster negative attitudes towards the subject. A consistent theme was the lack of training in multilingual pedagogy among Mathematics teachers, leaving them ill-equipped to effectively manage language transitions in their classrooms. Teachers expressed a need for specific strategies to bridge linguistic gaps and support diverse learners. While Bird (2022) describes an ideal resource for various educational roles including Math's subject leaders, its existence underscores the general availability of resources; however, many teachers still lack specific training focused on multilingual pedagogy to effectively adapt these resources for language-diverse classrooms. This gap in specialized training directly contributes to the challenges faced during language transition in math instruction.

3.2. Coping Mechanisms of Mathematics Teachers with the Challenges Encountered in Language Transition of Instruction—Language transition in mathematics instruction poses numerous challenges to teachers, particularly those teaching in linguistically diverse classrooms. To navigate these complexities,

mathematics teachers have developed various coping mechanisms aimed at maintaining instructional quality and learner comprehension.

3.2.1. Using Code-Switching—Language transition in mathematics instruction presents multifaceted challenges to educators. Among the most widely adopted coping mechanisms

is code-switching the deliberate alternation between two or more languages within a lesson. This strategy supports content delivery, enhances comprehension, and bridges gaps in linguistic understanding. Code-switching, the practice of alternating between two or more languages or dialects within a conversation or instructional context, has been widely documented as an effective pedagogical tool to bridge gaps in understanding complex mathematical concepts. This technique allows teachers to clarify terminology, reinforce concepts, and maintain student engagement when learners struggle with the primary instructional language (Hernandez et al., 2021). Research by Kim et al. (2022) underscores the role of code-switching in promoting inclusivity in classrooms where students come from diverse linguistic backgrounds. Teachers adapt their language use to meet students' needs, reducing cognitive overload and anxiety associated with language barriers. Moreover, code-switching supports scaffolding strategies, allowing learners to build on their prior knowledge in their home language before transitioning fully to the target language in mathematics instruction. The teachers emphasized the use of code-switching during the interview. Participant 1 primarily utilized code-switching in Mathematics to manage language transition, beginning with Bisaya for conceptual understanding before gradually introducing English terminology, prioritizing comprehension over pure English instruction, and normalizing bilingual use to alleviate student fear and foster a supportive environment. Meanwhile, Participant 5 personally managed the pressure of language transition by strategically employing code-switching in Math discussions, answering Bisaya questions in Bisaya before immediately translating to English, and relying on fellow teachers as a support system while ensuring interactive classroom discussions where mixed language was accepted to promote idea expression and model appro-

priate code-switching. Several scholars argue that while code-switching is beneficial, it also requires careful pedagogical planning to avoid dependency on the first language, which might hinder the full acquisition of the instructional language. Teachers must balance the use of code-switching with gradual immersion strategies to enhance language proficiency alongside mathematical understanding (Chen Park, 2023). Studies emphasize the emotional and cognitive coping benefits of code-switching for teachers themselves. Faced with the dual challenge of teaching subject matter and managing language transitions, educators report that code-switching reduces stress and increases instructional effectiveness (Singh Thomas, 2021). This strategy enables teachers to maintain classroom control and foster a positive learning environment despite language challenges.

The responses above revealed that Participant 9 primarily coped with Math language transition challenges through flexible code-switching, explaining formulas in Bisaya before presenting them in English, and relied on observing other teachers for support while actively encouraging students to ask for clarification to monitor their English comprehension. Similarly, Participant 10 managed the pressures of the Math language transition by being ready for on-the-fly code-switching, explaining English word problem terms in Bisaya, and constantly adjusting her approach based on student reactions. Their common difficulty was deprogramming students' reliance on Bisaya, which they navigated by requiring English output in activities, while still allowing Bisaya questions and emphasizing progress over perfect English. Further, integrating code-switching with technology-based language supports has been explored as a complementary approach. Research by Ahmed et al. (2022) highlights the synergistic effects of combining code-switching with multimedia resources that provide bilingual explanations, enhancing both teacher confidence and student

comprehension. Emerging studies continue to explore how professional development can equip mathematics teachers with effective code-switching techniques tailored to multilingual classrooms (Rodriguez Simmons, 2025). Such training promotes reflective practice and helps teachers adapt to increasingly linguistically diverse educational contexts.

3.2.2. Employing Visual and Contextual Aids. —Language transition in mathematics instruction often poses considerable challenges for teachers, particularly when learners have limited proficiency in the language of instruction. To address these challenges, many mathematics teachers employ visual and contextual aids as effective coping mechanisms that facilitate comprehension and support language transition. The study's findings agree that visual aids such as diagrams, charts, and graphic organizers provide concrete representations of abstract mathematical concepts, helping to bridge the linguistic gap between teachers and students. These tools enable learners to decode mathematical problems by associating language with imagery, which enhances understanding regardless of language proficiency (Brown et al., 2020). On the other hand, the study's findings were supported by contextual aids, including real-life examples and culturally relevant scenarios, which make mathematical content more relatable and meaningful to students navigating a second language. Teachers report that contextualizing problems within familiar settings reduces cognitive load and fosters student engagement, thereby promoting a deeper conceptual grasp (Díaz et al., 2023). The participants expressed the importance of visual and contextual aids. Participant 3 managed the demands of the Math language transition by providing contextual aids, setting scenarios in Bisaya before introducing English problems, and creating relevant story problems to ensure students understood the entire problem, not just the numbers. Meanwhile, Participant 4's primary cop-

ing mechanism for Math language transition challenges was a combination of visual and contextual aids, utilizing physical objects and drawings in geometry, and relying on free on-line resources for support while emphasizing demonstration over verbal explanation to overcome students' reliance on direct translation and maintain a conducive environment. Several studies emphasize that the combined use of visual and contextual supports helps teachers manage classroom diversity in language skills while maintaining instructional effectiveness (Evans et al., 2024). By integrating multiple modes of communication, educators accommodate different learning styles and language levels, facilitating smoother language transition. Research by Hassan et al. (2021) demonstrates that visual and contextual aids are instrumental in scaffolding instruction, enabling students to connect their prior knowledge with new mathematical concepts. This scaffolding reduces frustration and anxiety associated with language barriers, improving both student motivation and teacher confidence. The participant also addressed the challenge of transitioning Math instruction from Bisaya to English by integrating multimodal aids, such as videos, simulations, and interactive whiteboards, to clarify concepts. As a coping mechanism, she created pre-teaching activities focused on vocabulary development through images to cater to diverse learning styles. This deals with the idea that technology-enhanced visual aids, such as interactive whiteboards and educational software, have been recognized as powerful tools in supporting language transition (Ivanov Lopez, 2023). These digital resources offer dynamic visualizations and immediate feedback, enriching the instructional environment and helping teachers overcome linguistic challenges. However, scholars caution that reliance on visual and contextual aids must be balanced with language development strategies to ensure students ultimately build academic language proficiency alongside conceptual un-

derstanding (Jiang Thompson, 2025). Professional development focusing on the effective integration of these aids is critical for sustaining teaching quality in multilingual classrooms (Kumar Rodriguez, 2024).

3.2.3. Simplifying Mathematical Language—Language transition in mathematics instruction often complicates teachers' efforts to communicate complex concepts clearly to learners with varying language proficiency. To overcome this, many mathematics teachers employ simplification of mathematical language as a coping mechanism, modifying the complexity of terms and expressions to improve student understanding. The foregoing results of the study were consistent with the findings that simplification involves the intentional use of clear, concise, and accessible language to convey mathematical ideas without diluting the core content. This approach helps reduce cognitive load for students, enabling them to focus on concept acquisition rather than struggling with linguistic complexities (Bennett et al., 2021). Studies indicate that teachers simplify language by using common vocabulary, rephrasing definitions, and breaking down complex sentences into shorter, manageable parts. This strategy supports learners in grasping fundamental concepts before advancing to more formal mathematical language, fostering incremental learning (Diaz et al., 2023). During the interview, the participant emphasized the value of simplifying mathematical language. Such a theme was further supported by another participant during the discussion. Participant 2 simplified mathematical language during English transition in Math by using simpler, direct English terms and focusing on core concepts rather than jargon, which helped manage demands and address students' fear of long English sentences by explaining terms in various ways and providing relatable examples. Similarly, Participant 7 personally managed the pressure of language transition by using concise and repetitive math-

ematical phrases. As a coping mechanism, she created a "Math word bank" with simple English terms. Moreover, the use of analogies and everyday language to explain abstract mathematical concepts is a frequent technique reported by educators (Evans Kumar, 2024). By connecting mathematical ideas to familiar experiences, teachers bridge the gap created by language barriers and promote deeper understanding (Garcia Hassan, 2021). Research also highlights the role of teacher reflection and adaptation in effectively simplifying language. Teachers often adjust their language use based on student feedback and comprehension cues, demonstrating a dynamic process of language modification to meet learner needs (Ivanov Lee, 2023). However, scholars caution that oversimplification can risk reducing mathematical rigor and precision. Thus, striking a balance between simplicity and accuracy is essential to maintain the integrity of mathematical instruction (Jiang Patel, 2024). Professional development programs that focus on language simplification techniques help teachers navigate this balance. Hence, participants' insights highlight the challenges of Math language transition by simplifying mathematical language, focusing on essential terms, and presenting problems in the simplest English possible without filler words. This approach relies on student-friendly textbooks for support while addressing students' difficulty in extracting important information from lengthy problems. This finding is congruent with the notion that a comprehensive study of the emotional and cognitive benefits of teachers employing simplification strategies is notable. Teachers reported decreased frustration and increased instructional confidence when they successfully made content more accessible through language adjustment (Lopez Singh, 2022). The integration of simplification strategies with visual and contextual aids has been shown to amplify the effectiveness of coping mechanisms in language transition

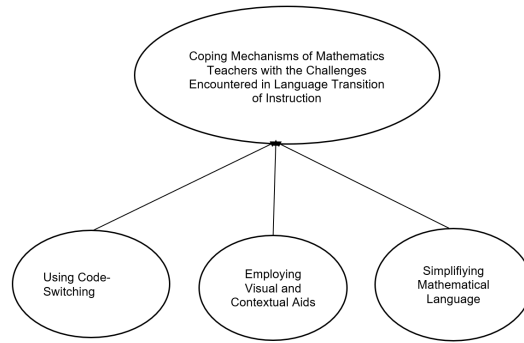


Fig. 4. Emerging Themes on the Coping Mechanisms of Mathematics Teachers with the Challenges Encountered in Language Transition of Instruction

contexts, providing multimodal support for diverse learners (Martinez Nguyen, 2021). Based on the themes identified in the figure below, the coping mechanisms of teachers in response to the challenges they encounter can be summarized as follows: using code-switching, employing visual and contextual aids, and simplifying mathematical language. A primary coping mechanism observed among Mathematics teachers is the use of code-switching during instruction, strategically alternating between the language of instruction and the students' mother tongue. This practice helps bridge immediate linguistic gaps, making complex mathematical concepts more comprehensible. While Datu et al. (2021) studied cross-cultural differences in grit and its association with academic engagement in Math and Science, code-switching can implicitly serve as a pedagogical tool that enhances student engagement and persistence by reducing communication barriers. Teachers frequently employ visual and contextual aids as a coping mechanism to clarify mathematical concepts amidst language transition challenges.

These aids, such as diagrams, real-world examples, and manipulatives, provide concrete representations that bypass purely linguistic understanding. Miele et al. (2022) found that a math-specific construct was linked to behavioral math persistence. Visual and contextual aids can directly contribute to developing this construct by making abstract concepts tangible and fostering a clearer understanding that encourages students to persist in problem-solving. Another key coping mechanism involves teachers simplifying mathematical language to make instructions and problems more accessible during language transition. This involves simplifying complex sentence structures and using more straightforward vocabulary to ensure that core mathematical ideas are grasped. While a 2022 study by Keating et al. focused on the relationship between parent attitudes and emergent math skills in preschoolers, teachers' simplification efforts often address existing linguistic and conceptual gaps that may stem from diverse early learning environments, making the content more digestible for all learners.

3.3. Educational Management Insights Drawn from the Findings of the Study on Language Transition of Instruction—The participants shared their educational management in-

sights, which were then condensed into a single theme. These themes were carefully analyzed and formulated based on the information provided by the informants' accounts and reflections. The subthemes are shown below:

3.3.1. Implementing Proactive Professional Development Programs. —The study's findings on language transition in instruction underscore the crucial need for proactive professional development (PD) programs that equip mathematics teachers with effective strategies for managing bilingual or multilingual classrooms. Teachers encounter challenges when students transition between languages of instruction, which impacts comprehension and engagement in mathematics learning. Educational management must therefore prioritize targeted PD that includes language acquisition theories, culturally responsive pedagogy, and adaptive instructional practices. Recent research emphasizes the importance of professional development programs designed around these insights, which emphasize collaborative learning communities, ongoing coaching, and reflective practices to support teachers' evolving instructional needs. Integrating technological tools to scaffold language and content simultaneously can enhance teacher preparedness in managing language transition effectively (Lee et al., 2022). Recent studies also reveal that professional development focusing on educational management strategies, such as time allocation, resource mobilization, and stakeholder engagement, enhances teachers' capacity to implement language transition practices successfully. Furthermore, programs that incorporate peer mentoring and collaborative problem-solving are shown to improve teacher confidence and student outcomes in mathematics during language transition phases (Garcia Thompson, 2020; Patel et al., 2024). The participants highlighted the importance of proactive professional development programs during the interview. P1 emphasized that while students initially experienced confusion with English academic vocabulary, a teacher's preparedness and guidance smoothed this transition, fostering adaptability and the ability to integrate a new language, valuable lessons for future academic growth.

Meanwhile, P5 highlighted that a lack of professional development in assessing students' emotional states during language transition significantly impacted academic growth; yet, the most valuable skills students acquired were critical thinking and problem-solving in both languages, ultimately strengthening their academic readiness. Proactive PD programs, as informed by recent research, should be grounded in practical approaches that support teachers in designing linguistically inclusive learning environments. Educational leaders play a pivotal role in fostering such programs by aligning school-wide goals with capacity-building initiatives that promote pedagogical and linguistic flexibility. Insights suggest the need to equip teachers with a repertoire of teaching strategies tailored to language-diverse classrooms, including code-switching, translanguaging, visual scaffolding, and culturally responsive teaching (Smith Reyes, 2020). Moreover, successful PD programs should include structured mentoring systems, opportunities for reflective collaboration, and school-based language transition support frameworks (Taylor Hunt, 2021). Educational management must also ensure that PD is not a one-time training, but a sustained and adaptive process that evolves with classroom demands. School leaders must provide not only technical resources but also a supportive culture that values linguistic diversity and encourages instructional experimentation (Kumar Ellis, 2022). The participant above conveyed that students' academic readiness and development were evident, underscoring the necessity for schools to invest in proactive professional development focusing on scaffolding techniques for multilingual classrooms; ultimately, the most valuable lessons students gained were resilience and the ability to adapt to new learning methods, skills crucial for their academic journey and preparedness for higher education. Furthermore, research underscores the importance of empowering teachers with data-driven decision-

making skills, enabling them to assess the impact of language instruction shifts and adapt their strategies accordingly (Garcia et al., 2023). Integrating technology such as bilingual math software or real-time translation tools into PD programs also enhances teachers' ability to facilitate instruction during language transition periods (Chen Morales, 2024). This is also supported by a study, which suggests that professional development initiatives anchored in educational management insights must be holistic, teacher-centered, and context-sensitive to effectively respond to the unique experiences of mathematics teachers during language transitions. These programs should strive not only to build competence but also to foster confidence, agency, and resilience in teachers who handle linguistically diverse classrooms.

3.3.2. Accessing Multimodal Teaching Materials.—The experiences of mathematics teachers during language transition in instruction emphasize the pressing need for equitable access to multimodal teaching materials. These materials, which include visual aids, interactive simulations, audio-visual content, and language-integrated digital tools, play a pivotal role in helping teachers convey mathematical concepts to students navigating between languages. Findings suggest that insufficient access to such resources hinders effective instruction, particularly in linguistically diverse classrooms, thereby underscoring an important area for educational management to address. From an educational management perspective, providing access to multimodal resources necessitates strategic planning, effective resource allocation, and targeted training. Administrators must not only invest in acquiring appropriate materials but also ensure that teachers are trained to use them effectively. It is not merely the presence of technology or resources that determines success, but the pedagogical integration of these tools that enhances comprehension during language transitions (Chen Ward, 2021).

Moreover, multimodal resources support differentiated instruction, enabling teachers to adapt their approaches to students' varying linguistic proficiencies and learning styles. Mathematics teachers reported that incorporating bilingual diagrams, interactive graphs, and real-world video examples helped bridge linguistic gaps in instruction. Educational leaders, therefore, must foster systems that continuously assess material relevance, accessibility, and cultural responsiveness. Some participants shared insights regarding accessing multimodal teaching materials. During the interview, Participant 2 found that students' comprehension and academic growth were greatly aided by educational videos and audio files, with multimedia access strengthening their confidence in English and contributing to future academic readiness. Likewise, Participant 6 noted that a significant student experience during language transition was their increased interest in subjects when instruction was supported by interactive multimedia, which shaped their academic development by making learning more enjoyable and engaging. Literature affirms that access to multimodal teaching tools enhances student engagement, boosts academic performance, and reduces instructional gaps among learners in language transition contexts (Garcia et al., 2023). Furthermore, the role of educational leadership is critical in ensuring that such tools are contextually aligned and equitably distributed across grade levels and school settings (Brown Adams, 2020). Ongoing professional development in the use of multimodal strategies should be embedded within school improvement plans, reflecting a systemic approach to enhancing teaching quality during language shifts. In the context of language transition in mathematics instruction, the availability and effective use of multimodal teaching materials are pivotal. These resources such as visual aids, digital tools, interactive media, and bilingual content provide essential scaffolding for learners navigating between languages. Insights from

mathematics teachers reveal that such tools are not just supplementary, but integral to comprehension and retention, especially when students are still developing proficiency in the language of instruction (Thomas Rivera, 2020). During the FGD, some participants also expressed how significant it is to access multimodal teaching materials. P7 indicated that virtual simulations and interactive diagrams made abstract ideas easier to grasp, and this approach enhanced students' critical thinking and problem-solving skills in English, while their ability to find and use online resources contributed to their independent learning and academic readiness. Thus, P10 stated that the most valuable lesson students learned was the effectiveness of self-directed learning using multimedia tools, and this prepared them not only for future subjects but also for a technologically driven world. Educational management plays a crucial role in ensuring equitable access to multimodal resources. It involves strategic planning in procurement, training, and integration of these materials into curricula. When school leadership prioritizes teacher access to multimodal tools, the learning environment becomes more inclusive and effective (Benson Li, 2021). Administrators are also responsible for assessing the relevance, quality, and adaptability of these tools to meet the needs of linguistically diverse classrooms. Furthermore, multimodal instruction has been shown to enhance student engagement and mathematical understanding by providing alternative modes of input and expression. For example, the use of diagrams, manipulatives, digital simulations, and multilingual platforms allows students to connect abstract concepts with real-life applications (Jensen Malik, 2022). This approach supports differentiated learning, helping educators address language barriers through visual and contextual reinforcement (Chen Osei, 2023).

]Adopting Flexible Curriculum Frameworks.

In light of findings related to the language

transition in instruction, adopting flexible curriculum frameworks has become a strategic approach in educational management. Mathematics teachers navigating language transitions often face challenges in aligning rigid curricula with the linguistic and cognitive levels of their learners. A flexible curriculum allows for contextual adaptation, ensuring that instructional goals are still met while accommodating the diverse language backgrounds of students. A flexible curriculum enables teachers to integrate translanguaging strategies, scaffold content, and incorporate real-world contexts that align better with students' cultural and linguistic identities. This responsiveness enhances student engagement and fosters a deeper understanding of mathematical concepts (Singh Harper, 2021). Educational managers and curriculum developers play a crucial role in providing autonomy to educators, supporting curriculum innovations that are sensitive to language diversity (Brown Kim, 2022). Moreover, research shows that curriculum flexibility positively impacts both teaching efficacy and student achievement, particularly in multilingual environments. When teachers are allowed to adapt pacing, content delivery, and assessment methods, learners benefit from more inclusive and differentiated instruction (Nguyen Silva, 2023). This approach is vital in mathematics where linguistic precision and conceptual clarity are paramount. The need to adopt flexible curriculum frameworks were given attention during the interview. P3 observed that flexible curriculum frameworks were very important in teaching, and this allowed students to experience a smoother transition when the curriculum adapted to their pace, and it also enabled their readiness to learn a new language and their academic growth to develop more quickly. Further, P4 stated that a significant student experience was their comfort in self-expression, and this fostered their academic development by providing space for language experimentation, while their flexibil-

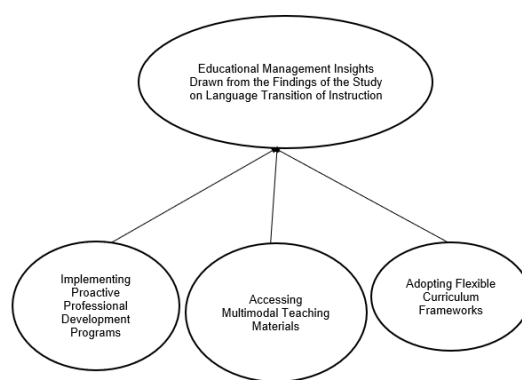


Fig. 5. Emerging Themes on the Educational Management Insights

ity and ability to adapt to varied instructions were valuable acquisitions. However, flexibility must be balanced with clear learning standards and continuous teacher support. School leaders must provide guidance, resources, and training to help teachers implement adjustments effectively without compromising curriculum coherence (Lopez Adeyemi, 2024). The emphasis should be on outcome-based frameworks that empower teachers to meet objectives while addressing linguistic barriers. Language transition in instruction, especially in mathematics education, presents significant pedagogical challenges for both teachers and learners. Mathematics teachers often face the dilemma of delivering abstract concepts in a second or third language, leading to reduced comprehension and learner engagement. In response to this, educational management has increasingly recognized the importance of adopting flexible curriculum frameworks that cater to diverse linguistic needs and classroom realities (Harper Lin, 2020). This participant shared that their experiences indicated students initially struggled but ultimately improved due to a curriculum that al-

lowed for diverse approaches; this positively impacted their academic growth, especially their information processing ability, and their independent learning and intercultural communication skills were excellent outcomes. Flexible curriculum frameworks are characterized by the adaptability of instructional content, teaching strategies, and assessments to suit students' language proficiency levels while maintaining curriculum standards (Miller Zhou, 2021). Such frameworks support differentiated instruction, allowing teachers to employ various methods such as scaffolding, translanguaging, and multimodal strategies that bridge the language gap in mathematical instruction (Tan Rivera, 2022). Flexible frameworks encourage teacher autonomy and innovation. When teachers are empowered to adjust curriculum pacing and content delivery based on learners' linguistic readiness, it results in more inclusive and effective learning environments (Singh Taylor, 2023). This aligns with educational management goals of enhancing instructional responsiveness and improving learning outcomes across multilingual settings.

3.3.3. Drawn From the Findings of the Study on Language Transition of Instruction—Based on the figure above, three themes emerged from the participants' responses, which emphasized proactive professional de-

velopment, accessing multimodal teaching materials, and adopting flexible curriculum frameworks. A key educational management insight highlighted the importance of proactive professional development for teachers navigating

language transition in mathematics instruction. This theme emphasizes equipping educators with specialized skills before challenges escalate. While Maras and Shand (2021) explored how art teachers demonstrate critical and creative thinking during collaborative reasoning about contemporary Chinese artworks, their findings underscore the value of targeted professional development that fosters reflective practice and innovative thinking essential for complex pedagogical demands like language transition. Another significant insight pointed to the crucial role of accessing multimodal teaching materials in supporting language transition during mathematics instruction. These materials provide diverse avenues for understanding, catering to various learning styles and reducing reliance on purely linguistic comprehension. Wakhata et al. (2023) explored that flipped cloud learning has been widely used to support online instruction and enable teaching and

learning. This aligns with the need for multimodal resources, as digital platforms and varied media can effectively facilitate content delivery and interaction, making abstract mathematical concepts more accessible during language shifts. The study emphasized the necessity of adopting flexible curriculum frameworks as a key educational management insight to mitigate challenges in language transition. Rigid curricula often fail to accommodate the diverse linguistic and cognitive needs of learners. According to a study conducted by Hatisaru in 2020, mathematical tasks focused on procedural skills were the most common among Turkish students, which suggests a potential overemphasis on rote learning rather than conceptual understanding. Flexible frameworks would allow teachers to adapt pacing and methodology, enabling a deeper, more conceptual understanding of mathematics despite

4. Implications and Future Directions

This chapter serves as a critical component of the study, providing insights into the practical, policy, and research implications of the findings. It provides guidance on how the study's results can be applied to enhance educational practices and identifies areas for future research.

4.1. Implications—This study sheds light on the complex realities faced by Mathematics teachers as they navigate the pedagogical challenges inherent in language transition during instruction. The findings offer crucial insights into how linguistic factors impact the teaching and learning of mathematics, highlighting the need for specialized support systems and adaptive instructional strategies to ensure conceptual understanding and academic success for all learners. On the experiences in language transition in instruction of Mathematics teachers, three themes emerged from the responses of the participants which were conceptual misunderstandings due to language barriers, increased cognitive load for learners, and lack of training in multilingual

pedagogy. The prevalence of conceptual misunderstandings due to language barriers implies that the linguistic gap directly impedes learners' ability to operate within their Zone of Proximal Development (ZPD). When mathematical language is unclear, the necessary social interaction and scaffolding from the teacher cannot effectively guide the learner towards new understanding of concepts. Therefore, bridging these language barriers is crucial for enabling students to progress beyond their current independent cognitive level in mathematics. The finding of increased cognitive load for learners during language transition directly highlights the challenges illuminated by Cognitive Load Theory (CLT). When students are simultaneously pro-

cessing new mathematical concepts and translating language, their limited working memory becomes overloaded, hindering learning. This implies that instructional strategies must explicitly aim to reduce extraneous cognitive load caused by linguistic demands, allowing learners to focus their mental resources on the intrinsic complexity of the mathematical content. The identified lack of training in multilingual pedagogy implies that teachers are currently ill-equipped to effectively manage the increased cognitive load experienced by their learners. To mitigate this, professional development programs must focus on equipping teachers with explicit strategies from Cognitive Load Theory (CLT). Such training will empower teachers to proactively design instruction that minimizes extraneous load during language transition, allowing students to process mathematical concepts more efficiently. On the coping mechanisms of Mathematics teachers with the challenges encountered in language transition in instruction can be summarized as follows: using code-switching, employing visual and contextual aids, and simplifying mathematical language. The effective use of code-switching as a coping mechanism by mathematics teachers directly aligns with Vygotsky's Zone of Proximal Development (ZPD). By strategically transitioning between languages, teachers provide crucial linguistic scaffolding that enables students to access mathematical concepts they might not grasp independently in the target language alone. This practice allows learners to operate within their ZPD, leveraging their existing linguistic strengths to build new mathematical understanding and bridge communication gaps. The widespread use of visual and contextual aids by mathematics teachers is a powerful strategy for managing the increased cognitive load learners experience during language transition, as explained by Cognitive Load Theory (CLT). These aids reduce the extraneous cognitive load associated with processing new language by providing a direct, non-

linguistic pathway to understanding mathematical concepts. By making abstract ideas more concrete and relatable through visuals, teachers free up working memory, allowing students to focus their limited cognitive resources on the intrinsic complexity of the math itself. The coping mechanism of simplification of mathematical language directly addresses the challenge of cognitive overload, consistent with Cognitive Load Theory (CLT). When teachers deliberately simplify sentence structures and vocabulary, they reduce the extraneous cognitive load placed on learners who are simultaneously processing new mathematical concepts and navigating an unfamiliar language. This strategic linguistic adjustment allows students to allocate more mental resources to understanding the core mathematical content, preventing their working memory from becoming overwhelmed and facilitating clearer comprehension. On the educational management insights drawn from the study's findings on language transition in instruction, three themes emerged from the participants' responses, emphasizing the implementation of proactive professional development, access to multimodal teaching materials, and the adoption of flexible curriculum frameworks. The finding that proactive professional development is crucial directly supports the application of Vygotsky's Zone of Proximal Development (ZPD) to teacher learning. Educational management must provide structured and ongoing training that helps teachers develop skills in multilingual instruction, acting as the "more knowledgeable other" to guide them through their own professional ZPD. By fostering this growth, teachers become better equipped to scaffold learning for their students who are navigating language transitions in math. The emphasis on accessing multimodal teaching materials highlights a vital strategy for optimizing learning under conditions of increased cognitive demand, as per Cognitive Load Theory (CLT). Educational management should prioritize providing diverse

resources like visuals, manipulatives, and digital tools that reduce extraneous cognitive load during language transition in math instruction. These materials enable learners to process complex mathematical concepts more efficiently by offering alternative pathways to understanding, rather than relying solely on linguistic comprehension. Adopting flexible curriculum frameworks is essential for educational management to effectively manage cognitive load for learners in language transition, aligning with Cognitive Load Theory (CLT). Rigid curricula often impose high extraneous cognitive load by forcing a fixed pace regardless of students' linguistic or conceptual understanding. Therefore, flexible frameworks allow teachers to adapt instruction, pacing, and assessment to minimize overload, ensuring that students' working memory is dedicated to the intrinsic learning of mathematics rather than struggling with external demands.

4.2. Future Directions—Building upon the findings of this study on the experiences and coping mechanisms of Mathematics teachers regarding language transition in instruction, several future directions emerge for key stakeholders: Learners Learners should prioritize developing and implementing targeted linguistic support within mathematics classrooms to ease the cognitive load associated with language transition. This includes providing clear bilingual glossaries, interactive visual aids, and opportunities for peer-assisted learning in both languages. Ultimately, empowering learners with effective strategies to navigate language barriers will foster deeper conceptual understanding in mathematics. Teachers Teachers necessitate comprehensive professional development programs focused explicitly on multilingual pedagogy and strategies for effective language transition in math instruction. This training should include practical sessions on code-switching techniques, creating language-sensitive math tasks, and utilizing multimodal resources. Providing ongoing mentorship and collaborative

platforms will further support teachers in refining these crucial skills. Parent Parents should be involved in establishing robust home-school communication channels that explain the challenges of language transition in mathematics and offer practical support strategies. This includes providing parents with resources in their native language to reinforce math concepts and encouraging their active participation in their children's mathematical journey. Empowering parents as partners ensures a consistent and supportive learning environment that bridges linguistic gaps. School Administrators School Administrators must champion future directions by creating supportive policies and allocating resources specifically for addressing language transition in mathematics instruction. This involves investing in multilingual teaching materials, facilitating access to language support specialists, and fostering a school culture that values linguistic diversity. Their leadership is crucial in building capacity and ensuring equitable access to quality math education for all learners. Department of Education The Department of Education should focus on integrating multilingual pedagogy into national mathematics curriculum frameworks and teacher education standards. This includes developing clear guidelines for language-inclusive math instruction and providing funding for research into effective models for language transition. Policy reforms are essential to acknowledge and strategically address the linguistic complexities of mathematics education nationwide. Future Researchers Future Researchers are encouraged to conduct empirical studies on the long-term impact of specific multilingual pedagogical strategies on mathematics achievement during language transition. This includes investigating the efficacy of various code-switching approaches, the optimal use of digital tools for linguistic scaffolding, and the role of teacher beliefs in implementing language-sensitive instruction. Longitudinal studies are needed to track student progress and

refine best practices in this critical area.

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