

Exploring Disparities of Mathematics Education: A Comparative Study of Challenges Faced by Rural and Urban Educational Settings in Digos City

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ABSTRACT: In Digos City, primary-level math education faces significant challenges, with distinct issues for teachers in rural and urban areas. Rural teachers often struggle with limited access to educational materials, while their urban counterparts deal with overcrowded classrooms. This study examines the experiences of 10 public school math teachers, focusing on the challenges they encounter and their coping strategies. Key challenges include literacy constraints, a lack of foundational math skills, and teacher preparedness, particularly in rural settings. In urban areas, disparities in grade progression, math proficiency, and class sizes present major obstacles. Both settings also faced challenges with diverse learning paces among students, the need for aligned teaching strategies, and time constraints in curriculum delivery. To address these issues, the study suggests several strategies: integrating e-learning tools, implementing differentiated teaching approaches, enforcing mandated educational initiatives, employing innovative instructional practices, fostering peer collaboration, and promoting continuous professional development for teachers in both settings.

KEYWORDS: education, teacher challenges, coping strategies, urban schools, rural schools, Digos City, Philippine

INTRODUCTION

In the 2018 Programme for International Student Assessment (PISA), Filipino students ranked among the lowest performing groups globally. Specifically, in mathematics, fewer than 20% of students reached the minimum proficiency level (Level 2), while over half demonstrated very low proficiency (below level 1). This indicates a significant lag in mathematical education, with more than half of Filipino students in this age group lacking adequate skills compared to their international peers. Earlier research has indicated distinct disparities between public and private schools in the Philippines concerning learning resources (Trinidad, 2020). Teacher attributes are closely linked to the quality of instruction and are predictive of improved students' performance in mathematics (Toropova et al., 2019; Wayne & Youngs, 2003; Wedel, 2021). The decision by the Philippine government to join PISA 2018 was driven by the goal of leveraging insights from this global assessment to enhance the existing educational framework. In this case, we can see what is the updated analysis for students in mathematics based on this.

Primary-level mathematics teachers in both rural and urban settings are important in nurturing students' understanding of basic mathematical concepts. Despite challenges such as limited resources in rural schools (Andin et al., 2019), teachers display creativity in teaching methods, utilizing available materials and engaging students in practical learning experiences. In urban areas, teachers adapt strategies to cater to diverse student backgrounds. Experts have identified factors contributing to students' math struggles, including weak foundations (Uka & Ezech, 2022), overcrowded classes, and outdated resources (Evans et al., 2019). Ineffective teaching methods and materials are also highlighted (Inweregbuh et al., 2020; Mosimege & Egara, 2023; Osakwe et al., 2023). Nevertheless, primary-level mathematics teachers remain dedicated to creating supportive learning environments conducive to academic success.

Mathematics teachers encounter unique challenges in both rural and urban educational environments. Teachers in rural schools often face isolation due to limited access to financial, recreational, and healthcare facilities, which affects their morale and teaching effectiveness. In addition, language barriers, inadequate pedagogical resources, and poor school infrastructure further exacerbate the challenges they encounter in teaching (Shahnaz & Gandana, 2020). In urban settings, overcrowded classrooms and diverse student populations create challenges for providing individualized support. Overcrowded classrooms and a lack of essential skill sets (Mahlo, 2017) are significant obstacles that hinder effective teaching and learning. Yet, the specific challenges faced by mathematics teachers in both rural and urban areas remain largely unexplored. Additionally, it's unclear whether teaching and learning are more effective in urban settings compared to rural areas. Mathematics teachers have problems and challenges such as learners' perception, readiness and, their interest in study, time management and curriculum structure (Isnawan et al., 2022). Addressing these challenges can reduce educational disparities, enhance students' mathematical competencies, and foster inclusivity

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and competitiveness.

The “new normal” in education has disrupted mathematics instruction in elementary schools. To counter this, teachers are diligently exploring practical methods to improve their students’ grasp of math and learning outcomes. AI- Mashaqbeh (2016), cited by Anderson (2020), researchers compared traditional with technology-based approaches in an urban elementary school. It suggests that students utilizing technology grasped mathematical concepts both at a faster and deeper level compared to those taught with traditional methods that teachers should use. These resources, along with appropriate teacher instruction are essential for ensuring all students have the necessary support and tools to effectively grasp mathematical concepts (Ozcaya & Karaca, 2017). Sinambela (2020) emphasizes that teacher creativity is crucial for developing engaging and diverse learning materials.

Many primary school educators have expressed concerns regarding the lack of updates about the methodologies employed in generating mathematical problems that necessitate the application of higher-order cognitive skills. Rural elementary math teachers may lack a strong foundation in mathematics. According to Lowe (2018) that rural districts can experience a greater need, as they work to recruit teachers to teach in more remote areas. In contrast, certain challenges like managing students' diversity and parent communication are often categorized as general teaching difficulties, they can manifest differently within urban contexts (Gaikhorst et al., 2019). According to Tundag (2014), translation of mathematics concepts or language in a mother tongue was a major problem in a certain school in Dumaguete, Philippines, whereas delivering exercise and activities was viewed as a moderate problem. Multiple studies have highlighted the issue of teachers facing a high workload and consequently experiencing significant stress.

Attentional Control Theory or ACT (Eysenck et al., 2007) adopt an inquiry-based constructivist learning theory, which served as the basis for this research. ACT argues that anxiety is characterized by diminished ability to control attention, resulting in reduced performance in tasks that require the central executive of the working memory system. According to attentional control theory, the anxiety associated with Mathematics distracts the minds of students, diminishes their working memory, and consequently, detrimentally affects their academic achievements in Mathematics (Justicia- Galiano et al., 2017). When students get to do things and touch real objects to learn, they understand things better, learn to think more deeply, and start to enjoy learning more. This advocate for guided discovery learning with manipulatives as the most effective instructional tool in another way of teaching (Yurniwati & Hanum, 2017).

To teach mathematics effectively, math teachers must be well- prepared in urban and rural contexts. To better serve the children, math courses should be updated and made more relevant to their needs and interests. We conducted this study because this study aims to explore, compare and identify the unique challenges that are experienced by the math elementary teachers and to gain a deeper understanding of the factors influencing these differences. This study has the potential to contribute significantly to educational equity by improving teaching practices and mathematics education in Digos City. This study would like to provide insights into the teaching environment by understanding the disparities between urban and rural settings. This information is very important for addressing the overall needs of educators and ultimately leads to the development of effective strategies that ensures equitable access to quality mathematics education for all students.

OBJECTIVES OF THE STUDY

This study was to identify the challenges of public elementary math teachers that faced in rural and urban educational settings, compare and contrast the challenges in both areas, and identify the factors that contribute to the disparities in mathematics education between rural and urban educational settings.

- 1.) To identify challenges faced by mathematics teachers in rural and urban educational settings.
- 2.) To identify coping mechanisms for mathematics teachers facing challenges in rural and urban educational settings.

METHOD

Participants

The participants consisted of 10 public elementary teachers, regardless of gender, age, or year level, who had dedicated at least five years to the teaching profession and had experience teaching math in Digos City, Davao del Sur. Notably, the sample size aligned with recommendations for qualitative studies using phenomenology, which suggest 5-25 participants (Creswell, 1996). Specifically, 5 teachers from rural settings and 5 from urban locales participated, with one representative from each identified school. Moreover, to explore this further, the study employed purposive sampling, selecting participants based on specific criteria. However, participants who demonstrated irregular participation or voluntary withdrawal were excluded. Additionally, those who no longer met the study's criteria or opted not to continue were removed.

Instruments

To gather data, researchers crafted questions aligned with the study's objectives, designing them to elicit comprehensive responses from participants. Semi-structured questionnaires fostered open and detailed answers, enabling an in-depth investigation. The interview guide questions were reviewed and validated to ensure accuracy. Furthermore, audio recordings were employed to capture

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interviews accurately, a customary procedure in qualitative research (Tracy, 2019). With participants' consent, all interviews were voice-recorded and transcribed verbatim. Prior to the interviews, participants received informed consent forms outlining the study's purpose, their rights, and confidentiality measures. Interviewers played a crucial role, guiding conversations and ensuring participants' comfort and respect. This rigorous approach ensured data reliability and validity. The transcripts provided valuable insights into the research topic, allowing researchers to draw meaningful conclusions. Throughout the process, participants' responses were treated with confidentiality and anonymity, upholding ethical standards.

Design and Procedure

The research method used was descriptive-qualitative, and the participants were recruited through purposive sampling. Descriptive qualitative research emphasizes a detailed exploration and seeks to understand participants' experiences, allowing for a richer understanding of the subject. Data is collected through interviews and open-ended questions to gathered comprehensive insights that reflect participants' experiences. This study employed the multiple case study method, ideal for analyzing and comparing data across various cases (Abadir et al., 2020). This design proved effective for examining how factors like individual characteristics, social dynamics, psychology, organizational culture, and environment shape leadership and management development. Using multiple case studies enhanced reliability and trustworthiness, as information came from diverse sources and contexts.

Furthermore, the researchers proceeded by obtaining formal approval from the DepEd Division Office of Digos City to conduct the study in public primary schools. Identified five rural and five urban schools, ensuring balanced selection. After securing consent from principals, participants were selected, and interviews were conducted in confidential settings, lasting 30 minutes to 1 hour. Following transcription, translation, and analysis by a data expert, the Multiple Case Study (MCS) approach was recommended to examine the similarities and differences across cases. This method enhanced the study's depth, revealing important patterns and adding credibility to the findings.

RESULTS AND DISCUSSION

The challenges faced by public school math teachers in urban and rural educational settings in Digos City

One of the objectives of this study was to identify the challenges faced by mathematics teachers in rural and urban schools in Digos City. The responses revealed distinct themes for each setting. In rural schools, the challenges included Literacy Constraints, Deficiencies in Foundational Math Skills, and Teacher Preparedness and Content Mastery. In contrast, urban schools faced issues such as Disparities in Grade Progression and Math Proficiency, along with the challenge of managing Large Class Size Dilemma.

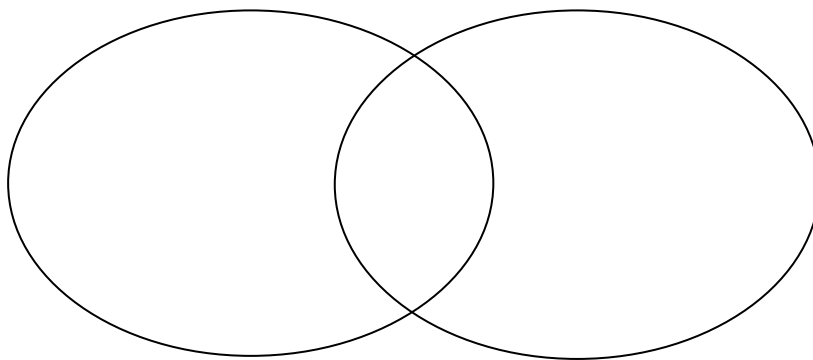


Figure 1. Cross-case Analysis on the Challenges Faced by Math Teachers in Urban and Rural Educational Settings

Literacy Constraints. Non-reader students faced difficulties in grasping concepts due to their lack of reading skills, which were essential for understanding instructions and processing information across all subjects. In math, even basic problems often involved written instructions or word problems, making it hard for these students to follow along. For those with limited English comprehension, the challenge was compounded, as they must decode the language before engaging with the math content. In rural areas, participants 1 and 2 noted that some students showed strong numerical skills but struggled significantly with problem-solving due to difficulties in comprehending the language used in word problems.

Below are the following responses of the 2 participants:

“Naay bata nga non-reader mag excel sila sa math kung numbers lang pero in terms of problem solving diha na gyud, dili na gyud sila kalahutay.” (There are learners who are non-readers who can excel in math when it comes to numbers alone, but when it comes to problem-solving, they struggle to solve). [Participant 1, Rural]

“Naa puy ubang bata kung dili to siya kasabot ug English lay english naman ang instruction, kung dili sila kasabot ug english dili pud sila makaanswer sa usa ka problem”. (There are also other learners who are

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experienced in understanding English since the instructions are in English, they struggle to answer a problem if they don't know how to comprehend the language). [Participant 2, Rural]

This issue was unique to rural areas, as it was not observed in urban schools, where students did not encounter the same challenges. The gap between students' proficiency in working with numbers and their reading comprehension highlights that excelling in mathematics alone is insufficient to solve real-life problems. Over the past two decades, the emphasis on mathematical literacy has increased, prompting a shift in teaching approaches that now integrate reading skills into math instruction (Beaudine, 2018).

This correlation between math skills and reading comprehension underscores a key theme: teachers face challenges in helping students understand both mathematical concepts and the English instructions that accompany them. Students often struggle academically in English-speaking classrooms due to language proficiency gaps (Driver & Powell, 2016). The responses suggest that if students cannot grasp the literacy component of math problem-solving or understand English instructions, this may hinder their ability to grasp fundamental concepts. Even students with strong reading skills might not fully comprehend the material they read.

Participant 1 from rural areas shared that while their student excelled at numbers, they struggled with problem-solving, likely due to a lack of understanding of the problem's language. It was also suggested that students who enjoy reading may read more but still struggle with comprehension. Building mathematics vocabulary starts in early elementary grades, as students need to understand and communicate mathematical concepts effectively. However, English learners and students with math difficulties often face challenges in acquiring math language skills, highlighting the importance of targeted support (Forsyth & Powell, 2017; Orosco, 2014). Similarly, Participant 2 noted that their student's inability to understand the English language led to difficulties in solving problems as well. In contrast, urban students did not report similar literacy-related challenges, suggesting that literacy constraints in rural areas may be more pronounced due to factors like access to resources and language barriers.

Diverse Learning Space. Teachers often struggle to meet the needs of both slow and fast learners in their classes. They have to change their teaching methods, giving extra time to help slow learners while offering harder tasks to fast learners. However, this becomes harder because of the limited time they have. With a lot to teach in a short amount of time, it is difficult for teachers to provide individual support to everyone and still cover the required lessons. Balancing these needs adds stress and makes teaching more challenging, as they try to make sure no students fall behind. Moreover, teachers in both rural and urban areas often face challenges in meeting the needs of slow, average, and fast learners in their classrooms. However, the difficulties they encounter vary depending on the context, particularly in relation to time management, resources, and student diversity.

Below are the following responses of the 4 participants:

“My observations sa mga estudyante in teaching mathematics ang akong naexperience is different multiple intelligence kay naay mga slow learners, naay mga fast learners ug naa puy mga in the middle lang pud”. (So, I've seen that students have different levels of intelligence. Some are slow learners, some are fast, and some are in between). [Participant 2, Rural]

In rural areas, Participant 2 observed a wide range of student abilities, including slow, fast, and average learners, making it difficult for teachers to ensure fairness in their instruction. In mixed-ability classrooms, teachers encounter challenges in addressing diverse learning needs. Teachers may encounter challenges related to fairly assessing all students due to a variety of factors, including differing proficiency levels, diverse learning styles, and the assessment tools they have available (Asal et al., 2024). The diverse intelligence levels in the classroom force teachers to adjust their teaching methods, yet finding the right balance remains challenging.

“Intervention group mana sila no, gamay rajud ang mga resources ana nila, kay kasagaran sa mga resources katu ng sa mga average ug sa mga advance. Siguro as to resources, sa advance ug sa average nga mga learners available, pero katung mga resources jud sa mga bata nga nagdahik, dili sya available”. (The intervention group has very limited resources compared to the average and advanced learners. Most resources are geared towards average and advanced students. The resources specifically designed for those who are struggling are not readily available). [Participant 3, Rural]

Similarly, Participant 3 in rural areas highlighted a lack of resources specifically designed for struggling students. While resources were readily available for average and advanced learners, slow learners often have limited access to materials, which hinders their ability to improve their math skills. Teachers in rural areas must be flexible and adapt their teaching approaches to meet the needs of different learners, but without the proper resources, students with weaker math skills fall behind. Sovia and Herman (2019) suggest that slow learners can improve if teaching methods are adjusted to suit their needs, but the absence of resources limits their opportunities for growth.

“The biggest obstacle to effective math instruction include insufficient time for individualized instruction”. [Participant 4, Urban]

“...so kung non-negotiable so wala tay mahimo e comply jud nato and teacher are very flexible. We need to have initiative;

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we need to do something na ma accomplished ang dapat ma accomplished. We have no choice but to comply kay kung dili ma question imong management sa time". (So if it's non-negotiable, we have no choice but to comply. Teachers are very flexible and need to take initiative to accomplish what needs to be done. We have to comply because if we don't, our time management will be questioned). [Participant 5, Urban]

In contrast, participants from urban areas emphasized time constraints rather than a lack of resources. Participant 4 noted that insufficient time for individualized instruction is a major barrier to effective math teaching. Participant 5 added that teachers in urban areas must be flexible and take the initiative to meet curriculum demands, despite the tight schedules. The need to comply with non-negotiable requirements, such as completing the curriculum within a limited time, adds pressure to urban teachers. Although urban schools may have smaller class sizes and better access to resources, teachers still struggle to balance their instructional duties with the time required for lesson preparation, material creation, and managing diverse students (Sousa, 2021).

Deficiencies in Foundational Math Skills. Learners often struggle with advanced math topics because they lack a strong foundation in basic math skills. Gaps in their understanding of key concepts like addition, subtraction, multiplication, and division make it hard for them to handle more complex problems. Since these four operations are essential for higher-level math, students find it difficult to move forward without mastering them. Without a solid grasp of them, students may feel confused and frustrated, unable to build on their existing knowledge.

Below are the following responses of the 2 participants:

"Readiness in terms of kining mastery nila sa four operations, four fundamental operations in math". (The main problem with the students regarding math is their readiness for the subject. Specifically, their mastery of the four fundamental operations in math). [Participant 2, Urban]

Participant 2 from an urban setting emphasized that students' primary challenge in math was their lack of readiness, specifically their struggle to master the four fundamental operations. The absence of sufficient readiness hinders the learning process (Dewantara, 2020), leading to students struggling to attain fundamental math skills. Similarly, Participant 1 from a rural area identified multiplication as particularly difficult, noting that it involves a combination of addition, which makes it even more challenging for students who are already struggling with the basics.

"So ang challenge is most especially kanang four fundamental operations and then ang sa four fundamental operations ang sa akua ang murag dakog challenge is kanang multiplication kay nag involve man gud sya og naa na siya'y addition". (The biggest challenges, especially for me, are the four basic operations—addition, subtraction, multiplication, and division. Among these, multiplication is particularly challenging because it involves addition). [Participant 1, Rural]

Both participants pointed to the same core issue: students' lack of proficiency in the four operations, which significantly hampers their overall math progress. Studies, such as the one by Uwezo (2011), cited by Omar (2022), reveal that over 67% of young children in early primary school have not yet acquired basic math skills. Participants noticed that this lack of understanding led to frustration and confusion, requiring them to spend extra time reviewing these basics instead of introducing new topics from both settings. Research has shown that students often struggle to remember math concepts over time, which creates a major barrier to their overall math skills (Nzeadibe et al., 2020). It is a big challenge for them on how these four fundamental operations can master their students to gain solid understanding as they proceed to the next lesson or level.

Disparities in Grade Progression and Math Proficiency. There are clear problems with students being ready to learn, especially in math. Even though they are moving up to higher grades, their math skills are not improving as they should. This shows that students are advancing without fully understanding important math lessons from earlier grades. Because of this, they have a hard time keeping up with harder topics, since they have not built a strong foundation. In urban areas, both participants highlighted that their students' readiness for math was a major issue, primarily due to their lack of mastery in the four fundamental operations (addition, subtraction, multiplication, and division). Participant 2 specifically pointed out that students were not adequately prepared for the subject because of this gap in basic skills.

Below are the following responses of the 2 participants:

"...ang ilahang readiness sa math subject. Readiness in terms of kining mastery nila sa four operations, four fundamental operations in math". (Their readiness in the math subject. The main problem with the students regarding math is their readiness for the subject. Specifically, their mastery of the four fundamental operations in math). [Participant 2, Urban]

"There's no mastery imbis unta dili ta mo proceed sa next lesson, unya kay naa man tay giapap nga learning competency". (There is no mastery because we can't move on to the next lesson without covering the required competencies). [Participant 5, Urban]

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Similarly, Participant 5 emphasized that without mastery, she cannot effectively move on to the next lesson. However, due to the pressure to meet required learning competencies, she was often forced to move forward even when her students have not fully grasped the material. Without a solid understanding of these basics, they have difficulty advancing to new lessons and keeping up with the curriculum. Nelson and Powell (2018) found that students with lower performance usually did not catch up with those who performed better over time. Students in remote areas of West Java exhibited low mathematical mastery due to a weak understanding of fundamental mathematical concepts (Hendriana et al., 2017). From this citation, remote areas were cited as having low mastery of mathematical concepts and from this study, only urban students experience this kind of problem. According to Kempen & Biehler (2019), many students have not mastered (fundamental math concepts), which are essential for accurately solving problems and progressing to advanced material. Since excerpts say that they have the problem of readiness in terms of mastery in math, teachers understood the importance of addressing these gaps to support students' success, highlighting the need for targeted interventions to ensure that students mastered the essential skills necessary for advancement of math.

The responses from urban participants reflect that class sizes and other contextual factors may exacerbate the issue of readiness in these areas. Teachers recognize the importance of addressing gaps in basic math skills to support student success, underlining the need for targeted interventions to ensure that students master essential skills before advancing. This issue of readiness is thus a shared challenge, but the factors influencing it may vary between rural and urban settings, with both requiring tailored strategies to bridge the gap.

Teacher Preparedness and Content Mastery. Teacher preparedness encompassed both the possession of necessary skills, knowledge, and strategies, as well as the ability to effectively implement them in the classroom. Moreover, content mastery referred to teachers' thorough understanding of the subject matter, which enabled them to deliver lessons with maximum accuracy. In particular, non-math major teachers often faced the challenge of mastering math content, especially those teaching higher grades. In conclusion, the concept of Teacher Preparedness and Content Mastery was derived from the participants' experiences and concerns regarding their qualifications and expertise in teaching mathematics.

Below are the following responses of the 3 participants:

“And another challenge **diay kana btawng gipatudlo kag math unya, syempre diman jud ta makahatag ug wala ta**, dipod baya ta tanan teachers hawd ug math, naa man pod jud tay weakness no. for example sa higher grade, syempre magkalisud ang concepts nga imong itudlo, ikaw teacher, **kami teacher nga dili mi major kay elementary baya**, so amua nang I learn, I try ug learn, so kana palang challenge na sya kay maglearn paman gani mi unsaon nalang namo pagtudlo sa bata nga exemplify sya nga kami mismo nga maglearn rami through youtube”. (And another challenge is teaching math when we are not experts ourselves. Not all teachers are proficient in math; we all have our weaknesses. For example, in higher grades, the concepts we need to teach can be difficult. As teachers who are not Math majors but rather elementary teachers, we have to learn and try to understand these concepts ourselves. This is a challenge in itself because we need to learn how to teach the students effectively, often resorting to learning through resources like YouTube). [Participant 3, Rural]

The excerpt highlighted the challenges faced by non-Math major elementary teachers in teaching math. In particular, participants from rural areas expressed their difficulties in understanding and teaching math concepts themselves due to their lack of expertise. Many primary school teachers lack the necessary skills and expertise to teach (Turner et al., 2021). Consequently, teachers with a lack of expertise often go back to learn concepts on what specifically they need to know after teaching it to their students. Moreover, most often, they have to educate themselves about math concepts as they access various platforms on the internet, for example, YouTube, and study by themselves.

“**...nakatudlo ko'g math dili ko major in math pero nakatudlo ko'g math**”. (I have taught math even though it's not my major). [Participant 2, Rural]

Another excerpt from Participants 2 in rural areas highlighted the reality of non-Math major teachers being tasked with teaching math. This underscored the potential difficulties faced by non-math majors in teaching a subject that is outside their area of expertise, particularly in higher grade levels. As the participant noted, it was challenging to teach math with involuntary action. Even primary subjects, often seen as generalized, can be difficult for teachers who are not proficient in all areas, especially math. Similarly, Participant 3 in rural areas encountered the same struggles as Participant 2.

“**First is the educational preparation nako kay dili manko math major**”. (First, my educational preparation is limited because I am not a math major). “**Last the mastery of the content I am not a math teacher in nature I am Bsed english yet I am teaching math in grade 3**. It is a water low for me or my weaknesses because I do not know much about the concept and dili ko kabalo sa term sa math so ineed to study it first before nako itudlo. I think those are my struggles that challenges as a math teacher”. (Lastly, mastering the content is tough for me because I am not a math teacher in nature I am Bsed english yet I am teaching math in grade 3. This is a weakness for me because I need to study math concepts and terms before teaching them. I think those are my struggles that challenges as a math teacher). [Participant 5, Rural]

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Additionally, the excerpts highlighted the challenges faced by a non-Math major elementary teacher in teaching math, especially at higher grade levels in rural areas. Moreover, the participant's limited educational preparation due to their non-math major background and the difficulty in mastering the math content, despite being an English teacher, emphasized the need for additional educational preparations for teachers who are not math specialists. Furthermore, teacher-related factors, particularly teacher preparedness, have been identified as a primary cause of poor teaching methods, which, in turn, was the main reason for pupils' poor performance (Kariuki et al., 2019). Consequently, it gives a big impact for the teacher if there was no preparation for that subject, especially if it was not her or his mastery field. In the Philippines, mismatched teaching loads are a common issue, particularly among elementary instructors (Co et. al., 2022). Therefore, the worst challenge here was that the content should be mastered first by the teacher, but participant 5 in rural areas did not because this was not her or his specialties.

Conversely, in urban settings, the problem of Teacher Preparedness and Content Mastery was more prevalent than in rural settings. Unlike urban settings, rural teachers often required additional educational preparation to develop effective instructional strategies. The participants' responses revealed that many were not math majors, yet they were responsible for teaching mathematics in their classrooms. This lack of specialized training and content knowledge in mathematics education hindered their ability to effectively convey mathematical concepts to students. The discussions underscored the need for increased teacher preparedness and content mastery, especially when teaching subjects outside their areas of expertise.

Teaching Strategy Alignment. Refers to the process of ensuring that teaching methods and activities are directly linked to learning objectives and standards. Moreover, teaching strategy alignment emerged from participants' experiences and challenges in teaching math. Consequently, many students struggle with math concepts, requiring repeated explanations and adjustments. Therefore, teachers emphasized the need for revisiting basics and aligning teaching strategies to meet individual needs. In order to bridge the gap between students' current understanding and desired learning outcomes, they must adapt their instructional approaches.

Below are the following responses of the participants:

“Ang pinaka biggest obstacle is kani ganing sa pag understand sa bata sa pagtudlo nimo kay kanang mostly diba kay daghan man jud maglisod sa math kanang maglisod jud ang math i-tudlo kay balik-balikon nimo ba ang **process then ang pagsabot sa bata dili gud parehas pud sa imoha nga level kailangan nimo mu go deeper pud sa ilaha** kanang mu go back jud sa basic ana siya ang pinakadako nga obstacles”. (The biggest obstacle in teaching math is making sure the students understand the lessons because many struggle with math. You have to repeat the process multiple times, and their understanding isn't at the same level as yours. You need to go back to the basics. This is the biggest challenge). [Participant 2, Rural]

The excerpts highlighted the challenges faced by teachers in aligning teaching strategies with students' learning capabilities. Furthermore, participants 2 in rural settings expressed difficulty in ensuring students' understanding of math lessons due to their varying abilities. Teachers often need to re-teach the lesson (González & Skultety, 2018). Consequently, this emphasizes the need for teachers to adapt their instructional approaches to effectively bridge the gap between students' current understanding and desired learning outcomes.

“So para sa akua isip usa ka magtutudlo, specially sa math so siguro ang maingun nako nga **kalisud kay makatudlo mi pero ang dili pag grasp sa bata sa idea**. Kana sya ang murag lisud dili man gud mi maka adto sa ikaduhang competency kung maglisud sila. **So in order for as nga ma cater pato sila or kanang ma makaabot gud sila sa level kay dili man gyud silang tanan makahibalo jud no sa isa ka competency**”. (As a teacher, especially in math, I find that the biggest challenge is not just teaching the material but ensuring that students grasp the concepts. It's difficult for us to move on to the next competency if they struggle with the current one. To help them reach the required level, we need to accommodate their varying abilities because not all students will master a competency at the same pace). [Participant 4, Rural]

Another excerpt highlighted the challenge faced by teachers in rural areas in aligning their teaching strategies with students' learning capabilities. Moreover, unprepared students for higher levels of mathematics is considered as the biggest obstacle, stated by Park et al. (2018). Furthermore, the participant noted that ensuring students grasp math concepts is crucial for progress, as struggling with one competency can hinder advancement to the next. Therefore, this emphasizes the need for teachers to find effective ways to communicate and ensure that every learner understands the concepts they teach.

Additionally, the excerpt coming from participant 2 in urban setting highlighted the challenge of aligning teaching strategies with students' learning capacities. Moreover, the participant noted that many grade 6 students were not prepared for the level of math expected, struggling with basic skills like multiplication, division, and fractions. Furthermore, everything indicated that teachers' efficiency and quality of teaching were reflected through their beliefs on how alignment could benefit their students (Baez-Hernandez, 2019). Therefore, this suggests that the students' current understanding was not aligned with the grade 6 curriculum, emphasizing the need for teachers to adjust their teaching strategies to meet the students' individual needs and bridge the gap between their current knowledge and the desired learning outcomes.

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“Pananglitan grade 6 man ko, grade 6 ko pero **ang level sa ilahang math gamay ra ang ready** sa grade 6 ngamuabot. Kasagaran ilang level naa sa grade 4 or grade 3 **tungod kay dili nila memorize ang multiplication table**, maglisod sila mag divide ma naa may decimal o wala, tanan labi napud sa fractions”. (For example, I teach grade 6, but very few students are ready for grade 6 level math. Most of them are at a grade 4 or grade 3 level because they haven't memorized the multiplication table, they struggle with division whether it involves decimals or not, and especially with fractions). [Participant 2, Urban]

Generally, rural and urban settings share similarities in teaching strategy alignment, which involves adjusting teaching methods to effectively help students achieve desired outcomes and master the content. In addition, both urban and rural educational settings face the challenge of aligning instructional strategies to students' learning capacities. Furthermore, the biggest difficulty often lies in finding the most effective and efficient ways to communicate and ensure that every learner understands the concepts. Consequently, the excerpts reveal that a significant obstacle lies in ensuring students' understanding of the lessons.

Time Constraints in Curriculum Delivery. The limited amount of time available to cover the entire curriculum has hindered teachers' ability to provide thorough and in-depth instruction. Resulting students may not fully grasp key concepts, leading to a superficial understanding of the material. Consequently, teachers struggled to teach all required topics in-depth, potentially affecting student learning outcomes. Furthermore, teacher preparedness and content mastery were crucial for effective learning within this time constraint. Moreover, many teachers felt the curriculum was "loaded," forcing them to teach all competencies simultaneously. The theme of Time Constraints in Curriculum Delivery emerged from excerpts highlighting challenges related to the vast amount of content within a limited timeframe. These challenges included overloaded curriculum, insufficient time for individualized instruction, complex concepts, and quarterly targets.

Below are the following responses of the 3 participants:

“The biggest obstacle to effective math instruction include **insufficient time for individualized instruction**, inadequate teacher training in math pedagogy since most of the teachers in the elementary, teaching mathematics are not specialized or major in mathematics, and the need to bridge gaps in foundational math skills among students”. [Participant 4, Urban]

The statement of participant 4 in urban settings highlighted the pressure to cover a large amount of curriculum content within a limited timeframe, which could hinder students' learning and understanding, especially those who needed additional support or clarification due to the lack of time for individualized instruction. Moreover, the study by Nurlaily et al. (2019), found that teachers face challenges in carefully preparing lesson plans and identifying initial problems during the planning stage, and consequently, they struggle with time constraints and guiding students to problem-solving during curriculum implementation.

Moreover, Participant 5 in urban settings highlighted the overwhelming number of learning competencies teachers were expected to cover in a given year, emphasizing the difficulty in keeping up with these competencies. Furthermore, Participant 5's urban experience in Grade 6 demonstrated the challenge of keeping up with the spiral nature of the curriculum, which aimed to reinforce previously learned concepts. As a result, because of the nature of the curriculum, the teacher struggles to make instruction successful (Sixbert & Oyango, 2022). Consequently, this pressure to address a vast amount of content within a limited timeframe could compromise the depth and understanding of the material.

“Isa sa mga non-negotiable nga challenges is **daghan kaayog learning competencies for one year in math per grade level. Ako sa grade 6 mag apas ko kay in one week sobra ka daghan ang learning competency**. Ikaduha ang learning competencies I think and I beleive kana ganing dili siya spiral or spiral siya pero dili siya makita nga spiral. Kumabaga and review ma part na unta sa curriculum. Dapat naay one-two days na review.” (One of these non- negotiable challenges is the large number of learning competencies for one year in math per grade level. For example, in grade 6, I have to keep up because there are too many learning competencies each week. Secondly, the learning competencies are supposed to be spiral, but they don't seem to be obviously spiral. In other words, review should be part of the curriculum, and there should be one or two days for review.) [Participant 5, Urban]

However, the participant from rural settings discussed the challenges of teaching Grade 3 due to the overloaded K-12 curriculum. Moreover, according to Bray and Tangney (2015), as cited by Inganah et al. (2023), Mathematics teachers were currently facing the problem of competencies in the teaching and learning of Mathematics competencies. Consequently, the rapid teaching of complex concepts to meet quarterly targets created a pressured learning environment, hindering global competitiveness. Furthermore, this demanding curriculum could disengage learners, negatively impacting the quality of education and students' learning experiences.

“Ako sa grade 3 man ko noh! Lisud sya! Lisud sya kay ngano man? Ang k-12 sad before wala pamay matatag sa grade 3 this year, **ang k-12 before is loaded kay sya**. Ang mga concepts nya nga dapat unta hinayhinay lang ba, kung dili ka kaya ang bata karon aning addition, di sa ka mu adtu sa subtraction, mao unta! **Pero kay naa man go'y ginasunod nga dapat mahuman nimo ni syag tudlo karon nga quarter kay ug di nimo na sya matudlo**, walay maanser ang bata exam, so mura ba'g na defeat ang purpose sa

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k-12 nga mga bata mag globally competitive sa ilang kagustuhan nga I bombard ang curriculum labi na'g sa math nga karong adlaw duha ka competencies ang itudlo, lisud sya.” (Teaching Grade 3 is especially challenging due to the loaded K-12 curriculum, which requires teaching complex concepts quickly to meet quarterly targets. This rush undermines the goal of making students globally competitive, as they become overwhelmed by the demanding curriculum). [Participant 3, Rural]

Overall, participants' experiences in both rural and urban settings emphasized the tension between covering a vast amount of content and ensuring students had sufficient time to learn and understand the material. Similarly, the study underscored the significant impact of time constraints on curriculum delivery, particularly in the context of the K-12 curriculum. In contrast, participants from rural schools expressed even greater frustration with the "loaded" curriculum and the difficulty in effectively addressing all required content. However, this issue was also prevalent in urban schools, highlighting the need for better instructional methods and support to ensure the quality of education across both settings.

Class-Size Dilemma. Refers to the challenges that arise from having a high student population in a classroom, which may impede individualized instruction, teacher-student interaction, and, consequently, the overall effectiveness of teaching and learning. Furthermore, teachers often have to teach large groups of students. By necessity, this makes them use less individualized teaching methods, thus, they are less able to cater to the various learning needs of students. Additionally, the class-size dilemma emerged from participants' urban teaching experiences, highlighting the challenges and limitations of overcrowded classrooms.

Below are the following responses of the 2 participants:

“The challenge that I faced here at Digos City Central Elementary School, as a grade 3 math teacher is large class size. As a grade 3 math teacher at Digos City Central Elementary School, some specific challenges **I encounter large class size**, which makes students individualized attention difficult, and a wide range of student abilities that require differentiated instruction”. [Participant 4, Urban]

“And last ang **kadaghanon sa mga studyanti** grabi usa jud na siya sa mga problema sa urban”. (Lastly, the large number of students is a significant problem in urban areas). [Participant 5, Urban]

The excerpts of both 2 participants in urban areas highlighted the issue of large class sizes in urban areas, which can significantly affect the quality of education. Moreover, emphasizing the difficulty in providing individualized attention to students with diverse abilities, which could hinder their progress as teachers struggled to effectively address their specific needs. Furthermore, teachers have reported that overcrowded classrooms can be a stressful, overwhelming, and discouraging experience (Botes et al. 2020 & Davila, 2019), presenting various challenges for teachers, even those who are most effective, and contributing to social and emotional difficulties among students.

Conversely, according to Osai et al. (2021), teachers feel that overcrowded classrooms cause "stress" for them because the classrooms usually end up being inadequate learning environments, health and safety issues, limiting interaction between students and teachers, disruptive behavior, emotional and mental challenges for teachers, increased workload, and insufficient classroom time. Despite these drawbacks, responses from urban teachers show their ability to handle different levels of learning and ensure that all pupils understand core information, even in quite diversified and vast classrooms.

Generally, rural settings do not struggle with class size. In contrast, a significant challenge with the class size of an urban public school was the fact that large class sizes make it hard for teachers to be effective in teaching and students to be effective in learning due to overcrowding. The large number of students in a classroom can limit the ability to provide individualized attention, which can negatively impact academic achievement (Ojeje & Ododo, 2018). Additionally, both Participant 4 and 5 identified large class sizes as a significant problem, similarly highlighting the difficulties teachers faced in providing individualized attention to students in large groups, ultimately impacting the overall quality of education. Therefore, this collective observation highlights the need for further exploration and potential solutions to address this issue.

The coping strategies applied by public school math teachers both in urban and rural educational settings in Digos City

Another objective of this study was to identify coping mechanisms for mathematics teachers facing challenges in rural and urban educational settings in Digos City. Based on their responses, the following themes are extracted and both settings have similarities: Integrate E-Learning Resources, Implement Differentiated Pedagogical Approaches, Enforce Mandated Educational Initiatives, Employ Innovative Instructional Practices, Engage in Peer Collaboration, and Engage in Continuous Professional Learning. The findings reveal that teachers across both settings employ a range of strategies to mitigate the difficulties they encounter.

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Table 1. Cross-case Analysis on the Coping Strategies Used by Math Teachers in Urban and Rural Educational Setting

Themes	Educational Context	
	Rural	Urban
Integrate E-Learning Resources	✓	✓
Implement Differentiated Pedagogical Approaches	✓	✓
Enforce Mandated Educational Initiatives	✓	✓
Employ Innovative Instructional Practices	✓	✓
Engage in Peer Collaboration	✓	✓
Engage in Continuous Professional Learning	✓	✓

Integrate E-Learning Resources. A strategy that involved the use of digital tools and platforms in the educational process to make learning more engaging. This could include the utilization of online courses, educational applications, multimedia content, interactive simulations, and virtual collaboration tools. Furthermore, by integrating e-learning resources, teachers could create more engaging and interactive learning experiences for students. The aim was to provide additional resources and opportunities for students to interact with the material, to cater to the different learning styles, and to supplement the traditional teaching methods. Moreover, the theme of Integrate E-Learning Resources emerged from participants' experiences and recommendations on the use of technology in education.

Below are the following responses of the 3 participants:

“Do research kanang mga lesson nga every day, mga lesson sa school every day pwede na nila ma research para matan-aw pud nila ug balik or makita nila didto ang other examples pa nga diin makatabang pa nila nga samot makasabot sa lesson tungod ka naa pa silay nakit-an nga lain nga pamaagi or lain-lain nga mga example nga ilang makita nga giprovide sa internet”. (We can also encourage children to do research on their own because most of them have cell phones, android phones that can connect to the internet. They can research lessons every day, the lessons taught in school every day; they can look them up to review or find other examples online that can help them better understand the lesson, as they might find different methods or various examples provided on the internet). [Participant 2, Urban]

The excerpt highlighted the potential of using technology stated by participant 2 in urban settings, specifically smartphones, as a tool for enhancing learning. Moreover, as noted by Osadchyi et al. (2021), using computers and other devices together with digital tools enables students to be more proactive in their learning. Furthermore, the participant suggested that children could use their devices to research lessons, review material, and find additional examples online. Therefore, the integration of e-learning materials in education could enhance traditional classroom instruction and provide students with more opportunities for self-directed study and inquiry.

“Dili lang ta magbasi sa libro, kailangan sab ka magsearch kay naa’y mga videos nga gikan sa youtube, pwede man nimo sya gamiton para isa sya sa imong mga guide”. (We shouldn’t rely only on books; we also need to search for resources like videos from YouTube. These can be helpful guides). [Participant 3, Urban]

“Magpalaban jud mi ni youtube og google kay ug dili mi kahibalo unsaon pagtudlo nya didtu mi magsearch dayun sa youtube, lesson videos about ana nga topic tapos among pangitaon dadto ug asa ang lesson videos nga kana mismo nakasabut mi. Kaysa kami ang mutudlo unya mali, so didtu mi kay ang lesson videos kay niagi man sab ug Q.A. mao to sya’y coping namo. Maski ako diman sab ko makaingun nga muadtu dayun ko saamuang master teacher. Kay what if ang imong master teacher kay dili math major”. (We really rely on YouTube and Google because if we don't know how to teach something, we immediately search for it on YouTube. We look for lesson videos on that topic and find the ones that we understand. It's better to do this than to teach incorrectly because these lesson videos have gone through quality assurance. That's our coping mechanism. Even I can't always go to our master teacher because what if they aren't a math major?) [Participant 3, Rural]

Furthermore, both urban and rural participants emphasized the crucial role of integrating e-learning resources into the educational process. Statements from Participants 3 in urban and Participants 3 in rural emphasized the importance of integrating e-learning resources into the educational process. Furthermore, online platforms like YouTube and Google provided teachers with quality instructional materials, enabling them to teach effectively and accurately. According to Yaniawati et al. (2020), integrating e-learning into the Resource- Based Learning method significantly enhances students' mathematical creative thinking and self-confidence compared to traditional learning methods.

Consequently, this integration of e-learning resources could significantly support teachers and improve student learning outcomes, highlighting the value of online platforms in the educational process. Moreover, Kumar et al. (2022), emphasized that technology can make instruction more inspiring and meaningful. Therefore, these digital tools could enhance teaching and learning

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by providing additional explanations and demonstrations.

Integrating e-learning resources, present in both rural and urban educational settings, involved incorporating digital tools and online platforms into classroom instruction. Similarly, this approach aimed to enhance learning by leveraging technology to support and enrich traditional teaching methods. However, while the belief that online platforms like YouTube and Google could significantly improve student learning and understanding was shared in both settings, the implementation and impact might have varied due to factors such as internet connectivity and access to devices. Nevertheless, students could independently research lessons, review concepts and discover alternative methods. Teachers could also use these resources to improve their teaching practices and ensure accurate content delivery. In conclusion, the emphasis on integrating e-learning resources highlighted the growing importance of technology in education and its potential to transform teaching and learning experiences, regardless of the geographical location.

Implement Differentiated Pedagogical Approaches. This strategy acknowledges that each student has a unique learning style and pace, which means that a one-size-fits-all approach to teaching may not be effective. Furthermore, the implementation of differentiated pedagogical approaches gathered insights from participants on effective coping strategies for teaching mathematics in diverse classrooms. Moreover, by adapting teaching methods to meet the diverse learning needs of students, teachers could create a classroom environment where everyone felt valued, supported, and had equal opportunities to succeed. Differentiated instruction could be implemented in various ways, such as by giving hands-on activities, real-life examples, and so on. In conclusion, this approach demonstrated a proactive approach to teaching in diverse classrooms.

Below are the following responses of the 3 participants:

"As a math teacher here, in Digos Central Elementary School, the best coping strategies that i applied in my challenges involves **breaking down complex concepts into smaller, incorporating hands on activities and real life examples**". [Participants 4, Urban]

The excerpt from Participant 4 in urban highlighted the use of differentiated pedagogical approaches to cater to diverse student learning needs. Moreover, studies have shown that using hands-on activities and engaging math lessons directly enhances mathematical learning (Tjandra, 2023), as well as real-world connections in teaching can positively impact student engagement (Lassinantti et al., 2019). By breaking down complex concepts into manageable parts, the teacher offered a structured, accessible learning method. Furthermore, the use of hands-on activities and real-life examples further enhanced the relatability of the subject matter, thus fostering meaningful connections with the material.

Furthermore, both statements from Participants 2 in urban and Participants 2 in rural settings has the same responses highlighting the use of differentiated pedagogical strategies, such as providing students with problems or worksheets to solve, to cater to individual learning needs.

"So aside sa strategy nga amoa silang ipamaster sa four fundamental operations sa math nga ma hawod gyud sila ana, **gahatag kog mga activity sheets pata ma enhance ang ilahang ability o ma enhance ilahang knowledge ato nga competency maghatag kog worksheets ana**. Para mapraktisan sa ilahang balay, unya studyhan jud nila". (Aside from the strategy of mastering the four fundamental operations in math to ensure proficiency, I provide activity sheets to enhance their ability or knowledge in that competency. I give them worksheets so they can practice at home, study them). [Participants 2, Urban]

"Ang akola lang strategy nga gihatag pud sakoa nga teacher pud sa laing math pud kailangan nimo, **naa pud ni siya nga strategy example ang bata hatagan nimo siyag problem then paansweran nimo saila**". (The strategy I use, which my teacher also used, is to give students a problem to solve). [Participant 2, Rural]

In addition to, teachers can help students learn better by giving them strategies that encourage them to think critically and solve problems (Darling-Hammond et al., 2020). This approach fostered meaningful engagement with the material, promoting an inclusive and effective learning experience. Consequently, it also encouraged critical thinking and problem-solving skills, crucial for success in today's world. Ultimately, this was essential for a more inclusive and effective learning experience.

Implement differentiated pedagogical approaches was present in both rural and urban educational settings, involving tailoring instruction to meet the individual needs, interests, and learning styles of each student. This approach allowed teachers to provide students with the support and challenges they needed to succeed. In both settings, participants adopted various pedagogical approaches to cater to students' diverse learning needs. For example, in rural settings, participants might have employed hands-on activities, real-life examples, and giving worksheets, while in urban settings, they may have given a problem to solve. However, the underlying principle of differentiation remained consistent in both contexts: to provide each student with the best possible opportunity to learn and succeed. By employing these strategies, participants demonstrated a proactive approach to addressing challenges and ensuring all students succeeded in mathematics.

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Enforce Mandated Educational Initiatives. By adhering to and executing educational policies and programs, schools can contribute to the overall improvement of the education system and provide quality learning experiences for students. Furthermore, these initiatives, often mandated by educational authorities, focus on literacy and numeracy. Teachers' experiences with these programs highlighted the importance of enforcing mandated educational initiatives and their potential impact on student achievement. In addition, teachers' commitment to implementing evidence-based practices and improving student outcomes was evident. Enforce Mandated Educational Initiatives emerged from the participants' discussions regarding the active involvement in school-wide programs and interventions aimed at improving student performance.

Below are the following responses of the 4 participants:

"Naa mi mga remediation after class, mag pick mi'g mga bata nga katong nakakuha ug gamay nga score nga every Friday, last school year, naa mi catch up Friday nya naay math ana literacy every Friday gyud na siya." (We have remediation sessions after class where we select students who got low scores every Friday. Last school year, we had "Catch Up Friday" dedicated to math and literacy). [Participants 1, Rural]

"Mao gani nga every Friday ang focus namo sa catch up is ang reading lang ug ang math." (Every Friday, our focus during catch-up sessions is only on reading and math). [Participants 3, Rural]

"Ang Digos City nay programa nga CATCH-UP Program. Diri gafocus sa mga bata nga hina sa mga subject. Kay isa sa mga NLC ang literacy and numeracy." (Digos City has a program called the CATCH- UP Program. This focuses on children who are struggling in their subjects, especially in literacy and numeracy). [Participants 3, Urban]

Similarly, the Department of Education's goal of ensuring equal opportunities for success is reflected in these initiatives. Furthermore, the Ministry of Education has also implemented a special remedial program to help students who are struggling with core academic abilities such as reading and numeracy (Special Education Division, 2019).

Enforce mandated educational initiatives, such as catch-up Fridays, were present in both rural and urban educational settings, following the rules and guidelines set by the Department of Education. Labad (2024) notes that Catch-Up Fridays have emerged as a widely adopted strategy in numerous educational institutions, aimed at assisting both teachers and students. In coping with the often-demanding pace of the academic week. In particular, it reinforces key concepts and skills that students may have overlooked or struggled with during regular class sessions. This initiative seeks to enhance student success by providing additional learning time and tailored support. As Murru (2018) noted, remedial teaching programs, like the Catch-Up remedial teaching program, can be effective in helping students improve their reading and numeracy skills.

Employ Innovative Instructional Practices. Adopting creative and effective teaching methods that engage students, promote critical thinking, and foster engagement in learning is essential. Moreover, using innovative and unconventional teaching methods can capture students' interest and improve learning outcomes. By utilizing these and other creative techniques, teachers can make learning more meaningful, relevant, and enjoyable for students. This can lead to increased student engagement, motivation, and academic achievement. Employ Innovative Instructional Practices emerged from the participants' shared experiences and insights regarding the importance of using creative and engaging teaching methods to enhance student learning. These methods go beyond traditional methods and cater to diverse learning styles, creating more interactive and meaningful learning experiences for students. Ultimately, this approach improves their understanding and engagement in mathematics, demonstrating a commitment to employing innovative instructional practices.

Below are the following responses of the 4 participants:

"Then kanang mga models gani, mga illustrations like kanang sa fractions giunsa man siya. Effective jud siya basta naay mga models makit-an nila kung giunsa." (For instance, using models and illustrations, like for fractions. It's effective when they can see how it works with models). [Participants 2, Rural]

"So ang mga maistra muandar jud ang creativity nga apil mga dahon apilon nalang jud sya ug gamit". (Teachers have to be creative, and sometimes even using leaves as a teaching aids). [Participants 3, Rural]

Participants 2 and 3 from rural areas have the same responses, both discussing the use of leaves as a teaching aid. Furthermore, they highlight its innovative use as a natural resource to enhance learning. Indeed, teachers used different tools and resources to solve problems and implement new ways of teaching and learning (Eickelmann & Gerick 2020). Therefore, teachers should be resourceful, like using models (ex. like straw, stones, leaf, or any available resources) that are found outside the classroom. By using creative and non-traditional techniques, teaching becomes more effective and meaningful, thereby engaging students in a hands-on and interactive manner.

However, Participant 3 from urban schools highlighted the used of creative teaching techniques, such as games and interactive tasks, to engage students in meaningful and memorable learning experiences.

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“Ini’g human nimo ug present sa imong lesson, **ang mga bata pod kay tagaan nimo sila ug mga task nga makaperform sab sila. Then games also, dapat naa pod na sya**”. (After you present your lesson, give the students tasks that allow them to perform and understand the topic better. Games should also be included in lessons). [Participants 3, Urban]

Indeed, playing games can help primary students learn math better (Cohrsen & Niklas, 2019), and be more interested in the subject (Lindenskov & Lindhardt, 2020). This approach deviated from traditional lecture-based instruction, allowing their students to actively participate, explore concepts, and apply knowledge in real-world scenarios. As a result, this approach enhanced their student motivation and deepened their understanding of the subject matter.

Moreover, Participant 4 from urban schools emphasized a preference for teaching methods that required minimal materials or technology. Indeed, this indicated a commitment to creative and non-traditional approaches suitable for diverse educational settings, particularly those with limited resources. By adopting such methods, the participant aimed to enhance student engagement and instruction effectiveness.

“For instance, in a school with limited resources, **I may rely more on innovative teaching methods that require minimal materials or technology**”. [Participants 4, Urban]

Employing Innovative Instructional Practices was present in both rural and urban educational settings, involving moving beyond traditional lecture-based approaches to explore a wide range of strategies that cater to diverse learning styles and promote deeper understanding. Similarly, in both settings, participants adopted various strategies, such as using models, illustrations, hands-on activities with natural materials, relying more on innovative teaching methods that require minimal materials or technology, games, and tasks, to make math lessons more effective and engaging. While the specific strategies might have varied slightly between rural and urban schools, the overarching goal of employing innovative instructional practices remained consistent. By moving away from traditional methods and embracing more creative approaches, participants demonstrated a commitment to providing students with a rich and engaging learning experience.

Engage in Peer Collaboration. Collaborating with other teachers to share ideas, resources, and strategies for overcoming common difficulties in teaching math is a valuable approach. Moreover, this collaborative approach fosters professional growth, enhances teaching effectiveness, and creates a positive and supportive learning environment for teachers. Furthermore, engage in peer collaboration emerged from the teachers' shared experiences and insights regarding the importance of collaboration among teachers in addressing challenges in teaching mathematics. Participants acknowledged the value of seeking support and guidance from colleagues, especially those with expertise in specific areas. Consequently, engaging in peer collaboration demonstrates a proactive approach to addressing challenges and ensuring access to necessary resources.

The excerpts from participants 3 in rural and urban settings had correlated responses that emphasized the significance of collaborating with colleagues to improve mathematical teaching practices.

“**Effective ang coping strategy nga peer teaching kung dili busy katung hawud ana.** Let’s say kung dili busy amuang math 5 tapos vacant niya, tapos naa koy problema nga competency sa math, pwede nako sya adtuon. Kung unsa’y nalisudan nako, sya ra’y mutudlo nako, sya’ mupasabut nako.” (Peer teaching is an effective coping strategy when the expert is not busy. For example, if our Math 5 teacher has free time and I have a problem with a math competency, I can go to them for help. When I struggle with something, they teach and explain it to me. [Participants 3, Rural]

“**Naa jud kay collaboration sa other teachers especially kung kinsa tu’y mga hawud aning math. Mangutana mi unsa’y tamang paagi, unsa’y tama nga strategy kini nga certain topic**”. (You need to collaborate with other teachers, especially those good at math. We ask them for the right ways and strategies for certain topics). [Participants-3 Urban]

Collaboration with other teachers effectively improved students’ achievement as stated by Mora-Ruano et al. (2019). This suggests that collaborating with other educators, particularly those skilled in mathematics, and sharing knowledge, resources, and experiences could help teachers overcome common challenges and enhance their instructional methods, ultimately benefiting the students they served. Moreover, according to Sancar et al. (2021), teachers working together can help each other improve their skills, and this collaboration also encourages a sense of responsibility among the teaching staff.

Teachers in both rural and urban settings rely on peer teaching as an efficient method. Similarly, teachers can improve their teaching abilities by working with others, particularly those with expertise in mathematics. Moreover, by working together, teachers can create a more effective and engaging learning environment for their students. Participants acknowledged the value of seeking support and guidance from colleagues, especially those with expertise in specific areas. Teachers engage in collaborative problem-solving to address curriculum and pedagogical challenges (Chapman et al., 2016 cited by Alsaeed, 2022). They described strategies like peer teaching and seeking advice from experienced colleagues, highlighting the collaborative nature of teaching and the benefits of sharing knowledge and best practices. In both rural and urban settings, teachers found that working together can lead to improved teaching outcomes and a more positive learning experience for students.

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Engage in Continuous Professional Learning. Commitment to lifelong learning and development is essential for educators. It's about staying up-to-date with the latest educational trends, acquiring new skills and knowledge, and enhancing your professional capabilities. By engaging in Continuous Professional Learning (CPL), teachers can improve their teaching skills and continue to develop professionally. Furthermore, continuously seeking professional development through seminars and training programs, including focus group discussions, enhances teaching skills. This is crucial for teachers to maintain a high level of teaching quality and to better serve the needs of their students. Teachers actively seek opportunities for growth, such as attending DepEd-provided training and seminars, to enhance their teaching practices. Indeed, "Engage in Continuous Professional Learning" emerged from the participants from both rural and urban settings, who shared experiences and insights regarding the importance of ongoing professional continuous professional development in improving teaching practices.

Statements from Participant 5 in a rural setting and Participant 1 in an urban context emphasized a shared commitment to enhancing teaching skills and remaining updated with educational practices.

"School learning action cells tapos going to trainings. So ang among mga expert ang among bsd math sila ang magtudlo sa amoa, during school learning action cells mao na siya ang time na mag gather mi tanan teacher then tudluan mi sa expert na teacher". (School learning action cells and attending trainings. Our experts, who specialize in mathematics, lead these sessions where all teacher gather. During these sessions, the expert teachers provide us with guidance). [Participants 5, Rural]

"We do have this what we called LAC session wherein we do have a collaborative expertise, we shared different strategies that might also effective to our students". [Participants 1, Urban]

The excerpts from Participants 5 in rural and another Participant 1 in urban emphasized that participating in school learning action cells and attending training demonstrated a commitment to improving teaching skills and staying current with educational practices. Moreover, the Department of Education (DepEd) issued an order (D.O. 35) in (2016) cited by Medina et al., (2023), establishing Learning Action Cells (LACs) as a way to help teachers improve their knowledge, skills, and attitudes in teaching, learning, and assessment. These activities fostered collaboration, knowledge sharing, and skill development for both participants and their students.

Moreover, the excerpts from Participants 5 and 3 from urban schools highlighted the school community's commitment to continuous professional learning.

"Halimbawa, ako naka train kog manipulatives, tapos paghuman nakog seminar sa manipulatives kay gigamit namo diari. Yes, naka observed ko, ang teacher naa mi gianatwag na midyear performance evaluation (mpre). So naa mi inservice training kumbaga naa mi fucos group discussion. Naa mga teacher nga naka apil sa seminar ilaha pud ng e echo like sila mahimong speaker diri sa amoang school". (For example, I got trained on using manipulatives, and after the seminar, we used them here. Yes, I have observed that the teacher conducts what we call a midyear performance evaluation (MPRE). So we have in-service training, which includes focus group discussions. Teachers who attended seminars will share what they learned by becoming speakers at our school). [Participants 5, Urban]

"Para makapangita ko ug tama nga stratehiya para macope up nako tung mga challenges. Naa ma'y ginahatag nga trainings and seminars ang DepEd. So, mao na ang isa sa among mga ginaapilan para ma enhance pa mi. Kung unsaon pagtudlo sa mga bata, mga stratehiya nga angay itudlo". (To find the right strategies to cope with challenges, we attend trainings and seminars provided by DepEd. This is one way we can improve our teaching skills and learn strategies that are suitable for different children). [Participants 3, Urban]

Furthermore, the participants actively participated in DepEd training and seminars, enhancing their teaching skills and acquiring new strategies for diverse students through structured professional development methods. According to Abakah (2019) and Abonyi et al. (2020), the prevalence and involvement of the organization CPD (continuing professional development) activities like in-service training, workshops, and seminars is widespread. In particular, in-service training (INSET) serves as a valuable tool for teachers to enhance their teaching methods, classroom management, professional growth, and overall effectiveness in student-centered learning. Moreover, the sharing of knowledge through seminars, training, and workshops fostered a culture of learning and collaboration among educators, contributing to their professional growth and improvement.

In both rural and urban educational settings, teachers participated in Learning Action Cells (LACs) and in-service trainings led by expert educators and seminars. Similarly, the experiences highlighted the participants' dedication to continuous professional learning, recognizing its vital role in enhancing teaching effectiveness and ensuring student success. This demonstrated a commitment to professional growth and staying updated with current educational trends, which was crucial for teachers to adapt their methods to students' needs and create a more inclusive and equitable learning environment. However, the underlying goal was the same in both settings: to equip teachers with the knowledge and skills necessary to provide high-quality instruction to their students.

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SUMMARY AND IMPLICATIONS

The cross-case analysis of challenges faced by teachers in urban and rural educational settings in Digos City highlighted both differences and similarities. In rural areas, teachers struggled with English comprehension and non-reader students, often feeling unprepared to teach advanced topics. In urban settings, while students progressed through grade levels, many still faced difficulties in math due to gaps in foundational skills and large class sizes. Despite these differences, teachers in both environments encountered common challenges, such as managing diverse learning paces, selecting appropriate interventions, and addressing gaps in basic math skills. They also felt overwhelmed by a demanding curriculum that required teaching multiple skills at once. Mathematics teachers in both rural and urban settings employ a range of coping mechanisms to tackle the challenges they encounter in the classroom. A cross-case analysis identified six main strategies that reflect similarities across these environments. One prominent approach is leveraging technology through e-learning resources, which allows teachers to provide engaging and interactive lessons that can cater to diverse learning styles.

Additionally, teachers often tailor their instruction to meet individual needs through differentiated instruction, ensuring that each student receives the support necessary for their success. Adhering to mandated educational initiatives, such as catch-up Fridays, also helps teachers address learning gaps and keep students on track. These strategies not only enhance the learning experience but also empower teachers to create a more inclusive classroom environment. Moreover, teachers frequently employ creative methods and innovative teaching practices to make math more relatable and enjoyable for their students. Collaboration with colleagues is another vital strategy, as it fosters a supportive community where teachers can share ideas, resources, and best practices. Actively seeking continuous professional learning opportunities further enriches their teaching skills and keeps them updated on the latest educational trends. However, the effectiveness of these strategies can be influenced by various factors, including the availability of resources, the specific context of the school, and the level of teacher training. By recognizing these influences, teachers can better navigate their challenges and continue to strive for excellence in their teaching practices.

The identified themes underscore crucial challenges in primary-level math education in Digos City that need prompt attention to improve students' outcomes. Literacy gaps and basic math skills demand focused interventions and tailored teaching methods to address diverse student needs for those in the rural areas by emphasizing a strong math foundation, students' progress through their studies, ensuring they have the skills required for advanced concepts that benefits in both settings. On the other hand, both rural and urban areas lead the differences in learning speeds and varied progress among students highlighting the importance of flexible teaching approaches. Teachers should use adaptable resources and strategies that accommodate each student's unique learning pace, helping ensure no student is left behind. Challenges with teaching processes in rural areas, teacher readiness in urban areas and time constraints for both settings emphasizes the need for new tools and creative teaching methods. Incorporating e-learning resources and innovative techniques can make lessons more engaging and efficient, enhancing the overall quality of education. Moreover, effective class-size management specially for those teachers in urban areas and aligning of teaching methods with curriculum goals in both settings are also critical for fostering a positive learning environment. Policies supporting smaller class-sizes and personalized instruction can improve educational outcomes.

Lastly, enforcing educational policies, collaborating with colleagues and professional development are essential strategies for both settings to enhance teaching practices. By staying informed and working together, teachers can better support diverse learners, close educational gaps and strengthen overall math skills. Addressing these challenges through targeted interventions, flexible teaching methods, innovative tools, and collaborative efforts will lead to more effective teaching practices and better educational outcomes for students in both settings in Digos City.

I. CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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