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Competence and professional development needs of teachers in mathematics instruction: Cordillera Administrative Region, Philippine context

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ABSTRACT

The study assessed the competence and professional development needs of Grade 2 teachers in mathematics instruction in the Division of Abra using a descriptive-correlational research design. The respondents consisted of 50 Grade 2 teachers assigned to public elementary schools in the Bucay District who are directly responsible for mathematics instruction. The study used the Weighted Mean to assess teachers' levels of competence and professional development needs, and the Pearson Product-Moment Correlation Coefficient to examine the relationship between competence and professional development needs.

The findings revealed that Grade 2 teachers demonstrated high competence in mathematics instruction across content knowledge, pedagogical strategies, and assessment practices. However, their professional development needs were identified as urgent, particularly in applying strategies that engage learners in mathematical problem-solving, teaching number sense and operations, and designing formative and summative mathematics assessments. Furthermore, the study found no significant relationship between teachers' perceived professional development needs and their current competence in teaching mathematical word problems.

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Introduction

Mathematics plays a vital role in equipping learners with logical reasoning, analytical thinking, and problem-solving skills necessary for academic success and everyday life. Globally, there is increasing emphasis on improving early mathematics instruction, recognizing that the formative years are critical for developing strong numeracy skills. International studies such as TIMSS and PISA have continually

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highlighted the direct link between early mathematics competence and long-term performance in higher-order mathematics and related disciplines (OECD, 2019).

In the Philippines, the Department of Education has made foundational learning a key priority under its Basic Education Development Plan (BEDP). The K to 12 curriculum emphasizes the early acquisition of core competencies in mathematics, particularly from Kindergarten through Grade 3. During these years, learners are expected to master basic number operations, spatial relationships, patterns, and simple problem-solving. Among these grade levels, Grade 2 is particularly crucial, as it serves as a transition point where learners apply foundational skills to increasingly complex tasks (Garcia et al., 2021).

Despite curricular improvements, challenges persist. National and regional assessments continue to reflect low proficiency levels in mathematics among early-grade learners. These learning gaps, if not addressed early, can compound over time and contribute to poor overall performance in higher grades. Research consistently points to the central role of the teacher in addressing these gaps—specifically, their content knowledge, pedagogical competence, and ability to adapt instruction to diverse learners (Hamouda et al., 2015).

Although there is no single national percentage specifically for Grade 2 learners' low comprehension of word problems, recent data from major educational assessments and local studies indicate a severe crisis in both literacy and numeracy in the Philippines. Based on comprehension levels measured using the Philippine Informal Reading Inventory (Phil-IRI), a majority of Grade 2 learners (approximately 66%–75%) are at the "frustration level," meaning they struggle significantly to understand the context of what they read. In terms of word-problem challenges, teachers report that Grade 2 learners often focus on word recognition rather than context, resulting in difficulty grasping the abstract requirements of mathematical problems (EDCOM 2).

In early mathematics instruction, Grade 2 teachers are expected not only to deliver content but also to inspire curiosity and confidence among learners. However, teachers—especially those in rural and underserved areas—often face multiple barriers, such as limited access to professional learning opportunities, inadequate teaching resources, and a lack of ongoing instructional support (Manuel et al., 2022).

Rural teaching contexts, such as the Manabo District in the Division of Abra, present additional complexities. According to Hallinger and Bryant (2013), rural educators often encounter constraints such as limited access to instructional resources, professional isolation, and multigrade classes. These conditions affect not only student learning but also the professional growth of teachers. In such settings, teacher competence is often shaped more by experience and peer support than by formal training, making it essential to assess teachers' actual needs and provide localized, responsive professional development.

The Division of Abra, a province within the Cordillera Administrative Region, is one setting where these challenges are evident. Within this division, the Manabo District consists mostly of public schools located in rural barangays. Teachers in this district are committed to delivering quality education; however, many lack structured professional development programs tailored to their needs in teaching

early mathematics. Supervisory reports and informal assessments have identified varying levels of teaching competence, with specific gaps in number operations, use of manipulatives, differentiated instruction, and learner assessment (Tolentino, 2020).

Given these challenges, few studies have specifically assessed teachers' competence in teaching mathematics at the Grade 2 level. It is therefore evident that there is a pressing need to systematically evaluate the competence of Grade 2 teachers in mathematics instruction, particularly in rural districts such as Manabo. Such an assessment should go beyond surface-level evaluation and examine actual instructional practices, challenges, and available support systems.

Given the importance of teacher competence and professional development in enhancing mathematical instructional capability, few studies have thoroughly examined teachers' competence in mathematics instruction. For instance, Tolentino (2020) assessed Grade 2 teachers in Northern Luzon and found them to be moderately competent in teaching mathematics, and recommended more targeted training, particularly in the use of manipulatives and craft-based lessons. Clemens et al. (2015) emphasized that mathematics instruction should be hands-on, exploratory, and grounded in real-life contexts, noting that teachers who lack either content knowledge or effective teaching strategies may inadvertently hinder student progress. Similarly, the Southeast Asia Primary Learning Metrics (2019) found that a significant number of Filipino Grade 5 students failed to meet the minimum proficiency level in numeracy. Furthermore, Hallinger et al. (2013) reiterated that rural educators face persistent challenges, including limited resources, professional isolation, and multigrade teaching conditions. These issues highlight the urgent need to assess teachers' actual needs and provide localized, responsive professional development.

This study aims to conduct a quantitative analysis of Grade 2 teachers' competence and professional development needs in mathematics instruction in the Manabo District, Division of Abra. The findings will provide a data-driven basis for identifying areas of strength and, more importantly, areas requiring support. A key output of this study is the development of a localized Professional Development Program.

This study is organized into several sections: introduction, literature review, research methodology, data presentation and analysis, results and discussion, and conclusion.

Literature review

The literature review focuses on the competence and professional development needs of Grade 2 teachers in mathematics instruction, specifically in content knowledge, pedagogical strategies, and assessment practices.

Teacher competence

The quality of mathematics instruction in the early grade levels plays a pivotal role in shaping the academic trajectory of young learners. Numerous studies have shown that the early years of schooling form the foundation of a child's mathematical understanding, influencing their confidence and performance in later academic stages. Teachers, therefore, are key agents in delivering this instruction effectively, as their competence in both content and pedagogy directly impacts learner achievement. As

such, understanding and supporting the professional development of Grade 2 mathematics teachers is essential to ensuring early mathematics success.

Jones (2012), in her book *Visualizing Mathematics*, emphasizes that it is essential for mathematics teachers to help students visualize and construct representations of their mathematical understanding so that learners perceive mathematics as an integral part of their everyday lives. Beilock and Wellington (2014) found that teachers can play a significant role in reducing mathematics anxiety among learners. Furthermore, integrating technology, such as GeoGebra, with photography and children's literature can enhance both teacher motivation and student engagement in mathematics learning (Marinas, 2016).

Teachers must possess a strong understanding of mathematical content and the pedagogical skills necessary to teach it effectively. The use of psychological approaches and positive discourse is also important in reducing mathematics anxiety. Emphasis on pedagogical strategies in mathematics promotes active learning, conceptual understanding, and learner engagement. Students often express positive attitudes toward mathematics when teachers present content in developmentally appropriate ways, create supportive and inclusive learning environments, maintain high expectations for all learners regardless of gender, race, or language, and employ diverse assessment methods and instructional strategies. These practices help address mathematics anxiety and improve student learning outcomes (Chernoff & Stone, 2014; Dowker et al., 2016; Schoenfeld).

Teachers' competence is commonly described as a combination of content knowledge, pedagogical skills, and the ability to manage and assess learning effectively. Shulman (1986) introduced the concept of pedagogical content knowledge (PCK), emphasizing that effective teaching requires not only mastery of subject matter but also the ability to present it in ways that are accessible to learners. This includes anticipating misconceptions, selecting appropriate instructional strategies, and scaffolding lessons effectively. In mathematics, where abstract concepts often challenge early-grade learners, such competencies are particularly critical.

In the primary years, mathematics instruction focuses on essential concepts such as number sense, operations, patterns, shapes, and measurement. These topics are foundational and must be taught in ways that promote understanding rather than rote memorization. According to Clements and Sarama (2015), effective early mathematics instruction should be hands-on, exploratory, and grounded in real-life contexts. It should also foster problem-solving and critical thinking, even among young learners. Teachers who lack sufficient content knowledge or effective instructional strategies may inadvertently hinder student progress.

Despite curricular enhancements under the Philippine K to 12 programs, learning assessments indicate that many students continue to struggle with basic mathematics skills. The Southeast Asia Primary Learning Metrics (SEA-PLM) 2019 results revealed that a substantial proportion of Filipino Grade 5 students failed to meet the minimum proficiency levels in numeracy. These findings point to gaps in early-grade instruction, suggesting issues not only in the curriculum but also in instructional delivery. When teachers are not adequately prepared to teach foundational mathematics effectively, the effects may accumulate and result in long-term learning deficits.

Several local studies affirm the challenges faced by early-grade teachers in mathematics instruction. For instance, Tolentino (2020) found that Grade 2 teachers in Northern Luzon rated themselves as moderately competent in teaching mathematics but expressed the need for more targeted training, particularly in the use of manipulatives, the development of problem-based lessons, and the integration of technology. This supports the argument that ongoing professional development is not a luxury but a necessity, especially in the early grades, where instruction significantly shapes learners' attitudes and abilities in mathematics.

Professional development

Professional development is globally recognized as a critical factor in improving teacher quality and student learning outcomes. According to Guskey (2002), effective professional development must be ongoing, job-embedded, and aligned with teachers' actual instructional challenges. One-off seminars or generic training programs often fail to address the specific needs of classroom teachers. In contrast, professional development grounded in classroom realities and aligned with current teaching demands is more likely to influence practice and improve outcomes. This is particularly important in rural school settings, where teachers may face unique challenges that are not addressed in standardized training programs.

The Department of Education in the Philippines has acknowledged this need by institutionalizing in-service training (INSET) and school-based professional learning mechanisms, such as Learning Action Cell (LAC) sessions. DepEd Order No. 35, s. The 2016 mandate requires schools to regularly conduct LAC sessions to improve teaching and learning. However, Salcedo and Reyes (2020) noted that these sessions are often conducted without proper needs assessment, resulting in limited impact. For professional development to be effective, it must be data-driven and directly address specific gaps in teachers' knowledge and competence.

International literature also supports the importance of mathematics-specific training. Ball, Thames, and Phelps (2008) emphasized the need for teachers to develop "mathematical knowledge for teaching," a specialized form of understanding that enables them to explain concepts clearly, evaluate multiple solution strategies, and identify errors in student reasoning. Without this depth of knowledge, teachers may rely on rote methods or superficial instruction, thereby limiting students' mathematical thinking and problem-solving abilities.

Assessment practices are also a critical component of teacher competence. Teachers must be able to use a variety of formative and summative assessment tools to gauge student understanding, provide meaningful feedback, and inform instruction. A study by Garcia and Santos (2021) found that teachers who regularly used varied, context-based assessments were more effective in addressing learning gaps. However, many early-grade teachers continue to rely heavily on textbook-based tests, thereby missing opportunities to diagnose and respond to specific learner needs.

A study conducted by Nizeyimana and Muthukrishna (2023) revealed that some teachers employ ineffective practices in curriculum implementation. In an effort to increase the number of students who

pass national examinations, teachers may focus excessively on paper-based assessments. This highlights the need to properly orient both pre-service and in-service teachers on appropriate instructional and assessment approaches that support the development of students' mathematical problem-solving skills. Similarly, integrating authentic assessment with teaching strategies ensures that students have consistent opportunities to engage in problem-solving. Hopkins (2000) emphasized that the effective use of assessment in mathematical problem-solving can positively impact education and society by developing competencies necessary for productive citizenship (Griffin et al., 2012). In the context of evolving economic demands, it is essential to develop students' full potential (Griffin et al., 2012; Noreen, 2020), ensuring that teaching and assessment practices reflect learners' true understanding (Kelly, 2006). Assessment remains a critical component in supporting learning and certification (Moss, 2013; Taras, 2019). Furthermore, assessment tasks should be designed to measure specific aspects of mathematical competencies and aligned with the curriculum (Petterson, 2020). Hence, there is a call for reform in how mathematics assessment is conducted (Berenson & Carter, 2005).

Furthermore, teacher competence is influenced by professional and demographic factors, including years of experience, educational background, and prior training. Several studies have found a positive correlation between these factors and instructional effectiveness. For example, Manuel and Dela Cruz (2022) found that teachers with more years of service and frequent training in mathematics instruction demonstrated greater confidence and effectiveness in delivering lessons, particularly in remote and underserved communities.

Mathematics is a discipline that deals with numbers, measurements, quantities, and shapes. Effective mathematics instruction requires a strong foundation in content knowledge, pedagogy, and instructional skills (Oslund, 2016). As technology advances, teaching approaches in mathematics continue to evolve. Aseeri (2019) emphasized that professional development programs for mathematics teachers should be designed based on teachers' needs and experiences. Such programs aim to equip teachers with diverse pedagogical skills and enhance their classroom competence.

Effective professional development programs incorporate both structural and core features. Structural features include activity formats, opportunities for collaborative participation, and sufficient duration. Core features, on the other hand, include a strong focus on content knowledge, meaningful learning opportunities for teachers, and coherence with other professional development initiatives (Sevis, Cross, & Hudson, 2017; Desimone, Birman, & Yoon, 2002).

A well-designed professional development model can transform teachers' thinking and enhance student learning outcomes (Dogan et al., 2015). Darling-Hammond et al. (2017) noted that professional development for mathematics teachers is most effective when program design and implementation consider teachers' needs and classroom realities. Hatisaru and Erbas (2017) further emphasized the relationship between quality teaching and student learning outcomes. Powell and Bodur (2019) discussed how professional development programs can influence teachers' perceptions and instructional practices by focusing on specific areas of teaching. As a result, teachers can improve both their instructional skills and classroom practices. Additionally, Niess and Roschelle (2018) found that students' performance improved after teachers participated in targeted professional development programs. Successful

professional development initiatives also enhance teachers' knowledge and skills (Jacob et al., 2017). To ensure effectiveness, teachers must continuously develop their competencies, particularly in curriculum innovation (Mellegard & Pettersen, 2017). Without up-to-date knowledge and skills, teachers may struggle to sustain effective teaching and learning processes.

Numeracy skills

These are foundational competencies that enable individuals to understand and apply mathematical concepts in various contexts. For Grade 2 learners, these skills encompass a range of abilities, including understanding numbers and their relationships, performing basic arithmetic operations, recognizing patterns, and solving simple problems. At this stage, learners are expected to transition from concrete to more abstract mathematical thinking, thereby building a solid foundation for more advanced mathematical concepts in subsequent grades.

Research underscores the critical importance of early numerical skills in academic success. A study by Purpura and Lonigan (2015) highlights that early mathematics skills are strong predictors of later academic achievement, particularly in mathematics. Similarly, a meta-analytic study by Tamir and Talib (2025) found a significant positive effect of educational media on early numerical skills, with computer-based instruction being particularly effective. These findings suggest that interventions aimed at enhancing numeracy skills in early education can have long-lasting effects on learners' academic trajectories.

Despite these efforts, challenges remain in achieving desired outcomes in numeracy. A study by Celemin (2023) revealed that Grade 2 learners at Rizal Elementary School obtained a mean percentage score of 38.20% in the four fundamental operations and 20.60% in problem-solving tasks, indicating the need for targeted interventions to improve numeracy skills. This finding aligns with the observations of Spaull and Kotze (2015), who reported that only 16% of Grade 2 learners meet curriculum standards for numeracy, thereby highlighting the need for focused efforts to enhance these skills.

To address these challenges, it is essential to implement evidence-based strategies that promote the development of numeracy skills. Celemin (2023) suggested that authentic performance tasks, which involve real-life scenarios and hands-on activities, can effectively enhance numeracy skills among Grade 2 learners. Such approaches not only engage learners but also provide opportunities to apply mathematical concepts in meaningful contexts, thereby reinforcing learning and fostering a deeper understanding of mathematics.

Zaskis and Liljedahl (2015) further emphasized that storytelling in mathematics education serves as a powerful tool for bridging the gap between abstract mathematical concepts and learners' real-life experiences. By embedding mathematical problems within narratives, learners can better contextualize and understand mathematical ideas. This approach enhances comprehension and fosters deeper engagement with the subject. For Grade 2 learners, integrating story-based mathematics activities can make learning more relatable and enjoyable, thereby potentially improving numeracy skills.

Underdown (2015) highlighted that the use of picture books in mathematics education provides a valuable framework for supporting young learners' understanding of mathematical concepts. By carefully selecting and utilizing storybooks that incorporate mathematical ideas, educators can create a rich learning environment that promotes numeracy skills in an engaging and accessible manner.

Similarly, Collins and Saxby (2022) found that storytelling can effectively support classroom mathematics learning by guiding learners to construct and understand mathematical ideas. This aligns with the view that narrative-based approaches facilitate deeper comprehension by providing context and meaning to abstract concepts.

Masel Walters et al. (2015) explored the use of digital storytelling as a problem-solving strategy in mathematics education. Their study found that creating mathematics-based digital stories enhanced pre-service teachers' understanding of the problem-solving process and the relationships among visual, auditory, and verbal representations in critical thinking. This highlights the potential of digital storytelling to strengthen mathematical understanding and problem-solving skills.

Statement of the problems

This study aims to determine the competence and professional development needs of grade 2 teachers in mathematics instruction in the Bucay District, Division of Abra. This study seeks to provide insights that can guide the development of a proposed intervention or training framework to strengthen integrated instruction in literacy and numeracy.

Specifically, the study seeks to answer the following questions:

1. What is the level of competence of Grade 2 teachers in mathematics instruction in terms of:
    a. content knowledge;
    b. pedagogical strategies and
    c. assessment practices?

2. What are the professional development needs of Grade 2 teachers in mathematics instruction?

3. Is there a significant relationship between the level of competence of Grade 2 teachers and their professional development needs in mathematics instruction?

Hypothesis

There is no significant relationship between Grade 2 teachers' competence levels and their professional development needs in mathematics instruction. This finding is consistent with Tolentino (2020), who found that Grade 2 teachers in Northern Luzon rated themselves as moderately competent in teaching mathematics but expressed the need for more targeted training, especially in using manipulatives, crafting problem-based lessons, and integrating technology. This supports the argument that ongoing professional development is not a luxury but a necessity, especially in the early grades, where instruction shapes attitudes and abilities toward math.

Scope and limitations of the study

This study assesses the competence and professional development needs of Grade 2 teachers in teaching mathematics within the Division of Abra, specifically in the Manabo District.

Specifically, it sought to analyze the levels of competence of Grade 2 teachers in content knowledge, pedagogical strategies, assessment practices, and professional development needs in mathematics instruction. The research is limited to 50 public elementary school teachers.

Research methodology

Research design

This study employs a quantitative approach, descriptive assessment, and correlational research design. The researcher has used both primary and secondary data in this study. The primary data were collected through a questionnaire, and the secondary data were collected from available books, publications, research studies, and websites.

Locale of the study

The study was conducted in Manabo-Bucay and included all identified Grade 2 teachers currently assigned to mathematics instruction in the Bucay District.

Population and sampling

The population of the study comprises all Grade 2 teachers currently assigned to public elementary schools in the Bucay District for School Year 2025-2026. The researcher used a random sampling technique, in which some Grade 2 teachers within the district were invited to participate. A total of 50 questionnaires were distributed, of which were returned and used for analysis.

Data gathering procedure

The researcher constructed the questionnaire based on the literature review and related studies, had it reviewed by experts, and had its content validated. The instrument received a mean rating of 3.81 on the four-point Likert Scale, indicating that it is highly valid and effective. To ensure the instrument's reliability, a pilot test was conducted, yielding a Cronbach's alpha of 0.85, which meets standard research thresholds. Ethical guidelines were put into place for the research period: respondents' rights to their safety were upheld at all times; questionnaire was filled out voluntarily by the subject, maintaining he participants anonymity; preventing disclosure of any personal information: only fundamental questions were included in the questionnaire; primary data was utilized only by the researcher; and study's objectives had been explained and quitting answering the survey questions at any moment was made clear.

Before distributing the questionnaire, the researcher obtained written approval from the appropriate authorities, including the Schools Division Superintendent of Abra and the Public Schools District Supervisor (PSDS) of the Bucay District.

Tools for data analysis

Quantitative data analysis was conducted using appropriate statistical tools to address the study's specific research questions. The results were encoded and processed using statistical software such as SPSS (Statistical Package for the Social Sciences) or Microsoft Excel, specifically for the weighted mean and Pearson r.

Ethical considerations

Ethical review was considered, but because the study does not involve sensitive human issues, it was waived.

The following ranges of values with their descriptive interpretation were used:

The Weighted Mean was used to assess teachers' competence levels and professional development needs.

To determine the level of competence of Grade 2 teachers in Mathematics instruction, this scale was used:

Points	Statistical Limits	Descriptive Equivalent	Symbol
4	3.26-4.00	Highly Competent	HC
3	2.51-3.25	Competent	C
2	1.76-2.50	Slightly Competent	SC
1	1.0-1.75	Not Competent	NC

To determine the level of the perceived professional development needs in Mathematics, this scale was used.

Points	Statistical Limits	Descriptive Equivalent	Symbol
4	3.26-4.00	Urgent Need	UN
3	2.51-3.25	Moderate Need	MC
2	1.76-2.50	Low Need	LN
1	1.0-1.75	No Need	NN

Data presentation and analysis

The data are presented in line with the study’s objectives, collected through research questionnaires, and analyzed using statistical methods.

Problem 1: What is the level of competence of Grade 2 teachers in mathematics instruction in terms of:

a. content knowledge;
b. pedagogical strategies; and
c. assessment practices.

Table 1: ***Level of competence of Grade 2 teachers in mathematics instruction in terms of content knowledge***

Indicators	Mean	DR
1. I can explain number concepts (e.g., place value, odd/even, patterns).	3.90	HC
2. I understand and teach basic operations with confidence.	3.60	HC
3. I can use multiple strategies to explain a single math concept.	3.70	HC
4. I can relate math concepts to real-life situations that are relevant to my learners.	3.56	HC
5. I have mastery in teaching fundamental operations (addition, subtraction, etc.) and their applications.	3.80	HC
Composite Mean	**3.71**	**HC**

Legend: HC (Highly Competent)

(Source: SPSS IBM)

Based on the data presented, the level of Grade 2 teachers' mathematics instruction in terms of content knowledge has a composite mean of 3.71, indicating a "Highly Competent" level. This rating indicates a consistently high level across the other indicators, demonstrating the teacher's ability to explain number concepts (e.g., place value, odd/even, patterns) and to teach and apply the fundamental operations (addition, subtraction, etc.). The teachers can use multiple strategies to explain a single math concept, with confidence in their understanding of the basic operations. Furthermore, teachers can relate math concepts to real-life situations relevant to their learners. Clements and Sarama (2015) noted that effective early math instruction should be hands-on, exploratory, and built on real-life contexts. Instruction should also promote problem-solving and critical thinking, even among young learners.

Table 2: ***Level of competence of Grade 2 teachers in mathematics instruction in terms of pedagogical strategies***

Indicators	Mean	DR
I use a variety of teaching strategies (e.g., storytelling, games, role-play) to engage learners in math.	3.66	HC
I integrate concrete-pictorial-abstract (CPA) approaches in my lessons.	3.60	HC
I adjust my teaching strategies to meet the diverse needs of my learners.	3.68	HC
I use local materials or realia in teaching math concepts.	3.74	HC
I encourage learners to verbalize their thinking or explain their answers.	3.78	HC
Composite Mean	**3.71**	**HC**

Legend: HC (Highly Competent)

(Source: SPSS IBM)

As indicated by the data in the table, Grade 2 teachers' competence in mathematics instruction, in terms of pedagogical strategies, had a composite mean of 3.71, indicating a "Highly Competent" level. Other indicators show a consistently high level of teachers' competence in encouraging learners to verbalize their thinking or explain their answers. The use of local materials or realia in teaching math concepts and teachers adjusting their teaching strategies to meet the diverse needs of their learners. The teachers use a variety of teaching strategies (e.g., storytelling, games, role-play) to engage learners in math, and,

lastly, assess the teachers' ability to integrate concrete-pictorial-abstract (CPA) approaches into their lessons. Teacher competence is often described as a combination of content knowledge, pedagogical skills, and the ability to manage and assess learning effectively. In Tolentino's (2020) study, Grade 2 teachers in Northern Luzon rated themselves as moderately competent in teaching mathematics but expressed a need for more targeted training, especially in using manipulatives, crafting problem-based lessons, and integrating technology. This supports the argument that ongoing professional development is not a luxury but a necessity, especially in the early grades, where instruction shapes attitudes and abilities toward math.

Table 3: ***Level of competence of Grade 2 teachers in mathematics instruction in terms of assessment practices***

Indicators	**Mean**	**DR**
I use diagnostic assessments to determine prior knowledge and readiness for new math topics.	3.72	HC
I regularly use formative assessments to monitor understanding and adjust instruction.	3.62	HC
I provide timely and constructive feedback to support learners' progress in math.	3.84	HC
I use multiple assessment tools (e.g., oral drills, performance tasks, games) to evaluate understanding.	3.68	HC
I consistently track and record learners' progress in math and use this data to plan remediation.	3.76	HC
Composite Mean	**3.74**	**HC**

Legend: HC (Highly Competent)
(Source: IBM SPSS)

Based on the data presented in the table, Grade 2 teachers' competence in mathematics instruction, particularly in assessment practices, had a composite mean of 3.74, indicating a "Highly Competent" level. Although individual indicators vary in their ratings, the results consistently reflect teachers' strong ability to provide timely and constructive feedback that supports learners' progress in mathematics.

Teachers also demonstrate competence in tracking and recording learners' progress and in utilizing this data to plan appropriate remediation strategies. Furthermore, they employ diagnostic assessments to determine learners' prior knowledge and readiness for new mathematical topics and use multiple assessment tools, such as oral drills and performance tasks. This competence is further reflected in their regular use of formative assessments to monitor learners' understanding and adjust instruction accordingly.

Jones (2012) emphasized that the quality of mathematics instruction in the early grade levels plays a pivotal role in shaping the academic trajectory of young learners. Numerous studies have shown that the early years of schooling form the foundation of a child's mathematical understanding, influencing both confidence and performance in later academic stages. Teachers, therefore, are key agents in delivering effective instruction, as their competence in both content and pedagogy directly impacts learner

achievement. Consequently, understanding and supporting the professional development of Grade 2 mathematics teachers is essential to ensuring early mathematics success.

Problem 2: What are the professional development needs of Grade 2 teachers in mathematics instruction

Table 4: ***The professional development needs of Grade 2 teachers in mathematics instruction***

Indicators	Mean	DR
1. Strategies for teaching number sense and operations	3.82	UN
2. Use of manipulatives and ICT in math teaching	3.64	UN
3. Lesson planning using contextualized/localized materials	3.72	UN
4. Designing formative and summative math assessments	3.80	UN
5. Remediation and intervention strategies for struggling learners	3.70	UN
6. Strategies for engaging learners in math problem-solving	3.86	UN
7. Developing learner confidence and interest in mathematics	3.76	UN
Composite Mean	**3.76**	**UN**

Legend: UN (Urgent Need)
(Source: SPSS IBM)

The table presents the level of professional development needs of Grade 2 teachers in mathematics instruction, with a composite mean of 3.76, indicating an "Urgent Need" for professional development. Although the individual indicators vary in their ratings, they consistently reflect an urgent need for professional development among teachers.

These needs include strategies for engaging learners in mathematical problem-solving, teaching number sense and operations, and designing both formative and summative assessments. The findings also highlight the need to develop learners' confidence and interest in mathematics through effective lesson planning that incorporates contextualized and localized materials. Furthermore, there is a clear need for enhanced remediation and intervention strategies for struggling learners, including the use of manipulatives and information and communication technology (ICT) in mathematics instruction.

Effective mathematics instruction requires a comprehensive understanding of content knowledge, pedagogy, and instructional skills. According to Oslund (2022), as technology advances, teachers' methods for improving teaching and learning processes must also evolve. This finding is consistent with Aseeri's (2020) study, which emphasized that professional development programs for mathematics teachers should be designed based on their specific needs and experiences. Such programs aim to equip teachers with a range of pedagogical skills and enhance their overall competence in the classroom. Therefore, active participation in professional development programs is essential for improving teaching practices and achieving better learning outcomes.

Problem 3: Is there a significant relationship between the level of competence of Grade 2 teachers and their professional development needs in mathematics instruction?

Table 6: ***Relationship between professional development needs and their competence in mathematics instruction in terms of mathematical word problem solving***

Professional development needs	**Pearson's r**	**Interpretation**	**p-value**	**Interpretation**	**Decision (Ho)**
Competence of Grade 2 teachers in mathematics instruction in terms of					
Mathematical word problem solving	0.220	+weak relationship	0.120	Not Significant	Not supported
Mathematical word problem solving	0.212	+ weak relationship	0.140	Not Significant	Not supported
Mathematical word problem solving	0.256	+weak Relationship	0.061	Not Significant	Not supported

Note. *p < .05
(Source: SPSS IBM)

Table 6 presents the relationship between teachers' professional development needs and their competence in mathematics instruction, specifically in solving mathematical word problems. The findings reveal weak positive correlations between professional development needs and the identified indicators of mathematical word problem-solving, with Pearson's *r* values of 0.220, 0.212, and 0.256, respectively. However, the corresponding *p*-values are all greater than the 0.05 significance level, indicating that these relationships are not statistically significant.

Therefore, the null hypothesis is not rejected, indicating insufficient evidence to establish a significant relationship between teachers' professional development needs and their competence in solving mathematical word problems.

The results indicate a slight positive trend; however, teachers' perceived professional development needs are not significantly associated with their current level of competence in teaching mathematical word problems. This may imply that teachers' self-identified professional development needs are influenced by factors other than their actual instructional competence, such as institutional requirements, policy expectations, or personal professional goals.

Results and discussion

The findings indicate that Grade 2 teachers demonstrate a high level of competence in mathematics instruction across content knowledge, pedagogical strategies, and assessment practices. In terms of content knowledge, teachers can explain key mathematical concepts such as place value, number patterns, and basic operations, and apply multiple instructional strategies, relating concepts to real-life contexts (Collins et al., 2022). This level of competence reflects a strong foundational understanding necessary for effective early mathematics instruction.

Assessment practices further support this competence. Teachers utilize a range of formative and summative assessment tools to evaluate learner understanding, provide timely and constructive

feedback, and inform instructional decisions. They can also track learner progress systematically and use assessment data to guide remediation. These findings align with Garcia and Santos (2021), who emphasized that varied, context-based assessments are more effective at addressing learning gaps. However, some reliance on textbook-based assessments persists, potentially limiting opportunities for more diagnostic and responsive instruction (Chernoff et al., 2014).

Pedagogically, teachers demonstrate the ability to implement diverse and learner-centered strategies. These include encouraging learners to articulate their thinking, using contextualized materials and realia, adapting instruction to diverse learner needs, and employing approaches such as storytelling, games, and the concrete–pictorial–abstract (CPA) method. Such practices are consistent with Jones (2012), who highlighted the importance of visualization in mathematics learning, and with Beilock and Wellington (2014), who underscored the teacher's role in reducing mathematics anxiety. The integration of technology and creative resources further enhances engagement and instructional effectiveness (Marinas, 2016). Moreover, the use of positive discourse and inclusive classroom practices contributes to improved learner attitudes and outcomes (Chernoff & Stone, 2014; Dowker et al., 2016; Schoenfeld, 2022).

Despite these strengths, the findings reveal an urgent need for professional development among Grade 2 teachers in mathematics instruction. Teachers expressed a need for enhanced strategies in facilitating mathematical problem-solving, teaching number sense and operations, and designing assessments that promote higher-order thinking skills. There is also a need to strengthen learner engagement through contextualized lesson planning and to improve remediation and intervention strategies, particularly by using manipulatives and information and communication technology (ICT) (Guskey, 2022).

These findings support existing literature emphasizing that effective teaching requires a comprehensive integration of content knowledge, pedagogy, and instructional skills (Oslund, 2022). As educational technologies continue to evolve, teaching approaches must also adapt. Aseeri (2020) highlighted that professional development programs should be responsive to teachers' needs and experiences, while effective programs should incorporate both structural features (e.g., sustained duration and collaboration) and core features (e.g., content focus and active learning) (Sevis, Cross, & Hudson, 2019; Desimone, Birman, & Yoon, 2021). Well-designed professional development has been shown to enhance both teacher competence and student learning outcomes (Dogan et al., 2015; Darling-Hammond et al., 2017).

However, evidence also suggests that instructional practices may not always align with best practices, particularly when teaching is overly focused on examination performance (Nizeyimana & Muthukrishna, 2023). This underscores the need for targeted and context-sensitive professional development that supports meaningful learning and problem-solving.

Notably, the study found no statistically significant relationship between teachers' professional development needs and their competence in teaching mathematical word problems, despite a slight positive correlation. This suggests that perceived professional development needs may not directly reflect actual instructional competence, but may instead be influenced by external factors such as

institutional expectations or personal professional goals. Consequently, professional development needs alone may not be a reliable predictor of teaching competence.

This finding highlights the importance of conducting comprehensive needs assessments that integrate both perceived needs and observed teaching practices. Similar conclusions have been drawn in previous studies, which emphasize the role of targeted professional development in improving instructional practices and student outcomes (Hatisaru & Erbas, 2017; Powell & Bodur, 2019; Niess & Roschelle, 2018). Furthermore, effective professional development must enhance teachers' knowledge and skills while supporting continuous innovation in curriculum and instruction (Jacob et al., 2017; Mellegard & Pettersen, 2017).

Overall, the findings align with the Dreyfus Model of Skill Acquisition, which posits that professional competence develops through sustained practice and experience rather than theoretical knowledge alone. This underscores the importance of responsive and practice-oriented professional development initiatives, such as in-service training (INSET), Learning Action Cell (LAC) sessions, and instructional coaching, in strengthening teachers' competence in mathematics instruction.

Conclusion

This study aimed to examine the competence and professional development needs of Grade 2 teachers in mathematics instruction, and to explore the literacy–numeracy connection among Grade 2 pupils as observed and experienced by teachers in the Bucay District, Division of Abra. The findings provide a basis for developing an intervention or training framework to strengthen integrated instruction in literacy and numeracy.

The results reveal that most of the respondents, who are Grade 2 teachers in the Bucay District, demonstrate a high level of competence in mathematics instruction. This includes strong content knowledge and mastery of teaching fundamental operations, such as addition and subtraction, and their practical applications. In terms of pedagogical strategies, teachers demonstrate competence in encouraging learners to verbalize their thinking, explain their answers, and engage with mathematical concepts using local materials or realia.

Moreover, teachers demonstrate high competence in assessment practices, particularly in providing timely, constructive feedback to support learners' progress and systematically recording learners' performance to inform data-driven remediation. These competencies reflect their capacity to support effective mathematics instruction in early grade levels.

Despite these strengths, the findings indicate that the professional development needs of Grade 2 teachers in mathematics instruction remain urgent. Specifically, teachers require further support in implementing strategies to engage learners in mathematical problem-solving, strengthening instruction in number sense and operations, and designing both formative and summative assessments that promote higher-order thinking skills.

Furthermore, the Pearson r correlation analysis indicates that teachers' perceived professional development needs are not significantly related to their current competence in teaching mathematical word problems. This suggests that self-identified development needs may be influenced by factors beyond actual instructional competence, such as institutional requirements, policy expectations, or personal professional goals.

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