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Research Article

Assessment Convergence: Teachers' Praxis and Professional Needs in Mathematics

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ABSTRACT

This study investigated the preparedness, instructional practices, and professional development needs of elementary mathematics teachers to inform the design of a capacity-building program aimed at enhancing instructional quality and assessment alignment with the National Achievement Test (NAT). Using a descriptive research design, data were gathered from 35 mathematics teachers across 18 public elementary schools in one city division in the Philippines. A validated researcher-made questionnaire measured preparedness across four domains: content knowledge, pedagogical strategies, assessment practices, and NAT alignment. Quantitative data were analysed using descriptive statistics, Spearman correlation, Mann-Whitney U, and Kruskal-Wallis tests, while qualitative responses were subjected to thematic analysis. Findings revealed that teachers demonstrated high preparedness in content, pedagogy, and assessment but expressed very high training needs, particularly in assessment literacy and NAT alignment. Years of teaching experience showed a significant relationship with content knowledge, while sex was associated with differences in content and pedagogical preparedness. Other demographic factors such as age, position, and educational attainment showed no significant influence. Qualitative results highlighted major instructional challenges, including pupils' poor problem-solving skills, lack of mastery in basic operations, and limited learning resources. Teachers also emphasized misalignment between classroom assessments and NAT competencies. The study concludes that teacher preparedness in mathematics is multidimensional and shaped by continuous professional learning rather than demographic attributes. It recommends a comprehensive professional development program focused on assessment design, test alignment, and pedagogical innovation to strengthen instructional quality and improve mathematics achievement.

Keywords: Teaching Mathematics; Teacher Preparedness, content knowledge, pedagogical strategies, assessment practices, training needs

1. INTRODUCTION

Globally, mathematics achievement remains a cornerstone of educational success and economic competitiveness. Research across diverse contexts underscores that academic performance is a reliable predictor of later outcomes on standardized assessments. Rittle-Johnson et al. (2024) reported that early mathematics proficiency at age four predicted

American College Testing scores by 12th grade among marginalized U.S. students, highlighting the long-term importance of foundational skills. Similarly, Tatar and Düştegör (2020) found that grade point average (GPA) consistently predicted undergraduate graduation performance more effectively than individual course grades. Together, these findings affirm that continuous academic performance provides a robust basis for forecasting standardized outcomes.

Across international assessments such as the Programme for International Student Assessment (PISA), performance disparities demonstrate how learner, teacher, and contextual factors jointly shape mathematics achievement. Wang et al. (2023) identified socioeconomic status, absenteeism, and teacher shortages as persistent determinants of performance across nations. Wu et al. (2020) further showed that PISA mathematics performance can be explained through fine-grained knowledge attributes, with countries such as Singapore demonstrating the most complex learning trajectories. European and Asian studies likewise emphasize the role of teacher quality and innovation in instructional design. Teacher preparedness has consistently emerged as a decisive global factor. Schoen et al. (2024) found that Cognitively Guided Instruction professional development yielded long-term improvements in upper elementary mathematics performance. Tyminski and Brittain (2022) observed that when teachers engage in analytical and problem-posing activities, their ability to diagnose and respond to student learning difficulties strengthens. Evidence from Saka (2021) and Geoffrey et al. (2024) similarly supports the idea that continuous professional collaboration enhances instructional quality and student outcomes.

In the Philippines, mathematics achievement remains a persistent concern despite ongoing curriculum reforms. The National Achievement Test (NAT), administered by the Department of Education, has consistently shown below-proficient levels of performance in mathematics across grade levels (Paredes et al., 2020). Although academic grades are used to monitor student progress, they do not always align with standardized assessment results. Cuajao (2024) found that academic performance in Filipino was related to NAT outcomes, but variations in school context reduced this predictive validity. Likewise, Callaman and Itaas (2020) synthesized studies from Mindanao indicating that mathematical skills, attitudes, and self-efficacy strongly predict mathematics achievement, while Galangco (2023) linked GPA and mathematics anxiety to senior high school performance. Philippine research also points to the crucial role of teachers. Reyno and Guzman (2025) reported that instructional preparedness significantly influenced NAT performance. Berame (2023) demonstrated that integrating technology into classroom instruction enhanced pupils' mathematics performance, underscoring innovation as an essential dimension of teacher competence. At both regional and school levels, the challenge of low mathematics proficiency remains evident.

Mathematics is a foundational discipline in the Philippine basic education curriculum, shaping logical reasoning, problem-solving abilities, and lifelong learning skills. Despite this, national assessments continue to reveal substantial learning gaps. The persistent mismatch between academic grades and NAT results raises questions regarding the coherence of assessment practices and the adequacy of teacher preparation. Effective mathematics instruction requires mastery of content, evidence-based pedagogy, and alignment with national assessment frameworks (Judijanto et al., 2023; Schoen et al., 2024). However, studies show that many teachers lack confidence in designing classroom assessments that mirror standardized expectations and often report limited readiness in addressing students' conceptual difficulties (Reyno and Guzman, 2025).

This study aims to examine the preparedness of elementary mathematics teachers by evaluating their content knowledge, pedagogical strategies, assessment practices, and alignment with NAT standards. Specifically, it seeks to address several key questions, including the teachers' demographic and professional profiles (age, sex, highest educational attainment, years of teaching experience, position, and participation in seminars or workshops); their level

of preparedness across the four domains; and whether significant relationships exist between preparedness levels and demographic variables. Additionally, the study investigates the challenges teachers encounter in teaching elementary mathematics, the types of seminar-workshops or training they deem essential to enhance instructional competence, their perspectives on why some pupils with high classroom grades perform poorly on the NAT, and the specific areas of assessment in which they believe further professional development is necessary.

2. METHODOLOGY

2.1. Research Design

This study employed a descriptive research design to examine the preparedness, instructional practices, and professional development needs of elementary mathematics teachers. This design was appropriate as it aimed to describe existing conditions and determine teachers' levels of preparedness in terms of content knowledge, pedagogical strategies, assessment practices, and training needs. The approach enabled the researcher to provide an objective portrayal of teachers' instructional realities without manipulating variables, while also identifying the specific areas in which professional development is needed to strengthen mathematics instruction at the elementary level.

2.2. Research Locale

The study was conducted in eighteen public elementary schools within one city division in the Philippines. These schools represented a range of educational settings including urban, suburban, and rural contexts providing a comprehensive view of mathematics teaching practices across diverse environments. The locale was purposively selected due to its accessibility, varied school profiles, and consistent participation in mathematics-related programs, making it an appropriate setting for examining teacher preparedness and professional development needs.

2.3. Respondents of the Study

The profile of the teacher respondents in terms of age, sex, educational attainment, teaching experience, position, and training attendance is summarized in Table 1. The table presents the demographic and professional characteristics of the 35 participating teachers. In terms of age, the largest groups fall within the 35–44 years (31.4%) and 55–64 years (31.4%) categories, followed by teachers aged 25–34 years (22.9%) and a smaller group aged 45–54 years (14.3%). This distribution suggests a balanced workforce comprising both mid-career and senior teachers. Such diversity strengthens institutional capacity, as early-career teachers tend to introduce innovation and technology-driven practices, while more experienced teachers contribute deeper pedagogical knowledge and classroom management expertise (Reyno & Guzman, 2025; Salifu & Bakari, 2022). In terms of sex, the teaching workforce is predominantly female (80.0%), reflecting the continued feminization of the teaching profession in the Philippines. Similar patterns have been reported globally, particularly in basic education, where female teachers consistently outnumber their male counterparts (Gyeltshen, 2021; Yasin, 2021). This demographic feature is noteworthy, as research indicates that teacher gender composition can influence classroom interactions, learning climate, and role-modeling opportunities for students (Geoffrey et al., 2024).

Table 1. Profile of the teacher respondents

Urban	Category	Frequency (f)	Percentage (%)
Age	25–34 years	8	22.9
	35–44 years	11	31.4
	45–54 years	5	14.3
	55–64 years	11	31.4
Sex	Female	28	80.0
	Male	7	20.0
Highest Educational Attainment	Bachelor's only	7	20.0
	Master's (units/Complete Academic Requirement)	26	74.3
	Master's completed	1	2.9
	Doctorate	1	2.9
Years of Teaching Experience	0–5 years	10	28.6
	6–10 years	2	5.7
	11–15 years	5	14.3
	16–20 years	6	17.1
	26–30 years	9	25.7
	31–35 years	3	8.6
Position	Teacher I	11	31.4
	Teacher II	4	11.4
	Teacher III	17	48.6
	Master Teacher I	2	5.7
	Master Teacher II	1	2.9
Attended Seminar/Workshop	Yes	11	31.4
	No	24	68.6

For highest educational attainment, most respondents had pursued graduate studies, with 74.3% holding master's units or having completed the academic requirements for a master's degree. Only 2.9% each had completed a master's or doctorate degree, while 20.0% held only a bachelor's degree. These results highlight teachers' commitment to professional growth, yet the low percentage of completed advanced degrees suggests the presence of barriers such as financial constraints, demanding workloads, and limited institutional support (Obeka, 2024). Previous studies confirm that teachers with advanced degrees tend to exhibit stronger instructional competence and improved alignment with curriculum reforms, thereby supporting better student achievement in standardized assessments such as the NAT (Paredes et al., 2020). Regarding years of teaching experience, the respondents presented a wide distribution. The largest clusters were those with 0–5 years (28.6%) and 26–30 years (25.7%) of experience, with fewer teachers falling in the mid-range categories. This indicates a polarized workforce in which novice teachers work alongside highly experienced educators. Teaching experience has consistently been associated with expertise in pedagogy, classroom management, and assessment literacy all essential components that influence student performance outcomes (Saka, 2021). In terms of position rank, nearly half of the respondents were Teacher III (48.6%), followed by Teacher I (31.4%) and Teacher II (11.4%). Only 8.6% held Master Teacher positions, suggesting limited progression into the highest professional ranks. This trend underscores the need for deliberate capacity-building and mentoring initiatives to support more teachers in qualifying for higher positions, which are often linked to stronger leadership in pedagogy and assessment (Mirasol et al., 2021).

Finally, participation in seminars and workshops was limited, with only 31.4% reporting attendance within the past three years. A substantial majority (68.6%) had not participated in any professional development activities during this period, raising concerns about teachers' access to sustained training opportunities. Prior research has emphasized that continuous

development in both content and pedagogy is crucial for addressing gaps between classroom instruction and performance on standardized assessments such as the NAT (Schoen et al., 2024).

2.4. Research Instrument

The primary data-gathering tool was a researcher-made questionnaire that underwent expert validation, pilot testing, and reliability analysis. The instrument was also reviewed and approved by the Department of Education Research Ethics Committee prior to its administration. It consisted of five main sections. The first section focused on the teachers' demographic and professional profiles, including age, sex, highest educational attainment, years of teaching experience, position, and seminars or workshops attended during the past three years. The second section assessed teacher preparedness using a five-point Likert scale across five domains: content knowledge, pedagogical strategies, assessment practices, NAT alignment, and training needs. The third section examined perceived challenges in mathematics instruction through open-ended questions that allowed teachers to describe their experiences, instructional difficulties, and constraints. The fourth section identified teachers' professional development preferences and recommendations for capacity-building programs. Reliability was measured using Cronbach's alpha, which produced a coefficient above 0.80, indicating that the instrument demonstrated high internal consistency.

2.5. Data Gathering Procedure

Permission to conduct the study was obtained from the Schools Division Superintendent and the principals of the participating schools. The researcher coordinated with the mathematics department heads to ensure smooth distribution and retrieval of the questionnaires. Each respondent was informed of the purpose of the study, the voluntary nature of participation, and their right to confidentiality. The questionnaires were personally administered by the researcher to ensure clarity of instructions and completeness of responses. Sufficient time was provided for respondents to answer all items, after which the completed instruments were collected and prepared for data encoding and analysis.

2.6. Data Analysis

The collected data were encoded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, such as frequency and percentage, were used to describe the teachers' demographic profile. The weighted mean and standard deviation were computed to determine the level of teacher preparedness across each domain. The Spearman rank-order correlation, Mann–Whitney U test, and Kruskal–Wallis H test (Akoglu, 2018) were employed to examine possible relationships between teachers' profile variables such as age, educational attainment, and years of experience and their preparedness levels. Qualitative responses to the open-ended questions on perceived challenges and professional needs were analyzed using thematic analysis, which involved identifying, categorizing, and interpreting recurring themes and patterns that emerged from the data.

2.7. Ethical Considerations

The study strictly adhered to the ethical standards set by the Department of Education Research Ethics Committee. Ethical clearance was obtained (1273) prior to data collection, ensuring that all procedures aligned with the principles of respect, beneficence, and justice.

Participation was entirely voluntary, and respondents were informed of their right to withdraw from the study at any time without penalty. Anonymity and confidentiality were safeguarded by omitting any identifying information from the dataset, and all results were presented in aggregate form. The researcher upheld transparency, honesty, and professionalism throughout the research process, ensuring that all participants were treated with dignity and fairness.

3. RESULTS AND DISCUSSION

3.1. Level of Teacher Preparedness in Teaching Elementary Mathematics

Table 2 presents the summary of teachers' self-assessed preparedness in teaching elementary mathematics, focusing on their content knowledge, pedagogical strategies, NAT alignment, and assessment practices. Overall, the results show that teachers exhibit high preparedness across all domains assessed. In terms of content knowledge, teachers reported strong confidence in applying mathematical concepts, with the highest rating observed for connecting lessons to real-life applications (M = 4.21, SD = 0.48, Very High). This finding suggests that teachers value contextualization and relevance in mathematics instruction, consistent with Montero and Geducos (2022), who highlighted the effectiveness of localized and contextualized strategies in deepening student understanding. However, identifying pupils' misconceptions received the lowest rating (M = 3.85, SD = 0.62, High), indicating an area where diagnostic teaching strategies should be strengthened.

Table 2. Level of teacher preparedness in teaching Elementary Mathematics

Content Knowledge	**Mean**	**SD**	**Interpretation**
I feel confident in my knowledge of elementary mathematics concepts.	4.00	0.71	Agree (High)
I can explain mathematics concepts clearly and accurately to my pupils.	3.94	0.70	Agree (High)
I am able to connect mathematics lessons to real-life applications.	4.21	0.48	Strongly Agree (Very High)
I can identify the common misconceptions of pupils in mathematics.	3.85	0.62	Agree (High)
Composite Mean	4.0		Agree (High)
Pedagogical Strategies	**Mean**	**SD**	**Interpretation**
I use a variety of strategies to teach mathematics effectively.	3.97	0.68	Agree (High)
I integrate problem-solving tasks in my lessons.	4.18	0.64	Agree (High)
I utilize instructional materials to support mathematics teaching.	4.21	0.70	Strongly Agree (Very High)
I adapt my teaching strategies to address different learning styles and needs.	4.21	0.48	Strongly Agree (Very High)
Composite Mean	4.14		Agree (High)
NAT alignment	**Mean**	**SD**	**Interpretation**
I am familiar with the competencies measured by the NAT in mathematics.	3.70	0.68	Agree (High)
I align my classroom assessments with NAT competencies.	3.85	0.57	Agree (High)
I integrate test-type questions (multiple-choice, problem-solving) similar to those in NAT.	4.00	0.56	Agree (High)
I regularly analyze pupil performance to identify areas needing improvement for NAT preparation.	3.91	0.52	Agree (High)
Composite Mean	3.87		Agree (High)
Assessment Practices	**Mean**	**SD**	**Interpretation**
I am confident in constructing valid and reliable test items for mathematics.	3.88	0.65	Agree (High)
I use item analysis to evaluate the quality of my test questions.	4.00	0.56	Agree (High)
I integrate both traditional and authentic assessment tools in my mathematics classes.	4.15	0.44	Agree (High)
Composite Mean	4.01		Agree (High)

For pedagogical strategies, teachers demonstrated consistently high preparedness, particularly in adapting instruction to different learning styles (M = 4.21, SD = 0.48, Very High) and in using technology and instructional materials (M = 4.21, SD = 0.70, Very High). These results align with the findings of Yildirim and Seckin-Kapucu (2021), who emphasized that innovative instructional approaches, including technology integration, significantly enhance learners' achievement and retention in mathematics and science.

Regarding NAT alignment, teachers reported high preparedness in aligning classroom assessments with NAT competencies (M = 3.85, SD = 0.57, High) and in using test-type questions similar to those found in the NAT (M = 4.00, SD = 0.56, High). This underscores the importance of bridging classroom-based learning with standardized assessment requirements, a concern echoed in previous NAT-related studies (Berame, 2023; Casildo, 2022). Nonetheless, familiarity with NAT competency standards had the lowest mean (M = 3.70, SD = 0.68, High), indicating that while teachers integrate NAT-like tasks, deeper mastery of the test's content and structure remains necessary.

For assessment practices, teachers reported high competence in test construction, item analysis, and the use of authentic assessment (M = 4.15, SD = 0.44, High). These competencies are essential for aligning classroom evidence with national benchmarks. The findings highlight teachers' awareness of gaps between classroom practices and NAT performance, reinforcing conclusions by Reyno and Guzman (2025) that teacher preparedness and ongoing professional development are vital determinants of student achievement in standardized assessments.

3.2. Relationship between Teacher's Preparedness Domains and the Demographic Profile

Table 3 presents the correlation between teachers' preparedness domains and their demographic profile, particularly age. The results show generally weak and statistically non-significant associations across all domains of preparedness. The correlation between age and content knowledge ($\rho = 0.265$, $p = 0.124$) indicates a low positive relationship, suggesting that older teachers tend to have slightly higher content knowledge than their younger counterparts; however, this association is not statistically significant at the 0.05 level. This implies that age alone does not contribute meaningfully to differences in teachers' mastery of mathematical content.

Table 3. Relationship between teachers' preparedness domains and their age

	Preparedness Domains	Spearman ρ	p-value	Interpretation
AGE	Content Knowledge	0.265	0.124	Low, not significant
	Pedagogical Strategies	-0.008	0.962	Zero, not significant
	NAT Alignment	0.245	0.156	Low, not significant
	Assessment Practices	0.036	0.836	Negligible, not significant

For pedagogical strategies ($\rho = -0.008$, $p = 0.962$), the coefficient is almost zero, indicating no relationship between age and the use of effective instructional strategies. This finding suggests that pedagogical practices are not determined by age, as both younger and older teachers may employ a range of approaches that reflect their training, professional development, and classroom experience rather than their chronological age. Similarly, the correlation between age and NAT alignment ($\rho = 0.245$, $p = 0.156$) reflects a low positive but non-significant relationship. This indicates that teachers' ability to align their instruction and assessments with NAT standards is not age-dependent. Alignment-related competencies may instead arise from professional development opportunities, exposure to curriculum reforms, or familiarity with standardized testing frameworks. Overall, the findings suggest that age is not a significant determinant of teacher preparedness across the domains assessed, highlighting the importance of continuous training and capacity-building for teachers at all career stages.

Table 4 presents the results of the Mann-Whitney U test examining whether teachers' preparedness differs by sex across four domains. Significant differences were found in content knowledge and pedagogical strategies, whereas NAT alignment and assessment practices showed no statistically significant variation. For content knowledge, the Mann–Whitney U value of 158.00 with a p-value of 0.011 indicates a significant difference at the 0.05 level, with male teachers reporting higher preparedness. This finding aligns with broader literature suggesting that teacher characteristics particularly confidence, prior exposure to mathematics-related tasks, and participation in subject-specific professional activities contribute to variations in mathematics competence. Geoffrey et al. (2024) and Yasin (2021) emphasized that access to mathematics-focused development opportunities can significantly enhance subject-matter mastery, which may help explain the higher scores reported by male teachers.

Table 4. Teachers' preparedness domains

	Preparedness Domains	**Mann-Whitney U Test**	**p-value**	**Interpretation**
Sex	Content Knowledge	158.00	0.011	Significant – Male teachers scored higher than female teachers
	Pedagogical Strategies	146.50	0.039	Significant – Male teachers scored higher than female teachers
	Preparedness for NAT Alignment	143.50	0.054	Not Significant
	Assessment Practices	124.00	0.263	Not Significant

A significant difference also emerged in pedagogical strategies (U = 146.50, p = 0.039), again favoring male teachers. This pattern is consistent with findings by Schoen et al. (2024) and Tyminski and Brittain (2022), who noted that teachers' instructional competence often varies based on their engagement with innovative teaching approaches and exposure to method-oriented training. Teachers who participate more frequently in professional learning activities related to pedagogy tend to demonstrate greater confidence and effectiveness in implementing diverse instructional strategies.

In contrast, preparedness for NAT alignment did not reach statistical significance (U = 143.50, p = 0.054). This suggests that male and female teachers possess comparable levels of familiarity with NAT competencies. Studies on national assessment performance, such as those by Berame (2023) and Paredes et al. (2020), highlight that alignment with standardized competencies is typically shaped by institutional policies, shared instructional practices, and mandated assessment requirements rather than demographic attributes an explanation that aligns with the similar preparedness levels found across sexes. Likewise, assessment practices showed no significant difference (p = 0.263), supporting the notion that assessment literacy is developed through common school-wide processes and uniform expectations. Research by Judijanto et al. (2023) and Montero and Geducos (2022) similarly observed that teachers exposed to standardized assessment frameworks tend to display consistent levels of assessment competence regardless of demographic variation. Overall, the findings indicate that sex is associated with variations in content knowledge and pedagogical strategies but not with preparedness in NAT alignment or assessment practices. This supports the broader pattern in the literature that teacher preparedness is shaped more by professional exposure, training experiences, and instructional contexts than by demographic characteristics alone (Geoffrey et al., 2024; Gyeltshen, 2021; Wang et al., 2023).

Table 5 presents the results of the Kruskal–Wallis H test, which examined whether teachers' preparedness across four domains differs according to their highest educational attainment. Across all domains content knowledge, pedagogical strategies, NAT alignment, and assessment practices no statistically significant differences were observed, as all p-values exceeded the 0.05 significance level. For content knowledge, the H value of 3.13 (p = 0.372)

indicates that teachers' mastery of mathematical content does not differ significantly among those who hold a bachelor's degree, have earned graduate units, or have completed graduate degrees. This result is consistent with the findings of Yasin (2021) and Gyeltshen (2021), who noted that teacher performance and subject-matter competence do not necessarily increase with higher academic credentials, particularly when classroom practice and continuous professional learning exert a stronger influence on instructional effectiveness.

Table 5. Relationship between teachers' preparedness domains and their highest educational attainment

	Preparedness domains	**Kruskal–Wallis H Test**	**p-value**	**Interpretation**
Highest Educational Attainment	Content Knowledge	3.13	0.372	Not Significant
	Pedagogical Strategies	1.11	0.775	Not Significant
	Preparedness for NAT Alignment	4.07	0.254	Not Significant
	Assessment Practices	3.29	0.348	Not Significant

Similarly, pedagogical strategies showed no significant differences ($H = 1.11$, $p = 0.775$). This supports the perspectives of Tyminski and Brittain (2022) and Schoen et al. (2024), who emphasized that effective pedagogy is shaped primarily by instructional experience, participation in professional development, and engagement with evidence-based strategies, rather than by formal academic attainment alone. Preparedness in NAT alignment also revealed no significant differences across educational attainment groups ($H = 4.07$, $p = 0.254$). This suggests that teachers, regardless of their academic qualifications, possess similar familiarity with NAT competencies. Such a pattern aligns with research by Berame (2023) and Paredes et al. (2020), which highlights that alignment with national assessment standards is typically driven by institutional expectations, standardized curriculum guides, and school-level assessment practices rather than academic degree levels.

Finally, assessment practices likewise showed no significant variation across educational attainment groups ($H = 3.29$, $p = 0.348$). This finding echoes conclusions by Judijanto et al. (2023) and Montero and Geducos (2022), who observed that assessment literacy tends to develop through shared school systems, collaborative practices, and targeted training opportunities rather than through formal degree completion. Overall, the results indicate that highest educational attainment is not a significant determinant of teacher preparedness across the four domains assessed, underscoring the importance of practical experience and continuous professional development in shaping instructional competence.

Table 6 presents the relationship between teachers' years of teaching experience and their preparedness across four domains. The results show that years of teaching experience have a statistically significant relationship only with content knowledge. The correlation between experience and content knowledge ($\rho = 0.43$, $p = 0.011$) indicates a moderate and significant positive association. According to Akoglu (2018), a coefficient of this magnitude reflects a meaningful relationship, suggesting that teachers with more years in the profession tend to demonstrate stronger mastery of mathematical content. This finding is consistent with Gyeltshen (2021), who reported that accumulated experience contributes to deeper subject-matter understanding and improved instructional confidence. Similarly, Reyno and Guzman (2025) noted that experienced teachers often develop more effective strategies for diagnosing student misconceptions, which further enhances their content expertise.

In contrast, years of teaching experience did not show significant correlations with pedagogical strategies ($\rho = 0.06$, $p = 0.749$), preparedness for NAT alignment ($\rho = 0.32$, $p = 0.062$), or assessment practices ($\rho = 0.15$, $p = 0.398$). These results suggest that tenure in the profession does not automatically translate into greater pedagogical innovation, assessment literacy, or alignment with standardized testing frameworks. This pattern aligns with Schoen et al. (2024) and Tyminski and Brittain (2022), who emphasized that advanced pedagogical

competence and assessment capability are shaped primarily by sustained professional development and exposure to updated instructional models rather than by years of service alone.

Table 6. Relationship between teachers' years of teaching experience and their preparedness domains

	Preparedness Domains	Spearman ρ	p-value	Interpretation
Years of Teaching Experience	Content Knowledge	0.43	0.011	Moderate, Significant
	Pedagogical Strategies	0.06	0.749	Not Significant
	Preparedness for NAT Alignment	0.32	0.062	Not Significant
	Assessment Practices	0.15	0.398	Not Significant

Furthermore, Wang et al. (2023) and Yasin (2021) noted that teacher preparedness and instructional quality depend heavily on access to training opportunities, institutional support, and curriculum familiarity factors that vary independently of teaching experience. The near-significant correlation between teaching experience and NAT alignment ($\rho = 0.32$, $p = 0.062$) suggests a possible trend indicating that more experienced teachers may begin to develop greater familiarity with standardized assessment expectations, although the relationship does not reach statistical significance. This reflects observations by Paredes et al. (2020), who emphasized that alignment with national assessments requires deliberate training and continuous exposure to updated curriculum guidelines rather than reliance on teaching experience alone.

Table 7 presents the results of the Kruskal–Wallis H test, which examined whether teachers' preparedness significantly differs across position ranks. The findings show no statistically significant differences among Teacher I, Teacher II, Teacher III, and Master Teacher positions across all four preparedness domains. The p-values for content knowledge ($H = 6.29$, $p = 0.178$), pedagogical strategies ($H = 2.96$, $p = 0.564$), preparedness for NAT alignment ($H = 6.03$, $p = 0.197$), and assessment practices ($H = 3.20$, $p = 0.525$) all exceed the 0.05 significance threshold, indicating that position does not meaningfully influence preparedness levels.

Table 7. Relationship between teachers' preparedness domains and their position

	Preparedness Domains	Kruskal–Wallis H Test	p-value	Interpretation
Position	Content Knowledge	6.29	0.178	Not Significant
	Pedagogical Strategies	2.96	0.564	Not Significant
	Preparedness for NAT Alignment	6.03	0.197	Not Significant
	Assessment Practices	3.20	0.525	Not Significant

This uniformity suggests that teachers across ranks operate within similar instructional environments and encounter comparable curriculum expectations and classroom demands. As noted by Mirasol et al. (2021), structural designations in the Philippine education system often reflect administrative requirements or accumulated years of service rather than clear distinctions in instructional expertise. Likewise, Gyeltshen (2021) highlighted that preparedness is shaped more by access to training and professional learning opportunities than by formal rank. The absence of significant variation across positions also aligns with the findings of Wang et al. (2023) and Yasin (2021), who reported that teacher effectiveness is more strongly associated with ongoing development and institutional support systems than with hierarchical designation. Overall, the results reinforce the view that progression from Teacher I to higher ranks does not automatically translate into improved pedagogical or assessment proficiency. Enhanced preparedness requires sustained capacity-building efforts, targeted professional development, and continuous engagement with updated instructional practices.

3.3. Teachers' Challenges, Training Needs, and Assessment Areas

The qualitative findings presented in Table 8 highlight the key challenges, training needs, and assessment-related concerns reported by elementary mathematics teachers. A dominant theme concerns pupils' lack of mastery in basic operations and their weak comprehension of word problems difficulties that teachers identified as the most frequent obstacles to effective mathematics learning. These challenges are consistent with persistent foundational skill deficits documented in both Philippine and international studies. Callaman and Itaas (2020) emphasized that weak numeracy foundations significantly hinder learners' progression to higher-order mathematical tasks, while Judijanto et al. (2023) underscored the importance of comprehension-driven instruction in strengthening conceptual understanding. Teachers also reported low learner motivation and limited focus as recurring issues. These observations align with Salifu and Bakari (2022), who found that students' interest and engagement are critical predictors of mathematics achievement. Structural constraints such as large class sizes, insufficient instructional time, and limited availability of manipulatives were likewise identified as barriers that complicate instructional delivery. These constraints echo the findings of Reyno and Guzman (2025), who noted that contextual factors significantly impair classroom implementation and diminish learners' readiness for standardized assessments such as the NAT.

Table 8. Teachers' qualitative responses on challenges, training needs, and assessment areas

Question	Emerging Themes / Categories	Sample Responses	Frequency
1. What challenges do you encounter in teaching Mathematics to elementary pupils?	• Lack of mastery in basic operations • Poor comprehension and problem-solving skills • Lack of learner interest and focus • Limited time and large class size • Insufficient resources or manipulatives	"Pupils have low comprehension skills in understanding word problems." "Children have not mastered the basic mathematical operations."	25
2. What kind of seminar-workshop or training will help improve your teaching?	• Strategies in teaching and differentiated instruction • Content deepening and problem-solving approaches • Use of ICT and interactive materials • Assessment-related workshops	"Strategies on how to make it easy for children to understand problems. "Seminar on integrating ICT and creative strategies."	23
3. In your opinion, why do some pupils who have high grades still perform poorly in the NAT?	• Misalignment between classroom tests and NAT • Reliance on memorization • Test anxiety or time pressure • Poor comprehension of test questions	"Because the exam is different from their classroom tests" Pupils may be used to recall-based exams while NAT measures deeper understanding."	27
4. In what areas of assessment do you need more training?	• Test construction • Item analysis • Formative assessment • Designing valid and reliable tools	"I need more training in test construction and item analysis." Formative assessment and differentiated evaluation."	30

Correspondingly, teachers expressed strong demand for capacity-building programs focused on teaching strategies, differentiated instruction, and content deepening in problem solving. This aligns with evidence indicating that targeted professional development enhances instructional competence and contributes to improved long-term student outcomes (Schoen et al., 2024). Many respondents also emphasized the need for training in ICT integration, reflecting the shift toward digital pedagogies. This is consistent with findings by Yildirim and

Seckin-Kapucu (2021), who demonstrated that technology-enhanced learning environments promote better retention and conceptual understanding in mathematics and science.

A consistent theme regarding NAT performance was the misalignment between classroom assessments and NAT competencies. Teachers noted that school-based tests often emphasize recall and procedural tasks, whereas the NAT assesses reasoning, analysis, and application. This assessment gap is well-documented in the literature. Paredes et al. (2020) and Cuajao (2024) both reported that high classroom grades may not reliably reflect proficiency in nationally benchmarked competencies due to mismatches in assessment design and cognitive demand. Additional factors such as test anxiety and difficulty interpreting complex NAT items were also cited as contributors to performance disparities. Regarding assessment literacy, teachers identified training needs in test construction, item analysis, formative assessment, and the development of valid and reliable assessment tools. Their responses reveal limited confidence in applying technical criteria for test quality a pattern consistent with global findings indicating that many teachers require strengthened assessment competencies to ensure accurate and meaningful evaluation of learning (Wang et al., 2023). Overall, the qualitative data underscore the need for a comprehensive professional development program that integrates content mastery, innovative pedagogy, and assessment alignment to address the multifaceted instructional challenges experienced by teachers.

4. CONCLUSION

The study found that elementary mathematics teachers demonstrate a high level of preparedness in content knowledge, pedagogical strategies, NAT alignment, and assessment practices, yet report very high training needs in assessment literacy and test alignment. Although teachers expressed confidence in teaching and contextualizing mathematics lessons, notable gaps persist in identifying learner misconceptions and aligning classroom assessments with national standards. Statistical analyses showed no significant differences in preparedness across age, position, and educational attainment, suggesting that teacher competence is influenced more by continuous professional learning than by demographic characteristics. However, sex was significantly related to content and pedagogical preparedness in favor of male teachers, and years of teaching experience exhibited a moderate positive correlation with content mastery. Qualitative findings further highlighted instructional challenges, including pupils' weak foundational skills, limited instructional resources, and persistent misalignment between classroom assessments and the NAT. To address these concerns, a structured professional development program emphasizing assessment literacy, test construction, alignment with competency standards, and pedagogical innovation is recommended to enhance teachers' instructional and evaluative competence.

Conflict of Interest
The author declares no conflicts of interest.

Author Contribution Statement
Vincent Banot: Conceptualisation, methodology, data collection, visualisation, writing original draft, reviewing, and editing.

Data Availability Statement
All data generated or analyzed during this study are included in this published article.

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