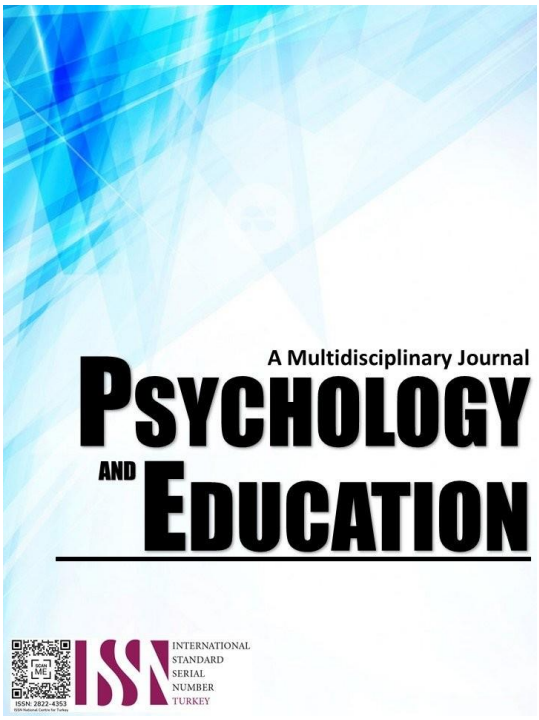
TEACHERS' COMPETENCIES ON TECHNOLOGICAL, PEDAGOGICAL, AND CONTENT KNOWLEDGE: IN RELATION TO THEIR TEACHING PERFORMANCE



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 35
Issue 6
Pages: 706-719
Document ID: 2025PEMJ3395
DOI: 10.70838/pemj.350609
Manuscript Accepted: 03-25-2025

Psych Educ, 2025, **35**(6): 706-719, Document ID:2025PEMJ3395, doi:10.70838/pemj.350609, ISSN 2822-4353

Research Article

Teachers' Competencies on Technological, Pedagogical, and Content Knowledge: In Relation to their Teaching Performance

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Abstract

The study determined the influence of teachers' technological pedagogical content knowledge on their performance among teachers at selected schools in the Nunungan District, Division of Lanao del Norte, during the School Year 2024-2025. It aimed to examine the relationship between these competencies and their influence on teaching effectiveness. Findings revealed that teachers exhibited strong competencies across all three domains. In content knowledge, educators demonstrated a robust understanding of their subject matter, maintained currency with developments in their fields, and employed diverse teaching strategies that connected content to real-life contexts. Similarly, teachers showcased effective pedagogical knowledge by adapting instructional strategies to meet student needs, fostering supportive classroom environments, and utilizing various assessment methods. However, a gap was identified in the integration of technology; while teachers incorporated technology into some lessons, there was a notable need for further development in this area. Overall performance in numeracy and literacy instruction was high, with most teachers rated as "Outstanding" or "Very Satisfactory." The results indicated effective delivery of education that met diverse student needs. Nevertheless, the study highlighted a clear necessity for ongoing professional development, particularly in enhancing technological skills. Statistical analysis showed a significant positive relationship between content knowledge and technological proficiency with teaching outcomes in numeracy and literacy. In contrast, the relationship between pedagogical knowledge and teaching performance was not statistically significant, suggesting that while important, pedagogical expertise may be secondary to content and technological knowledge. This underscores the need for targeted interventions to strengthen these competencies through professional development programs focused on technology integration.

Keywords: *teachers' competencies, performance, technological, pedagogical, content knowledge*

Introduction

Within the field of education, the ongoing investigation and improvement of teaching methods is a topic of constant examination. One of the many aspects that contribute to successful education, the teacher's technological pedagogical content knowledge (TPACK) is a vital component. Technological Pedagogical Content Knowledge or TPACK, encompasses the subtle fusion of a teacher's expertise in a certain subject matter with their awareness of efficient teaching methods for imparting that knowledge to pupils. Recently, there has been a significant focus on studying the influence of teacher Technological Pedagogical Content Knowledge (TPACK) on many aspects of student learning, namely in the areas of numeracy and literacy instruction.

Comprehending the impact of teacher Technological Pedagogical Content Knowledge (TPACK) on the teaching of numeracy and literacy has significant ramifications for educational policies, teacher training initiatives, and classroom methodologies. By clarifying the processes by which teacher knowledge is transformed into successful instruction, educators can create specific interventions to improve the quality of teaching and, as a result, raise student accomplishment. Furthermore, the knowledge obtained from research in this field can be used to shape professional development programs that enhance teachers' pedagogical skills in teaching numeracy and literacy.

Teachers' performance in numeracy and literacy are essential foundations of education, acting as foundational abilities that lay the groundwork for academic accomplishment and long-term prosperity. Within the realm of numeracy, students acquire not only mathematical knowledge but also cultivate vital cognitive abilities such as critical thinking, problem-solving, and analytical skills, which are needed for successfully navigating the intricacies of contemporary society. Further, literacy teaching extends beyond the basic skills of reading and writing; it involves the capacity to understand, analyze, and convey information proficiently in many situations.

Teachers have a crucial role in molding students' learning experiences and outcomes in the areas of numeracy and literacy education. Their expertise in the subject area, combined with teaching methods customized to address the varied requirements of learners, greatly impacts the development and mastery of numeracy and literacy abilities. Nevertheless, the degree to which teacher technological pedagogical content knowledge (TPACK) influences the caliber of teaching and, consequently, student learning outcomes continues to be a subject of significant discussion and research.

This research aimed to enhance the existing knowledge by examining the impact of teachers' Technological Pedagogical Content Knowledge (TPACK) on the teachers' performance in instruction of numeracy and literacy. Furthermore, the study sought to investigate the complex relationship between teacher knowledge, instructional methods, and student learning outcomes through a comprehensive strategy in quantitative methodologies. This research endeavored to provide practical and valuable insights for educators, policymakers,

and stakeholders committed to promoting excellence in numeracy and literacy education. It achieved this by conducting thorough analyses and interpretations of the data.

As education adapted to societal changes and technological progress, instructors played a crucial role in developing students' numeracy and literacy abilities. This research investigated the influence of teachers' technological pedagogical content knowledge on their performance in numeracy and literacy instruction. The study was conducted in the first semester of the School Year 2024-2025. The researcher was a second-year student in Master of Arts in Education at St. Peter's College (SPC).

Research Questions

This study determined the influence of teachers' technological pedagogical content knowledge towards their teaching performance in numeracy and literacy instruction at selected schools of Nunungan District, Division of Lanao del Norte. This study sought to answer the following specific questions.

1. What is the extent of teachers' competence in terms of:
    1.1. content knowledge,
    1.2. pedagogical knowledge, and
    1.3. technological knowledge?
2. What is the teaching performance of the respondents in numeracy and literacy instruction?
3. Is there a significant relationship between the respondents' extent of competence and their teaching performance in numeracy and literacy instruction?
4. Which of the extent of teachers' competence best influences teaching performance in numeracy and literacy instruction?
5. What action plan can be designed based on the findings of the study?

Methodology

Research Design

The researcher employed the descriptive-correlational research method, utilizing a quantitative approach to collect data through a survey questionnaire. This study was descriptive in nature, as it described the teachers' level of competence and their performance in numeracy and literacy instruction. Additionally, it adopted a correlational design to examine the relationships between the variables. Further, a descriptive correlational design is used in research studies that aim to provide static pictures of situations and establish the relationship between different variables (McBurney & White, 2009, as cited in Bienvenida et al., 2023).

Respondents

The respondents for this research were the teachers in Nunungan District, Division of Lanao del Norte. In Nunungan District, with its 15 schools, the total population of 188 teachers in the district. Using the Raosoft Online Application, considering a 5% margin of error, 95% confidence level, and a 50% response distribution, to determine the recommended sample size of 127 respondents.

Table 1. *Respondents of the Study*

School	*Total Teachers in Nunungan District*	*Sample Respondents*
Bangco Primary School	8	6
Carcum Elementary School	11	7
Dimayon Elementary School	12	8
Kaludan Elementary School	11	7
Katubuan Primary School	8	5
Liangan Primary School	10	7
Lupitan Primary School	8	6
Mangan Primary School	9	7
Masibay Integrated School	32	22
Nunungan Central Elementary School	16	11
Nunungan National High School	28	19
Pantar Primary School	8	5
Rarab Primary School	11	7
Rebucon Primary School	8	5
Taraka Primary School	8	5
Total	188	127

Simple random sampling was then utilized to select the respondents, ensuring that every teacher in Nunungan District, Division of Lanao del Norte, had an equal opportunity to be included in the study. Prior to data collection, informed consent was obtained from all participating students, ensuring ethical standards were upheld throughout the research process. This approach ensured statistical reliability while maintaining the feasibility of data collection. Simple random sampling is a commonly used technique in quantitative studies that utilize survey instruments, particularly in homogeneous and uniformly selected populations. This method provided all

individuals in the population with an equal opportunity to participate, with the selection process relying entirely on chance (Noor & Golzar, 2022).

Instrument

The study used an adapted questionnaire from Das and Mishra (2016) entitled "Questionnaire on Learner Use of Technology". The questionnaire was divided into two parts. The first part dealt with the level of technology awareness composed of 15 statements. The second part assessed the extent of technology utilization and was composed of 15 indicators. The Teachers' Technological Pedagogical Content Knowledge Questionnaire consisted of three constructs: content knowledge, pedagogical knowledge, and technological knowledge. The questionnaire contained ten indicators per construct and employed a 4-point Likert scale. The instrument underwent a validation process with experts in the field. Additionally, this questionnaire was pilot-tested with respondents who were not included as actual participants in the study. The instrument needed to yield a Cronbach's Alpha of at least 0.70 to be deemed reliable for use by the actual respondents of the study

Table 2. *Reliability analysis of variables*

Variables	*Number Of Indicators*	*Cronbach Alpha*	*Interpretation*
Content Knowledge	10	0.837	Good
Pedagogical Knowledge	10	0.876	Good
Technological Knowledge	10	0.853	Good

Note: 0.90 and up - Excellent | 0.80 – 0.89 - Good | 0.70 – 0.79 - Acceptable | 0.60 – 0.69 - Questionable | 0.50 – 0.59 - Poor | Less than 0.50 - Unacceptable

Procedure

With the recommendation of the panel members to conduct the study, the researcher initially requested an endorsement from the Dean of Graduate Studies of St. Peter's College to gather the needed data. After the endorsement was sought, the researcher wrote a letter of permission to the Schools Division Superintendent. After receiving approval, the researcher communicated with the principals of the participating schools by submitting a permission/consent letter to formally conduct the study for this research.

Informed consent was sent to the participants days before the actual data gathering. The consent aimed to inform the participants on the context, purpose, advantages, and disadvantages of participating in the study. Upon distributing the questionnaires, a hard copy was taken back from the participants. Only those participants who affixed their signatures on the informed consent form were given questionnaires to answer. This signified their voluntary participation in the study. The participants were given enough to answer the questionnaires.

The researcher together with the select master teachers was asked and requested to administer the instrument to the respondents to collect data. The respondents were provided ample time to answer the questionnaires, after which these were retrieved. Responses were tabulated, collated, and were readied for statistical treatment.

Data Analysis

The study employed the following statistical tools to analyze the data gathered:

Problem 1, the Mean and Standard Deviation were used to describe the extent of teachers' competence in terms of content, pedagogical, and technological knowledge.

Problem 2, Frequency and Percentage, were used to determine the respondents' teaching performance in numeracy and literacy instructions.

Problem 3, Pearson's Correlation Coefficient, was employed to examine the significant correlation between the respondents' extent of competence and their teaching performance in numeracy and literacy instructions.

Problem 4, Linear Regression analysis was utilized to determine which variable best predicted respondents' teaching performance in numeracy and literacy instructions.

Results and Discussion

This chapter presents the data gathered to answer the problems of the study. It also analyzes and interprets the data collected by the researchers to solve the issues in the study. The presentation, interpretation, and analysis were supported by tables and arranged in the same manner as the questions presented in the statement of the problem in Chapter 1.

Problem 1: What is the extent of teachers' competence in terms of content knowledge, pedagogical knowledge, and technological knowledge?

Table 3 presents the results for teachers' content knowledge. The result showed that teachers excel in connecting content knowledge to real-life contexts, with a mean score of 3.63 for the statement, "I connect content knowledge to real-life contexts, fostering students' understanding and application beyond the classroom."

This result highlighted that teachers recognize the importance of contextualizing their content knowledge to make learning more relevant and engaging for students. This is aligned with findings by Hutchison and Woodward (2013), who asserted that contextualized learning enhances student motivation and understanding. Similarly, Tezcan (2023) supported this notion, noting that contextualized knowledge helps students construct meaning and apply concepts in authentic settings, ultimately improving retention and understanding.

Table 3. *Content Knowledge*

Indicators	*Mean*	+	*SD*	*Description*
1. I should have knowledge about the key subjects in my area.	3.57	+	0.50	Strongly Agree
2. I should have knowledge on developing class activities and projects.	3.61	+	0.51	Strongly Agree
3. I should have knowledge on following recent developments and applications in my content area.	3.58	+	0.50	Strongly Agree
4. I should have knowledge on following up-to-date resources (ex, books, journals) in my content area.	3.59	+	0.53	Strongly Agree
5. I should have knowledge on conferences and activities in my content area.	3.59	+	0.49	Strongly Agree
6. I ensure my content knowledge is comprehensive and up-to-date, serving as a solid foundation for effective teaching.	3.55	+	0.50	Strongly Agree
7. I integrate diverse teaching strategies that reflect my deep understanding of content knowledge, catering to varied learning styles and needs.	3.46	+	0.54	Strongly Agree
8. I cultivate a dynamic classroom environment where content knowledge is explored through inquiry, discussion, and hands-on activities.	3.51	+	0.50	Strongly Agree
9. I connect content knowledge to real-life contexts, fostering students' understanding and application beyond the classroom.	3.63	+	0.48	Strongly Agree
10. I collaborate with colleagues and leverage resources to continuously enhance my content knowledge and instructional approaches.	3.58	+	0.50	Strongly Agree
Weighted Mean	3.57	+	0.34	Strongly Agree

Note: 3.25-4.00 - Strongly Agree | 2.50-3.24 - Agree | 1.75-2.49 - Disagree | 1.00-1.74 - Strongly Disagree

However, the lowest mean score is associated with the statement, "I integrate diverse teaching strategies that reflect my deep understanding of content knowledge, catering to varied learning styles and needs," which received a mean score of 3.46. This suggests that, while teachers have a strong grasp of their content, they may find it challenging to consistently apply various teaching strategies that cater to diverse student needs. The discrepancy between high content knowledge and lower pedagogical diversity points to a critical area for professional development. Effective teaching requires not only robust content knowledge but also the ability to adapt instructional strategies to meet the varying learning styles of students (Hudson et al., 2021).

The gap in using diverse teaching strategies is significant because it highlights the need for differentiated instruction, which is essential for meeting the needs of all learners. Research indicated that differentiated instruction, which includes using various methods such as group work, technology integration, and individualized tasks, is crucial for accommodating students' different learning styles (Mardiyah, 2023). Effective pedagogical strategies are equally important as content knowledge in improving student outcomes, as students process information differently, necessitating various teaching strategies (Suprayogi, 2023). For instance, some students may benefit from visual aids, while others may be more responsive to auditory or kinesthetic approaches (Amoakwah, 2023). Integrating these diverse strategies is central to addressing the diverse learning needs in a classroom.

While the teachers' strong content knowledge, particularly their ability to connect learning to real-life contexts, is a significant strength, the lower score related to teaching strategy integration points to a gap in pedagogical skills. This suggests that although teachers are knowledgeable in their subject areas, they may need additional support in effectively adapting their teaching practices to meet the needs of all learners. The lower score calls for professional development that focuses on enhancing pedagogical skills, particularly differentiated instruction, so that teachers can better serve their students (Tirizite, 2023). Studies have shown that teachers trained in differentiated instruction are more likely to use various strategies effectively, thereby improving student engagement and achievement (Sari et al., 2023).

In line with these findings, the literature emphasized the importance of continuous professional development in improving pedagogical competence. Smets and Struyven (2020) found that professional development programs targeting differentiated instruction positively impacted teachers' instructional practices, which, in turn, improved student learning outcomes. This view is further supported by Tezcan (2023), who emphasized ongoing training to help teachers develop the necessary skills to effectively implement varied teaching methods (Awofala & Lawani, 2020). The role of instructional leadership is also crucial in facilitating effective teaching practices. Strong instructional leadership can provide the necessary support and resources to help teachers improve their ability to implement differentiated instruction (Riyadi et al., 2023). Research by Mardiyah (2023) suggested that effective instructional leadership enhances teachers' pedagogical practices by fostering a collaborative and supportive environment where teachers can refine their teaching strategies.

The findings indicated that while teachers exhibited a strong level of competence in Content Knowledge, particularly in their ability to connect learning to real-life contexts, there is a need for professional development to enhance their ability to integrate diverse teaching

strategies. Teachers are well-equipped to contextualize content and engage students in meaningful ways, but they face challenges in employing a broad range of instructional strategies that cater to the diverse needs of learners. This gap highlights the importance of professional development programs focused on differentiated instruction, which can equip teachers with the tools they need to meet the diverse learning styles in their classrooms (Tirizite, 2023). The integration of instructional leadership to support these initiatives will also be essential in fostering an environment where teachers can continuously improve their pedagogical practices. By addressing this gap, educational institutions can create a more inclusive and effective learning environment, ultimately improving teaching quality and student outcomes in literacy and numeracy instruction.

Table 4 presents the teachers' pedagogical knowledge. The result revealed significant insights into their practices and their impact on student learning. The highest mean score of 3.53 for the statement, "I foster a supportive classroom environment where students feel empowered to take ownership of their learning, guided by my pedagogical expertise," indicates that teachers prioritize creating a nurturing atmosphere that encourages student autonomy.

Table 4. *Pedagogical Knowledge*

Indicators	*Mean*	+	*SD*	*Description*
1. I adapt my pedagogical knowledge to meet the diverse needs and backgrounds of my students, ensuring inclusive and equitable learning experiences.	3.50	+	0.54	Strongly Agree
2. I employ evidence-based teaching strategies informed by my pedagogical knowledge, promoting active engagement and deep understanding among learners.	3.33	+	0.47	Strongly Agree
3. I prioritize ongoing reflection and refinement of my pedagogical knowledge, continuously seeking to improve my instructional effectiveness.	3.40	+	0.53	Strongly Agree
4. I foster a supportive classroom environment where students feel empowered to take ownership of their learning, guided by my pedagogical expertise.	3.53	+	0.54	Strongly Agree
5. I collaborate with colleagues to share insights and best practices, enriching my pedagogical knowledge through collective expertise and feedback.	3.51	+	0.50	Strongly Agree
6. I know how to assess student performance in a classroom.	3.35	+	0.52	Strongly Agree
7. I can adapt my teaching style to different learners.	3.35	+	0.48	Strongly Agree
8. I can assess student learning in multiple ways	3.26	+	0.44	Strongly Agree
9. I can use a wide range of teaching approaches in a classroom setting.	3.30	+	0.46	Strongly Agree
10. I know how to organize and maintain classroom management.	3.27	+	0.47	Strongly Agree
Weighted Mean	3.38	+	0.28	Strongly Agree

Note: 3.25-4.00 - Strongly Agree | 2.50-3.24 - Agree | 1.75-2.49 - Disagree | 1.00-1.74 - Strongly Disagree

This is a crucial aspect of effective pedagogy, as it aligns with the principles of self-determination theory, which posits that when students feel supported and empowered, their intrinsic motivation increases, leading to greater engagement and persistence in learning tasks (Smets & Struyven, 2020). Deci and Ryan (2000) emphasized that an empowering classroom environment fosters a sense of ownership among students, which can significantly enhance their academic outcomes (Tezcan, 2023).

Further, Vygotsky's theory of social constructivism supports the notion that students learn best in environments where they feel valued and capable of contributing to the learning process. This is echoed by Riyadi et al., (2023), highlighting that a positive, supportive classroom climate is among the most influential factors in student achievement. The high mean score reflects teachers' strong commitment to fostering an environment where students actively participate in their learning, which is essential for promoting deeper learning and motivation. This commitment is vital, as it enhances student engagement and contributes to a more meaningful educational experience (Mardiyah, 2023).

On the other hand, the lowest mean score of 3.26 for the statement, "I can assess student learning in multiple ways," suggests that while teachers generally exhibit confidence in their pedagogical knowledge, they may feel less equipped to utilize a diverse range of assessment methods to evaluate student progress. Effective assessment is crucial for understanding students' learning needs and adapting teaching strategies accordingly. The low mean score indicates that teachers might rely on limited assessment forms, potentially missing opportunities to evaluate students' learning from multiple perspectives. Suprayogi in 2023 emphasized that formative assessments, which include a variety of methods such as quizzes, peer assessments, and observations, provide teachers with ongoing feedback that is critical for improving instructional practices.

Amoakwah (2023) also stressed the importance of differentiating assessments to ensure all learners are evaluated to match their strengths and learning styles. This finding suggests a need for professional development in diversified assessment strategies to ensure that teachers can accurately gauge and respond to the diverse learning needs of their students. By enhancing their assessment practices, teachers can adapt instruction more effectively and support students' academic growth. This is particularly important in today's diverse classrooms, where students come with varying backgrounds, learning styles, and needs (Tirizite, 2023).

The results indicated that teachers are highly effective in fostering a supportive and empowering classroom environment, linked to positive student outcomes as supported by motivation theories and constructivist learning principles. However, the lower mean for using multiple assessment methods suggests an area for improvement in teachers' pedagogical practices, particularly in terms of diversifying assessment strategies. Addressing this gap through professional development focused on assessment for learning could enhance teachers' ability to monitor and support student progress more effectively. By investing in teachers' assessment capabilities,

educational institutions can ensure that all students receive the support they need to succeed academically (Sari et al., 2023).

Table 5. *Technological Knowledge*

Indicators	*Mean*	+	*SD*	*Description*
1. I know how to solve my own technical problems.	3.10	+	0.59	Agree
2. I can learn technology easily.	3.14	+	0.55	Agree
3. I keep up with important new technologies.	3.19	+	0.56	Agree
4. I know about a lot of different technologies.	3.05	+	0.67	Agree
5. I have the technical skills I need to use technology.	3.07	+	0.65	Agree
6. I stay abreast of emerging educational technologies, continuously expanding my technological knowledge to enhance teaching and learning experiences.	3.18	+	0.48	Agree
7. I integrate technology seamlessly into my instructional practices, leveraging digital tools to facilitate interactive and engaging lessons.	3.46	+	0.52	Strongly Agree
8. I critically evaluate the effectiveness of technological resources, ensuring they align with learning objectives and promote meaningful student outcomes.	3.43	+	0.50	Strongly Agree
9. I provide ongoing support and guidance to students in developing their technological skills, empowering them to navigate digital platforms confidently and responsibly.	3.26	+	0.46	Strongly Agree
10. I collaborate with colleagues and educational technology specialists to share best practices and stay informed about new trends and innovations in the field of technology-enhanced learning.	3.36	+	0.52	Strongly Agree
Weighted Mean	3.22	+	0.37	Agree

Note: 3.25-4.00 - Strongly Agree | 2.50-3.24 - Agree | 1.75-2.49 - Disagree | 1.00-1.74 - Strongly Disagree

Table 5 presents the teachers' technological knowledge. The result showed that the highest mean score of 3.46 for the statement, "I integrate technology seamlessly into my instructional practices, leveraging digital tools to facilitate interactive and engaging lessons," reflects teachers' confidence in incorporating technology into their teaching. This aligns with the research of Smets and Struyven (2020), which indicated that effective integration of technology can significantly enhance student engagement and learning outcomes. The ability to use digital tools in lessons not only fosters interactivity but also accommodates diverse learning styles, which is essential in today's educational landscape (Tezcan, 2023).

Moreover, Riyadi et al., 2023 emphasized that integrating technology can provide varied learning experiences that cater to different student needs, thereby enriching the classroom environment. This growing trend of adopting digital tools to promote active learning indicates a shift towards more innovative teaching practices. Teachers' confidence in their technological integration reflects an understanding of the importance of technology in facilitating a more engaging and effective learning experience for students (Mardiyah, 2023).

However, the lowest mean score of 3.05 for the statement, "I know about a lot of different technologies," suggests that while teachers feel competent in using technology, they may not possess comprehensive knowledge of the wide array of available digital tools. This gap indicates that teachers might be limited to familiar technologies, which could fully hinder their ability to fully leverage technology for educational purposes. Suprayogi, in 2023, supported this notion, highlighting that many teachers often utilize only a narrow range of technologies and may not be up-to-date with newer tools.

This limitation could stem from various factors, including insufficient professional development opportunities, time constraints, and the rapid pace of technological advancements (Amoakwah, 2023). The implications of this finding are significant. Teachers unfamiliar with a diverse range of technologies may struggle to select the most appropriate tools for specific learning objectives. Without exposure to various technologies, they might miss opportunities to enhance their teaching with innovative tools to better engage students and support varied learning needs (Tirizite, 2023). Koehler and Mishra (2009) emphasized the importance of teachers developing

Technological Pedagogical Content Knowledge (TPACK), which combines their understanding of technology, pedagogy, and content knowledge to create effective learning, experiences (Sari et al., 2023). This highlights the necessity for ongoing professional development that not only introduces teachers to different technologies but also educates them on how to integrate these tools effectively into their teaching practices (Papanthymou & Darra, 2022).

While teachers demonstrate confidence in integrating technology into their instructional practices, the lower mean score for knowledge of various technologies indicates a critical area for improvement. To address this gap, educational institutions should prioritize providing targeted training and development opportunities that expose teachers to a broader range of technologies. By enhancing their technological knowledge, teachers can evolve their teaching practices and improve their students' learning experiences. This approach will not only empower teachers but also contribute to a more dynamic and effective educational environment that meets the diverse needs of learners in the 21st century (Awofala & Lawani, 2020).

Problem 2: What is the teaching performance of the respondents in numeracy and literacy instruction?

Table 6 displays the respondents' teaching performance in numeracy and literacy instruction. The result presented a commendable level of competence among the respondents, with a significant majority (91.1%) falling within the Outstanding (44.6%) and Very Satisfactory (46.5%) categories. This high level of performance suggests that teachers are effectively equipped to deliver quality

education in these foundational areas. The highest percentage of respondents, categorized as Very Satisfactory, with 47 teachers (46.5%) scoring in the 5.41 – 6.20 range, indicates that these educators demonstrate strong proficiency in their teaching methods. However, this also suggests that there may be opportunities for further improvement to elevate their performance to the Outstanding level. Research indicates that teachers who perform at very satisfactory levels typically exhibit competence in key teaching strategies and subject knowledge, although they may not always employ the most advanced pedagogical techniques (Smets & Struyven, 2020).

Table 6. *Teaching Performance in Numeracy and Literacy Instruction*

Range	*Frequency*	*Percentage (%)*	*Descriptor*
6.21 – 7.00	45	44.6	Outstanding
5.41 – 6.20	47	46.5	Very Satisfactory
4.61 - 5.40	9	8.9	Satisfactory
3.81 – 4.60	0	0	Unsatisfactory
3.00 – 3.80	0	0	Poor
Total	101	100.0	

In contrast, the Outstanding category, which includes 45 respondents (44.6%), reflects a nearly equal number of teachers performing at a high level of expertise in numeracy and literacy instruction. These teachers are likely utilizing best practices, including differentiated instruction, evidence-based strategies, and effective classroom management techniques. The high level of performance among these educators aligns with literature that emphasizes the significance of deep content knowledge and the application of innovative, student-centered teaching practices in achieving excellent educational outcomes (Tezcan, 2023). For instance, a study conducted in the Philippines by Maloloy-On and Arnado (2023) highlighted the importance of aligning teaching practices with the Philippine Professional Standards for Teachers (PPST), which emphasizes the need for teachers to engage in continuous professional development to enhance their pedagogical skills (Riyadi et al., 2023).

The distribution of respondents across these performance categories implies that while most teachers are competent in their numeracy and literacy instruction, areas remain for growth, particularly for those in the Very Satisfactory range. These teachers could benefit from targeted professional development opportunities to elevate their teaching practices to an Outstanding level. Continuous professional learning, mentorship, and exposure to innovative teaching methods are crucial for helping these educators refine their skills and adapt to the evolving educational landscape (Mardiyah, 2023). A study by Manigbas (2024) emphasized the need for intensive guidance and professional development programs to enhance teachers' pedagogical competencies, particularly in content knowledge and instructional strategies (Suprayogi, 2023).

Moreover, the findings suggest that while teachers demonstrate a high level of competence, there is a need for ongoing support to ensure that they can effectively implement best practices in their classrooms. Research indicates that sustained professional development is key to improving instructional effectiveness and ultimately enhancing student outcomes (Amoakwah, 2023). For example, a study by Roallos (2022) highlighted the importance of utilizing pedagogical approaches as mandated by the PPST to achieve teaching standards, thereby improving the quality of education in the Philippines (Tirizite, 2023).

The performance data indicates that most teachers demonstrated high competence in numeracy and literacy instruction. The strong presence of educators in both the Outstanding and Very Satisfactory categories suggests that these teachers are well-equipped with the necessary skills to deliver effective instruction. However, to further elevate their teaching practices and improve student outcomes in numeracy and literacy development, it is essential to provide ongoing professional support and opportunities for skill enhancement. By investing in teachers' professional growth, educational institutions can ensure that all students receive the high-quality instruction they need to succeed academically.

Problem 3: Is there a significant relationship between the respondents' extent of competence of teachers and their teaching performance in numeracy and literacy instruction?

Table 7. *Relationship1 Respondents' Teaching Performance and the Extent of Competence*

Variables	*Teaching Performance*		*Remarks*	*Decision*
	r-value	*p-value*		
Content Knowledge	0.414	<0.001	Significant	Reject Ho
Pedagogical Knowledge	.0110	0.273	Not Significant	Failed to reject Ho
Technological Knowledge	0.297	0.003	Significant	Reject Ho

*Note: 1 – Based on Pearson's r Correlation | ns – P > 0.05 | * - P < 0.05 | ** - P < 0.01 | *** - P < 0.001*

Table 7 displays the relationship between the respondents' level of competence of teachers and their performance in numeracy and literacy instruction. The result showed that the respondents' performance had a significant relationship with the level of competence in terms of content and technological knowledge. Thus, the null hypothesis, which states no significant relationship between respondents' performance and the level of competence, was not rejected in terms of content and technological knowledge.

The significant role of Content Knowledge in improving student performance aligns with Cognitive Load Theory (Sweller, 1988), which posited that teachers with strong subject matter knowledge can present information in ways that minimize cognitive overload, aiding better student comprehension and retention (Smets & Struyven, 2020). Research consistently shows that teachers with robust content knowledge are better equipped to adapt their teaching strategies to meet students' needs, leading to improved academic performance (Tezcan, 2023; Francisco & Caingcoy (2022) found that teachers' content expertise significantly influenced learners' performance in national assessments.

Similarly, the relationship between Technological Knowledge and performance underscores the importance of technology in modern teaching practices. Teachers proficient in technology can create more engaging and interactive lessons that enhance student learning, particularly in numeracy and literacy. The TPACK framework (Mishra & Koehler, 2006) emphasized that effective technology integration requires a balanced understanding of technology, pedagogy, and content (Mardiyah, 2023). Research has shown that technology can enhance student motivation and understanding, particularly in subjects like mathematics and language arts, which benefit from diverse teaching strategies (Suprayogi, 2023). A study by Mercado (2023) found that teachers' technological competencies positively impacted their effectiveness in teaching mathematics, highlighting the importance of technology for improving learning outcomes.

Conversely, the lack of a significant relationship between Pedagogical Knowledge and performance suggests that pedagogical strategies, while essential, may not be sufficient to influence student outcomes in numeracy and literacy. Effective teaching requires strong content knowledge and the appropriate use of technology. Shulman's (1986) Pedagogical Content Knowledge (PCK) framework supports this, emphasizing that effective teaching combines content expertise and pedagogical strategies tailored to students' needs (Tirizite, 2023). This implies that while pedagogical knowledge is critical, its effectiveness is enhanced when supported by content knowledge and technology.

The non-significant relationship between Pedagogical Knowledge and student performance emphasizes the need for a combination of pedagogical, content, and technological knowledge to drive student success. This finding suggests that while pedagogical knowledge is crucial, its full potential is realized only when it is supported by strong content knowledge and effective technology integration. Shulman's (1986) PCK framework further suggests that integrating content expertise with tailored teaching strategies is essential for student achievement (Gorbunova, 2023).

The implications of these findings for teacher education are significant. Educators must prioritize developing both Content Knowledge and Technological Knowledge alongside pedagogical strategies to improve overall teaching effectiveness and student learning outcomes. Continuous professional development programs should focus on enhancing teachers' subject matter expertise and their ability to integrate technology into teaching practices. This approach aligns with the growing recognition of the need for teachers to be adaptable and innovative in an increasingly digital learning environment (Wang et al., 2022).

These highlight the critical roles of Content and Technological Knowledge in improving student performance in numeracy and literacy instruction. The rejection of the null hypothesis for these areas underscores teachers' need to actively cultivate these competencies. On the contrary, the lack of a significant relationship with Pedagogical Knowledge suggests that while it is important, pedagogical knowledge must be complemented by strong content mastery and effective technology use to influence student outcomes meaningfully. As educational landscapes continue to evolve, prioritizing comprehensive teacher competencies will be essential for fostering improved educational experiences and achievements for students.

Problem 4: Which of the extent of teachers' competence best influences teaching performance in numeracy and literacy instruction?

Table 8. *Variables that best predict Respondents' Teaching Performance*

Indicator	*Unstandardized Coefficients*		*Standardized Coefficients*		
	B	*Std. Error*	*Beta*	*t*	*Sig.*
(Constant)	3.736	.634		5.893	<.001
Content Knowledge	.663	.156	.385	4.259	.001
Pedagogical Knowledge	-.377	.113	-.301	-3.346	.001
Technological Knowledge	.417	.145	.266	2.865	.005
R = 0.535	R2 =0.286		F = 12.966	Sig. = <0.001	

Table 8 presents the variables that best predict respondents' performance. The respondents' performance was affected by the content knowledge with β=0.385, t=4.259, and p=0.001; pedagogical knowledge, β=-0. 301, t=-3.346, and p=0.001; and technological knowledge with β=0. 266, t=2.865, and p=0.005. This implied that the level of competence affects the respondents' performance.

The R2 value of 0.286 implies that 28.6% of the variance in the performance can be explained by the level of competence by the respondent. Hence, 71.4% of the respondents' performance difference can be attributed to other variables not included in the regression model.

The regression analysis is significant, with an F-value of 12.966 with a corresponding p-value of <0.001. Therefore, the null hypothesis stating that "there is no variable singly or in combination that best influence respondents' performance" was rejected.

The analysis of the relationship between teachers' competencies and their performance in numeracy and literacy instruction reveals that Content Knowledge is the most significant predictor of student performance, as indicated. The unstandardized coefficient for Content Knowledge is 0.663, with a standardized beta of 0.385, a t-value of 4.259, and a significance level of p=0.001. This suggests that for every unit increase in Content Knowledge, there is a corresponding increase in student performance, highlighting the critical role that subject mastery plays in effective teaching (Hidayat, 2023).

This finding is consistent with existing literature that emphasizes the importance of teachers' deep understanding of the content they teach. For instance, Hidayat (2023) discussed how teachers' professional competence, particularly in content knowledge, directly influences student engagement and learning outcomes (Lolo & Sudira, 2019).

In contrast, the analysis shows a negative impact of Pedagogical Knowledge on performance, with a beta coefficient of -0.301 and a significance level of p=0.001. This suggests that higher levels of Pedagogical Knowledge, when isolated from other competencies, may not contribute positively to student performance in numeracy and literacy. This finding raises questions about the effectiveness of pedagogical strategies when they are not supported by strong content knowledge or appropriate technological integration. The literature indicated that while pedagogical knowledge is essential, it must be complemented by content mastery to be effective (Rizal et al., 2019). For example, Shulman's (1986) Pedagogical Content Knowledge (PCK) framework posited that effective teaching requires a blend of content expertise and pedagogical strategies tailored to students' needs (Hidayatullah & Qomariyah, 2022).

Technological Knowledge also plays a significant role in predicting performance, with a beta coefficient of 0.266 and a significance level of p=0.005. This finding aligns with the TPACK framework, which emphasizes the integration of technology, pedagogy, and content knowledge as essential for effective teaching (Hartono, 2017). Teachers who are proficient in using technology can create engaging and interactive learning experiences that enhance student motivation and understanding, particularly in subjects like mathematics and language arts (Tarlina, 2023). The ability to leverage technology effectively in the classroom is increasingly recognized as a vital component of teacher competence, especially in the context of modern educational demands (Ramli, 2015).

The overall regression model explains 28.6% of the variance in student performance, indicating that while teachers' competencies are significant predictors, a substantial portion (71.4%) of the variance is attributed to other factors not included in the model. This suggests that additional variables, such as classroom environment, student motivation, and socio-economic factors, may also play critical roles in influencing student outcomes (Muazza, 2021). The significance of the regression analysis, with an F-value of 12.966 and a p-value of <0.001, allows for the rejection of the null hypothesis, affirming that there are indeed variables that influence respondents' performance in numeracy and literacy instruction (Goh et al., 2017).

The implications of these findings are profound for teacher training and professional development programs. Educators must prioritize the development of Content Knowledge and Technological Knowledge alongside pedagogical strategies to enhance overall teaching effectiveness and student learning outcomes. Continuous professional development initiatives should focus on equipping teachers with the necessary skills to integrate technology into their teaching practices effectively, as well as deepening their understanding of the subjects they teach (Tösten, 2020). This approach aligns with the growing recognition of the need for teachers to be adaptable and innovative in their instructional methods, particularly in an increasingly digital learning environment (Achyar et al., 2019).

This analysis indicates that Content Knowledge is the most influential factor in predicting performance in numeracy and literacy instruction, followed by Technological Knowledge. The negative impact of Pedagogical Knowledge suggests that pedagogical strategies alone may not enhance student performance without the support of strong content mastery and effective technology integration. Therefore, it is essential for educators to focus on developing these competencies to improve educational experiences and outcomes for students.

Problem 5: What action plan can be designed based on the findings of the study?

Based on the findings of the study, an action plan has been developed to address gaps in teacher competence, particularly in the integration of technology into teaching practices. The action plan proposes several strategies for professional development, including targeted training in technology use, differentiated instruction, and classroom management techniques. It emphasizes the importance of fostering collaborative learning environments, providing peer support, and implementing ongoing monitoring and evaluation to ensure continuous improvement in teaching effectiveness. These efforts aim to enhance student performance in literacy and numeracy by improving teaching practices.

Rationale:

This action plan addresses the identified gaps in teacher competence, particularly in the integration of technology, differentiated instruction, and classroom management. Targeted professional development is crucial for enhancing teachers' skills and improving their ability to deliver effective instruction. By focusing on collaborative learning, peer support, and continuous evaluation, this plan ensures that teachers consistently improve their practices, which will, in turn, enhance student performance in numeracy and literacy.

Objectives:

From the study's findings, this enhancement plan focuses more on the extreme results of the study.

Enhance Teacher Content Knowledge: Enhance teachers' understanding of subject-specific content and methodologies to increase their effectiveness in teaching numeracy and literacy.

Improve Pedagogical Knowledge: Equip teachers with strategies to adapt their teaching methods to diverse student needs, emphasizing differentiated instruction, classroom management, and active learning techniques.

Develop Technological Competence: Improve teachers' ability to integrate technology into the classroom, supporting numeracy and literacy instruction with digital tools and platforms.

Foster Holistic Teacher Competency: Encourage continuous professional development by integrating content, pedagogy, and technology to refine teaching practices over time.

Improve Student Performance in Numeracy and Literacy: Focus on improving student outcomes through data-driven instruction, project-based learning, and increasing parental involvement to support literacy and numeracy development.

Conclusions

The findings of this study emphasized the integral role that teacher competence in content knowledge, pedagogical knowledge, and technological knowledge plays in shaping effective teaching and improving student outcomes in numeracy and literacy instruction. Teachers demonstrated a high level of content knowledge, showcasing their ability to stay current with developments in their subject areas, integrate diverse teaching strategies, and connect lessons to real-world contexts. Similarly, their pedagogical skills were generally strong, with a focus on adapting teaching methods to meet students' diverse needs, fostering a supportive classroom environment, and employing various assessment techniques.

However, while content and pedagogical knowledge were largely robust, the study also highlighted an area of concern—teachers' technological knowledge. Although teachers integrated technology into their lessons to some extent, there was a clear gap in their proficiency and confidence in fully leveraging digital tools to enhance teaching and learning. This gap, while not diminishing the effectiveness of their teaching, points to an opportunity for further development in this area. The study found that technological knowledge was a key factor influencing teaching outcomes, demonstrating the need for targeted professional development in this domain.

In terms of teaching performance in numeracy and literacy, the results were largely positive, with most teachers demonstrating "Outstanding" or "Very Satisfactory" performance. However, there remains a need for ongoing development to further bridge any gaps, particularly in the integration of technology to support student engagement and improve learning outcomes. The results also showed a significant relationship between content knowledge and technological knowledge with teaching performance, underlining the importance of these competencies in promoting student success.

The study also revealed that the combined influence of content knowledge and technological competence was a stronger predictor of teacher effectiveness compared to pedagogical knowledge alone. While pedagogical expertise remains essential, its impact on student outcomes in numeracy and literacy was found to be less significant than that of content and technology. These findings suggest that professional development efforts should prioritize enhancing teachers' technological skills alongside content mastery to better support their teaching practice.

This study underscores the critical need for comprehensive teacher development programs that address all three areas of competence—content, pedagogy, and technology. Schools and educational systems should focus on equipping teachers with the necessary tools to continually evolve in an increasingly digital and knowledge-driven education landscape. The emphasis should be on providing teachers with regular opportunities for training, collaboration, and access to updated resources, ensuring that they are well-prepared to meet the diverse needs of their students and improve learning outcomes in numeracy and literacy.

The findings of this study present a clear call to action for educational leaders and policymakers to invest in targeted professional development, support technology integration in teaching, and foster environments of collaboration and continuous improvement. Only through such efforts can teachers truly thrive in their roles and deliver high-quality education that prepares students for the challenges of the 21st century.

Based on the findings and objectives of the study, the following recommendations are made to strengthen the implementation of the action plan:

Ongoing Monitoring and Evaluation: While the action plan includes quarterly evaluations, it is important to ensure that these assessments are not just for compliance but are actionable and result in meaningful adjustments. Monitoring should involve regular feedback loops where teachers can express concerns about the effectiveness of workshops, resources, or technological tools. Instead of only assessing the completion of tasks, the evaluations should also measure real-time improvements in teaching and student outcomes.

A dedicated team of coordinators could ensure these evaluations are integrated into teachers' day-to-day activities and used to adjust the approach when necessary.

Broader Access to Technology and Training: Given that not all teachers are comfortable or proficient with new technologies, a more gradual approach to integrating technology should be adopted. It is recommended that schools provide hands-on, personalized technology training sessions at various levels—from beginner to advanced—for teachers who are less tech-savvy. Real-world use cases should be demonstrated so teachers can relate the tools directly to their daily teaching tasks. Additionally, ongoing support through tech support teams or dedicated "tech mentors" can ensure that teachers are not left struggling with unfamiliar tools. Schools can also partner with local tech companies or education NGOs to provide resources or affordable solutions tailored to the needs of the community.

Strengthening the Mentorship Program: Mentorship programs should be carefully designed to pair teachers based on specific needs. For example, novice teachers struggling with classroom management might benefit from being paired with experienced teachers who have demonstrated strong classroom control, while others might need mentorship on subject-specific teaching strategies. Flexibility in the mentorship structure is key: sometimes, the traditional one-on-one pairing might not be feasible, so a more peer-based group model could be adopted. Ensuring that mentors are adequately trained for their role is also essential—ongoing professional development for mentors should be a priority, equipping them with the right skills to guide and support their peers effectively.

Improving Parental Engagement: Parental involvement has been identified as an area that needs strengthening. Schools can improve this by organizing regular, accessible workshops for parents, not just focused on supporting numeracy and literacy at home, but also on the psychosocial aspects of learning. Workshops on how to create a learning-friendly home environment, provide emotional support for their children, and manage homework routines can help empower parents. Schools should ensure that communication channels are open, such as through online platforms, apps, or regular school newsletters, to keep parents informed of their child's academic progress and school activities. Additionally, community-based events can be organized to bridge the gap between schools and parents, especially in areas where there is a lack of direct access to schools.

Better Resource Allocation: Access to updated content resources like textbooks, journals, and digital platforms should be prioritized. However, many schools—particularly in rural or underfunded areas—may face logistical or financial constraints. A more realistic solution would be to adopt open-source educational resources and digital libraries that are freely available online. Schools can leverage partnerships with government education departments or NGOs to provide low-cost or free access to such resources. Additionally, local schools should consider collaborative buying of resources in bulk to reduce costs and make resources more accessible to all teachers.

Professional Development that Adapts to Teachers' Needs: Teachers often face a variety of challenges—whether it's managing large classrooms, dealing with diverse student needs, or integrating new technologies. To make the professional development (PD) more relevant, it should be tailored to individual teacher needs. This can be achieved by conducting regular needs assessments (such as surveys or informal feedback sessions) to understand which areas of teaching they find most challenging. Based on the feedback, PD can then be customized. For example, one group of teachers might need support in effective lesson planning, while others may need guidance on using data to drive instruction. Flexible PD programs, such as online learning modules, in-school coaching, and peer observations, should be available to meet the diverse needs of the teaching staff.

Fostering a Collaborative Culture: To sustain the improvements over time, schools should prioritize creating a collaborative culture where teachers feel comfortable sharing ideas, challenges, and strategies. This can be achieved through structured time for collaboration, whether through team teaching or regular planning sessions. The action plan includes monthly Teacher Learning Communities (TLCs), but these could be strengthened by introducing cross-school collaborations—for example, district-wide teacher meetings where teachers from different schools meet to share best practices. The school leadership should encourage and provide incentives for teachers to participate in these communities.

Data-Driven Decision Making: A critical recommendation is to incorporate a systematic use of data in evaluating student performance and adapting teaching strategies. Teachers should be trained to use both qualitative and quantitative data (e.g., formative assessments, student surveys, observational data) to inform their instruction. However, a major barrier is often a lack of proper data management tools. Schools should invest in easy-to-use data management systems to track student progress, which would allow teachers to quickly assess which students need additional support. To ensure that data is being used effectively, regular data review sessions should be held, where teachers analyze trends and adjust their teaching strategies accordingly.

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