Teachers' Technological Pedagogical Content Knowledge (TPACK) and Readiness for Implementing the MATATAG Curriculum: Context for Developing TPACK-Based Intervention Framework

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ABSTRACT

The evolving educational landscape demands that teachers possess the knowledge and skills to effectively integrate technology into their teaching practices. This descriptive-correlational study investigated the Technological Pedagogical Content Knowledge (TPACK) and readiness of thirty - one (31) Grade Seven Mathematics teachers in the Surallah Secondary Clustered Schools to implement the technology-driven MATATAG curriculum. The study utilized standardized TPACK assessments and readiness surveys to gather comprehensive data. Findings revealed that teachers demonstrated proficiency in technological and pedagogical knowledge, with moderate-advanced content knowledge. However, gaps were identified in areas such as technical troubleshooting, diverse technology integration, interdisciplinary connections, and advanced pedagogical strategies. Furthermore, teachers reported moderate readiness for implementing the MATATAG curriculum, indicating a need for further support in digital pedagogy, content knowledge enhancement, and pedagogical strategies. A strong positive correlation was found between TPACK and readiness, suggesting that teachers with strong Technological Pedagogical Content Knowledge (TPACK) in Mathematics are more likely to be ready to implement the new MATATAG Curriculum. It is recommended that a TPACK-Based In-Service Training framework shall be used to address the identified gaps and enhance teachers' capacity to effectively integrate technology in the MATATAG curriculum.

Keywords: Technological Pedagogical Content Knowledge (TPACK), MATATAG Curriculum, technology integration, teacher readiness, professional development, mixed-methods

INTRODUCTION

The increasing integration of technology in education has spurred a paradigm shift in pedagogical approaches, necessitating a deeper understanding of how teachers can effectively leverage technology to enhance learning. The Technological Pedagogical Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006), has emerged as a critical lens through which to examine the complex interplay of technology, pedagogy, and content knowledge in teaching. This framework posits that effective technology integration requires teachers to possess not only technological proficiency but also the ability to seamlessly weave technology into their pedagogical practices and subject matter expertise.

Globally, the discourse surrounding TPACK has gained significant traction, with researchers exploring its various dimensions and implications for teacher education and professional development. A growing body of literature highlights the challenges faced by teachers in developing and enacting TPACK, including limited access to technology, inadequate training opportunities, and the constantly evolving nature of digital tools (Bingimlas, 2009; Koehler et al., 2013). Furthermore, cross-cultural studies have revealed the influence of cultural contexts on TPACK development and implementation, underscoring the need for culturally responsive approaches to technology integration (Angeli & Valanides, 2009). In the Philippines, the

Department of Education (DepEd) has acknowledged the imperative of integrating technology in education, launching initiatives such as the Digital RISE Program to equip teachers and students with digital literacy skills. However, systemic challenges persist, including disparities in access to technology and the need for sustained professional development to enhance teachers' TPACK (DepEd, 2022). Moreover, research has pointed to the need for greater alignment between technology integration efforts and curriculum goals, particularly in light of the recent implementation of the MATATAG Curriculum (Valdez & Ang, 2021).

Within the SOCCSKSARGEN region, the Schools Division of South Cotabato has been actively promoting the use of technology in education. However, local assessments and observations have revealed nuanced challenges related to bandwidth limitations affecting online learning platforms, the inadequate availability of specific devices for specialized subject areas, and discrepancies in teachers' digital literacy skills across different schools. Furthermore, a preliminary survey conducted by the researcher in Surallah Secondary Clustered Schools indicated that teachers perceive a need for more targeted support in developing their TPACK, particularly in relation to the pedagogical approaches and content specificities of the MATATAG Curriculum. Despite the burgeoning research on TPACK, there remains a dearth of empirical evidence examining the specific TPACK needs of Filipino teachers in the context of the newly implemented MATATAG Curriculum. This study aims to address this gap by investigating the contextual factors that influence the development and enactment of TPACK among Filipino mathematics teachers in Surallah Secondary Clustered Schools, conducting a comprehensive needs assessment to identify the specific TPACK strengths and weaknesses of these teachers in relation to the demands of the MATATAG Curriculum, and developing and evaluating a TPACK-based intervention framework designed to enhance teachers' TPACK and support the effective integration of technology in the MATATAG Curriculum.

The urgency of this study stems from the critical role of teachers in the successful implementation of the MATATAG Curriculum, which places a strong emphasis on technology integration and student-centered learning. By addressing the identified research gaps, this study aims to analyze the level of teachers' TPACK in Mathematics concerning the MATATAG Curriculum, specifically examining their technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK); evaluate teachers' perceived readiness to implement the MATATAG Curriculum, assessing their technological capability, content capability, and pedagogical capability; examine the relationship between teachers' TPACK and their perceived readiness to implement the MATATAG Curriculum, exploring the predictive power of TPACK in curriculum implementation; and develop and validate a TPACK-based intervention framework designed to enhance teachers' TPACK and facilitate the effective integration of technology in the MATATAG Curriculum. This study seeks to contribute to the growing body of knowledge on TPACK and provide empirical evidence to inform teacher professional development initiatives aimed at supporting the successful implementation of technology-integrated curricula.

METHODOLOGY

Research Design

This study employed quantitative research employing descriptive- correlational type. As Fraenkel, J. R., & Wallen, N. E. (2015) affirm, "Descriptive-correlational research is a type of research that describes and measures the relationship between two or more variables without manipulating them." (p. 289)

The study specifically looked into the connection between teachers' preparedness to use the MATATAG Curriculum and their Technological, Pedagogical, and Content Knowledge (TPACK). MATATAG curriculum, a reform initiative in the Philippines, aims to improve educational outcomes, especially in literacy and numeracy.

Research Locale

The study was conducted within the Surallah Secondary Clustered Schools in South Cotabato, Philippines. This cluster comprises seven public secondary schools, all of which had participated in a municipal-wide rollout of the MATATAG Curriculum at Libertad National Advanced School, the largest school in the

division. This shared experience with the MATATAG Curriculum provides a homogenous group, minimizing the impact of differing curricular backgrounds on research findings, a crucial factor in enhancing internal validity. Furthermore, the cluster exhibited a diversity of schools within the municipality, encompassing varying sizes, resources, and student demographics. This diversity strengthens the study's external validity by increasing the generalizability of findings beyond the specific context of Surallah Secondary Clustered Schools. The researcher, a teacher at Libertad National Advanced School, has chosen this cluster due to this unique combination of factors and the availability of the Cluster Head, chaired by the School Principal IV of Libertad National Advanced School, which facilitates logistical support and ensures smooth research implementation.

Research Participants

The study focused on 31 Grade 7 Mathematics teachers from the Surallah Secondary Clustered Schools. These teachers were selected because they are the initial implementers of the MATATAG Curriculum and have undergone specialized training on its principles and methodologies. As the first educators to introduce this innovative curriculum to their students, Grade 7 teachers have a unique perspective on its effectiveness and challenges. Their direct involvement in teaching the MATATAG Curriculum makes them key stakeholders and valuable participants in this research.

Research Instrument

The study utilized the following adapted instruments:

A. TPACK Assessment Tool: The survey instrument, based on the TPACK framework, included 18 items designed to measure teachers should know and be able to do related to the TPACK domains (Archambault & Crippen, 2009). In particular, it adopted the Schmidt et al. (2009) self-report instrument. The initial survey consisted of 45 items and covered four subject areas (mathematics, science, social studies, and literacy) on a seven-dimensional TPACK scale. This study utilized a modified self-report instrument, based on Schmidt et al. (2009), to assess teacher knowledge within three core domains relevant to secondary mathematics: Technological Knowledge (TK), Content Knowledge (CK), and Pedagogical Knowledge (PK). Each of these domains was represented by six indicators. The survey employed a 4-point Likert scale, ranging from "strongly disagree" to "strongly agree." This selective focus on three domains addresses the limitations observed in previous research, which often struggled to reliably assess all seven TPACK constructs (e.g., Voogt et al., 2013; Zelkowski et al., 2013). Furthermore, this approach acknowledges ongoing scholarly debate regarding the validity of certain TPACK subdomains (e.g., Zou et al., 2022).

B. Teacher Readiness Survey: This survey assesses teachers' readiness for MATATAG Curriculum encompassing pedagogical capability, content capability, and pedagogical capability. Comprised of 18 indicators in all, component relate to teachers' readiness with MATATAG Curriculum Implementation. Following a survey of related literature, the items were created, mostly drawing from works by Bwalya & Rutegwa (2023), Castéra et al. (2020), Sarri (2021), Schmid et al. (2020), Schmidt et al. (2009), and Shafie et al. (2022). To fit the current study's setting, the scales were modified from the previously stated studies. The items were categorized using a four-point Likert scale: "Strongly Disagree," "Disagree," "Agree," and "Strongly Agree." Six questions were used to measure content capability (α=.909), pedagogical capability (α=.861), technological capability (α=.861), and digital pedagogy readiness (α=.872).

Data Gathering Procedure

The researcher started the preliminary step of the study by writing a communication letter. The letter, which was submitted for approval by the South Cotabato Schools Division Superintendent, explained the goals and purpose of the study. Following approval of the letter granting authorization to conduct the study, survey questionnaires were distributed to the mathematics teachers of seventh grade at Surallah Secondary Clustered School. The Surallah Secondary Cluster Head as tapped to facilitate the survey among target participants. The survey forms retrieved from teachers were analyzed and organized for analysis. Access to the target respondents may deem easy as the Cluster Head of identified Surallah Secondary Public Schools for this study

is also the School Principal IV of Libertad National Advanced School, a school where the researcher is stationed.

Ethical Considerations

This study adhered to strict ethical guidelines, prioritizing the protection and respect of all participants. Prior to data collection, letters detailing the study's purpose, procedures, potential risks, and benefits were sent to identified schools, seeking their cooperation and informing them of the voluntary nature of teacher participation. Teachers were explicitly informed that their participation was entirely voluntary and that they were free to withdraw at any point without consequence, ensuring no coercion was involved. Informed consent was obtained, emphasizing confidentiality and anonymity in data handling, with data securely stored and access restricted to the researcher. The study design minimized potential harm, and participants were treated with respect, ensuring their rights to privacy and autonomy were upheld.

RESULTS AND DISCUSSION

Level of Teachers' TPACK in Mathematics concerning the MATATAG Curriculum

To determine the level of teachers' TPACK in Mathematics concerning the MATATAG Curriculum, the researcher used the TPACK assessment tool. Separated into three categories, namely (1) Technological Knowledge, (2) Pedagogical Knowledge, and (3) Content Knowledge, thirty-one (31) Mathematics teachers in the Surallah Secondary Clustered Schools participated in the survey to identify the level of teachers' TPACK in Mathematics. The tables that follow show the results of the survey.

Technological Knowledge

Table 1 presents the results for teachers' technological knowledge (TK), a component of the Technological Pedagogical Content Knowledge (TPACK) framework

Table 1. Teachers' Level of TPACK in terms of Technological Knowledge

Indicators	M	SD	Interpretation
I am confident in my ability to troubleshoot technical issues.	2.97	0.51	Proficient
I am able to quickly learn and adapt to new technologies.	3.45	0.51	Proficient
I stay updated on emerging technological trends and developments.	3.06	0.51	Proficient
I enjoy experimenting with and exploring various technological tools.	3.23	0.62	Proficient
I have a broad understanding of different technological applications.	2.97	0.48	Proficient
I possess the technical skills necessary to effectively use technology in my teaching.	3.16	0.52	Proficient
General Weighted Mean	**3.13**	**0.55**	**Proficient**

This dimension assesses teachers' confidence and ability to use, adapt to, and stay updated with technology in education. The findings indicate an overall proficient level of technological knowledge, with a general weighted mean of 3.13. This aligns with findings that many teachers are increasingly comfortable with

technology integration, although specific areas may require further development (Koehler & Mishra, 2009). Among the six indicators, the highest-rated competency was learning and adapting to new technologies (3.45, Proficient), while the lowest were technical troubleshooting and broad understanding of technological applications (both at 2.97, Proficient). This suggests that teachers are comfortable with adopting new technologies but may need additional support in troubleshooting and gaining a more comprehensive understanding of various technological tools. This aligns with research that highlights the common challenge of teachers lacking sufficient technical support and training in troubleshooting (Ertmer & Ottenbreit-Leftwich, 2010).

Standard deviation values indicate moderate variability, with the highest (SD = 0.62) in adapting to new technologies and the lowest (SD = 0.48) in understanding technological applications. These findings suggest that while teachers demonstrate strong adaptability and interest in technology, continuous training in technical troubleshooting and diverse technological applications would further enhance their technological proficiency in education. This need for continuous training is supported by studies that emphasize the dynamic nature of technology and the necessity for ongoing professional development (Harris, Mishra, & Koehler, 2009).

Pedagogical Knowledge

Table 2 presents the results of the survey regarding Mathematics teachers' Pedagogical Knowledge (PK) within the TPACK framework. Notably, all measured aspects, including assessment skills, differentiated instruction, creating engaging experiences, addressing misconceptions, classroom management, and adapting teaching strategies, fall within the "Proficient" interpretation.

Table 2. Teachers' Level of TPACK in terms Pedagogical Knowledge

Indicators		M	SD	Interpretation
1.	I am skilled at assessing student learning in a variety of ways.	3.29	0.59	Advanced
2.	I can effectively differentiate my instruction to meet the needs of diverse learners.	3.29	0.46	Advanced
3.	I am able to create engaging and interactive learning experiences.	3.19	0.54	Advanced
4.	I am familiar with common student misconceptions and can address them effectively.	3.35	0.55	Proficient
5.	I can effectively manage classroom behavior and create a positive learning environment.	3.35	0.61	Proficient
6.	I am able to adapt my teaching strategies based on student feedback and assessment data.	3.29	0.53	Proficient
General Weighted Mean		**3.30**	**0.54**	**Proficient**

This consistency, reflected in the General Weighted Mean of 3.30, indicates that while teachers possess a foundational understanding of pedagogical principles, there's room for enhancement across all areas. This aligns with findings that suggest many teachers have a good working knowledge of pedagogy but need continuous development to refine their practices (Darling-Hammond & Bransford, 2005). The standard deviations, hovering around .54, suggest a relatively consistent spread of responses, implying that the "Proficient" perception is generally shared among the surveyed teachers.

The uniform "Proficient" rating across all PK aspects suggests that teachers possess a functional understanding of pedagogy, but may benefit from further professional development. This implies that while teachers are implementing core pedagogical practices, they could refine their ability to assess student learning, tailor instruction, and create dynamic learning environments. This need for refinement is supported by research emphasizing that effective pedagogy involves continuous improvement and adaptation (Hattie, 2009). Targeted training that focuses on advanced assessment techniques, differentiated instruction strategies, and innovative engagement methods could elevate their PK to an "Advanced" level, ultimately leading to

improved student outcomes. This emphasis on targeted training is consistent with the idea that professional development should be specific and focused on improving particular aspects of teaching practice (Guskey, 2000).

Content Knowledge

Table 3 presents the results for teachers' content knowledge (CK) within the Technological Pedagogical Content Knowledge (TPACK) framework. Content knowledge refers to teachers' mastery of their subject matter and their ability to apply, explain, and connect it to real-world contexts. The findings indicate an overall moderate-Advanced level of content knowledge, with a general weighted mean of 3.48. This demonstrates a solid foundation in subject matter, which is crucial for effective teaching (Shulman, 2019).

Table 3. Teachers' Level of TPACK in terms of Content Knowledge

Indicators	M	SD	Interpretation
1. I have a deep understanding of the subject matter I teach.	3.77	0.43	Proficient
2. I can apply my knowledge to real-world situations and problems.	3.58	0.50	Proficient
3. I am able to explain complex concepts in a clear and understandable manner.	3.58	0.50	Proficient
4. I am familiar with different pedagogical approaches for teaching my subject.	3.23	0.43	Proficient
5. I can connect my subject matter to other disciplines and areas of knowledge.	3.39	0.50	Proficient
6. I am able to critically evaluate and analyze information related to my subject.	3.35	0.49	Proficient
General Weighted Mean	**3.48**	**0.50**	**Proficient**

The highest-rated competency was having a deep understanding of the subject (3.77, Advanced), followed by applying knowledge to real-world problems and able to explain complex concepts in a clear and understandable manner (3.58, Advanced). This highlights teachers' confidence in their subject expertise and ability to make it relevant for students. This reflects the importance of deep content understanding in enabling teachers to effectively bridge theory and practice (Ball, Thames, & Phelps, 2008). Meanwhile, competencies such as familiarity with different pedagogical approaches (3.23), interdisciplinary connections (3.39), and critical evaluation of subject-related information (3.35) were rated at a moderate-Advanced level. Standard deviation values indicate moderate variability, with the highest (SD = 0.50) in applying to real world, explaining complex concepts and connect subject area to the subject while the lowest (SD = 0.43) in pedagogical approaches and deep understanding of the subject. These results suggest that while teachers demonstrate strong subject mastery, further professional development in interdisciplinary connections and diverse teaching strategies could enhance their overall content knowledge application. This need for development in pedagogical approaches and interdisciplinary connections is consistent with findings that emphasize the importance of teachers being able to integrate content knowledge with pedagogical strategies and cross-curricular concepts (Grossman, 2022).

Table 4 summarizes teachers' level of TPACK, based on the findings of this study.

Table 4. Summary of Teachers' Level of TPACK.

Indicators	M	SD	Interpretation
1. Technological Knowledge	3.13	0.55	Proficient

2. Pedagogical Knowledge	3.30	0.54	Proficient
3. Content Knowledge	3.48	0.50	Proficient
General Weighted Mean	**3.30**	**0.55**	Proficient

These results indicate a general "Proficient" level across all TPACK components, which aligns with recent research showing that many teachers possess a functional level of TPACK (Yeh, Hsu, Wu, & Hwang, 2019; Chai, Koh, Tsai, & Tan, 2017).

Level of Teachers' Readiness to Implement the MATATAG Curriculum

To determine the level of teachers' readiness to implement the MATATAG Curriculum, the researcher utilized a Teacher Readiness Survey. This survey assesses teachers' readiness for MATATAG Curriculum encompassing technological capability, content capability, and pedagogical capability.

Technological capability

Table 5 results show an overall moderate level of digital pedagogical readiness (mean = 3.27).

Table 5. Teachers' Level of Readiness on Technological Capability

Indicators	M	SD	Interpretation
1. Create learning activities for learners using digital tools	3.19	0.54	Moderately Ready
2. Create a supportive learning environment using digital tools	3.16	0.45	Moderately Ready
3. Provide on-going feedback to my learners using digital communication tools	3.06	0.51	Moderately Ready
4. Use digital tools to locate resources for teaching (From Google, YouTube)	3.61	0.50	Highly Ready
5. Do effective lesson delivery using appropriate digital tools	3.45	0.57	Moderately Ready
6. Assess learners using appropriate digital tools	3.16	0.52	Moderately Ready
General Weighted Mean	**3.27**	**0.55**	**Moderately Ready**

This indicates that while teachers are making strides in integrating digital tools, there's still room for significant growth, which is consistent with the challenges many educators face in fully adopting digital pedagogy (Ertmer & Ottenbreit-Leftwich, 2010). The highest-rated competency was using digital tools to locate resources (3.61, Highly Ready), while other areas, such as effective lesson delivery using appropriate digital tools (3.45), creating learning activities (3.19), digital assessments and create a supportive learning environment using digital tools (3.16), and providing feedback (3.06), were at a moderate level. This suggests that teachers are comfortable with resource gathering but need more support in designing digitally-enhanced learning experiences and assessments (Koehler & Mishra, 2009).

Standard deviation values indicate variability, with the highest in resource location (SD = 0.57) and the lowest in digital feedback (SD = 0.45). These findings suggest that while teachers can integrate digital tools into instruction, further training is needed in lesson delivery, assessment, and feedback to enhance MATATAG Curriculum implementation. The challenge in providing digital feedback is a known issue, as it requires both technical proficiency and a nuanced understanding of effective feedback strategies (Nicol & Macfarlane-Dick, 2006). The need for targeted training in these areas aligns with the principle that professional development should address specific needs and challenges related to digital pedagogy (Guskey, 2000).

Pedagogical Capability

Table 6 presents the results for teachers' readiness on pedagogical capability, a key component of the MATATAG Curriculum Teacher Readiness Survey.

Table 6. Teachers' Level of Readiness on Pedagogical Capability

Indicators	M	SD	Interpretation
1. Interpret curriculum documents	3.06	0.57	Moderately Ready
2. Plan for teaching	3.29	0.53	Moderately Ready
3. Use a variety of appropriate teaching methods	3.23	0.62	Moderately Ready
4. Customize my teaching based on student prior learning	3.45	0.51	Moderately Ready
5. Sequence learning content using based on context	3.29	0.53	Moderately Ready
6. Use appropriate methods to elicit learner attention and motivation	3.35	0.49	Moderately Ready
General Weighted Mean	**3.28**	**0.54**	**Moderately Ready**

This capability, measured using six items (α = .861), assesses teachers' ability to plan, implement, and adapt instruction effectively. The findings indicate an overall moderate level of pedagogical readiness, with a general weighted mean of 3.28. This suggests that teachers possess a functional understanding of pedagogical principles but may benefit from further development to enhance their effectiveness, which aligns with the idea that pedagogical expertise is a continuous process of improvement (Darling-Hammond & Bransford, 2005).

All indicators fall within the moderate readiness range (3.06 – 3.39), suggesting that teachers possess foundational pedagogical skills but may benefit from further development. The highest-rated competency was customizing teaching based on student prior learning (3.45), while the lowest was interpreting curriculum documents (3.06). This disparity highlights a potential gap in teachers' ability to effectively translate curriculum frameworks into practical instructional strategies, which is a crucial aspect of pedagogical content knowledge (Shulman, 2019). Standard deviation values indicate some variability, with the highest (SD = 0.62) in customizing instruction and the lowest (SD = 0.49) in curriculum interpretation. These results suggest that while teachers are capable of using diverse teaching methods and sequencing content effectively, additional training on curriculum interpretation and learner-centered customization could further enhance their pedagogical effectiveness. This need for targeted training in curriculum interpretation and learner-centered strategies is supported by research emphasizing the importance of teachers being able to adapt instruction to meet the diverse needs of their students (Tomlinson, 2014).

Content Capability

Table 7 presents the results for teachers' readiness on content capability, a key component of the MATATAG Curriculum Teacher Readiness Survey which assesses teachers' knowledge and ability to develop subject-specific content.

Table 7. Teachers' Level of Readiness on Content Capability

Indicators	M	SD	Interpretation
1. Have sufficient knowledge to develop content in my subject area	3.44	0.56	Moderately Ready

2. Am abreast with current trends and developments in my subject area	3.06	0.57	Moderately Ready
3. Can use various strategies to develop understanding of my subject area	3.44	0.50	Moderately Ready
4. Can use the latest sources of information to improve my understanding of the subject	3.44	0.50	Moderately Ready
5. Am able to apply subject-specific thinking to my content area	3.29	0.46	Moderately Ready
6. Know the historical development of important theories and concepts in my subject area	3.00	0.58	Moderately Ready
General Weighted Mean	**3.28**	**0.55**	**Moderately Ready**

The results indicate an overall moderate level of content capability, with a general weighted mean of 3.28. This suggests that while teachers possess a reasonable grasp of their subject matter, they may benefit from further development to enhance their expertise, which is consistent with the idea that content knowledge is a dynamic and evolving aspect of teaching (Shulman, 2019).

All six indicators fall within the moderate readiness range (3.00 – 3.39), suggesting that teachers are fairly confident in their subject knowledge but may need further development. The highest-rated competencies include developing content (3.44), using various strategies (3.44), and utilizing the latest sources of information (3.44), while the lowest was knowledge of historical development of theories and concepts (3.00). This disparity highlights a potential gap in teachers' understanding of the historical roots of their subject, which is an important aspect of deep content knowledge (Ball, Thames, & Phelps, 2008). Standard deviation values indicate moderate variability, with the highest (SD = 0.58) in content development knowledge and the lowest (SD = 0.46) in historical knowledge of theories. These findings suggest that while teachers are knowledgeable in their subject areas, continuous professional development is necessary to enhance subject-specific expertise, particularly in integrating historical perspectives into teaching. This need for ongoing professional development is supported by research emphasizing the importance of keeping content knowledge up-to-date and relevant (Grossman, 2022).

Table 8 summarizes the teachers' readiness in implementing the MATATAG Curriculum, as assessed in this study.

Table 8. Summary of Teachers' Readiness in Implementing MATATAG Curriculum

Indicators	M	SD	Interpretation
1. Technological Capability	3.27	0.55	Moderately Ready
2. Pedagogical Capability	3.28	0.55	Moderately Ready
3. Content Capability	3.28	0.55	Moderately Ready
General Weighted Mean	**3.28**	**0.55**	Moderately Ready

The results indicate a general "Proficient" or "Moderately Ready" level across all readiness components. This suggests that teachers possess a foundational level of readiness but may benefit from further support and training to fully implement the curriculum (Guskey, 2000). The overall moderate readiness can also be attributed to the normal challenges teachers face when implementing new curriculum materials (Fullan, 2016).

Significant Relationship Between Teachers' TPACK and their Perceived Readiness to Implement the Matatag Curriculum

The study found a strong positive correlation (r = 0.78) between teachers' TPACK and their perceived

readiness for the MATATAG Curriculum as shown in Table 9.

Table 9. Significant Relationship between Teachers' TPACK and their Perceived MATATAG Curriculum Readiness

Variable	SD	M	r	p-value	Remark
Teachers' TPACK	0.276	3.304	0.78	0.00*	Significant
MATATAG Curriculum Readiness	0.312	3.270			

This means that as TPACK in Mathematics increases, the readiness to implement the MATATAG Curriculum also tends to increase, and vice versa. Furthermore, teachers with stronger Technological Pedagogical Content Knowledge (TPACK) in Mathematics are more likely to be ready to implement the new MATATAG Curriculum. This finding is consistent with the foundational concept of TPACK, which emphasizes the integrated nature of technological, pedagogical, and content knowledge in effective teaching (Koehler & Mishra, 2009). A strong positive correlation indicates a significant linear relationship between the two variables, suggesting that TPACK plays a crucial role in predicting teacher readiness.

Furthermore, in essence, since the p-value (0.000) is below the 0.05 level of significance, there is enough evidence to reject the null hypothesis. The observed relationship is unlikely to have occurred by chance because it is statistically significant. To understand the effect size, r-squared (r^2) is calculated; $r^2) = (0.78)^2$ = 0.6084. This means that approximately 60.84% of the variance in readiness to implement the MATATAG Curriculum can be explained by the TPACK variables in Mathematics. This substantial effect size aligns with research indicating that TPACK is a significant predictor of technology integration effectiveness in teaching (Harris, Mishra, & Koehler, 2009). Therefore, TPACK is a strong predictor of the readiness to implement the new curriculum. This highlights the importance of fostering teachers' TPACK to ensure successful curriculum implementation, especially in technology-rich educational environments (Ertmer & Ottenbreit-Leftwich, 2010).

TPACK- Based Intervention Framework to Enhance TPACK and Readiness for Effective Implementation of MATATAG Curriculum

The Philippine Department of Education's implementation of the MATATAG Curriculum represents a significant shift towards enhancing the quality and relevance of basic education. This curriculum demands that teachers not only possess deep content knowledge but also employ innovative pedagogical approaches and effectively integrate technology into their teaching practices. However, many teachers face challenges in seamlessly blending these three domains—content, pedagogy, and technology—which is the essence of TPACK (Technological Pedagogical Content Knowledge) (Koehler & Mishra, 2009). The effective integration of technology into curriculum delivery is a critical component of modern education systems (UNESCO, 2019). Anchored on the lowest ratings evaluated by Grade Seven teachers, the intervention framework prioritizes building teachers' confidence in troubleshooting technical issues (M= 2.97) and expanding their understanding of diverse technologies (M= 2.97), ensuring they can effectively integrate technology into the MATATAG Curriculum. This is particularly relevant given the common challenges teachers face in technical troubleshooting and understanding diverse technological applications (Ertmer & Ottenbreit-Leftwich, 2010).

The study proposed a framework titled TPACK-Based In-Service Training: Building Technological Confidence for MATATAG Curriculum Readiness. It constitutes the following DepEd framework elements, including (a) Rationale, (b) Framework Goal, (c) Framework Objectives, (d) Implementation Strategies, (e) Evaluation and Sustainability, and (f) Stakeholders, and (g) Expected Outcomes. This framework aims to address the identified gaps in teachers' technological knowledge and enhance their TPACK, which is crucial for effective curriculum implementation (Harris, Mishra, & Koehler, 2009).

Introduction

This framework is designed to address the critical need for teachers to develop technological confidence and proficiency as they implement the MATATAG Curriculum. Recognizing that effective technology integration requires not only skill but also a sense of empowerment, these "TPACK Lesson Lab" workshops prioritize building teachers' ability to troubleshoot technical issues and expand their understanding of diverse technologies. By fostering a supportive and hands-on learning environment, we aim to equip teachers with the tools and confidence necessary to seamlessly integrate technology into their teaching practices.

Framework Goal

The overarching goal of this framework is to foster teachers' technological self-efficacy through practical training, targeted troubleshooting strategies, and exposure to a broad range of educational technologies. This will empower them to confidently implement the MATATAG Curriculum, ensuring that technology serves as a powerful tool for enhancing teaching and learning.

Framework Objectives

To achieve this goal, several key objectives have been established. First, teachers will be equipped with practical troubleshooting skills to address common technical challenges encountered in the classroom. Second, they will broaden their understanding of diverse educational technologies and their potential applications within the MATATAG Curriculum. Third, teachers will build confidence in experimenting with and adapting technology to meet their instructional needs. Fourth, a supportive environment will be created where teachers can share troubleshooting tips and technology best practices. Finally, teachers will be enabled to effectively use technology to enhance content delivery, pedagogical strategies, and assessment practices.

Framework Components

The training program is structured around six modules. Module 1 focuses on Technology Troubleshooting Essentials, providing hands-on experience with identifying and resolving common technical issues. Module 2, Exploring Diverse Educational Technologies, introduces teachers to a wide array of software, apps, and platforms, fostering a broad understanding of available tools. Module 3, Technology Integration for MATATAG Content, guides teachers in selecting and adapting technologies to align with specific curriculum standards. Module 4, Technology-Enhanced Pedagogical Strategies, demonstrates how technology can support active learning, collaboration, and assessment. Module 5, Building Technological Confidence and Collaboration, focuses on overcoming technology anxiety and establishing a supportive peer network. Finally, Module 6, Sustainable Technology Integration and Adaptation, assists teachers in developing personalized technology integration plans and staying updated on emerging technologies.

Implementation Strategies

The workshops will emphasize hands-on learning through practical troubleshooting exercises and technology exploration labs. Peer-to-peer support and collaborative learning will be fostered, and teachers will have access to a comprehensive technology resource bank and online support forum. Teacher-led demonstrations and workshops will further enhance learning, and ongoing professional development opportunities will ensure continuous growth.

Evaluation and Sustainability

To measure the effectiveness of the workshops, pre- and post-workshop assessments of technology self-efficacy and troubleshooting skills will be conducted. Teacher feedback surveys and focus group discussions will provide qualitative insights, and classroom observations will assess technology integration in practice. A sustainable technology support network will be established, and the technology resource bank will be regularly updated and expanded.

Stakeholders

Successful implementation of this framework requires the collaboration of various stakeholders, including teachers, school administrators, technology specialists, curriculum specialists, and Department of Education personnel. Their collective efforts will ensure that the workshops achieve their intended outcomes and contribute to the successful implementation of the MATATAG Curriculum.

Expected Outcomes

The expected outcomes of this framework include increased teacher confidence in troubleshooting technical issues, a broadened understanding of diverse educational technologies, enhanced ability to integrate technology into the MATATAG Curriculum, improved student engagement and learning outcomes, and a sustainable technology support system for teachers.

CONCLUSION

Building upon the summarized findings, this section articulates the conclusions derived from the data analysis, providing a synthesized interpretation of the study's outcomes. These conclusions offer insights into the level of teachers' TPACK and Readiness as well as relationships observed, suggesting the implications of the research for educational practice and policy. The following conclusions are grounded in the empirical evidence gathered, offering a clear understanding of the teachers' TPACK and readiness in relation to the MATATAG Curriculum.

The study concluded that while Mathematics teachers possess a foundational understanding of TPACK components, specific areas require improvement, particularly in technical troubleshooting, diverse technological applications, interdisciplinary connections, and advanced pedagogical strategies. Teachers are moderately ready to implement the MATATAG Curriculum, but further support is necessary to enhance their digital pedagogical, content, and pedagogical capabilities.

The strong positive correlation ($r = 0.78$) between teachers' TPACK and their perceived readiness for the MATATAG Curriculum highlights that TPACK is a strong predictor of curriculum readiness, emphasizing the influence of other factors. Targeted professional development, such as the proposed TPACK-Based In-Service Training framework, is crucial for enhancing teachers' technological confidence and overall readiness for the MATATAG Curriculum. Additionally, the teachers exhibited a need for more training on technical troubleshooting and the historical development of theories and concepts within their subject area.

RECOMMENDATION

While this study offers valuable insights, there are a few important areas that future research could build on to strengthen its impact and relevance. Expanding future studies to include a more diverse group of teachers from different regions and school contexts would help make the findings more applicable to a wider audience.

Also, since the data relied entirely on self-reported responses adding qualitative methods like interviews, focus groups, or classroom observations would give a deeper, more personal look into teachers' actual experiences and the real-world challenges they face. These approaches can reveal context and nuance that surveys alone often miss.

To get a fuller picture of how teachers' TPACK contributes into their teaching practices, future research should aim to cover all seven domains. Longitudinal studies would also be valuable—by tracking changes over time, especially after putting intervention strategies in place, we could better understand what kinds of support truly make a difference in helping teachers grow.

Taking these steps would not only enrich future research but also offer more meaningful guidance for teacher training programs and policy development focused on technology integration in educations.

CONFLICT OF INTERESTS

The authors declared no conflict of interest.

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