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TPACK Acceptance Level of Elementary Teachers in an Inclusive Education: A Correlational Study

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Abstract—Educators worldwide are increasingly challenged to create learning environments that foster the engagement and achievement of every student, while also harnessing the potential of technology to enhance teaching and learning experiences. This research aims to determine the ascertain importance of primary school instructors to recognize the role that TPACK plays in inclusive education. The study employed a correlational research design and was participated by 150 elementary school teachers in Davao del Sur with the use of questionnaires. Likert scale option, Mean, and frequency distribution were utilized as statistical tools. The results of the study shows that elementary teachers in Davao del Sur demonstrate a high level of TPACK acceptance, particularly in terms of digital literacy, which scored the highest among the indicators. This suggests that most primary teachers are technologically inclined and open to integrating digital tools into their instructional strategies. However, the researchers recommend that the educational institutions must prioritize the enhancement of TPACK competencies among elementary teachers, with particular focus on teaching experience.

***Index Terms*—digital literacy, inclusive education, teacher competency technology integration, 21st century learning.**

1. Introduction

Educators worldwide are increasingly challenged to create learning environments that foster the engagement and achievement of every student, while also harnessing the potential of technology to enhance teaching and learning experiences (Almusaed et al., 2023). Inclusive education is about making sure that everyone, including those who have been left out of regular education, can learn together. It's not just about adding people who are different, it's about making diversity a key part of how we teach, not just an extra thing we do (Florian, 2019). This intersection of inclusive practices and technological integration underscores the importance of exploring innovative approaches that can effectively support diverse learners in the digital age (Abendan et al., 2023).

In the Philippine context, a study evaluating the application of TPACK among pre-service teachers in Bulacan revealed that while teachers possessed strong knowledge in TPACK elements, the integration of educational technology tools was rated as "fairly adequate" (Kamei, 2025). This problem also relates to a study conducted in Finland and Australia by Voithofer and Nelson (2021) in which they examined the effective application of the TPACK framework in meeting the educational needs of diverse learners, including those with disabilities and other special education requirements. Despite its demonstrated potential, many educators continue to encounter difficulties in effectively implementing TPACK principles within inclusive classroom settings. Similarly, Redmond and Peled (2019) highlighted that teachers who possess well-developed TPACK competencies are more capable of creating learning environments that are accessible, engaging, and responsive to a wide range of student learning profiles. However, a significant concern persists: not all educators are adequately equipped with the necessary TPACK skills to address the complexities of inclusive education. This gap underscores the ongoing challenge of preparing teachers to integrate technology, pedagogy, and content knowledge effectively in support of all learners (Valtonen et al., 2023).

The Department of Education (DepEd) has been working with the United Nations Educational, Scientific and Cultural Organization (UNESCO) to train teachers to include students with disabilities in their classrooms. This training covers topics such as adapting instruction for students with disabilities, creating a supportive learning environment, and working collaboratively with parents (Llego, 2022). Studies on the extent of TPACK acceptance among the primary educators in the Philippines' Mindanao, who are involved in inclusive education, is still in need. But according to Jalipa and Caballa (2017), just thirty percent of Davao City's primary school teachers are required to improve their use of technology in the classroom in order to improve student learning outcomes. In addition to being in distress, students and teachers cannot learn to the maximum extent possible since they are not provided with the necessary resources (Maffea, 2020).

The constructivist theory of David H. Jonassen and the circumstances of learning proposed by Robert Gagne were examined in this study. Learning is impacted by our definition of meaning as we explore options and adopt a new point of view, Lindsay et al., (2023) and Liu et al., (2022) claim that incorporating technology into the classroom raises students' cognitive comprehension and knowledge levels. Teacher awareness impacts student learning by guiding effective teaching strategies (Agrawal et al., 2019).

This study is significant in today's ever-changing educational settings, where technology has become a vital part of teaching (Hamzah et al., 2024). This research highlights how

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important it is to evaluate elementary teachers' acceptance of the TPACK, especially in inclusive education settings. It's essential for teachers to not only have strong pedagogical and content knowledge but also the skills to effectively integrate technology into their teaching practices. By examining how well elementary teachers accept TPACK, this study offers valuable insights into their readiness and willingness to use technology as a tool for inclusive teaching. Additionally, the research's correlational design enables an exploration of the relationship between teachers' demographic backgrounds and their TPACK acceptance levels. Gierhart (2020) highlighted the significance of professional development programs in refining educators' TPACK abilities. These programs provide teachers with the capabilities to move within technology-rich environments and implement TPACK in effective ways within their teaching methods. The results of this study could lead to improvements in teacher education curricula and inform policies that promote inclusive and tech-integrated learning environments. Ultimately, this research highlights the importance of teacher preparedness in creating effective, equitable, and innovative educational practices for all learners.

2. Research Objectives

The purpose of this study was to ascertain how important it is for primary school instructors to recognize the role that TPACK plays in inclusive education. In addition to the research objectives, this research is particularly focused on achieving the following goals:

1. To determine the TPACK acceptance level of teachers, in terms of:
    1. Digital Literacy
    2. Teaching Experience
2. To determine the Inclusive preparedness level of elementary teachers.
    1. Conception of diversity
    2. Community participation
3. To determine if there is a relationship between TPACK and Inclusive Education.

3. Methods

A. Respondents

The following criteria were set to choose study participants; Teachers with 5 years and above of experience. It is a general perception that the teachers' who have been teaching for a long time are more knowledgeable than those who have just begun their careers. The use of observation frameworks to study pedagogy is an emerging field of research where the relationship between teacher experience and teaching quality has rarely been the focus (Graham et al., 2020).

Teachers between the ages of twenty-five (25) and fifty (50); Teachers between 20 and 30 years, they have better abilities in the technological aspect. Indeed, teachers under the age of 30 are better at mastering technology as the age range is keen to adapt to technologies. This is because people in this age group are usually at the peak of their careers, with experience and knowledge, yet still open to new educational trends. They probably also went through a big change in educational technology during their own school years, which makes them more comfortable using technology in their teaching (Anzari et al., 2024).

Lastly, teachers who are already employed in any public school around Davao del Sur. According to the latest statistics, there are around 452 public elementary schools found in Davao del Sur. All these schools cater for a large population of students within the province's borders including both regular and inclusive education (Beñalet et al., 2024).

The participants were selected through random sampling from a population. Moreover, randomization helps to offset the confounding effects of known and unknown factors by randomly choosing cases which may lead to a more considerate sample selection process for the intended study (Stockemer, 2019). The hypothesis is derived after conducting the survey by listing all the names of the respondents. To guarantee that this sample is representative of the general public by carefully chosen for extremely homogeneous groups, with research participants (Bhardwaj, 2019). In most cases, sampling is used by researchers to estimate population characteristics by examining sample characteristics (Walters, 2021).

B. Instrument

Table 1
TPACK acceptance level

Scale	Range of Means	Description levels	Interpretation
5	4.85 – 5.00	I know at a very good level.	This assessment demonstrates there were some similar aspects of the items that expressed teachers' opinions about TPACK.
4	3.82 – 4.80	I know at a good level.	This assessment demonstrate that a few items' aspects may be present and have connections to teachers' perceptions of TPACK.
3	2.89 – 3.50	I know at a middle level.	This assessment demonstrates the elements of the items pertaining to teachers' perceptions of TPACK are occasionally accessible.
2	1.85 – 2.50	I know at a low level.	This assessment demonstrates how rarely certain item aspects related to the teacher's perception happen.
1	1.35 – 1.80	I do not know.	This assessment demonstrates how important it is to understand the elements of things connected to the teacher's point of view.

An essential instrument for this research that enabled it to collect sufficient data was a closed questionnaire with a Likert scale option. The inclusiveness of elementary teachers' preparation was assessed by a questionnaire. The author of items for TPACK Acceptance Level by Akman and Guven (2015) and Elementary school Teacher's Evaluations in

Preparation for Inclusion by Pinila et al. (2024). The last questionnaire author by Inclusive Preparedness by Pasha et al. (2021) and Logrono and Gongora (2023). The questionnaire supports identifying specific vulnerabilities and resources needed for effective preparedness while advocating for equitable means of addressing these needs as well as equitable approaches to teaching. To find out if there is a connection between TPACK and inclusive education, the study used a pencil and survey questionnaire to gather data which was then analyzed to identify patterns and relationships, providing insights into how technological knowledge influences inclusive teaching practices.

Table 2
Inclusive preparedness level

Scale	Range of Means	Description levels	Interpretation
5	4.85 – 5.00	Strongly Agree	The teacher extremely accepts the form of inclusive teaching for diverse learners and direct the flexible application forms of inclusive teaching for children.
4	3.82 – 4.80	Agree	The teacher accepts the forms of inclusive teaching for diverse learners and direct the flexible application forms of inclusive teaching for children.
3	2.89 – 3.50	Neutral	The teacher seldom accepts the forms of inclusive teaching for diverse learners and direct the flexible application forms of inclusive teaching for children.
2	1.85 – 2.50	Disagree	The teacher rarely accepts the forms of inclusive teaching for diverse learners and application forms of inclusive teaching for children.
1	1.35 – 1.80	Strongly Disagree	The teacher never accepts the forms of inclusive teaching for diverse learners and application forms of inclusive teaching for children.

C. Design and Procedure

This correlational study examined the possible association between TPACK acceptance and inclusive preparation using three significant statistical variables. According to Bhandari (2023), each component, the mean provided a central tendency score that indicated the participants' average degree of TPACK acceptance and inclusive preparedness. The researchers started by writing letters to the Davao del Sur Division Office to ask for permission to do the study. After they got approval, they also asked the school principals for permission and the right time to do the surveys.

The researcher's collected a survey questionnaire, which was submitted to Research and Public Office for authorization and conduct pilot testing to ensure the validity of the questionnaire. The recommendation of the paper for revisions made by the consultant will be included in the guide. The necessary documentation such as letter to the Program Head, Dean's Office and Research and Public Committee (RPC) and some of the licensed elementary school teachers in Davao del Sur. After that, the RPC received these documents for confirmation. Following acceptance of the necessary documentation, the researchers visit the selected school to conduct an in- person survey of the elementary teachers while upholding the inclusion criteria and gaining informed consent.

The participants received a survey questionnaire from the researchers. After the survey's sessions, the researchers contextualized the data by descriptive statistical tools including the respondent's frequency and percentage. The degree to which scores for each variable differed from the mean was represented by the standard deviation, a measure of variability. This made it possible for us to evaluate the sample's similarity or variability in terms of inclusive preparation and TPACK acceptance. Finally, the level of the relationship between these two variables was determined using Spearman's rank correlation coefficient. Researchers were able to determine if there was a positive, negative, or no relationship between increased TPACK acceptance and inclusive preparation levels, or if the two did not correlate at all; the statistical measure made this feasible (Pallant, 2020). The results helped clarify the nature of the connection between teachers' technological competence and their readiness for inclusive education. This, in turn, provided a foundation for future recommendations in teacher training programs.

D. Ethical Consideration

Research ethics involves the ethical principles and guidelines adhered to during research in order to safeguard the rights, welfare, and dignity of respondents are referred to as research ethics. Several ethical issues need to be taken into account because this study uses human volunteers (George et al., 2016).

Informed Consent/ Assent. Refers to the ability to access and fully communicate the goals, risks, and benefits to the individuals. Prior to creating a preference, the participants of the study should be given a chance and opportunity to ask questions and receive clear information before making a preference. Teachers who agreed to participate in the study were asked to complete the survey and provide their informed permission.

Confidentiality. The researcher guaranteed responder anonymity and the confidentiality of the data provided by study subjects. The researcher must guarantee that any unapproved access to the data cannot link it to a participant.

Risks, Benefits, and Safety. The respondents were expressly told by the researcher that they were allowed to withhold their answers if any of the questions made them uncomfortable. In addition, the investigator will explicitly inform the participants that their involvement in the study has no bearing on their employment situation or the results of their performance reviews.

Adequacy of Facilities. The study was conducted according to procedure by the researcher. Before addressing participants directly, the researcher showed consideration for gatekeepers, including the Principal, Research Head, and other important officials.

Community Involvement. The researcher started a conversation with the instructors, the administration, and other relevant offices. This is to make sure that the quality and impartiality standards of the research are not compromised by the setting of the study location. Additionally, the researcher

abstained from or avoided use labels or classifications that permit irrational generalization.

4. Results and Discussion

This section presents the results, discussions and the personal insights that the researchers have gathered through the process of conducting investigation of the study on TPACK acceptance level of elementary teachers in an inclusive education around Davao del Sur. It is divided into three sections:

1) Demographic Profile of the Respondents, 2) TPACK acceptance Level of Teachers, 3) Inclusive Preparedness level of Elementary Teachers, 4) Correlation matrix between TPACK acceptance level and inclusive preparedness.

A. Demographic Profile of the Respondents

Table 3
Demographic profile of the respondents

Demographic Profile	*f*	%
School		
Sta. Cruz Central	45	21.8
Agripina	15	7.3
Tuban	15	7.3
Bato	35	17.0
Tagabuli	10	4.9
Anastacio G. Canda	20	9.7
Matanao	10	4.9
1	7	3.4
2	143	69.4
1	131	63.6
2	19	9.2
Marital Status		
1	2	1.0
2	148	71.8
Major Program		
1	150	72.8
Overall	**150**	**100%**

Table 3 shows the demographic profile of the respondents included in the study; namely, school participation, age, sex, marital status, programs, and years in teaching. A total of 150 teachers were surveyed around Davao del Sur.

School. Table 3 shows that the largest group of respondents came from Sta. Cruz Elementary School, which got a highest frequency of 45 approximately 21.8%; Bato Elementary School got a frequency of 35 approximately at 17.0%; Agripina Elementary School and Tuban Elementary School contributed equally with a frequency of 15 approximately 7.3% each; Tagabuli Elementary School and Matanao had the lowest participation and got a frequency of 10 approximately 4.9% each; and lastly the Anastacio G. Canda Elementary School got a frequency of 20 and accounted for 9.7%. This distribution indicates varied participation rates across schools, with some schools being more prominently represented.

Age. Table 3 shows that ages 25 and below got the frequency of 7, which is approximately 3.4%, indicating minimal participation from younger individuals such as undergraduates; ages 26 and above got the frequency of 143, a majority of 69.4%, suggesting that the participants are primarily older individuals, including those masteral teachers.

Sex. Table 3 shows that most of the respondents were females, with a frequency of 131, approximately 63.6%; males, with a frequency of 19, approximately 9.2%. This significant gender imbalance shows that females were more actively involved in this study.

Marital Status. Table 3 shows that out of 150 respondents, 2 belong to single status, which is approximately 1.0%; 148 are married and got the highest frequency, approximately 71.8%. Hence, the marital status results are prevailed by married couples.

Programs. Table 3 shows that all respondents (72.8%) were enrolled in the same major program. This indicates that the study primarily focused on teachers specializing in one major field of study.

B. TPACK Acceptance Level of Teachers

The findings indicated that elementary teachers exhibited a high level of acceptance toward TPACK, as reflected in the overall mean score of 4.13 with a standard deviation of 0.44. This suggests that teachers are positively inclined toward integrating technological, pedagogical, and content knowledge into their instructional practices. This indicates that teachers generally embrace the integration of technology, pedagogy, and content knowledge in their teaching practices. The teaching experience indicator scores 3.95, suggesting experienced teachers may struggle with integrating technology into their instruction despite possessing strong pedagogical knowledge. Moreover, The Digital Literacy indicator showed strong digital skills among teachers, with a mean score of 4.32, indicating confidence in using technology. However, some teachers may need further development. Addressing this gap through targeted professional development could enhance the overall effectiveness of technology use in inclusive education.

Table 4
TPACK acceptance of teachers

Indicators	ī	SD
Teaching Experience	3.95	0.44
Digital Literacy	4.32	0.66
Overall	**4.13**	**0.44**

The table shows that most primary teachers are open to using the technology into their teaching strategies. Teachers, particularly those in elementary schools, can enhance the quality of their instruction by incorporating gamified techniques for instruction into their lessons (Anil & Abbas, 2021). Virtual manipulatives are among the tools that can be used to teach mathematics, while other tools, like the classroom bundle, can be used to teach science lessons, the virtual museum can be used to teach social and biological sciences via Google Earth, and bubble draw can be used to teach visual arts in primary school. Additionally, web 2.0 tools (such Kahoot, Nearpod, blogs, etc.) can be integrated (Sari & Keser, 2021). In contrast, teachers with strong digital literacy are better equipped to integrate technology into their teaching, leading to higher TPACK acceptance (Schmidt et al., 2021). In the digital age that we live in today, it is crucial that teachers be able to incorporate technology into their teaching profession, to accommodate all the learning styles of diverse learners.

C. Inclusive Preparedness Level

The result showed that the overall mean score of Inclusive Preparedness of elementary teachers with an overall mean of 4.27 (SD=0.47) interpreted as high. However, there are slight differences in their perception of diversity and community participation. The mean of Conception of Diversity is 4.26 (SD= 0.53), indicating teachers generally understand diversity's importance in inclusive education, but there's room for improvement due to variability and potential need for additional training or resources. On the other hand, Community Participation achieved the highest mean score of 4.28 (SD = 0.55), reflecting a strong level of preparedness in engaging with communities to support inclusive education. Teachers acknowledge the importance of collaborating with parents, stakeholders, and community members to create inclusive learning environments, as these partnerships help support student success and foster a sense of shared responsibility for education.

Table 5
Inclusive preparedness level of elementary teachers

Indicators	$\bar{x}$	SD
Conception of Diversity	4.26	0.53
Community Participation	4.28	0.55
Overall	**4.27**	**0.47**

Teachers serve as the pillar of inclusive education; thus, they need to be knowledgeable about inclusive education, possess the necessary tools, and resources, as well as be aware of the rules and regulations to guarantee that all students can access the curriculum and get assistance for their learning (Wray et al., 2022, Woodcock and Jones, 2020). After all, teacher beliefs about diversity and difference contribute greatly to how they operationalize their classrooms (Ismailos et al., 2019). The average score is encouraging, since it indicates that teachers are confident in their capacity to establish inclusive and successful learning environments for all students. This shows that although elementary teachers are generally capable there can be some areas in which they want more help or training in order to feel fully prepared to design inclusive classrooms. This aligns with a view that teachers need more specialized training or courses to reach the level of confidence and certainty that qualify them to teach or deal with different students in inclusive classes (Badr, 2019).

D. Correlation Between TPACK Acceptance Level and Inclusive Preparedness

The findings of this study revealed a significant and moderately positive correlation between TPACK acceptance and inclusive education preparedness among elementary teachers. Specifically, the TPACK acceptance level demonstrated the strongest correlation with overall inclusive preparedness (r = .510*), followed closely by its association with the conception of diversity (r = .501*) and community participation (r = .394*). These results indicate that as teachers develop stronger competencies in integrating technology, pedagogy, and content knowledge, their readiness to implement inclusive practices also increases. Additionally, the correlation between digital literacy and general readiness, ranging from r = .241 to .492, further supports the idea that technological skills contribute meaningfully to inclusive teaching capacities.

Although TPACK acceptance emerged as the strongest predictor of inclusive preparedness in this study, it cannot independently substitute for inclusive education training. While TPACK provides teachers with the necessary tools to design engaging and adaptive instruction, inclusive preparedness involves deeper understanding and responsiveness to learner diversity, social equity, and collaborative community involvement. Therefore, while high TPACK acceptance can predict a teacher's potential to operate effectively in inclusive settings, it must be paired with explicit training in inclusive education principles and practices. The findings need comprehensive development programs that integrate the TPACK framework.

Table 6
Correlation between TPACK acceptance level and inclusive preparedness

	Diversity	Community Participation
GRS	.455***	.386***
	(.000)	(.000)
Digital Literacy	.354***	.241**
	(.000)	(.003)
TPACK Acceptance Level	.501***	.394***
	(.000)	(.000)

A recent study by Karagianni and Drigas (2023) identified a strong positive relationship between TPACK and inclusive education, noting, however, that both can present challenges when addressing diverse learning styles, particularly due to negative correlations in the use of digital literacy. For teachers to effectively create inclusive learning environments, it is essential for them to embrace and apply the TPACK framework. Regular classroom teachers have recognized the benefits of receiving specialized training in special education and understand the importance of having adequate experience and knowledge in this area. Many acknowledge their ability to support inclusive education, especially when it comes to addressing the challenges and misconceptions often faced by children with disabilities (Ecoben, 2019).

The study was supported by the findings of Miskolci et al. (2020) which emphasized that even with training in inclusion and special education, teachers' perceptions are still shaped by their broader socioeconomic context. The study suggests that while training plays a vital role, external factors can significantly influence teachers perceived readiness for inclusive classroom environments.

Special education programs remain a key component in equipping educators for inclusive teaching, even if sociopolitical elements may affect their overall readiness. Additionally, as modern teaching increasingly involves technology, educators must actively adjust their instructional methods. Backfisch et al. (2021) highlighted that in addition to acquiring TPACK, fostering motivation toward technology use is essential for successful integration into classroom practice, because without motivation, even well-developed TPACK skills may not be effectively applied.

5. Conclusion

The study concluded that elementary teachers in Davao del Sur exhibit a high level of TPACK acceptance, particularly in digital literacy, indicating that most are technologically inclined and open to using digital tools in their teaching. However, teaching experience contributed the least to TPACK acceptance, suggesting that more experienced teachers may require additional support in adapting to new technologies. Teachers also demonstrated high preparedness for inclusive education, with community participation scoring highest, underscoring the importance of collaboration with stakeholders, while the conception of diversity scored lower, pointing to an area needing improvement. A significant, moderately positive relationship was found between TPACK acceptance and inclusive education, especially in diversity and community involvement, suggesting that teachers who effectively integrate technology, pedagogy, and content knowledge are more likely to feel prepared to support inclusive classrooms. These findings highlight the need to enhance both technological skills and inclusive teaching strategies in teacher education, and the study was grounded in the constructivist theory of David H. Jonassen and Robert Gagne's conditions of learning.

6. Recommendations

The researchers recommended that educational institutions prioritize enhancing TPACK competencies among elementary teachers, particularly focusing on teaching experience, as continuous professional development is essential for effectively integrating technology with pedagogy and content. Special attention should be given to more experienced teachers who may need additional support in adapting to technological advancements, enabling them to teach more effectively in inclusive environments. They also emphasized the importance of maintaining and strengthening the current high level of inclusive preparedness among teachers, especially by improving their conception of diversity through targeted workshops and training on student differences, inclusive teaching approaches, and culturally responsive practices. Furthermore, the researchers highlighted the crucial role of community members and parents in supporting inclusive education, encouraging schools to continue fostering strong collaborations with families and local stakeholders, as community participation significantly contributes to a supportive learning environment. They also recommended that teachers pursue additional training that combines technology integration with inclusive teaching strategies, addressing the gap between digital literacy and inclusive practice, particularly for long-serving educators. Finally, future research should examine other influencing factors such as access to resources, administrative support, and teaching conditions, and replicate similar studies in other locations to gain broader insights into the relationship between TPACK and inclusive education.

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