Research Article

ALS TEACHERS' TECHNOLOGICAL, PEDAGOGICAL AND CONTENT KNOWLEDGE AND STUDENTS' PERFORMANCE AND ATTITUDE: TOWARD A TEACHER DEVELOPMENT FRAMEWORK

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ABSTRACT

Equipping Alternative Learning System (ALS) students with 21st-century skills requires mobile teachers with knowledge in technology utilization, content understanding, and lesson delivery. Thus, this study examined the relationship between ALS teachers' Technological, Pedagogical, and Content Knowledge (TPACK) and students' performance and attitude towards schooling. The research aimed to determine whether teachers' TPACK significantly influences student outcomes to eventually propose a framework for teacher development. A total of 162 ALS teachers and 387 students participated in the study. The research employed descriptive and correlational methods, utilizing documentary analysis and validated questionnaires. Data were statistically treated using weighted mean and Spearman Rank-Order Correlation Coefficient. Findings revealed that ALS teachers possessed a "good" level of TPACK, while students exhibited a generally "favorable" attitude towards schooling and achieved "fairly satisfactory" performance in the Accreditation and Equivalency (A&E) Test. Despite these outcomes, statistical analysis indicated that the TPACK of ALS teachers had a non-significant correlation with students' attitude and only a low, non-significant correlation with students' performance in the A&E Test. These results suggest that while teachers possess essential instructional competencies, these do not significantly influence student achievement and disposition toward schooling in the ALS context. The study recommends the adoption of the ***Enriched Instructional Framework for Mobile Teachers' Development (EIFMT)*** to enhance pedagogical practices and integrate more effective technological applications. This framework is envisioned to transform students' attitudes to "highly favorable" and improve A&E test performance to "highly satisfactory." Strengthened support from school administrators, supervisors, and parent-teacher associations is essential in the implementation of this framework to optimize student-learning outcomes in the ALS program.

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Introduction

The educational changes brought about by technology, economic, and cultural forces in the early 21st century speedily transformed the educational system globally. Developed nations substantially pronounced these changes, but their effect was also apparent in developing countries like the Philippines. Basic education worldwide is rapidly changing in many ways, especially the availability and ways to access digital information and communication technologies. However, in the Philippines, classroom practices of some teachers remained traditional in this era of rapid change, which remained content-focused, teachers directed, didactic instruction focused on content delivery, and rule-centered of the pedagogy.

Handal et al. (2013) emphasized the importance of maintaining high teaching standards by leveraging the instructional possibilities offered by emerging technologies. They also highlighted the strategic significance of assessing teachers' skills in using information and communication technologies to guide school-level and system-wide development programs. However, Hans and Akhter (2013) observed that teachers entering the education sector often lack adequate preparation, particularly in delivering lessons that integrate technology or promote digital literacy. They further pointed out that today's students, often referred to as digital natives, are no longer aligned with the educational models of the past. Their daily lives revolve around tools such as instant messaging, video games, video conferencing, and social networking, which form a core part of their communication landscape. Consequently, the traditional education system, which remains largely content-centered and teacher-directed, often fails to engage these learners meaningfully. This disconnect is particularly evident in the Alternative Learning

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System (ALS) in the Philippines, where the relevance and effectiveness of instructional practices urgently warrant further investigation.

In today's time, globalization favors educated, skilled, and mobile workers (Abinales and Dolan, 2012; Guerrero, 2007). The marginalized groups such as children, women, people with special needs, indigenous people communities and out-of-school-youths were denied access to education. They are most likely unable to benefit from modernization. However, the implementation of ALS paved the way to right to education for these people (Doronila, 1997; Valk, 2009). Equipping ALS students with 21st-century skills requires mobile teachers with knowledge in technology utilization, content understanding, and lesson delivery. Mobile teachers should be seasoned with the technological pedagogical content knowledge (TPACK) to meet the current demands of the learners, particularly in the ALS program to ensure obtaining the Accreditation and Equivalency certificate. Unarguably, Mishra and Koehler (2006) posited that technological knowledge, pedagogical knowledge, and content knowledge offer a productive approach to many of the problems teachers face in implementing classroom instruction.

Moreover, teachers' competence plays a critical role in shaping students' attitudes toward schooling. Competent teachers who effectively integrate content knowledge, pedagogical strategies, and technological tools tend to foster more engaging and supportive learning environments. These environments, in turn, influence how students perceive and value their educational experiences. Studies have shown that when teachers demonstrate strong instructional competence, students are more likely to develop positive attitudes toward school, leading to improved motivation and academic performance (Goos & Bennison, 2008; Holfve-Sabel & Gustafsson, 2005). Thus, it is important to examine how teachers' TPACK relates to students' attitudes, especially in non-formal education contexts like the Alternative Learning System (ALS) in the Philippines.

Meanwhile, recent trends in research disclosed the need to evaluate the TPCK among teachers of non-formal education programs, such as the ALS Program in the Philippines (Isaacs, et al., 2010; Walahoski & Suzanne, 2012; Dela Rosa, 2015). The use of effective evaluation plays a crucial role in revealing its outcomes, especially in terms of assessing if the objectives of the programs are met. As such, assessing students' performance is one of the best ways to measure the TPACK among ALS teachers to ensure that such knowledge promotes and helps students to become globally competitive through the acquisition of the 21st-century skills despite learning in non-formal school (George, et al., 2000; Bozhovich, 2009). Students' performance in the Accreditation and Equivalency test reflects the skills they possessed and acquired from their technologically, pedagogically, and content knowledgeable ALS teachers. However, little has been done to assess such engagement, especially with non-formal learners (Feichas, 2010; Guerrero, 2007).

Given this context, it becomes imperative to examine the extent to which ALS mobile teachers' TPACK influences their students' academic outcomes and perspectives on education. While ALS is designed to bridge educational gaps for marginalized sectors, the effectiveness of its delivery is intricately tied to the capacity of mobile teachers to integrate technology, sound pedagogy, and relevant content in their instruction. The relationship between teachers' competencies and student outcomes, both in terms of measurable performance and affective attitudes, offers valuable insights for improving program implementation.

In light of the foregoing, this study assessed the TPACK of ALS mobile teachers to determine its correlation with students'

performance in the Accreditation and Equivalency Test and their attitude towards schooling. The findings may serve as a basis for the development and possible adoption of a targeted teacher development framework aimed at strengthening instructional delivery in ALS and ultimately enhancing student success in non-formal education settings.

Objectives of the Study

This study examined the correlation between ALS teachers' Technological, Pedagogical, and Content Knowledge and students' performance and attitude toward schooling in the divisions of Zamboanga del Norte, Dipolog City and Dapitan City during the school year 2022-2023.

Specifically, it answers the following questions:

1. What is the level of Technological Pedagogical Content Knowledge (TPACK) among ALS teacher-respondents?

2. What is the level of students' attitude towards schooling?

3. What is the Level of Students' Performance in the Accreditation and Equivalency Test?

4. Is there a significant relationship between ALS teachers' TPACK level and students' attitudes toward schooling?

5. Is there a significant relationship between ALS teachers' TPACK level and students' performance in the Accreditation and Equivalency Test?

Theoretical/Conceptual Considerations

This study is anchored on the Technological Pedagogical Content Knowledge (TPACK) Framework developed by Koehler and Mishra (2006), which highlights the interplay among three core domains of teacher knowledge: technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). The TPACK model emphasizes that effective teaching with technology requires a thoughtful integration of these domains, enabling educators to deliver subject content through appropriate pedagogical strategies and relevant technological tools.

In this framework:

1. Content Knowledge - refers to the teacher's understanding of the subject matter.

2. Pedagogical Knowledge - involves the methods and processes of teaching, including classroom management, assessment, and lesson planning.

3. Technological Knowledge - encompasses familiarity with digital tools and platforms used to facilitate learning.

4. The model further defines intersections of these domains:

5. Pedagogical Content Knowledge (PCK) (Shulman, 1986) focuses on teaching strategies specific to content delivery.

6. Technological Content Knowledge (TCK) refers to the understanding of how technology can represent and transform specific content (Handal et al., 2013).

7. Technological Pedagogical Knowledge (TPK) involves the knowledge of how technology can support pedagogical strategies.

8. At the center lies TPACK, the integrated knowledge that enables teachers to use technology effectively in subject-specific and pedagogically sound ways.

The relevance of TPACK is strongly supported in the literature across curriculum development (Angeli & Valanides, 2009), online learning (Archambault & Barnett, 2009), and science education (Graham et al., 2009). Lee and Tsai (2010) further emphasized that TPACK-based instruments help assess how teachers integrate technology into teaching.

In the context of the Alternative Learning System (ALS) in the Philippines, this framework serves as a lens to explore how mobile teachers integrate technology with pedagogy and content to meet diverse learners' needs. Given the evolving educational landscape and digital shift, TPACK is not only instrumental in curriculum delivery but also in shaping students' attitudes toward schooling and academic performance.

Thus, this study adopts the TPACK framework to examine the self-reported competencies of ALS mobile teachers in Zamboanga del Norte, Dipolog City, and Dapitan City, and to assess how these competencies relate to student outcomes.

Furthermore, in this study, two key dependent variables were investigated in relation to ALS mobile teachers' TPACK: (1) students' attitude towards schooling, and (2) students' performance in the Accreditation and Equivalency (A&E) Test.

The construct of students' attitude towards schooling, adapted from Seker (2011), was measured through six indicators: teaching, school image, loneliness at school, testing and feedback, reluctance, and belongingness. These reflect the emotional, cognitive, and social dimensions of students' school experience. A positive attitude is often associated with engagement, motivation, and academic persistence.

The second dependent variable, students' performance in the A&E Test, captures academic outcomes and reflects the efficacy of instruction. As Padua and Santos (1997) emphasized, student ratings not only assess academic achievement but also function as feedback for learners, communication tools for stakeholders, and data for institutional decisions.

Additionally, the study examined how demographic profiles of both ALS mobile teachers (e.g., length of service, training, and educational attainment) and ALS students (e.g., age, family income, educational attainment) may influence the interplay between TPACK, attitudes, and performance.

Together, these variables formed the basis of the study's conceptual framework, which positions ALS mobile teachers' TPACK as the independent variable, students' attitude and performance as dependent variables, and demographic factors as contextual variables. The framework aims to explore how technology-integrated teaching expertise translates to student affect and achievement in the context of the ALS program.

Figure 1

Theoretical Framework: The Koehler's TPACK
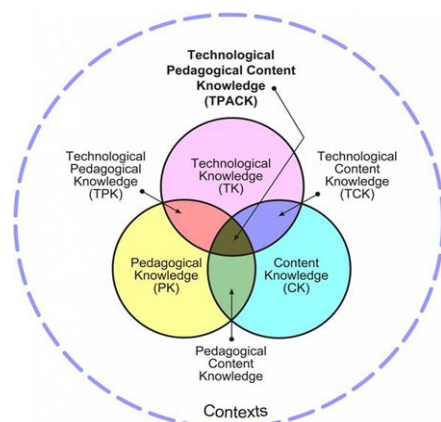
Methodology

This study employed a descriptive-correlational research design incorporating both survey and documentary analysis methods. The survey approach was used to gather data from respondents using a researcher-constructed questionnaire. Meanwhile, the correlational research method was applied to determine the statistical relationships between variables, specifically, the teachers' Technological Pedagogical Content Knowledge, students' attitudes toward schooling, and their performance in the Accreditation and Equivalency Test, without manipulating any variables, consistent with Bhat's (2019) description of non-experimental research.

The study was conducted in the ALS Centers within the Divisions of Zamboanga del Norte, Dipolog City, and Dapitan City, Philippines. The respondents included 162 ALS mobile teachers and 387 ALS students who took the 2019 A&E Test. All ALS teachers in the three divisions were included as respondents through total enumeration. Moreover, Slovin's formula was used to determine the sample size of the student respondents from a target population of 11,989. With a margin of error of 5%, a total of 387 student respondents were selected. The number of student representatives per division was proportionally computed, and respondents were chosen through simple random sampling using the lottery method. The distribution of respondents showed that 79% of both teachers and students were from Zamboanga del Norte, while the rest were from Dipolog City and Dapitan City.

Two instruments were developed for data collection, one for teachers and one for students. Each instrument consisted of two parts. The first part for teachers measured their level of TPACK, based on the indicators established by Akman and Guven (2015), which included technological knowledge, pedagogical knowledge, content knowledge, pedagogical content knowledge, technological pedagogical knowledge, technological content knowledge, and the integrated technological pedagogical content knowledge. The second part is for students to assess their attitudes toward schooling based on the scale developed by Seker and Komur (2004). This scale comprised six dimensions: teaching, school image, loneliness at school, testing and feedback, reluctance, and belongingness. Since both instruments were adopted from validated sources, only face validation was conducted.

The responses regarding the teachers' TPACK were measured using a four-point Likert scale: 4 – Very Good (3.26–4.00), 3 – Good (2.51–3.25), 2 – Low (1.76–2.50), and 1 – Very Low (1.00–1.75). Likewise, students' attitudes were rated using a similar four-point scale: 4 – Strongly Agree (3.26–4.00), 3 – Agree (2.51–3.25), 2 – Disagree (1.76–2.50), and 1 – Strongly Disagree (1.00–1.75). For student performance in the A&E Test, the benchmark for passing was set at a minimum score of 150 out of 250 test items, in accordance with DepEd Memorandum DM 076, s. 2018. Performance levels were further categorized using a five-point scale based on DepEd Form 138, ranging from "Did Not Meet Expectation" (below 150 points) to "Excellent" (225–250 points).

Prior to data collection, the researcher obtained approval through a series of formal communications. A letter was first addressed to the Head of the EMD Program at Saint Vincent's College, requesting endorsement and then followed by communications to the Schools Division Superintendents of Zamboanga del Norte, Dipolog City, and Dapitan City and ALS Division and District Coordinators. Upon approval, the researcher personally administered the questionnaires to the respondents. An informed consent was secured from the parents of the learners explaining the nature of the study. Then, learners were fully informed about the purpose of the research and their voluntary participation. The completed surveys were then immediately retrieved and subjected to data processing.

For data analysis, several statistical methods were employed. Weighted mean was used to analyze the levels of TPACK among teachers, students' attitudes, and their performance. To determine the relationship between the teachers' TPACK and students' attitudes and performance, the Spearman Rank-Order

Correlation was applied. The correlation values were interpreted using the scale provided by Cohen, West, and Aiken (2014) and supported by Refugio et al. (2020), with correlation sizes classified as large (±0.50 to ±1.00), medium (±0.30 to ±0.49), small (±0.10 to ±0.29), negligible (±0.01 to ±0.09), and no correlation (0.00). All data were analyzed using SPSS version 20.0, Minitab version 17, and Microsoft Excel's Data Analysis ToolPak, and statistical tests were conducted at a 0.05 level of significance.

Results and Discussion

Table 1

The Level of ALS Mobile Teachers' Technological Pedagogical Content Knowledge

Indicators	Zamboanga del Norte		Dipolog City		Dapitan City	
	Mean	Level/ Interpretation	Mean	Level/ Interpretation	Mean	Level/ Interpretation
Technological	3.23	Good	3.21	Good	3.22	Good
Pedagogical	3.08	Good	3.01	Good	3.04	Good
Content	3.15	Good	3.18	Good	3.15	Good
Pedagogical Content	3.28	Very Good	3.28	Very Good	3.29	Very Good
Technological Pedagogical	3.17	Good	3.16	Good	3.13	Good
Technological Content	3.20	Good	3.19	Good	3.19	Good
Technological Pedagogical Content	3.18	Good	3.17	Good	3.18	Good
Overall Mean	**3.18**	**Good**	**3.17**	**Good**	**3.17**	**Good**

Table 1 presents the ALS mobile teachers' technological, pedagogical, and content knowledge levels. The table reveals that, on average, the ALS mobile teachers' technological, pedagogical, and content knowledge was "good." This means that ALS mobile teachers possess the ability to understand and communicate concepts effectively using technology, and to apply appropriate pedagogical strategies that integrate technology in teaching content tailored to students' diverse learning needs. They are also knowledgeable about the factors that make certain concepts easier or more difficult to learn, and how technology can help address these conceptual challenges. Furthermore, they are aware of

students' prior knowledge and assumptions related to the content, including their technological strengths or limitations, and they know how to leverage technology to build on learners' existing experiences to help them develop or reinforce meaningful understanding.

Harris, Mishra, and Koehler (2006) emphasized that effective teaching requires teachers to transform subject content into appropriate pedagogical strategies while integrating technology meaningfully. Their study revealed that teachers showed notable growth in confidence across all components of the TPACK framework.

Table 2

The Level of the Students' Attitude towards Schooling

Indicators	Zamboanga del Norte		Dipolog City		Dapitan City	
	Mean	Level/ Interpretation	Mean	Level/ Interpretation	Mean	Level/ Interpretation
Teaching	3.20	Agree/ Favorable	3.23	Agree/ Favorable	3.26	Strongly Agree/ Highly Favorable
School Image	3.41	Strongly Agree/ Highly Favorable	3.42	Strongly Agree/ Highly Favorable	3.47	Strongly Agree/ Highly Favorable
Loneliness at School	1.10	Strongly Disagree/ Poorly Favorable	1.12	Strongly Disagree/ Poorly Favorable	1.08	Strongly Disagree/ Poorly Favorable
Testing & Feedback	3.63	Strongly Agree/ Highly Favorable	3.64	Strongly Agree/ Highly Favorable	3.62	Strongly Agree/ Highly Favorable
Reluctance	2.16	Disagree/ Slightly Favorable	2.16	Disagree/ Slightly Favorable	2.17	Disagree/ Slightly Favorable
Belongingness	1.81	Disagree/ Slightly Favorable	1.80	Disagree/ Slightly Favorable	1.79	Disagree/ Slightly Favorable
Overall Mean	**2.55**	**Agree/ Favorable**	**2.56**	**Agree/ Favorable**	**2.57**	**Agree/ Favorable**

Table 2 presents the level of students' attitudes toward schooling. A closer examination of the data indicates that students generally held a favorable attitude toward schooling, a view that was supported by their teachers. This suggests that students have a strong inclination to attend school and recognize its importance in their lives. Moreover, it implies that students perceive school not only as a place to acquire essential knowledge and skills, but also as a supportive environment where they can engage socially, academically, and emotionally with their peers.

Moè, Pazzaglia, Tressoldi, and Toso (2009) emphasized that students' attitudes toward school play a mediating role in the relationship between affective-motivational factors and academic achievement. They also highlighted that self-confidence directly influences students' academic success.

Table 3

The Level of the Students' Performance in the Accreditation and Equivalency Test

Divisions	225-250 (5)	200-224 (4)	175-199 (3)	150-174 (2)	Below 150 (1)	Average Weighted Value	Descrip-tion
Zamboanga del Norte	15	70	75	60	86	2.57	Fairly Satisfac-tory
Dipolog City	2	7	8	15	13	2.33	Fairly Satisfac-tory
Dapitan City	4	4	5	13	10	2.42	Fairly Satisfac-tory
Overall	**21**	**81**	**88**	**88**	**109**	**2.53**	**Fairly Satisfac-tory**

Table 3 presents the students' performance in the Accreditation and Equivalency (A\&E) Test. Upon closer examination, it is evident that students from Zamboanga del Norte, Dipolog City, and Dapitan City demonstrated only a "fairly satisfactory" level of achievement. This suggests potential issues in the implementation of the ALS program. The results imply that students may not be adequately equipped with the essential competencies needed to confidently pass the A\&E Test. One possible contributing factor could be the level of teachers' technological, pedagogical, and content knowledge.

Tomacruz (2018) highlighted that the low passing rates in the ALS program suggest it is not fully effective. Similarly, among the 10% of potential learners who enrolled, only around 60% attended classes regularly, and just about 20% successfully passed the ALS Accreditation and Equivalency examination. The World Bank (2018) also reported more pronounced challenges in poorer communities. For example, in the Autonomous Region in Muslim Mindanao, only 4% of eligible learners enrolled in the program, and merely 1% of them passed the Accreditation and Equivalency test.

Table 4

Test of Relationship between the Level of the TPACK of the ALS Mobile Teachers and the Level of Students' Attitude towards Schooling

Variables	Mean	Computed ρ	p-value	Decision
Level of the TPACK of the ALS Mobile Teachers & Level of Students' Attitude Towards Schooling	3.17 2.60	0.013	0.951	Negligible/ Slightly Positive Correlation/ Not Significant

Table 4 presents the test of the relationship between the TPACK levels of ALS mobile teachers and the students' attitude towards schooling. The data indicate that the relationship is negligible and only slightly positive, with no statistical significance across the three divisions, Zamboanga del Norte, Dipolog City, and Dapitan City. The computed ρ-value of 0.951 exceeds the significance level of 0.05, suggesting that an increase in teachers' TPACK does not result in a meaningful increase in

students' attitude towards schooling. This implies that students' attitudes are not strongly influenced by the TPACK of ALS teachers. Supporting this, Faqeih (2015) emphasized that students value school primarily for the benefits it brings and believe that what they learn will significantly shape and guide their future.

Table 5

Test of Relationship between the Level of the TPACK of the ALS Mobile Teachers and the Level of Students' Performance in the Accreditation and Equivalency Test

Variables	Mean	Computed ρ	p-value	Decision
Level of the TPACK of the ALS Mobile Teachers & Level of Students' Performance in the A&E Test	3.17 2.53	0.163	0.416	Small/ Low Positive Correlation/ Not Significant

Table 5 presents the results of the test examining the relationship between the TPACK levels of ALS mobile teachers and students' performance in the Accreditation and Equivalency (A&E) Test. The findings show a small, positively low, and statistically insignificant relationship across the three divisions—Zamboanga del Norte, Dipolog City, and Dapitan City. The computed ρ-values, all exceeding the 0.05 significance threshold, indicate that an increase in the TPACK level of ALS teachers corresponds only to a slight and non-significant improvement in students' performance. This suggests that the teachers' TPACK does not have a meaningful or significant impact on students' success in the A&E Test.

The present finding corroborated the study of Farrell and Hamed (2017), whose investigation revealed that the TPACK of teachers did not translate students' scores in the Value-Added Model test.

Conclusion

The findings of this study offer valuable insights into the relationship between ALS mobile teachers' Technological Pedagogical Content Knowledge (TPACK), students' attitudes toward schooling, and their performance in the Accreditation and Equivalency (A&E) Test. Overall, ALS teachers across the three divisions demonstrated a "good" level of TPACK, indicating a foundational understanding and application of technology in pedagogical and content delivery. Similarly, students exhibited a generally "favorable" attitude toward schooling, recognizing its importance in their academic and social development. However, their performance in the A&E Test was rated only as "fairly satisfactory," suggesting that learning outcomes are not yet optimal.

The results further revealed that while there was a negligible and statistically insignificant correlation between teachers' TPACK and students' attitudes toward schooling, there was a small but likewise insignificant correlation between teachers' TPACK and student performance in the A&E Test. These findings suggest that although TPACK is important, it alone may not be sufficient to significantly influence student attitudes or performance in the context of the ALS program.

These outcomes highlight the complexity of teaching and learning in non-formal education settings like ALS. Multiple variables, including student motivation, socioeconomic factors, instructional materials, and school support systems, likely interact with teacher competence to influence student outcomes. Thus, while enhancing teachers' TPACK remains essential, it should be integrated within a broader framework of systemic support, targeted interventions, and student-centered pedagogies to improve educational outcomes among ALS learners. Future research may benefit from examining these other contextual factors and exploring how they mediate or moderate the influence of teacher competence on student success.

Recommendations

1. The Department of Education may provide continuous, intensive, and contextualized training for ALS teachers focused on integrating technology meaningfully into pedagogy and content delivery. Emphasis should be placed on practical applications relevant to the non-formal learning environment. While ALS mobile teachers demonstrated a "good" level of TPACK, the findings suggest this may not be enough to significantly influence student attitudes or performance.

2. Since TPACK alone does not significantly predict students' performance in the A&E Test, ALS program managers and coordinators may address other factors affecting learning outcomes. These may include access to learning resources, learner motivation, family support, and socio-emotional well-being. Interventions like mentoring, modular enrichment, and community-based learning hubs may provide more support to ALS learners.

3. ALS implementers may create a more inclusive and motivating learning environment by fostering peer interaction, recognizing student achievements, and encouraging learner agency. Strategies such as learning circles, mobile learning apps, and peer-led sessions may help students feel more connected and motivated. Although students showed a generally favorable attitude toward schooling, areas like "belongingness" and "reluctance" scored low.

4. Further research should examine other influencing factors such as instructional time, learner profiles, digital access, teacher workload, and assessment design. Mixed-method or longitudinal research could provide deeper insights into the complex dynamics of teaching and learning in non-formal settings like ALS.

5. The Bureau of Alternative Education may consider embedding TPACK explicitly within teacher competency standards and curriculum implementation guides for ALS. This integration will ensure that digital literacy and technology integration are not treated as optional add-ons but as core components of quality instruction.

6. ALS implementers may use the A&E test results data to design remedial or bridging programs focused on learners' weak areas. Diagnostic assessments and feedback mechanisms may be employed regularly to monitor learner progress and adjust instruction accordingly.

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