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Technology Integration in Indonesian Language Teaching: Insights From TPACK, SAMR, and TAM Frameworks

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***Abstract*—The adoption of technology in language instruction has brought substantial changes to the educational landscape; however, challenges remain in bridging the gap between its potential benefits and its practical application among educators. This study examines the use of digital technology tools by Indonesian language teachers and pre-service teachers' perceptions of technology use in learning processes. The study employed a mixed-methods approach involving five Indonesian language teachers from five schools and 112 pre-service teachers from five universities. Data analysis was guided by three established theoretical frameworks: the Technology Acceptance Model (TAM), the Substitution Augmentation Modification Redefinition (SAMR) framework, and Technological Pedagogical Content Knowledge (TPACK). Qualitative data were obtained through interviews with in-service teachers, while quantitative data were collected through questionnaires administered to pre-service teachers. The findings revealed significant convergence between the two groups in their preference for efficient and user-friendly tools. Pre-service teachers emphasised interactivity and active engagement, whereas experienced teachers prioritised effective classroom management and pedagogical accuracy. This study offers theoretical and practical contributions to the development of educators' digital competencies, particularly in the context of language education in regions with limited digital infrastructure.**

***Index Terms*—language learning, SAMR, TAM, technology integration, TPACK**

I. Introduction

Digital technology has had a transformative impact on all aspects of human life, including language education. Although technology can enhance learning, its effectiveness depends on pedagogical implementation (Margareth et al., 2025; Lane et al., 2024; Linardon et al., 2024). Various digital tools are now widely used in language learning in Indonesia, including social media platforms such as YouTube and Instagram, language-learning applications, video-conferencing platforms such as Zoom and Google Meet, and online learning platforms such as Google Classroom and Moodle. The main advantage of these tools lies in their ability to help students learn independently at their own pace and according to their ability, while also providing access to a wide range of authentic and relevant language materials (Eryansyah & Erlina, 2023; Gani et al., 2024; Priante & Tsekouras, 2025).

According to Anjani et al. (2025), digital technology offers substantial benefits for language learning, and its application should extend beyond classroom boundaries. Consequently, collaboration among stakeholders and policymakers is essential for establishing an ecosystem that facilitates effective technology integration in education. In contrast, Abbey et al. (2024) identified a divergence in priorities between teachers and students regarding technology use: teachers primarily emphasise instructional quality and professional development, whereas students focus more on active engagement and improved learning outcomes. Furthermore, the successful implementation of educational technology is influenced by factors such as teachers' attitudes, digital competence, and the availability of adequate infrastructure (Chang, 2026). Similarly, the Technological Pedagogical Content Knowledge (TPACK), Substitution Augmentation Modification Redefinition (SAMR), and Technology Acceptance Model (TAM) frameworks collectively highlight the importance of continuous professional development to ensure that teachers' pedagogical practices remain aligned with technological advancements (Vancova, 2025).

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The main objective of this study is to examine the extent to which digital tools are used in language learning by in-service teachers and pre-service teachers. The study was conducted using three theoretical frameworks: the TAM framework (Davis, 1989), the TPACK framework (Mishra & Koehler, 2006), and the SAMR framework (Hamilton et al., 2016). These three frameworks are used simultaneously because each provides a distinct yet complementary perspective, ranging from how users accept technology, to the knowledge teachers require to integrate it, and the extent to which technology changes the quality of learning.

II. Literature Review

A. Technology Use in Learning

The success of technology integration in learning is inseparable from teachers' ability to apply it appropriately and judiciously in the classroom. Teachers play a central role in optimising the use of various digital tools (Gozali et al., 2023). Their role also includes ensuring a balance between technological innovation and established pedagogical approaches. However, the use of technology in the classroom is not without challenges. Several studies have revealed that many teachers still lack an adequate understanding of how to fully utilise technology in their teaching practices, particularly in assessing student learning outcomes (Nguyen & Habok, 2023). This situation is also evident in higher education, where instructors often face a digital competence gap, especially in evaluating and monitoring students' learning progress, even though digital tools can provide real-time data on learning development (Basilotta et al., 2022).

Limited access to collaborative learning forums among teachers exacerbates this situation, as many teachers ultimately learn independently without sufficient collaborative support, which may hinder their professional growth. Li et al. (2023) found that teachers with greater familiarity with digital technology tend to be more active and confident in using it as part of classroom learning strategies. However, Fernández-batanero et al. (2020) caution that the technology training teachers have received so far has primarily been oriented towards technical mastery, while underemphasising its application in classroom pedagogical contexts, even though this dimension is a crucial determinant of learning effectiveness.

Equipping pre-service teachers with adequate technological skills is therefore an urgent need, given the diverse learning situations they will encounter in the classroom (Behforouz & Ghaithi, 2025). Although digital tools were previously used mainly by independent and highly motivated students, their use has now expanded and become an integral part of both blended and online learning. Therefore, the successful implementation of technology in education depends heavily on the availability of teachers who are not only digitally literate but also able to align technology use with curriculum demands and students' actual classroom needs (Mulyadi et al., 2025).

Thus, strengthening teachers' technological competencies is not merely a supplementary concern but a core component of continuous teacher professional development. Teacher education programmes need to be designed not only to address technical aspects but also to equip pre-service teachers with contextual pedagogical strategies for utilising technology. Meaningful technology integration can only be achieved if teachers possess both confidence and a deep understanding of how technology can enhance, rather than replace, classroom learning interactions (Anwar et al., 2025). Ultimately, digitally and pedagogically competent teachers are key to creating adaptive, inclusive, and relevant learning in the modern era of education.

B. TPACK Framework

TPACK refers to a framework composed of three fundamental domains of knowledge: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). The interrelationship among these core components leads to the emergence of intersecting forms of knowledge, including pedagogical content knowledge (PCK), technological content knowledge (TCK), and technological pedagogical knowledge (TPK), which together form the holistic TPACK framework. As a knowledge construct, TPACK is inherently situated, complex, multidimensional, integrative, and transformative (Angeli & Valanides, 2009; Koehler et al., 2013; Mishra & Koehler, 2006).

TPACK illustrates how technology can be meaningfully integrated into teaching practices, from selecting appropriate digital tools to adapting pedagogical strategies to support optimal learning outcomes (Adelya et al., 2025). Implementing this framework requires teachers to align their teaching practices with technological developments, minimise limitations in the use of digital tools in educational contexts, and ensure that educators receive adequate training to utilise technology effectively and responsibly (Noortyani et al., 2024).

In the context of teacher training, Koh and Divaharan (2013) developed a TPACK-based learning model implemented in a pre-service primary teacher education programme. The model was designed through three interconnected stages: developing openness to technology and technical proficiency, modelling the use of technology in pedagogical contexts, and applying technology-based pedagogical strategies directly in the classroom. Their findings showed that participants experienced significant development, particularly in technological and pedagogical-psychological knowledge. However, the researchers emphasised the need for further in-depth studies, particularly regarding pedagogical modelling, the evaluation of learning products, and mechanisms for knowledge sharing among teachers.

C. SAMR Framework

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The SAMR framework is a model developed by Puentedura and discussed by Hamilton et al. (2016) as a guide for educators in integrating technology into learning in a gradual and meaningful manner. This model describes four hierarchical levels of technology utilisation in education, ranging from the simplest to the most transformative. At the lowest level, Substitution means that technology simply replaces conventional tools without functional change, for example, replacing handwritten text with digital documents. Augmentation occurs when technology still functions as a substitute but provides significant functional improvement, such as the use of commenting and autocorrect features in word processing (Puentedura, 2006; Hamilton et al., 2016).

The next two levels bring more fundamental changes to learning practices. At the Modification stage, technology enables significant redesign of assignments, such as requiring students not only to write essays but also to present them in interactive multimedia formats that can be reviewed by peers online (Puentedura, 2014b, 2014a). At the highest stage, Redefinition, technology creates opportunities for new learning tasks that would have been impossible without technology, such as real-time cross-border project collaboration or artificial intelligence-based simulations. This division emphasises that effective technology integration involves more than replacing media; it also transforms the learning experience as a whole (Puentedura, 2014b).

In language education and teacher professional development, the SAMR framework has been widely used as a reflective tool for educators to evaluate the extent to which the technology they use genuinely improves learning quality (Puentedura, 2006). Numerous studies have shown that most teachers remain at the two lower levels of Substitution and Augmentation and have not fully utilised the transformative potential of technology at the Modification and Redefinition levels (Hamilton et al., 2016). Therefore, a thorough understanding of the SAMR model should be incorporated into teacher training programmes so that educators are not only technically literate but also able to design innovative and contextually oriented learning experiences that strengthen students' overall competencies.

D. TAM Framework

TAM, first formulated by Fred D. Davis in 1989, is a theoretical model used to explain and predict how users accept and adopt information technology. It is derived from the Theory of Reasoned Action proposed by Martin Fishbein and Icek Ajzen, but was later simplified and contextualised by Davis for technology-related behaviour. TAM focuses on two principal determinants: perceived usefulness, which describes the degree to which an individual believes that technology enhances work or learning performance, and perceived ease of use, which refers to the perceived effortlessness of using a system. These two factors shape users' attitudes towards technology and consequently determine their behavioural intentions and actual usage patterns (Scherer & Howard, 2018; Teo, 2015).

Over time, TAM has undergone several extensions and refinements to accommodate increasingly diverse and complex contexts of technology use. Venkatesh et al. (2000) developed TAM2 by adding social and cognitive factors, such as subjective norms, job relevance, and output quality, as variables that influence perceived technology usefulness. Furthermore, Venkatesh et al. (2000) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT) as an integrative model that combines TAM with various other technology acceptance theories. In the educational context, TAM has been widely applied to assess teachers' and students' readiness for and acceptance of various digital learning platforms, learning management systems, and artificial intelligence-based technologies (Teo, 2015).

The relevance of TAM in education, particularly for understanding teacher behaviour in adopting technology in the classroom, has been demonstrated through various international empirical studies. Teo (2015) found that perceived ease of use and perceived usefulness significantly influence teachers' intentions to integrate technology into their teaching practices. Moreover, Scherer and Howard (2018) emphasise that digital self-efficacy and institutional support act as moderating variables that influence the relationship between technology acceptance and classroom implementation. Consequently, as proposed by Davis (1989), TAM functions not only as an explanatory framework for technology adoption but also as a conceptual foundation for the development of teacher training programmes aimed at identifying critical barriers to and drivers of effective and sustainable technology integration.

III. METHODOLOGY

A. Research Design

This study employed a mixed-methods design comprising a quantitative questionnaire for pre-service Indonesian language teachers from various universities and qualitative interviews with Indonesian language teachers already teaching in schools. Both designs were chosen because they offer a comprehensive view of the research problem (Benavides, 1997). This mixed-methods approach provided a complex perspective on the level of acceptance of digital tools among in-service teachers and on pre-service teachers' perspectives regarding technology-based digital learning tools (Insani et al., 2024). Each participant was given a detailed explanation of the research purpose, accompanied by assurances that their responses would remain confidential and that their identities would not be disclosed or traceable. The interviews were conducted individually and in person, with informed consent secured from every informant before the interviews commenced. Recordings were stored in a password-protected digital system. Similar procedures were applied to the management of questionnaire responses. The questionnaire was designed to be completely anonymous,

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and participation was voluntary, with the entire research process adhering to university-established research ethics guidelines.

B. Setting and Participants

This research involved 112 pre-service teachers from various universities and five senior high school Indonesian language teachers. Details are presented in Table 1 and Table 2.

TABLE 1
PRE-SERVICE TEACHERS

No.	Institution	Number of Students	Location	Instrument Used	Percentage
1	Universitas Madura	60	Pamekasan	Questionnaire	53.6%
2	Universitas Trunodjoyo Madura	10	Bangkalan	Questionnaire	8.9%
3	Universitas PGRI Sumenep	14	Sumenep	Questionnaire	12.5%
4	Universitas Islam Negeri Madura	18	Pamekasan	Questionnaire	16.1%
5	STKIP PGRI Sampang	10	Sampang	Questionnaire	8.9%
Total		**112**			**100%**

TABLE 2
SENIOR HIGH SCHOOL INDONESIAN LANGUAGE TEACHERS (IN-SERVICE TEACHERS)

No.	Institution	Location	Number of Teachers	Instrument Used	Teaching Experience
1	SMAN 1 Pamekasan	Pamekasan	1	In-depth interview	7 years
2	SMAN 3 Pamekasan	Pamekasan	1	In-depth interview	8 years
3	MAN 1 Pamekasan	Pamekasan	1	In-depth interview	7 years
4	MAN 1 Sumenep	Sumenep	1	In-depth interview	10 years
5	SMAN 2 Sumenep	Sumenep	1	In-depth interview	14 years
Total			**5 Teachers**	**Average: 9.2 years**	

C. Data Collection and Analysis

A mixed-methods strategy was implemented in this study to integrate quantitative and qualitative data systematically. The quantitative component involved the distribution of structured questionnaires to 112 pre-service teachers across five universities, whereas the qualitative component consisted of in-depth interviews with five senior high school Indonesian language teachers who had substantial teaching experience. The use of both instruments corresponds with the triangulation principle proposed by Creswell and Clark (2017) and Cresswell (2012), which emphasises that integrating numerical and narrative data can enhance the validity of research findings. The interviews were conducted directly in face-to-face settings, recorded with participants' consent, and subsequently transcribed verbatim to ensure data accuracy. Furthermore, all collected data were securely stored in a password-protected digital system to safeguard confidentiality, in accordance with established research ethics guidelines (Listyowati et al., 2025).

Descriptive statistical analysis was applied to the quantitative data to examine the frequency distribution, mean scores, and percentages of students' responses to the questionnaire statements. This approach allowed the researchers to identify general patterns and tendencies in participants' perceptions (Creswell & Clark, 2017). In the qualitative phase, interview data were processed through thematic analysis encompassing open, axial, and selective coding procedures, in accordance with the qualitative analytical approach outlined by Creswell and Clark (2017). This process was carried out iteratively, with the researchers rereading the transcripts to identify emerging themes inductively. To ensure the reliability of the analytical results, inter-coder reliability checks were conducted so that data interpretation was not subjective and could be scientifically justified.

To ensure data credibility and validity, this study adopted source triangulation by combining the perspectives of pre-service teachers and experienced teachers as complementary data sources. Yin (2009) emphasises that the use of multiple sources of evidence is a key strength in research design, as it allows findings from various perspectives to converge, thereby producing stronger and more convincing conclusions. Furthermore, Yin (2009) also emphasises the importance of establishing a clear chain of evidence, namely the logical link between the research question, the data collected, and the conclusions drawn. In this study, this principle was applied through systematic documentation at every stage of data collection and analysis, from interview protocols and questionnaires to verbatim transcripts and analytical memos, so that the entire research process could be traced and verified transparently (Gerring, 2007).

IV. RESULTS AND DISCUSSION

A. Results

Before the main data analysis was conducted, the reliability of the questionnaire was tested using Cronbach's alpha for each TAM dimension. The test results showed statistically acceptable values, with the Ease of Use dimension categorised as acceptable, the Behavioural Intention dimension categorised as good, and the Perceived Usefulness dimension categorised as very good, in line with the criteria proposed by Taber (2018). Furthermore, the feasibility of factor analysis was tested using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. The KMO value of 0.874 indicates that the data were well suited to factor analysis, and the significance of

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Bartlett's Test ($p < .001$) supports this finding (Vancova, 2025). Overall, the results of these statistical tests confirm that the research instrument had an adequate level of reliability and validity to produce scientifically accountable findings.

TABLE 3
RESULTS OF KMO AND BARTLETT'S TEST

Test	Parameter	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	-	0.874
Bartlett's Test of Sphericity	Approx. Chi-Square	1389.25
	df	286
	Sig.	< .001

1. Pre-Service Teachers' Perceptions of Learning Technology (TAM)

Questionnaire data from 112 pre-service teachers were analysed based on the three main components of TAM: Ease of Use (EoU), Behavioural Intention (BI), and Perceived Usefulness (PU). The results of the descriptive statistical analysis are presented in Table 4.

TABLE 4
PRE-SERVICE TEACHERS' PERCEPTIONS OF INDONESIAN LANGUAGE LEARNING TECHNOLOGY (N = 112)

Code	Statement Item	Mean	SD	Skewness	Category
Ease of Use (Cronbach's Alpha = 0.672)					
EoU1	Technology does not create time pressure in learning.	3.61	1.02	-0.61	High
EoU2	Technology makes it easier for me to support the teaching and learning process.	4.31	0.74	-1.69	Very high
EoU3	Technology helps meet learning needs effectively.	3.84	0.86	-0.73	High
Behavioural Intention (Cronbach's Alpha = 0.831)					
BI1	Technology helps with time management in my studies.	3.95	0.97	-0.89	High
BI2	Technology has become an integral part of my learning.	4.02	0.99	-0.80	High
BI3	I plan to use technology consistently in teaching.	4.21	0.88	-0.91	Very high
BI4	I would recommend the use of technology for students.	3.87	0.93	-0.75	High
Perceived Usefulness (Cronbach's Alpha = 0.908)					
PU1	Technology increases student motivation and engagement.	4.47	0.81	-0.90	Very high
PU2	Technology provides fast and high-quality feedback.	4.01	0.76	-1.35	High
PU3	Technology supports flexible learning.	4.22	0.72	-1.10	Very high
PU4	Technology is engaging and interactive.	4.49	0.79	-1.03	Very high
PU5	Technology helps students master Indonesian language skills.	4.05	0.83	-0.88	High
PU6	Technology encourages active student engagement.	4.46	0.77	-0.95	Very high
PU7	Technology helps connect theory and practice.	3.66	0.94	-0.49	High

Scale: 1 = strongly disagree; 5 = strongly agree. Categories: Low (1.00-2.60), Medium (2.61-3.40), High (3.41-4.20), Very High (4.21-5.00).

The results show that the highest mean score was obtained in the Perceived Usefulness dimension, particularly for the interactivity item (PU4; M = 4.49) and active student engagement (PU6; M = 4.46). This finding indicates that pre-service teachers highly value the potential of technology to encourage active and engaging learning. This result is consistent with the findings of Vancova (2025), who stated that pre-service teachers tend to emphasise interactivity and engagement as the main value of technology in language learning. Meanwhile, the lowest mean score was found for the item related to the ability of technology to encourage critical and independent thinking (PU7; M = 3.66), indicating that pre-service teachers have not fully recognised the transformative potential of technology in developing higher-order thinking skills. In terms of digital device use, the majority of pre-service teachers reported using computers (87.5%) and

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smartphones (74.1%) as their primary devices. The most frequently used software included instructional videos (83.0%), mobile applications (72.3%), and language-practice websites (54.5%). Notably, 58.9% of respondents expressed interest in learning how to integrate artificial intelligence (AI) into Indonesian language teaching, reflecting their awareness of current technological developments.

2. Teachers' Practices and Perceptions in the Use of Technology (SAMR and TPACK))

Thematic analysis of interview transcripts from five Indonesian language teachers yielded four main, interrelated themes. All interviewed teachers reported using official digital platforms such as Google Classroom and WhatsApp Groups as their primary classroom management tools. The main reasons cited were convenience in sharing materials, submitting assignments, and ensuring accessibility for all students. This finding aligns with Vancova (2025), who found that experienced teachers tend to prefer centralised and efficient platforms for managing the learning process. Within the SAMR framework, this use ranges from Substitution to Augmentation, where technology is used as a replacement for, and functional enhancement of, conventional methods without fundamental changes to learning design.

"It is easier for me to share materials because everything is in one place, and I can also create interactive assignments there."

Teacher at SMAN 1 Pamekasan

Experienced teachers consistently prioritise technology that is not only easy to use but also capable of ensuring content accuracy and pedagogical appropriateness. They tend to choose academically recognised tools such as Quizizz, Google Forms, and educational YouTube content rather than adopting new, unvalidated technologies. This attitude reflects the Technological Pedagogical Knowledge (TPK) dimension within the TPACK framework (Mishra & Koehler, 2006), namely the ability to select and utilise technology appropriately to support the learning process. Vancova (2025) also confirmed that experienced teachers prioritise classroom management effectiveness and pedagogical accuracy over mere technological novelty.

"I cannot rely solely on AI to grade my students' writing; I have to read it myself because it concerns the quality of their language analysis."

Teacher at MAN 1 Pamekasan

All informants consistently identified limited digital infrastructure, particularly unstable internet connections and limited student device ownership, as the most significant barriers to optimising technology use. These conditions represent external variables in Davis's (1989) TAM model, which directly influence teachers' perceptions of technology's usefulness in the field. Such infrastructure challenges are distinctive to educational contexts in regions such as Madura and differ from the findings of Vancova (2025), whose study was conducted in university settings with more adequate digital infrastructure.

"An unstable internet connection makes it impossible for me to rely entirely on online activities; I always have to prepare offline alternatives."

Teacher at MAN 1 Sumenep

An analysis of the technology-use practices of five teachers revealed varying levels of integration based on the SAMR framework. The findings indicate that all teachers' practices ranged from the Substitution to Augmentation levels, with a small proportion reaching the Modification level. None of the teachers reached the Redefinition level. This pattern is consistent with the findings of Vancova (2025), who found that educators tend to implement lower SAMR levels more frequently to increase accessibility and efficiency.

TABLE 5
TEACHER TECHNOLOGY INTEGRATION LEVELS BASED ON THE SAMR FRAMEWORK

SAMR Level	Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5
Substitution	Digital PDF and PPT	Digital PDF and PPT	PDF and digital modules	PDF and video	PDF and digital books
Augmentation	Quizizz and Google Forms	Google Forms and YouTube	Online quizzes and worksheets	YouTube and podcasts	Online practice
Modification	Collaborative feedback	Not observed	Digital writing project	Collaborative feedback	Not observed
Redefinition	Not observed	Not observed	Not observed	Not observed	Not observed

3. Convergence and Divergence: Integration of Qualitative and Quantitative Findings

The integration of findings from both methods revealed patterns of convergence and divergence between the perspectives of pre-service and experienced teachers. The most significant convergence lies in their general acceptance of technology; both groups view technology as an essential component of Indonesian language learning. However, a clear divergence is evident in the orientation of its use: pre-service teachers are more oriented towards engagement and interactivity, whereas experienced teachers prioritise pedagogical reliability and operational efficiency. These findings align with Vancova (2025), who concluded that the two groups hold complementary views and that these views can serve as a foundation for developing more integrated and contextualised teacher education programmes.

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TABLE 6
CONVERGENCE AND DIVERGENCE OF FINDINGS BETWEEN PRE-SERVICE TEACHERS AND EXPERIENCED TEACHERS

Dimension	Pre-Service Teachers (Quantitative)	Experienced Teachers (Qualitative)	Pattern
Primary value of technology	Student interactivity and engagement (M = 4.49)	Classroom management efficiency and pedagogical accuracy	Divergent; different emphasis
Technology acceptance (TAM)	Very positive PU and high EoU	Positive but selective and critical	Convergent; both accept technology
Adoption level (SAMR)	Aspiration: Modification-Redefinition	Reality: Substitution-Augmentation	Divergent; theory-practice gap
TPACK competencies	Dominant TK (tool mastery)	Dominant TPK and PCK (pedagogical integration)	Convergent; integration as a foundation
Main obstacles	Confidence and readiness to teach	Infrastructure and internet connection	Divergent; different contexts
Development needs	AI training and digital media design	Institutional support and further training	Convergent; both require development

B. Discussion

The findings of this study revealed that both pre-service and experienced Indonesian language teachers in several regions showed positive attitudes towards the use of digital technology in learning. Pre-service teachers consistently gave the highest ratings to the perceived usefulness dimension, particularly in relation to interactivity (M = 4.49) and active student engagement (M = 4.46), indicating that they view technology as a key instrument for creating engaging and meaningful learning experiences. This finding is consistent with the core constructs of TAM proposed by Davis (1989), namely that perceived usefulness and perceived ease of use are two main determinants of users' technology acceptance. This result is also corroborated by Granić and Marangunić (2019), who, in their systematic review of 84 TAM studies in educational contexts, concluded that perceived usefulness is consistently the strongest predictor of technology acceptance among learners, including pre-service teachers. Meanwhile, experienced teachers placed greater emphasis on classroom management efficiency and pedagogical accuracy, reflecting maturity in assessing technology not solely based on its features but also on its suitability for learning objectives. This attitude is in line with the findings of Al-Khalidi (2021) and Bui (2022), who emphasised that active teachers tend to evaluate technology based on its contribution to instructional quality and ease of classroom management, rather than merely on its popularity or novelty.

One of the most striking findings of this study is the clear gap between the aspirations of pre-service teachers and the reality of teacher practice in the field, particularly in relation to technology adoption as defined by the SAMR framework. Analysis of the practices of five teachers showed that all remained at the Substitution to Augmentation levels, with only a small number reaching the Modification level and none reaching Redefinition. This finding is consistent with research by Al-Khalidi (2021), who found that teachers tend to use technology at lower SAMR levels because of limited time, resources, and training. In their systematic review, Blundell et al. (2022) also confirmed that most teachers in various contexts are only able to implement technology at the substitution and augmentation stages, while the transformative modification and redefinition stages are rarely achieved without strong institutional support. This condition is also reinforced by limitations in digital infrastructure in the research area, especially unstable internet connections and minimal student device ownership, which constitute external inhibiting factors, or external variables, as identified in TAM by Venkatesh et al. (2000). These findings underscore the urgency of developing teacher training programmes that focus not only on technical mastery but also on strategies for transformative technology implementation in environments with limited infrastructure.

Analysis using the TPACK framework revealed that both pre-service and experienced teachers have relatively strong Technology Knowledge (TK) as a common foundation, but both also show weaknesses in cross-domain integration, namely TPACK in its entirety. Pre-service teachers tend to excel in mastering digital tools (TK), but they are not yet able to integrate these tools deeply with pedagogical strategies and Indonesian language content (PCK and TCK). This may lead to cosmetic technology use, in which conventional activities are merely transferred to digital media without meaningful pedagogical transformation. This result corresponds with the findings of Tseng et al. (2022), whose comprehensive examination of TPACK research in language education demonstrated that language teachers generally face challenges in simultaneously integrating the seven TPACK domains, while technology use remains largely concentrated in teacher-centred pedagogical practices. Furthermore, according to Mishra and Koehler (2006), the effectiveness of TPACK depends on a comprehensive understanding of the relationships among technology, pedagogy, and content, rather than on separate competence in each component. Thus, the findings of this study indicate the need for a reorientation of the Indonesian language teacher education curriculum towards greater emphasis on holistic and contextual TPACK development, particularly in relation to language learning in regional areas.

These findings highlight an important theoretical contribution, indicating that a multi-framework approach involving TAM, SAMR, and TPACK facilitates a more comprehensive and nuanced interpretation of technology integration in

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language education than an approach based on a single theoretical framework. As emphasised by Vancova (2025), the combination of these three frameworks can synergistically capture the dimensions of psychological acceptance (TAM), pedagogical transformation (SAMR), and the depth of teacher knowledge (TPACK). Practically, these findings suggest that Indonesian language teacher education programmes need to be redesigned to integrate hands-on experience in using technology in a transformative, rather than merely substitutive, manner from the pre-service education stage onwards. This recommendation aligns with Haškov et al. (2021), who emphasised the importance of equipping pre-service teachers with the ability to use technology effectively in various teaching scenarios, including under conditions of limited infrastructure. Furthermore, collaboration between higher education institutions and secondary schools is key to bridging the gap between pre-service teachers' technological aspirations and the realities faced by experienced teachers, as recommended by Hamilton et al. (2016), who found that access, competence, and hands-on experience were the three main predictors of successful technology integration by pre-service teachers in their teaching practice.

V. Conclusion

Drawing on the research findings and subsequent discussion, it can be concluded that both pre-service and practising Indonesian language teachers responded positively to the adoption of digital technology in learning environments. Despite this similarity, each group reflected distinct orientations towards the application of such technology in teaching practices. Pre-service teachers emphasised interactivity and active student engagement as the primary values of technology, whereas experienced teachers tended to prioritise classroom management efficiency and pedagogical accuracy in selecting digital tools. These differences in orientation suggest that teaching experience affects individuals' understanding and utilisation of technology in Indonesian language education. Furthermore, both orientations function synergistically in supporting the advancement of educators' digital competencies.

Analysis using the SAMR framework shows that all experienced teachers participating in this study remained at the Substitution to Augmentation levels, and none reached the Redefinition level. This indicates that technology use in Indonesian language learning remains functional and substitutive and has not yet reached a genuinely transformative stage. This condition is influenced by several inhibiting factors, including limited digital infrastructure, unstable internet connections, a lack of technology training oriented towards pedagogical practice, and curriculum pressures that do not provide sufficient space for technology-based innovation. Therefore, it is important to develop teacher training programmes that focus not only on technical mastery but also on encouraging teachers to integrate technology more creatively, collaboratively, and transformatively into Indonesian language learning.

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