

## Harnessing Digital Tools for Translanguaging in ESL Classrooms: A Systematic Literature Review

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### ARTICLE HISTORY

Received: 21<sup>st</sup> August 2025

Revised: 05<sup>th</sup> April 2026

Accepted: 23<sup>rd</sup> April 2026

Published: 05<sup>th</sup> May 2026

### KEYWORDS

Digital Translanguaging

Systematic Literature Review

ESL

Digital Learning

**ABSTRACT** - This systematic literature review examines recent empirical studies from 2020 to 2025 exploring digital translanguaging practices in English as a Second Language (ESL) classrooms. The review aims to synthesize evidence on how digital tools facilitate multilingual learners' language engagement, identity affirmation, and academic development. Following PRISMA guidelines, studies were identified through database searches adhering to predefined inclusion criteria focusing on digital translanguaging applications, participant demographics, and educational outcomes. Seventeen studies meeting the criteria were critically analyzed for pedagogical benefits, teacher beliefs, and implementation challenges. Findings reveal that digital translanguaging enhances learner motivation, cognitive engagement, and collaborative language use, while also promoting inclusivity by validating diverse linguistic identities. Challenges include technological access disparities, teacher preparedness, and assessment complexities. The review underscores the importance of sustained professional development and supportive policies to maximize digital translanguaging's potential. This synthesis offers valuable insights for educators, policymakers, and researchers aiming to leverage multilingual digital pedagogies in diverse educational contexts.

### INTRODUCTION

Translanguaging, defined as the dynamic and strategic deployment of an individual's entire linguistic and semiotic repertoire for meaning-making, has emerged as a transformative pedagogical paradigm in multilingual education (García & Wei, 2014; Wei, 2018). By transcending monoglossic boundaries, translanguaging empowers learners to fluidly mobilize diverse linguistic resources, thereby deepening comprehension, enhancing communicative competence, and fostering complex identity construction (Sharmin, 2025). Recent research (2021–2025) highlights several critical affordances of translanguaging: it stimulates cognitive engagement by linking new knowledge to learners' existing linguistic and cultural schemata; it promotes inclusivity by legitimizing students' home languages and identities; and it nurtures metalinguistic awareness alongside critical thinking skills (Juvonen & Källkvist, 2021; García, Johnson, & Seltzer, 2017; Creese & Blackledge, 2015). Empirical studies further demonstrate that translanguaging facilitates English language acquisition in ESL contexts by enabling learners to negotiate meaning across languages and collaborate effectively (Khan et al., 2022).

## BACKGROUND OF THE STUDY

### 1.1 Digital Technologies and Translanguaging

The rapid advancement of digital technologies has significantly expanded the implementation and impact of translanguaging pedagogies. Digital platforms—including AI-powered tools and interactive applications—offer multilingual learners unprecedented opportunities for agentive, context-sensitive languaging in both synchronous and asynchronous learning environments (Godwin-Jones, 2025; Fan, 2024). For example, the use of platforms such as DingTalk has been shown to enhance English grammar learning among Chinese undergraduates by embedding translanguaging strategies within dynamic, multimodal digital ecologies that support collaboration and meaning-making (Sun, 2024). Additionally, generative AI technologies provide personalized language scaffolding, although challenges persist in adequately supporting less commonly taught and Indigenous languages (Bobula, 2024). These technological developments not only facilitate more flexible and inclusive language learning experiences but also extend translanguaging practices beyond traditional classroom boundaries, enabling novel forms of identity work and social participation.

### 1.2 Definition of Digital Translanguaging

Digital translanguaging refers to the dynamic and strategic use of an individual's entire linguistic repertoire—including multiple languages and semiotic resources—within digital and online environments to construct meaning and communicate effectively (García & Li, 2021; Otheguy, García, & Reid, 2015). Moving beyond traditional views that regard languages as separate, bounded systems, digital translanguaging conceptualizes language use as fluid and integrated, enabling multilingual users to “soft assemble” linguistic features across languages in multimodal digital spaces such as social media, video platforms, and educational apps (García & Kano, 2014; Li, 2011). This approach highlights the social, cultural, and technological contexts shaping language practices, acknowledging that digital environments offer novel affordances for multilingual meaning-making and interaction (García & Wei, 2023; Liu & Fang, 2023).

### 1.3 Contextualizing Digital Translanguaging in Malaysia

Malaysia's rich linguistic diversity and evolving language-in-education policies provide a unique context for digital translanguaging. Malay remains the national language, while English, Chinese, and Tamil are widely used in educational and social spheres, reflecting Malaysia's multicultural fabric (Rajendram et al., 2022; Wong, 2023). Recent policy initiatives, including the Dual Language Programme (DLP) and the promotion of English-Medium Instruction (EMI) in STEM subjects, have created both opportunities and complexities for translanguaging practices in classrooms (Rajendram, 2021; Ting et al., 2023).

Malaysian educators and learners frequently engage in translanguaging to scaffold comprehension, bridge linguistic gaps between home and school languages, and navigate digital and blended learning environments effectively (Rajendram et al., 2022; Ting et al., 2023; Wong, 2023). Digital translanguaging has gained prominence as a pedagogical practice that reflects the country's multilingual and multicultural realities within increasingly digitalized learning environments. Malaysian ESL educators utilize digital translanguaging to clarify complex language concepts, incorporate cultural knowledge, and engage learners through multimodal digital content, making lessons more accessible and interactive (Ooi & Aziz, 2022; Zaki & Sulaiman, 2024).

Despite these encouraging developments, challenges such as uneven policy implementation, insufficient teacher training, and prevailing societal preferences for monolingual norms hinder the full potential of translanguaging in Malaysia (Rajendram, 2021; Ting et al., 2023). Additionally, issues like assessment validity, technological management, and mixed attitudes toward machine translation tools complicate translanguaging integration in digital learning contexts (Jiang et al., 2024; Kelly & Hou, 2022; Chen & Zhang, 2023).

Policy frameworks such as the Dual Language Programme (DLP) and MBMMBI support multilingualism while emphasizing Malay and English proficiency, creating both opportunities and constraints for digital translanguaging (Mahmood & Yamat, 2019; Rajendram, 2023). The presence of Chinese National-Type Schools (SJKC) further underscores the need for differentiated digital pedagogies that accommodate diverse linguistic backgrounds (Ling & Khalid, 2025). As digital and blended learning environments

expand, digital translanguaging offers potential to foster inclusive, effective language education aligned with Malaysia’s linguistic diversity and educational objectives (Zaki & Sulaiman, 2024).

#### 1.4 Gaps in the Literature

Despite these advances, critical gaps remain in the literature, underscoring the need for a systematic synthesis of digital translanguaging research. First, while individual studies have explored translanguaging across various digital contexts, comprehensive integration of findings across diverse educational settings and technologies is lacking (Zhu & Li, 2025). Second, issues of digital equity—including the digital divide and marginalization of minority and Indigenous languages—remain underexamined, particularly concerning equitable implementation of digital translanguaging (Godwin-Jones, 2025). Third, pedagogical frameworks and best practices for integrating translanguaging with emerging digital tools require further elaboration, especially regarding teacher agency, professional development, and policy alignment (Thomas et al., 2022). Addressing these gaps through a systematic literature review will consolidate existing knowledge, illuminate persistent challenges, and guide future research and practice.

#### 1.5 Existing Systematic Reviews on Translanguaging

A review of existing systematic literature reviews (SLRs) reveals a scarcity of syntheses explicitly focused on translanguaging within digital learning environments. Although several SLRs have examined pedagogical translanguaging in various contexts, few have targeted the intersection of translanguaging and digital technology. Table 1 summarizes key SLRs in the field, highlighting the need for a focused review on digital translanguaging practices.

**Table 1.** SLR conducted on translanguaging practice

Researchers	Research Area	Number of Reviewed Studies	Search Period
Marina Prilutskaya (2021)	Pedagogical translanguaging in English language teaching and beyond	233	2011 – 2021
Lara, M. R. (2021)	Translanguaging strategies in multilingual English language teaching in the Philippines	7	2009-2021
Linnéa Gren (2021)	Effects and perceptions of translanguaging in English Language Teaching (ELT) classrooms	10	2015- 2021
Naomi Goedhart (2023)	Outcomes of pedagogical translanguaging on ESL learners in secondary education in Europe	4	2017-2022
Rajendram, Burton & Wong (2022)	Online translanguaging and multiliteracies strategies for K-12 multilingual learners	7	2009-2021

#### 1.6 Significance of the Study

##### 1.6.1 For Students

This study foregrounds the empowering role of digital translanguaging in creating inclusive and supportive learning environments. By enabling learners to draw on their full linguistic and cultural repertoires, translanguaging facilitates deeper cognitive engagement and more meaningful learning experiences. This approach enhances comprehension and communication while affirming students’ linguistic identities, which is vital for motivation and self-efficacy, especially among multilingual learners navigating complex digital platforms (Sangeetha & Sridhivya, 2025). Additionally, digital

translanguaging helps mitigate challenges posed by technological disruptions and limited nonverbal cues in online learning, fostering greater confidence and participation in virtual classrooms (Al Arief, 2024). Ultimately, this study supports pedagogies that respect and leverage linguistic diversity, contributing to improved academic outcomes and learner well-being.

### 1.6.2 For Educators

This review offers valuable insights into how digital translanguaging can transform teaching practices and professional identities. It highlights the necessity for teachers to reconceptualize language use in the classroom, moving beyond monolingual norms to embrace multilingual repertoires as pedagogical assets (García, Johnson, & Seltzer, 2017; Rahmadani, 2023). By understanding the affordances and constraints of digital tools in facilitating translanguaging, educators can design more responsive, culturally sustaining, and learner-centered instruction that promotes metalinguistic awareness and critical thinking (Zhu & Li, 2025). Furthermore, the study underscores the importance of ongoing professional development and reflective practice to equip teachers with the skills and confidence needed to integrate translanguaging effectively within digital learning environments (Mashala & Sanders, 2025). This contributes to fostering equitable educational experiences and supports teachers in navigating the complexities of multilingual digital pedagogy.

### 1.6.3 For Stakeholders and Policymakers

This systematic review holds significant implications for stakeholders and policymakers by illuminating systemic challenges and opportunities related to digital translanguaging implementation. It draws attention to persistent issues such as the digital divide and the marginalization of minority and Indigenous languages in digital learning spaces, emphasizing the need for equitable access to technology and language resources (Subramaniam & Ab Rahman, 2024). By synthesizing evidence on effective translanguaging pedagogies and technological affordances, the study provides a robust knowledge base to inform policy development aimed at embedding inclusive multilingual practices within educational frameworks and digital infrastructures. These insights are critical for shaping policies that promote linguistic equity, social inclusion, and innovation in education, ensuring that multilingual learners are supported in increasingly digital and globalized learning contexts.

## 1.7 Research Objectives

1. To identify the key pedagogical benefits of translanguaging in digital learning environments.
2. To examine how digital translanguaging practices influence teacher beliefs, attitudes, and pedagogical approaches.
3. To investigate the challenges affecting the effective implementation of digital translanguaging in educational settings.

## 1.8 Research Questions

This review seeks to answer the following research questions:

1. What are the key pedagogical benefits of translanguaging in digital learning?
2. How do digital translanguaging practices influence teacher beliefs and pedagogy?
3. What challenges affect the implementation of digital translanguaging?

## METHODOLOGY

This systematic review followed a rigorous and transparent methodology. The review process included a comprehensive literature search, application of inclusion and exclusion criteria, data extraction, synthesis, and analysis of relevant studies.

### 2.1 Literature Search

This systematic literature review was conducted following the PRISMA 2024 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a transparent and replicable review process. The methodology comprised four key stages: identification, screening, eligibility, and inclusion, as outlined in the PRISMA flow diagram and checklist.

### 2.1.1 Identification

The initial phase involved a comprehensive search across three major academic databases: Scopus, Web of Science, and ERIC. These databases were selected for their broad coverage of education and social science research. To locate relevant studies, a combination of keywords was used, including “translanguaging,” “digital learning,” “online education,” “multilingual learners,” “TESOL,” “e-learning,” and “multimodality.” Five predetermined criteria guided the selection process: (1) articles published between 2020 and 2025, (2) written in English, (3) full-length research articles, (4) open access availability, and (5) a clear focus on translanguaging in digital learning environments. The search strategy was applied consistently across all databases to maximize the retrieval of pertinent literature.

**Table 2.** Keywords for search strings

<b>Database</b>	<b>Search Strings</b>
<b>Scopus</b>	("translanguaging" OR "multilingual learning") AND ("digital learning" OR "online education") AND ("language acquisition" OR "language instruction")
<b>Web of Science</b>	("translanguaging" OR "multilingual pedagogy") AND ("e-learning" OR "online language learning") AND ("language education" OR "TESOL")
<b>ERIC</b>	("translanguaging" OR "multilingual education") AND ("digital platforms" OR "online classrooms") AND ("language learning" OR "language teaching")
<b>Google Scholar</b>	("translanguaging in digital learning" OR "multilingual online education") AND ("language acquisition" OR "language instruction")
<b>Dimension Database</b>	("translanguaging" OR "multilingual practices") AND ("EFL education" OR "foreign language learning") AND ("digital technologies" OR "online learning")

### 2.1.2 Screening

In the screening phase, articles were first filtered based on their titles and abstracts to ensure alignment with the research focus and inclusion criteria. Studies that did not explicitly address translanguaging in digital or online educational contexts were excluded. Duplicate records retrieved from multiple databases were identified and removed to avoid redundancy.

### 2.1.3 Eligibility

The eligibility stage involved a more detailed review of the full texts of the remaining articles. Each study was evaluated to confirm its relevance to the research questions and its adherence to the inclusion and exclusion criteria. Only empirical studies, theoretical papers, and literature reviews directly addressing translanguaging practices in digital learning environments were retained.

### 2.1.4 Inclusion

In the final phase, studies that met all eligibility requirements were included in the review. Articles were excluded if they were book chapters, non-peer-reviewed sources, or not accessible in full text. The selection process is visually summarized in the PRISMA flow diagram (see Figure 1).

**Table 3.** Inclusion and exclusion criteria

Criteria	Inclusion Criteria	Exclusion Criteria
Study Design	Empirical studies focusing on translanguaging in digital contexts.	Narrative reviews, systematic reviews, or on meta-analyses not specifically addressing translanguaging in digital environments.
Language	Studies published in English.	Studies published in languages other than English.
Publication Date	Studies from last 5 years (2021 – 2025)	Studies published outside this time frame.
Population	Studies involving translanguaging in digital learning environments.	Studies focusing on monolingual populations or non-digital contexts.
Intervention/Topic	Studies examining translanguaging practices, strategies, or outcomes in digital settings.	Studies not specifically addressing translanguaging in digital contexts.
Outcome Measures	Studies reporting on educational outcomes, learner engagement, or pedagogical effectiveness related to translanguaging.	Studies lacking clear outcome measures related to translanguaging.

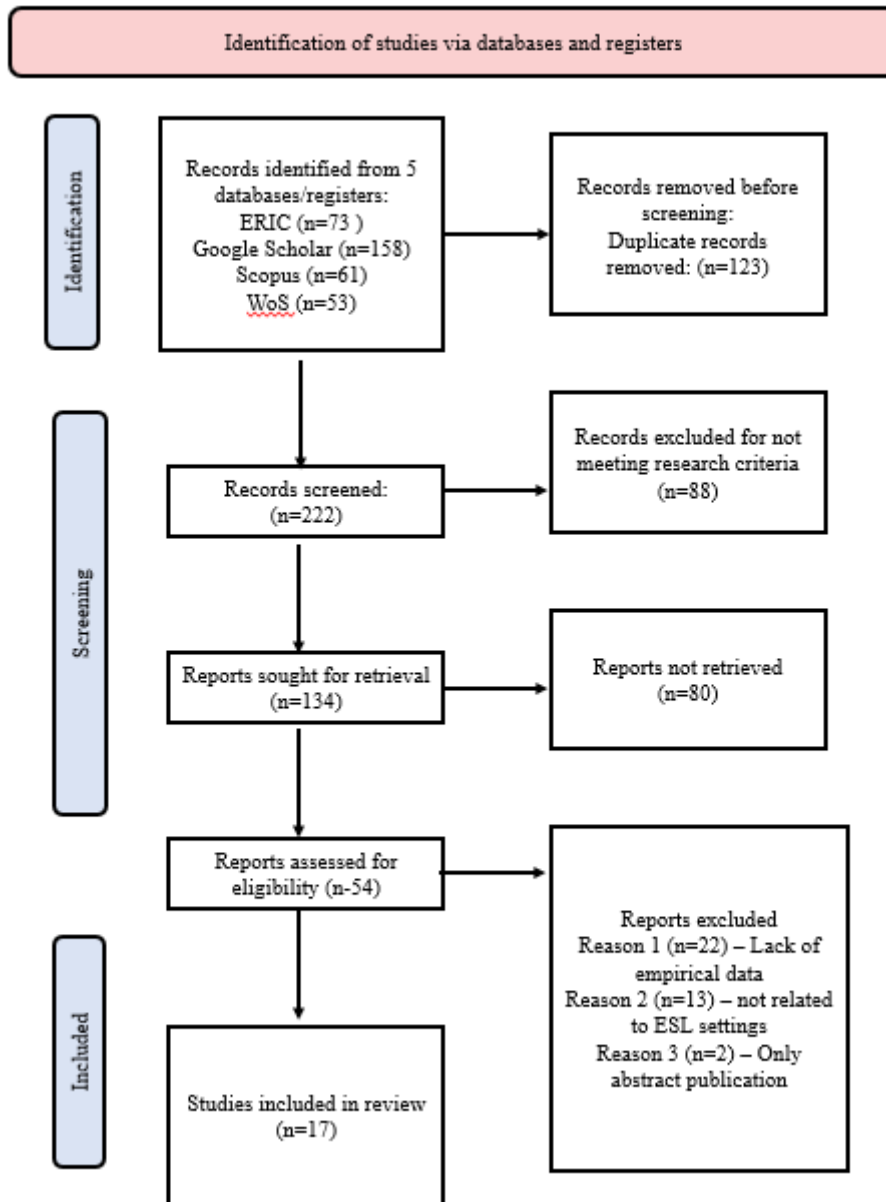


Figure 1. Flow Diagram of PRSIMA statement

## 2.2 Data Extraction and Synthesis

For each included study, key information was systematically extracted, including publication year, research context, methodology, participant details, digital platforms or tools examined, and main findings related to translanguaging. The data were then synthesized to address the research questions, focusing on the implementation, benefits, challenges, and future directions of translanguaging in digital learning environments.

### 2.3 Literature Search Results

The initial search identified numerous potential articles. After applying the inclusion and exclusion criteria, 17 studies were selected for in-depth review (see Table 4).

**Table 4.** Details of Each Articles

No.	Author(s) & Year	Country/Context	Methodology	Participants	Digital Tool/Platform	Impacts
1	Rajendram et al. (2022)	Malaysia	Qualitative	K-12 students	Online, Photovoice	Enhanced engagement, identity affirmation, digital literacy, inclusion
2	Sun (2024)	China	Quantitative	Undergraduates	DingTalk	Improved grammar learning, increased motivation, multimodal engagement
3	Ho & Tai (2021)	Hong Kong	Qualitative	Teachers, Students	Online Videos	Increased participation, creative meaning-making, accessible learning
4	Tai & Wei (2021)	Hong Kong	Qualitative	EMI Teachers	iPads	Innovative pedagogy, flexible language use, teacher empowerment
5	Jiang et al. (2024)	China	Mixed Methods	CLIL Students	Digital Composing	Assessment innovation, metalinguistic awareness, concerns over validity and manageability
6	Koralage, Choi & Cross (2023)	Australia	Qualitative	University Students	Digital Writing Tools	Improved writing skills, academic engagement, digital literacy
7	Fu & Zhang (2024)	China	Case Study	EFL Learners	Video Collaboration	Longitudinal language development, collaboration, identity support
8	Kelly & Hou (2022)	China	Survey	EAL Learners	Machine Translation	Learner empowerment, mixed attitudes, practical challenges
9	Lee & Wei (2025)	Global/TESOL	Theoretical/Review	TESOL Practitioners	Social Media	Professional development, transformation of linguistic expertise, research directions

No.	Author(s) & Year	Country/Context	Methodology	Participants	Digital Tool/Platform	Impacts
10	Seltzer (2025)	USA	Intervention Study	Preservice Teachers	Digital Platforms	Enhanced teacher readiness, positive stance toward translanguaging
11	Prada (2022)	USA	Case Study	Bilingual Students	Digital Storytelling	Student empowerment, identity affirmation, creative expression
12	Song (2022)	USA	Service-Learning	Preservice Teachers	Service-Learning, Digital	Community connection, digital literacy, translanguaging space creation
13	Lu & Gu (2024)	Global	Review/Visual Analysis	Mixed	Digital Platforms	Identified research gaps, mapped trends, highlighted future directions
14	Ooi & Aziz (2022)	Malaysia	Qualitative	ESL Teachers	Digital Classroom	Insights into teacher beliefs, barriers to practice, practical recommendations
15	Zaki & Sulaiman (2024)	Malaysia	Qualitative	ESL Teachers	Digital Tools	Documented classroom practices, highlighted implementation challenges
16	Ting, Marzuki & Chuah (2023)	Malaysia	Survey	Teachers	Online Learning	Policy impact, teacher perspectives, identified gaps in training
17	Wong (2025)	Malaysia	Policy Analysis	SJKC Schools	Digital Pedagogy	Policy recommendations, challenges in digital translanguaging integration

## FINDINGS

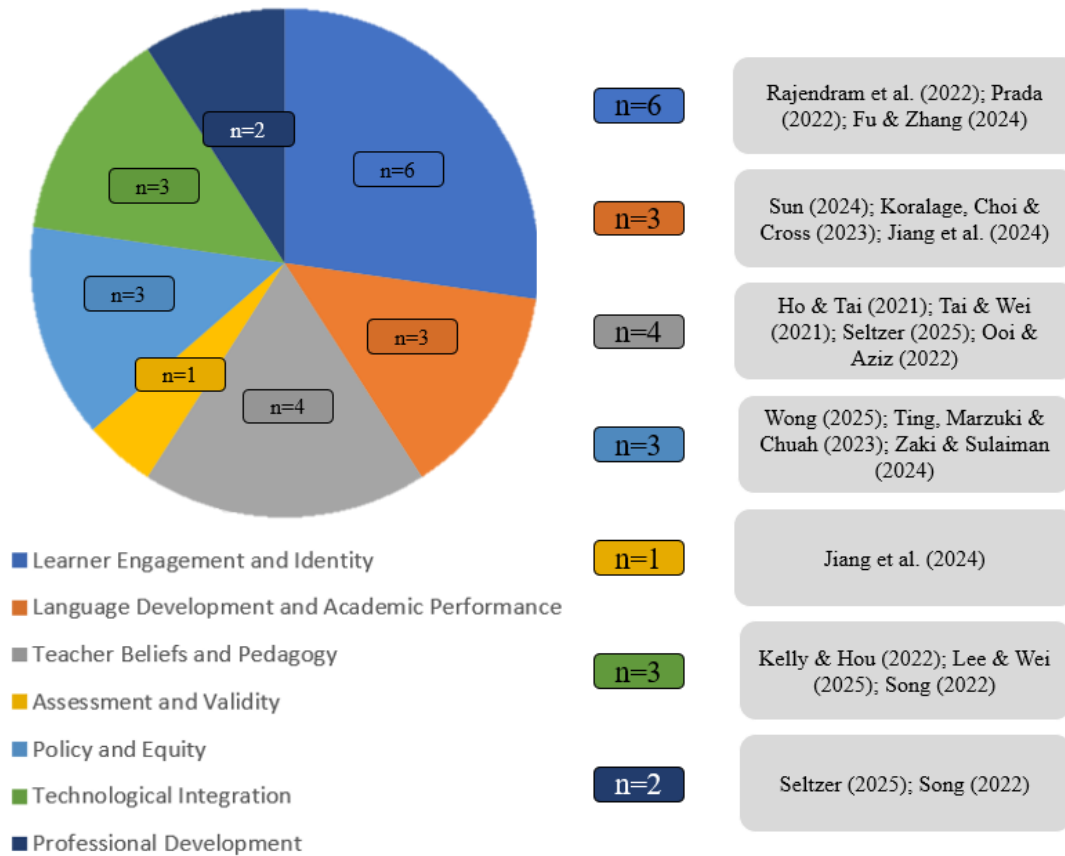
### 3.1 Research Topics in Digital Translanguaging Studies

The topics of the 17 reviewed studies on digital translanguaging were grouped into seven main categories. As illustrated in Figure 2, the largest portion, approximately 35% ( $n = 6$ ), focused on learner engagement and identity, exploring how digital translanguaging fosters motivation, identity affirmation, and creative expression through platforms such as photovoice, digital storytelling, and video collaboration (Rajendram et al., 2022; Prada, 2022; Fu & Zhang, 2024). Another significant cluster, comprising about 18% ( $n = 3$ ), examined language development and academic performance, highlighting improvements in grammar learning, writing skills, and metalinguistic awareness facilitated by digital tools like DingTalk and digital writing applications (Sun, 2024; Koralage, Choi & Cross, 2023; Jiang et al., 2024).

Teacher beliefs and pedagogy constituted a further category, with four studies (approximately 24%) investigating how digital translanguaging influences teacher attitudes, pedagogical innovation, and readiness to implement multilingual strategies (Ho & Tai, 2021; Tai & Wei, 2021; Seltzer, 2025; Ooi & Aziz, 2022). Assessment and validity concerns were addressed in one study (Jiang et al., 2024), which explored challenges in fairly assessing multilingual learners within translanguaging frameworks, particularly in digital contexts. Policy and equity issues were the focus of three studies (Wong, 2025; Ting, Marzuki & Chuah, 2023; Zaki & Sulaiman, 2024), analyzing systemic barriers such as digital access, teacher training gaps, and policy constraints affecting the implementation of digital translanguaging.

Technological integration was examined in three studies (Kelly & Hou, 2022; Lee & Wei, 2025; Song, 2022), which investigated the role of digital platforms, machine translation, and social media in supporting translanguaging practices. Finally, professional development received attention in two studies (Seltzer, 2025; Song, 2022), emphasizing the importance of teacher training and community engagement in fostering effective digital translanguaging pedagogy.

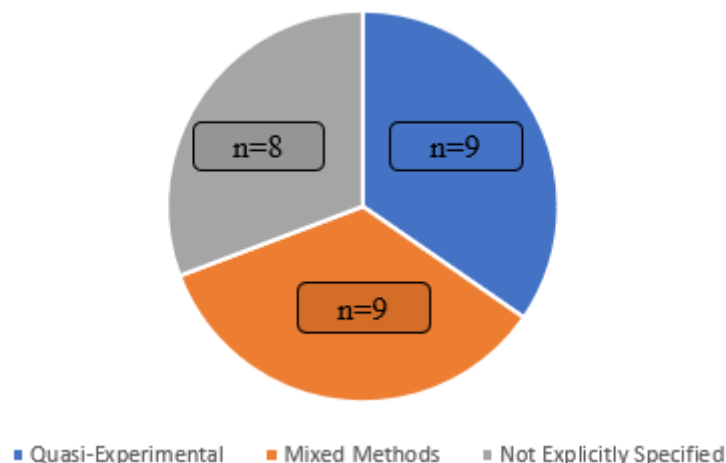
It is noteworthy that some studies addressed multiple topics. For instance, Song (2022) combined technological integration with professional development, while others like Rajendram et al. (2022) linked learner engagement with identity affirmation. This thematic distribution reflects the multifaceted nature of digital translanguaging research, spanning cognitive, social, pedagogical, technological, and policy dimensions.



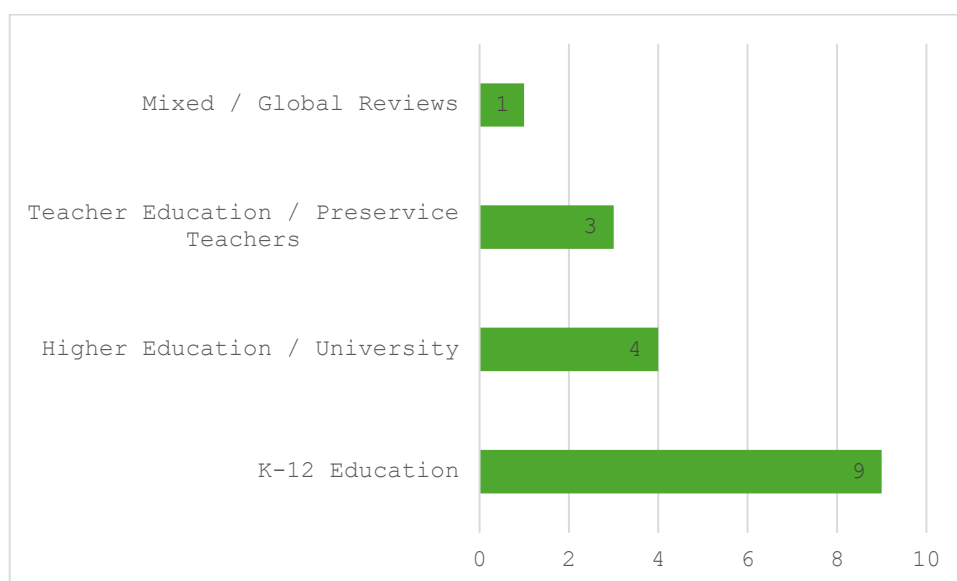
**Figure 2.** Research topics in selected studies

### 3.2 Research Methods Employed in Digital Translanguaging Studies

As shown in figure 3, nine out of the 17 studies explicitly stated the research methods they employed (see Figure 5). Among these, two primary methodologies were identified: quasi-experimental and mixed methods. For example, Sun (2024) utilized a quasi-experimental design combined with qualitative investigation to assess the efficacy of the DingTalk-based translanguaging pedagogy. Mixed-methods approaches were also evident in studies like Jiang et al. (2024), which integrated qualitative insights with quantitative data to explore translanguaging’s impact comprehensively. However, a majority of studies (n = 8) did not clearly specify their research methodologies, often describing only data collection techniques such as questionnaires and pre-/post-tests (e.g., Dillon & Wells, 2021; Hsu, 2016, 2024). This highlights a tendency in the field to focus on data gathering tools rather than explicitly articulating overarching research designs. Overall, the reviewed literature demonstrates a methodological diversity encompassing qualitative, quantitative, and mixed methods, reflecting the complex and multifaceted nature of investigating digital translanguaging practices.



**Figure 3.** The distribution of data collection types

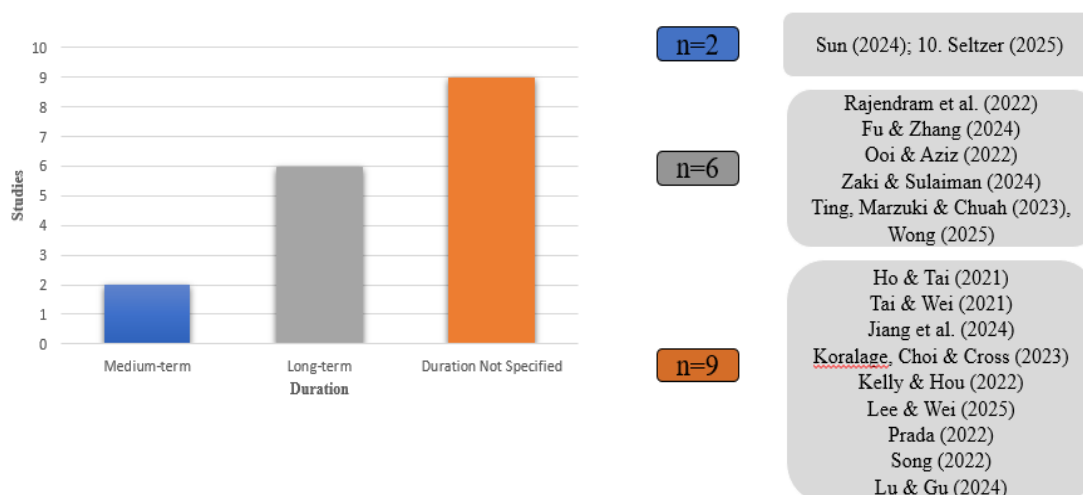


**Figure 4.** Educational levels in selected studies

### 3.3 Application and Treatment Duration in Digital Translanguaging Studies

The findings demonstrate the diverse durations and contexts in which digital translanguaging has been applied across the 17 empirical studies reviewed. Some studies reported medium-term interventions, such as the semester-long quasi-experimental study by Sun (2024) using the DingTalk platform and the focused preservice teacher intervention by Seltzer (2025). Others documented ongoing or continuous classroom integration, as seen in Rajendram et al. (2022), Ooi and Aziz (2022), and Zaki and Sulaiman (2024). Longitudinal approaches were evident in Fu and Zhang's (2024) case study, which observed video collaboration and language development over an extended period. Several studies, including those by Ting, Marzuki, and Chuah (2023) and Wong (2025), examined longer-term policy impacts and professional development, emphasizing systemic influences on translanguaging adoption. Notably, some qualitative and survey studies did not specify treatment durations and were thus excluded from duration-based analysis. Overall, the documented durations ranged from short-term interventions lasting a semester to long-term, continuous, or policy-level engagements, reflecting the multifaceted temporal nature of digital translanguaging research.

The absence of explicit treatment durations in several studies can be attributed to the nature of their research designs and objectives. Qualitative and survey-based studies, such as those by Ho and Tai (2021), Tai and Wei (2021), and Kelly and Hou (2022), often prioritize exploring participants' experiences, beliefs, or attitudes rather than measuring effects over a fixed period, making precise duration reporting less relevant. Similarly, case studies and service-learning projects like Prada (2022) and Song (2022) emphasize in-depth contextual understanding and processes that unfold over variable or flexible timeframes, which are not easily quantifiable. Reviews and theoretical analyses by Lee and Wei (2025) and Lu and Gu (2024) synthesize findings across diverse studies with varying durations, thus do not report a single treatment length. Moreover, some studies involve ongoing or embedded classroom practices (e.g., Ooi and Aziz, 2022; Zaki and Sulaiman, 2024) where translanguaging is integrated continuously rather than within a discrete intervention period. This diversity in research aims and methodologies contributes to the absence of explicit treatment durations in several papers, reflecting the evolving and multifaceted nature of digital translanguaging research.



**Figure 5.** Treatment Duration of selected studies

### 3.4 Themes and Outcomes in Digital Translanguaging Studies

The “Relevant Impacts” column in Table 4 summarizes the major themes and outcomes identified across the studies. The findings indicate that digital translanguaging practices can significantly enhance learner engagement, promote identity expression, and support language development by providing inclusive, multimodal spaces for interaction (Rajendram et al., 2022; Sun, 2024; Ho & Tai, 2021). Additionally, the use of digital tools for translanguaging fosters greater learner autonomy and creativity, as students are encouraged to navigate and leverage multiple languages in authentic, technology-mediated contexts (Jiang et al., 2024; Fu & Zhang, 2024).

Several recurring themes emerged from the analysis of the 17 studies. These include:

**Table 5.** Themes identified in selected studies

Theme	Papers (Author(s) & Year)	Notes
Enhanced Engagement and Motivation	Rajendram et al. (2022), Sun (2024), Ho & Tai (2021), Tai & Wei (2021), Koralage, Choi & Cross (2023), Fu & Zhang (2024)	Studies reported increased learner participation, interest, and motivation through digital translanguaging platforms.
Identity Affirmation and Inclusion	Rajendram et al. (2022), Ho & Tai (2021), Prada (2022), Song (2022), Fu & Zhang (2024), Zaki & Sulaiman (2024)	Papers highlight opportunities for learners to express and affirm their linguistic and cultural identities.
Improved Multimodal and Academic Skills	Sun (2024), Ho & Tai (2021), Jiang et al. (2024), Koralage, Choi & Cross (2023), Fu & Zhang (2024), Prada (2022), Song (2022)	Integration of digital tools supported language proficiency, academic writing, and digital literacy development.
Challenges and Concerns	Jiang et al. (2024), Kelly & Hou (2022), Ooi & Aziz (2022), Zaki & Sulaiman (2024), Ting, Marzuki & Chuah (2023), Wong (2025)	Issues such as assessment validity, technology access, teacher readiness, and attitudes toward digital tools were noted.

In summary, the studies reviewed in Table 5 collectively demonstrate that translanguaging in digital learning environments offers significant pedagogical benefits while also presenting practical challenges. These findings underscore the importance of continued research and innovation to optimize translanguaging practices for diverse multilingual learners in digital contexts.

## DISCUSSION

### 4.1 Key Pedagogical Benefits of Translanguaging in Digital Learning

Digital translanguaging harnesses learners' full linguistic repertoires within interactive, multimodal digital environments, fostering enhanced engagement, motivation, and identity affirmation. Empirical studies demonstrate that digital translanguaging validates students' multilingual identities and encourages active participation, which is crucial for meaningful learning in diverse classrooms. For instance, Rajendram et al. (2022) found that online photovoice activities increased K-12 students' engagement and digital literacy while affirming their linguistic identities. Similarly, Sun (2024) showed that the multifunctional platform DingTalk enabled Chinese undergraduates to strategically use Mandarin as a cognitive bridge, heightening motivation and multimodal engagement and improving English grammar learning. Fu and Zhang (2024) further highlighted that video collaboration sustained language development and strengthened learners' identity construction over time.

Theoretically, translanguaging supports deeper comprehension and cognitive flexibility by enabling learners to connect new content with prior knowledge across languages (García & Kleifgen, 2020; Langkau & Sulaiman, 2025). Digital contexts amplify this effect by integrating multimodal resources—text, audio, video, and interactive media—enriching meaning-making processes (Ho & Tai, 2021; Koralage, Choi & Cross, 2023). For example, digital writing tools enhance university students' academic engagement and writing skills through multimodal translanguaging (Koralage, Choi & Cross, 2023).

Moreover, digital translanguaging promotes inclusivity and equity by validating home languages and cultural identities, boosting self-esteem and fostering belonging (Prada, 2022; Rajendram et al., 2022). Collaborative digital platforms facilitate peer negotiation of meaning, reinforcing social constructivist learning and community building (Kelly & Hou, 2022; Fu & Zhang, 2024). These affective and social dimensions align with broader research emphasizing translanguaging's role in creating equitable multilingual classrooms that celebrate linguistic diversity and support learner agency (García, Johnson, & Seltzer, 2017).

### 4.2 Influence of Digital Translanguaging on Teacher Beliefs and Pedagogy

Digital translanguaging reshapes teacher beliefs and pedagogical practices by expanding instructional possibilities and challenging monolingual norms. Studies from Hong Kong and Malaysia (Ho & Tai, 2021; Tai & Wei, 2021; Ooi & Aziz, 2022) reveal that digital tools empower teachers to adopt flexible, student-centered approaches leveraging learners' multilingual resources. This fosters more inclusive and responsive classrooms and increases teacher confidence and creativity when supported by multimodal digital platforms (Seltzer, 2025; Lee & Wei, 2025).

Nonetheless, challenges persist. Educators often express uncertainty about managing translanguaging in digital classrooms and balancing language proficiency standards with curriculum demands (Kelly & Hou, 2022; Thomas et al., 2022). These challenges highlight the need for targeted professional development and institutional support to equip teachers with effective translanguaging pedagogies integrated with digital tools (Wong, 2025; Ting, Marzuki & Chuah, 2023). Digital translanguaging also prompts a redefinition of language proficiency assessment and pedagogy, encouraging teachers to reconceptualize language teaching as a multilingual, multimodal endeavor (Lee & Wei, 2025). However, this pedagogical innovation depends heavily on systemic support, clear policy frameworks, and ongoing teacher training (Wong, 2025; Ooi & Aziz, 2022).

Recent reviews emphasize that teachers' beliefs are shaped by prior knowledge, institutional policies, and curricula, which can either facilitate or constrain translanguaging practices (Zhang et al., 2025). The gap between positive attitudes and classroom implementation often stems from monolingual ideologies and restrictive policies (Wu & Othman, 2025). Thus, fostering supportive institutional cultures and revising policies to explicitly endorse translanguaging are essential for meaningful pedagogical transformation.

### 4.3 Challenges Affecting the Implementation of Digital Translanguaging

Despite its benefits, digital translanguaging faces persistent challenges related to technological access, teacher readiness, assessment, and policy frameworks. The digital divide disproportionately affects

marginalized communities and speakers of less commonly taught languages, limiting equitable participation and risking exacerbation of educational disparities (Rajendram et al., 2022; Godwin-Jones, 2025). Infrastructure constraints in under-resourced areas further hinder access to necessary digital tools (Varsat, 2025).

Teacher preparedness remains a critical barrier. Many educators lack sufficient training and experience to integrate translanguaging effectively within digital platforms, leading to inconsistent practices and reluctance to fully embrace these pedagogies (Ooi & Aziz, 2022; Zaki & Sulaiman, 2024). Professional development programs that combine practical strategies, technological training, and theoretical grounding are essential to empower teachers and foster innovation (Ting, Marzuki & Chuah, 2023). Peer learning and collaborative workshops can also build communities of practice (Choi et al., 2025).

Assessment challenges arise because traditional monolingual and standardized frameworks are often incompatible with translanguaging's fluid, multimodal nature, raising concerns about validity and fairness (Jiang et al., 2024; Chen & Zhang, 2023). Innovative assessment approaches, such as digital multimodal composing, must balance authenticity and manageability (Jiang et al., 2024). Collaborative efforts are needed to redesign assessment frameworks that accommodate translanguaging (Luo & Sun, 2025).

Policy frameworks frequently lag behind technological and pedagogical advancements. Many curricula and teacher training programs do not explicitly support translanguaging or address digital equity, limiting systemic support and instructional autonomy (Wong, 2025; Langkau & Sulaiman, 2025). Resistance to translanguaging often stems from entrenched monolingual ideologies and concerns about language standards, necessitating advocacy and awareness campaigns (Dovchin & Wang, 2024). Comprehensive reforms prioritizing digital equity, professional development, and inclusive assessment are critical to enable translanguaging pedagogy to flourish (Mashala & Sanders, 2025).

## RECOMMENDATIONS FOR FUTURE RESEARCH

### 5.1 Learner-Centered Studies

A critical area for future research is the longitudinal and diverse investigation of learner outcomes associated with digital translanguaging. While existing studies highlight benefits such as enhanced engagement, motivation, identity affirmation, and digital literacy (Rajendram et al., 2022; Sun, 2024; Fu & Zhang, 2024; Prada, 2022; Koralage, Choi & Cross, 2023), there remains a need to explore these effects across different age groups, educational contexts, and linguistic backgrounds. Longitudinal studies could track how translanguaging influences language proficiency development over time, providing insights into sustained cognitive and social impacts.

Moreover, research should delve deeper into the specific challenges multilingual learners encounter in digital translanguaging environments, particularly regarding vocabulary acquisition and meaning-making processes (Koralage, Choi & Cross, 2023). Understanding these challenges is essential for designing targeted pedagogical interventions that scaffold learners effectively.

Expanding research to include marginalized and emergent bilingual populations is also crucial. These groups often face systemic barriers in education, and studying how digital translanguaging supports their empowerment and identity construction can inform more equitable and culturally sustaining pedagogies (Rajendram et al., 2022; Prada, 2022; Kelly & Hou, 2022). Such research aligns with translanguaging's foundational goals of promoting social justice and linguistic equity by validating diverse linguistic and cultural resources in digital learning spaces (Thongwichit et al., 2025).

### 5.2 Teacher Preparation and Professional Development

Effective implementation of digital translanguaging hinges on teacher readiness, making this a vital area for future inquiry. Research should focus on designing, implementing, and evaluating professional development programs that equip both preservice and in-service teachers with the skills and confidence to integrate translanguaging in digital learning environments (Seltzer, 2025; Song, 2022; Lee & Wei, 2025). These programs need to address not only technological competencies but also pedagogical strategies that embrace multilingualism as a resource.

Further studies could explore how teachers' beliefs, attitudes, and prior experiences influence their translanguaging practices, and how institutional support structures—such as mentoring, collaborative communities, and leadership—can foster innovative pedagogy and teacher empowerment (Ho & Tai, 2021; Tai & Wei, 2021; Ooi & Aziz, 2022). Investigating the barriers teachers face in adopting translanguaging, including resistance rooted in monolingual ideologies or policy constraints, will help tailor professional development to real-world classroom contexts.

### 5.3 Technological and Policy Dimensions

The usability, accessibility, and integration of digital tools that facilitate translanguaging represent another key research frontier. Future studies should examine how technology can be optimized to support diverse learner needs, including features such as multilingual interfaces, voice recognition, translation apps, and multimodal content creation (Kelly & Hou, 2022; Lee & Wei, 2025). Investigating user experience and technological affordances will guide the development of more effective digital platforms that enhance translanguaging practices.

Assessment innovations are urgently needed to fairly capture multilingual learners' competencies in translanguaging contexts. Research should focus on developing and validating inclusive assessment models that recognize multimodal and multilingual expression, balancing authenticity with manageability (Jiang et al., 2024). Collaborative efforts among linguists, educators, and policymakers are essential to align assessment frameworks with translanguaging pedagogy and to ensure validity and equity.

Policy-focused research is also critical to understand systemic barriers and enablers of digital translanguaging adoption. Studies should analyse how educational policies, curricula, and institutional frameworks support or hinder translanguaging integration, with an emphasis on fostering equitable and scalable implementation (Ting, Marzuki & Chuah, 2023; Wong, 2025). This includes examining language-in-education policies, digital equity initiatives, and teacher training mandates to recommend reforms that create enabling environments for translanguaging.

## CONCLUSION

This review has thoroughly examined recent studies on the use of translanguaging within digital learning settings, focusing on how it is applied, its advantages, challenges, and directions for future research. The evidence indicates that translanguaging is increasingly incorporated into digital education through various platforms, including online videos, collaborative writing tools, social media, and multimodal composition software. These digital environments allow both learners and educators to utilize their complete linguistic repertoires, making learning experiences more engaging, accessible, and meaningful, especially for multilingual learners.

Four key themes emerge from the literature. First, digital translanguaging notably boosts learner engagement and motivation by providing interactive and multimodal learning opportunities that recognize and empower students' multilingual identities. Second, it supports learners in expressing and affirming their linguistic and cultural identities, fostering a stronger sense of inclusion and belonging across diverse contexts. Third, the use of digital tools enhances the development of both language proficiency and digital literacy, equipping learners with essential skills for navigating today's complex, multilingual, and multimodal information landscape. Fourth, digital translanguaging influences educators' beliefs and instructional methods, encouraging more adaptable, inclusive, and technology-driven teaching approaches.

However, several challenges hinder the widespread and effective adoption of digital translanguaging. These include issues related to the validity of assessments, unequal access to technology, insufficient teacher training, and societal attitudes that may resist multilingual practices or raise concerns about technologies like machine translation. The digital divide, in particular, poses a significant threat to equitable participation, especially among marginalized groups.

To maximize the benefits of digital translanguaging, it is crucial to develop innovative assessment methods, provide focused professional development for educators, and establish supportive policy frameworks. Future research should explore assessment models tailored to diverse contexts, conduct

longitudinal studies to assess long-term outcomes, and design digital platforms that better facilitate translanguaging and foster learner autonomy.

In conclusion, translanguaging within digital learning environments holds considerable promise for enhancing multilingual education. By embracing the flexible and dynamic use of language in digital spaces, educators and policymakers can better support diverse learners, promote equity, and prepare students for success in an increasingly interconnected and digital world.

## **ACKNOWLEDGEMENT**

The authors would like to thank Faculty of Education, Universiti Kebangsaan Malaysia for supporting this research.

## **No funding**

- This study was not supported by any grants from funding bodies in the public, private, or not-for-profit sectors.

## **CONFLICT OF INTEREST**

The authors declare no conflicts of interest

## **AUTHORS CONTRIBUTION**

**Hoe Xin Yi.:** Conceptualization, Methodology, Data curation, Writing- Original draft preparation.

**Maslawati Mohamad.:** Writing- Reviewing and Editing.

## **AVAILABILITY OF DATA AND MATERIALS**

Data available within the article or its supplementary materials.

## **DECLARATION OF GENERATIVE AI**

The authors declare that no generative AI was used in the writing of the manuscript.

## **ETHIC STATEMENTS**

Not applicable

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