SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 198-211
Open Access. Online & Print

DOI: 10.5281/zenodo. 12426117

TRANSLANGUAGING TEACHING LEARNING WITH AI: A MODERN TECHNIQUE OF CLASSROOM TEACHING

Revathi VG[1, 2, 3], Prof. Parul Mishra[2, 3]

[1] Research Scholar
[2] Amity School of Languages
[3] Amity University Rajasthan

Received: 01/12/2025
Accepted: 02/01/2026

Corresponding author: Revathi VG
(revathi.g@s.amity.edu)

ABSTRACT

Translanguaging is not a new concept of teaching in the digital age. Its uses and abuses are clearly stated through various research done with schools and teachers teaching in secondary schools. This study looks at translanguaging's dynamic function in contemporary education from several angles. It starts out by examining translanguaging as an innovative teaching method and examining its theoretical foundations and practical applications. The study examines the crucial role that teachers and artificial intelligence play and discusses the difficulties, challenges and contributions that teachers make to successful translanguaging techniques. It explores the effects of AI on students, highlighting enhanced learning results, language acquisition and cognitive advantages. With a particular emphasis on English language learners, translanguaging demonstrates how to bridge language gaps while enhancing overall competency. The article also examines the implementation of translanguaging in educational contexts, focusing on present approaches, policy implications and possible future possibilities. Translanguaging seeks to resist and reject the imposition of monolingual, named, and standard language ideologies as well as raciolinguistic categorisation. Use of AI generative play a pivotal role in implementation of translanguaging as a modern pedagogy in classroom teaching.

KEYWORDS: Translanguaging Pedagogy, Artificial Intelligence, Home language, Language repertoire, Digital age, AI Generative, Classroom, Teaching, Learning, School.

1. INTRODUCTION

"Our intelligence is what makes us human, and AI is an extension of that quality. "(Yann LeCun Professor, New York University).

The current society is characterized by huge and innovative technological advancements, called the Digital Age. These technological advancements provide us with an abundance of information, easily accessible through the Internet and mobile devices (Strimel et al., 2014). In this era, with the greater potential for ubiquitous learning (learning anywhere, anytime), the use of web-based learning management systems, mobile applications, social networks, and Artificial Intelligence techniques can underpin learning. Translanguaging is a contemporary pedagogical approach that emphasizes the diversity of languages spoken in classrooms and eliminates language barriers. As a provisional and developing idea, ‘‘Translanguaging is the process of making meaning, shaping experiences, gaining understanding and knowledge using two languages’’ (Baker, 2011, p. 288). Historical origin of Translanguaging is in Wales, a multilingual nation where both Welsh and English are widely used as official languages. Advocates such as Dr. Cen Williams have been strong proponents of translanguaging in Welsh education, particularly in the context of bilingual education frameworks. First used as a Welsh word in schools in Wales in the 1980s particularly by Cen Williams (1994), it was popularised, but not exclusively, by two books: Baker’s Foundations of Bilingual Education and Bilingualism (2001, 2006, 2011) and Ofelia Garcı´a’s (2009a) Bilingual Education in the 21st Century. Their focus has been on appreciating and utilizing all the linguistic skills that pupils possess. Dr. Ofelia García's pioneering research sets the foundation of the conception of translanguaging. Her work established the fundamental concept of translanguaging, which is defined as a method of seamless language acquisition and communication. Translanguaging in educational contexts has been greatly influenced by this concept. The current study on translanguaging brings various important factors into consideration. In order to fully grasp translanguaging's theoretical foundations and practical effects in classroom settings, we must dive into its application in teaching. subsequently we take a different approach and examine how important it is for educators to adopt translanguaging. The following part examines the challenges they face, the shifting views they hold, and how they support translanguaging approaches in various kinds of educational settings. Improved learning outcomes, language acquisition, and cognitive development are all enhanced by translanguaging. This study centers on methods that enable students to make better use of their language diversity in terms of both comprehension and expression. For English language learners, the role of translanguaging as a bridge is discussed, along with how it can help them study in a variety of linguistic contexts and improve their language proficiency. Lastly, the use of translanguaging in educational contexts is closely examined. In order to support its incorporation as a pillar of inclusive educational paradigms, this requires analyzing present practices, regulations, and possible future directions. These more recent approaches that conceive the use of languages beyond the strict limits of one language and one accepted linguistic form (García, 2009, 2018; Hornberger, 1989), are interesting parts of the discussion around the implementation of second/foreign language learning. Specifically, translanguaging, which was established by García (2009, 2018), refers to the use of language as a meaning-making system, which is constructed uniquely for each speaker through social interactions. According to translanguaging, language use is comprised not only by the formal language form and linguistic features (words, structures, etc.), but it also consists of other multimodal features such as gestures, images, sounds and anything that a person can use to achieve the highest possible level of successful communication (García, 2009, 2018; García & Wei, 2018). According to translanguaging, language use is comprised not only by the formal language form and linguistic features (words, structures, etc.), but it also consists of other multimodal features such as gestures, images, sounds and anything that a person can use to achieve the highest possible level of successful communication (García, 2009, 2018; García & Wei, 2018). However, when comparing translanguaging to traditional educational linguistics, and taking into consideration the new online language learning approach and the Seven Digital Affordances, it appears that the priority for instructors in the modern world points to identifying and valuing the needs and desires of their learners. Translanguaging, as established by Ofelia García (García, 2009, 2018; García & Wei, 2014, 2018), refers to the construction of a unique integrated system that comprises formal linguistic features such as words, linguistic structures, etc., as well as multimodal elements, like gestures, images, sounds and more, which are all used appropriately

and according to the person's decision of what is suitable for every situation in order to achieve successful communication. She claims that the emphasis of translanguaging is not on specific languages, but on the person who is the agent and meaning-maker that selects the features to be used from their dynamic repertoire to communicate and make sense of the world.

In a broader global context, the increasing adoption of translanguaging in education can be viewed as liberation from numerous negative notions regarding bilinguals and bilingualism prevalent in the first half of the 20th century (Gwyn Lewis, Bryn Jones and Colin Baker, 2012). This involves embracing additive bilingualism (where a second language supplements rather than supplants the first language) instead of subtractive bilingualism (García, 2009a; Lambert, 1974), adopting holistic views rather than fractional conceptualizations of bilingual individuals (Grosjean, 2008, 2010), and recognizing code-switching as a natural aspect of early childhood language development in contrast to rigid one parent – one language (OPOL) compartmentalization strategies (Baker, 2010). Prator & Celce-Murcia (1979) claim that the main characteristics of this approach in classrooms were the emphasis on grammatical rules and their explanation, translation and reading of texts, memorization of vocabulary and lists, and practice with written exercises. Cook (2016) argues that the primary goal of this method was to teach language as an academic subject, and language use was a secondary, indirect goal. He highlights that the extended goals of this method were that students would also achieve improvement of their way of thinking and cross-cultural understanding. He points out that teacher's role in this approach was formal, and they were considered the centre of knowledge.

Education Week writes, for years, research into the best instructional approaches for students identified as English learners has pointed to the concept of Translanguaging. Identified by bilingual education researcher Ofelia García, it's both a skill set and a total shift in the way language is thought of, used, and taught in K-12 classrooms where multiple languages are honoured and addressed, even as English remains the dominant language of instruction, said Marybelle Marrero-Colon, the associate director of professional development for the Centre for Applied Linguistics (Ileana Najarro, 2023).

Generative AI tools have caught great attention of language education researchers due to their potential for supporting learners' language development (Fang et al., 2023, Fitria, 2021; Su et al., 2023; Yan, 2023). More specifically, these tools can respond to the queries on language skills, generate grammatically sound sentences, and help learners produce well-organized texts (Wei, 2023). However, the popularity of generative AI tools has raised concerns among academics as it might impact writing integrity (e.g. Cotton et al., 2023; Thorp, 2023) and some universities have banned students from utilizing these AI-based tools in assignments. Nevertheless, rather than resisting the emerging technologies, researchers are exploring the potentials of generative AI tools to support EFL/L2 writing development (e.g. Su et al., 2023; Tseng & Warschauer, 2023;). Generative AI tools are often identified as useful for personalized learning, particularly in evaluating and providing feedback on writing. For example, Dai et al. (2023) found that the corrective feedback provided by generative AI was mostly consistent with that of human instructors, while being more readable and detailed. Steiss et al. (2024) examined the effectiveness of AI-generated feedback on writing and argued that the differences in feedback provided by ChatGPT, and humans were modest when considering the overall quality of feedback and time savings. This can legitimate its use in facilitating writing instruction with large classes by providing students with individualized feedback. However, doubts also exist in terms of generative AI's ability in giving feedback on writing, as Escalante et al. (2023) argued that it was still not clear if generative AI tools, trained with large language models (LLMs) instead of corpora from a specific domain, could serve as effective automated writing evaluation (AWE) tools. Translanguaging has been understood as the complex practices in which multilingual speakers use diverse languages as an entire linguistic repertoire to make sense of the world, as well as the pedagogical approaches that build on these practices (Canagarajah, 2013, García and Li, 2014). The concept of translanguaging is constantly expanding as it can refer to the use of different semiotic systems and modalities (Zheng & Drybrough, 2023).

1.1. Translanguaging and teachers

Global adoption of technology in education is transforming the way we teach and learn. Artificial Intelligence is one of the disruptive techniques to customize the experience of different learning groups, teachers, & tutors. (PI. 2021). Teachers can engage in a variety of activities that deliberately

encourage translanguaging, ranging from providing vocabulary in multiple languages to collaborative translation opportunities. The goal is to get students translanguaging as a practice that can be leveraged toward supporting literacy outcomes and engagement, as well as other academic endeavours. For example, two students could be assigned to solve a word problem, and one might be stuck on a word in English. The two students can then use an equivalent word in their home language to make sense of what the word problem is asking of them, Phillips Galloway said.

In group activities, students can be encouraged to elucidate how concepts taught in English would resonate in native language by highlighting both similar and distinct grammatical structures between the two languages. Upon introducing such activities, research indicates a noticeable transformation: students who were previously reticent start participating, and those less engaged in text-comprehension activities become more involved. This shift occurs because students are prompted to utilize their home language in class, fostering a broader consideration of language use.

Teachers need not speak their students' home languages to facilitate translanguaging; however, they must embrace a role as learners themselves, being open to students teaching them aspects of their languages. While some teachers might worry about off-task behaviour in languages they don't understand, research suggests that they can still perceive what's happening and redirect students toward the task. Even in states mandating English-only instruction, teachers can and should permit students to use other languages to access academic content. For instance, if a student needs to write an essay in English, they might start by constructing a primarily input by collecting information through a narrative or message in native language. The teacher can then utilize this in formulating words, phrases and sentences in the target language, i.e., English.

1.2. Translanguaging and learners

Translanguaging is the ability to move fluidly between languages and a pedagogical approach to teaching in which teachers support this ability (Ileana Najarro, 2023). It involves seamlessly transitioning between languages and represents a pedagogical approach to teaching where educators actively support this capability. Within translanguaging, students can engage in simultaneous multilingual thinking, utilizing their native language as a conduit for mastering academic English. For instance, while reading an article about the water cycle in English, a student might also be mentally processing and forming connections in Hindi, Tamil or Malayalam. They may annotate or initially articulate reading comprehension responses in their native language before translating them into English, as explained by Marrero-Colon. The focus is on empowering students to tap into their complete linguistic repertoire, according to Emily Phillips Galloway, an assistant professor at the Peabody College of Education at Vanderbilt University (Education Week).

Research has substantiated the benefits of employing translanguaging in classrooms. Translanguaging potentially enables students to achieve a more profound and comprehensive grasp of the subject matter. It is possible in a monolingual teaching situation, for students to answer questions or write an essay about a subject without fully understanding it. Processing for meaning may not have occurred. Whole sentences or paragraphs can be copied or adapted out of a textbook, from the internet or from dictation by the teacher without real understanding. It is less easy to do this with ''translanguaging''. To read and discuss a topic in one language, and then to write about it in another language, means that the subject matter must be processed and ''digested''. (Baker, 2011, p. 289)

Another potential benefit of translanguaging is its capacity to aid students in cultivating proficiency (both in oral communication and literacy) in their less dominant language. This approach might deter students from primarily engaging with more demanding tasks in their stronger language while relegating fewer challenging activities to their weaker language. ''Translanguaging' attempts to develop academic language skills in both languages leading to a fuller bilingualism and biliteracy'' (Baker, 2011, p. 290).

Translanguaging has the potential to facilitate stronger home-school connections and collaboration, particularly when a child is educated in a language not familiar to their parents. By involving the reworking of content, translanguaging can foster a more profound understanding and learning experience. Consequently, this enables the child to broaden, reinforce, and deepen their school-acquired knowledge by discussing it with parents in their other language at home, as outlined by Baker (2011).

Translanguaging can support the integration of proficient first language (L1) speakers with second language (L2) learners, spanning different

proficiency levels. Additionally, when both languages are thoughtfully and purposefully utilized in the classroom, translanguaging can foster the simultaneous enhancement of L2 proficiency and subject content comprehension (Maillat & Serra, 2009). This aspect was notably significant in Williams' (1994, 1996) initial exploration of translanguaging, emphasizing its role in nurturing a student's minority language, whether it's their primary or secondary language.

1.3. Translanguaging and english learners

Creating a classroom environment that embraces translanguaging is advantageous for all students, as many do not use academic English at home. For instance, North Indian students fluent in Hindi can leverage translanguaging activities to actively participate in academic classroom English. An example of English-only translanguaging involves tasks such as transforming William Shakespeare's sonnets into modern pop songs, representing the use of language in different registers or levels of formality, as explained by Phillips Galloway. Exposure to peers using their home languages often sparks interest among students to acquire additional languages, contributing to their success in an increasingly global society (Ileana Najarro, 2023).

Providing students with ample opportunities to engage in language use, regardless of whether it's English or another language, fosters increased linguistic utilization, which correlates with language acquisition. Further research indicates that enabling students to partake in translanguaging assists English learners in eventually surpassing their monolingual counterparts. This enhanced flexibility in thinking about and utilizing language within academic contexts contributes to their success, as highlighted by Marrero-Colon (Ileana Najarro, 2023).

Translanguaging in classrooms has the potential to enhance four-fold skills: listening, speaking, reading, and writing.

Table 1:

Effective use of Translanguaging in English Classrooms	
Skill	Suggested Activities
Listening	Collect the folk tales of native language from home and narrate it in English Classrooms. Teacher may ask questions to check the listening skills.
Speaking	Watch the news channel of native language and narrate the incidents in English in classroom.
Reading	Read the part of a text in native language and do a number of activities in English.
Writing	Comprehend the information received in native language and present it in English.

1.4. Implementation of translanguaging by schools

In recent theoretical discussions, translanguaging (García, 2009; 2018) has emerged as a newer approach in the field of language learning, setting as its base a unified system of communication with no restrictions on the use of specific named languages. Translanguaging acknowledges that each learner constructs a unique integrated system that comprises formal linguistic features as well as multimodal elements, which are all used appropriately and according to the person's decision to achieve successful communication (García, 2009 2018; García & Wei, 2014). The emphasis of translanguaging is not on specific languages, but on the individual who is the agent and meaning-maker that selects the relevant elements of their dynamic repertoire to communicate and make sense of the world (García, 2009, 2018; García & Wei, 2014, 2018). Supplementing this insight, the notion of transposition (Cope & Kalantzis, 2020b; Kalantzis & Cope, 2020) posits the never-ending fluidity of multimodal meaning-making where language is an integral part of a wider communicative context. In their constant movement, meanings are thus both translatable and to an extent untranslatable[2]across different forms of meaning making (text, image, space, object, body, sound, speech), and these meanings must be conceived more broadly than distinct "languages" or even "language" itself (Cope et al., 2021).

Improved curriculum, professional development, and mind sets around the value of home languages can all help schools to encourage translanguaging and support students in the process. Phillips Galloway is working with colleagues on a curriculum that better guides teachers in translanguaging activities since not all curricular materials recognize the concept. Researchers at the Center for Applied Linguistics, including Cieslak, also work on professional development and policy discussions that help educators and policymakers alike understand how English learners bring with them linguistic assets that should be nurtured for overall academic success. "It's about understanding cultural identity, and my language is part of my identity," Cieslak

said. "And I'm going to naturally translanguage, whether you tell me I can or cannot." (Ileana Najarro, 2023) There's a gradual shift happening from segregating languages in the classroom towards employing two or more languages within a single lesson (Baker, 2010; Blackledge & Creese, 2010; García, 2009a; Fortune, Tedick, & Walker, 2008; Lindholm-Leary & Howard, 2008; Met, 2008). This reflects the idea that children pragmatically use both of their languages to maximise understanding and performance in the home, street, and school ((Gwyn Lewis, Bryn Jones and Colin Baker, 2012). Hence, the trend is shifting away from segregating languages in classrooms toward a more simultaneous and integrated approach involving two or more languages (Baker, 2010).

1.5. Translanguaging and AI

Translanguaging—the dynamic and flexible use of multiple languages to enhance comprehension and communication—can be effectively integrated with AI in teaching and learning English. AI-driven apps (e.g., Duolingo, Memrise) can provide explanations in a learner's native language (L1) while gradually transitioning to English (L2), reinforcing understanding through cross-linguistic connections. AI chatbots (like ChatGPT or language tutors) can respond in mixed languages, allowing learners to express themselves in both L1 and L2, making input more comprehensible. Voice Assistants (Google Assistant, Siri, Alexa) can recognize and respond in multiple languages, helping learners practice conversational English while allowing L1 support when needed. Apps like DeepL or Google Translate enable real-time translation, helping learners compare structures between languages and identify patterns. AI tools (e.g., YouTube's auto-translate) can generate bilingual subtitles, aiding comprehension while exposing learners to authentic English. AI TTS systems (like ElevenLabs) could read texts with mixed-language inputs, helping learners grasp pronunciation and meaning. Grammar & Style Checkers (Grammarly, ChatGPT) can detect errors by comparing L1-influenced English with standard usage, providing corrective feedback while acknowledging translanguaging as a learning strategy. Automated Writing Evaluation (AWE) Systems can assess essays written with L1 influences and suggest improvements without penalizing translanguaging. AI moderators (e.g., in language learning communities) can encourage translanguaging by allowing learners to discuss concepts in L1 before transitioning to English. Apps like Tandem or Hello Talk use AI to facilitate exchanges between speakers of different languages, promoting natural translanguaging in conversations.

However, there are certain challenges as well while implying these AI tools. For instance, AI must balance translanguaging with sufficient L2 exposure to avoid dependency on translation. AI models need training in diverse linguistic contexts to avoid biases against non-standard language use. AI tools should allow users to adjust the level of translanguaging support based on proficiency. Although it has certain directions for future like, AI could create bilingual exercises, stories, or dialogues tailored to learners' linguistic backgrounds. Future AI might better process and respond to code-switched speech, making interactions more natural. AI can enhance translanguaging by providing flexible, personalized, and context-aware language support. By integrating learners' full linguistic repertoires, AI-powered tools can make English learning more inclusive, efficient, and cognitively engaging, though the design of such systems must prioritize pedagogical effectiveness over mere translation. Future AI models will likely integrate translanguaging even deeper, making language learning more natural and inclusive.

There are some AI-powered tools and applications that already incorporate translanguaging principles to support English (or multilingual) learning like, Duolingo, Memrise, ChatGPT / Gemini (Bard) / Other LLMs, Google Translate / DeepL, ELSA Speak (AI Speech Coach), HelloTalk / Tandem (Language Exchange Apps), YouTube's AI-Generated Subtitles, Reverso Context, Microsoft Reading Coach (AI-Powered Literacy Tool), Bilingual AI Chatbots (e.g., LangAI, Praktika), These tools show that AI doesn't just enforce monolingual English but can strategically leverage translanguaging to scaffold learning. The best implementations allow flexible input/output while gradually nudging learners toward L2 proficiency.

2. CASE STUDY: USING CHATGPT FOR TRANSLANGUAGING IN ENGLISH LEARNING

2.1. Self-Study Applications

2.1.1. Mixed-Language Explanations & Clarifications

Example Prompt: "Explain the present perfect tense in Spanish and give examples comparing it to the past simple in English."

AI Response: Provides a bilingual explanation, highlighting differences (e.g., "In Spanish, 'he comido' (present perfect) is like 'I have eaten,' but in English, we also use it for past actions with present relevance.")

Benefit: Reinforces grammar concepts through L1 while transitioning to L2.

2.1.2. Code-Switched Writing Practice

Example Prompt: "I'm practicing writing in English but might use some Arabic words. Can you help me write a short story about a trip, and correct my English while keeping some Arabic for context?"

AI Response: Generates a mixed-language story, then provides an English-only version for comparison.

Example:

"ذهبت إلى السوق (I went to the market) and bought some تفاح (apples). Then, I met a صديق (friend)."

Correction: "I went to the market and bought some apples. Then, I met a friend."

2.1.3. Vocabulary Building with L1 Cognates

Example Prompt: "Give me 10 English words related to science that sound similar in French, with example sentences."

AI Response: Lists cognates (e.g., "biology/biologie," "chemistry/chimie") with bilingual examples.

2.2. Classroom Applications

2.2.1. A. Interactive Translanguaging Dialogues

Activity: Students role-play a conversation in mixed languages, then refine it into English with AI.

Example Workflow: Students write a dialogue in English + L1 (e.g., Hindi/English).

Input it into ChatGPT with the prompt: "Improve this dialogue to make it natural English but keep some Hindi words for cultural context."

AI provides a polished version, and students compare the two.

2.2.2. Bilingual Reading Comprehension

Activity: Students read an English text, then ask AI to summarize key points in L1.

Example Prompt: "Summarize this paragraph in Tagalog, then translate the summary back to English so I can check my understanding."

Benefit: Strengthens comprehension through bidirectional translation.

2.2.3. Error Analysis with L1 Support

Activity: Students submit English writing with L1-influenced errors (e.g., direct translations).

Teacher/AI Prompt: "This student wrote, 'I am here since Monday' (from Spanish 'Estoy aquí desde el lunes'). Explain the mistake in Spanish and give the correct English version."

AI Response: "In Spanish, 'desde' is used with the present tense, but in English, we say 'I have been here since Monday' (present perfect)."

2.3. Advanced Uses for Teachers

2.3.1. Generating Translanguaging Materials

Prompt: "Create a bilingual English-Swahili worksheet on 'daily routines,' with matching exercises and fill-in-the-blanks."

Output: AI generates a printable worksheet with mixed-language tasks.

2.3.2. Simulating Multilingual Conversations

Prompt: "Act as a patient who speaks broken English and some Mandarin. I'll play the doctor, and we'll practice medical vocabulary."

AI Role-Plays: Responds in simple English + Mandarin, forcing the learner to negotiate meaning.

Table 2: Challenges & Solutions

Challenge	AI-Based Solution
Over-reliance on L1	AI gradually reduces L1 support as proficiency increases (e.g., "Now try this sentence without Spanish.")
Unnatural code-mixing	AI detects awkward mixes and suggests more natural alternatives.
Lack of cultural nuance	Teachers can fine-tune prompts (e.g., "Include Nigerian Pidgin examples.").

Translanguaging, the flexible use of multiple languages to aid comprehension and communication can improve AI-driven language learning in several significant ways:

2.3.3. AI Understand & Process Mixed-Language Input

Problem: Traditional AI language models are often trained on "pure" monolingual data, making them struggle with code-switching (e.g., Spanglish, Hinglish).

Solution: Translanguaging-based AI (e.g., ChatGPT, Google's Universal Speech Model) can now:

Recognize mixed-language sentences ("Me gusta learning English").

Respond appropriately ("! Qué bueno! Do you

want more examples?").

Example: Meta's SeamlessM4T model translates and transcribes speech in 100+

languages, even when speakers mix them.

2.3.4. Makes AI Tutors More Culturally & Linguistically Inclusive

Problem: Many AI language apps enforce strict "English-only" rules, ignoring learners' native languages.

Solution: Translanguaging-friendly AI (e.g., Duolingo's bilingual tips, ChatGPT's multilingual explanations) allows:

L1-supported learning (e.g., explaining English grammar in Spanish).

Natural code-switching (e.g., AI chatbots that let users mix languages).

Example: A Hindi speaker can ask ChatGPT:

"Explain phrasal verbs in Hindi with English examples."

2.3.5. Improves AI's Error Detection & Feedback

Problem: Standard grammar checkers (like Grammarly) often fail when learners write with L1 influence.

Solution: Translanguaging-aware AI can:

Detect L1 transfer errors (e.g., Spanish speaker writing "I have 20 years" instead of "I am 20 years old").

Provide bilingual corrections ("In English, we say 'I am 20,' not 'I have 20' (like 'tengo 20 años' in Spanish).").

Example: Tools like Language Tool now offer language-specific feedback for multilingual writers.

2.3.6. Enables Better Personalization in AI Learning Apps

Problem: Most AI language apps use a one-size-fits-all approach.

Solution: Translanguaging allows AI to:

Adapt to learners' linguistic backgrounds (e.g., an app suggesting cognates between French and English).

Adjust difficulty (e.g., allowing L1 support for beginners, then fading it out).

Example: Memorize uses bilingual videos where speakers naturally mix languages.

2.3.7. Supports Low-Resource & Indigenous Languages

Problem: AI often performs poorly in languages with limited digital data.

Solution: Solving the challenge of AI performing poorly in low-resource languages (those with limited digital data) requires a combination of techniques to overcome data scarcity, improve model generalization, and leverage available resources efficiently. Following are the points useful for solving the issue.

2.3.8. Data Augmentation & Synthetic Data Generation

Back-Translation: Translate available text from a high-resource language (e.g., English) to the low-resource language using an existing model, then use this as additional training data.

Paraphrasing & Noise Injection: Introduce slight variations (e.g., word swaps, synonym replacement) to existing sentences to expand the dataset.

Rule-Based Generation: Use linguistic rules (e.g., grammar templates) to generate synthetic sentences in the target language.

2.3.9. Transfer Learning & Multilingual Models

Pretrained Multilingual Models: Pretrained multilingual models are machine learning models that have been pre-trained on large-scale multilingual text data, enabling them to understand and generate text in multiple languages. These models leverage transfer learning, meaning they can be fine-tuned for specific tasks (like translation, sentiment analysis, or named entity recognition) with relatively small amounts of task-specific data. They are commanding tools for NLP tasks across languages, reducing the need for language-specific models. However, their efficacy differs by language and task, so fine-tuning or using task-specific adaptations may be necessary for optimal performance. (e.g., mBERT, XLM-R, NLLB). Fine-tune models are already trained on many languages, as they may have learned some cross-lingual patterns.

Leveraging Similar Languages & Language Families: Leveraging language families and similarities between languages primarily make the learning process comfortable. Languages within the same family probably share vocabulary, grammar, and pronunciation patterns, making it simpler to understand related languages According to Luca Lampariello, as people come in families, so do languages. There aren't such things as mommy, daddy, and baby languages, but rather languages that share common origins and characteristics, based upon their evolution throughout human history. If the low-resource language is related to a higher-resource one (e.g., Swahili and Zulu), use data from the related language to bootstrap

learning.

Active Learning & Human-in-the-Loop: Active learning makes translanguaging an interactive, student-centered process, while the human-in-the-loop element ensures structured, responsive, and culturally sustaining pedagogy. Together, they create an inclusive, effective multilingual learning environment. Active learning engages students in meaningful interactions, encouraging them to use their full linguistic repertoire rather than restricting them to a single language. In translanguaging pedagogy, active learning strategies include:

1. Multilingual Discussions: Students discuss concepts in different languages, deepening comprehension.
2. Code-Switching Tasks: Learners switch between languages to solve problems or express ideas.
3. Collaborative Projects: Group work where students leverage their home languages alongside the target language.
4. Peer Teaching: Students explain concepts to each other using their strongest language, reinforcing understanding.

Active learning ensures that translanguaging is not just a passive acceptance of multilingualism but a dynamic process where students actively construct knowledge.

1. Human-in-the-Loop (HITL) in Translanguaging: Human-in-the-loop refers to the essential role of teachers (and sometimes peers) in guiding, assessing, and refining learning. In translanguaging, HITL supports:

Scaffolding: Teachers provide real-time feedback, helping students bridge languages effectively.

Adaptive Instruction: Educators adjust lessons based on students' language use, ensuring comprehension.

Cultural & Linguistic Validation: Teachers acknowledge and incorporate students' home languages, fostering inclusivity.

AI-Assisted Learning Enhancement: In digital learning environments, teachers work alongside AI tools (e.g., multilingual chatbots) to personalize instruction while maintaining human judgment.

Synergy Between Active Learning & HITL in Translanguaging: The synergy between Active Learning (AL) and Human-in-the-Loop (HITL) systems in translanguaging (the dynamic use of multiple languages and language resources in communication) can significantly enhance language learning, machine translation, and multilingual NLP applications. Through dynamic feedback Loops students actively engage in multilingual tasks while teachers provide corrective and affirming feedback. Teachers use personalized learning pathways to activate insights from students' language interactions to tailor instruction. Through balanced autonomy & guidance learners explore language flexibility while educators ensure academic rigor.

3. CASE STUDY EXAMPLE: ADAPTING TO A LOW-RESOURCE LANGUAGE

Suppose you want to build a chatbot for Tamil (a language with some but limited digital resources):

1. Collect & Augment Data: Scrape Tamil websites, use back-translation from English, and generate synthetic dialogues.
2. Use a Pretrained Model: Fine-tune XLM-R or Indic BERT on available Tamil data.
3. Active Learning: Deploy a basic model and ask Tamil speakers to correct responses to improve it.
4. Leverage Related Languages: Incorporate data from Malayalam or Telugu if helpful.
5. Deploy Lightweight: Use distillation to make the model efficient for real-world use.

Translanguaging helps AI leverage high-resource languages (e.g., English/Spanish) to support low-resource ones.

Example: Google's T2T (Translation 2) can translate speech between languages even with minimal training data by using intermediary languages.

Patterns of AI-powered machine translation use in second language writing: The integration of AI-powered machine translation (MT) in second language (L2) writing has become increasingly prevalent, reshaping how learners compose, revise, and refine texts in a foreign language. A case study was performed for understanding use of AI in learning second language (Yu, R., & Jiang, L. 2025) translanguaging was taken as a tool. The findings reveal an extensive use of MT in L2 writing, with four major patterns of MT use: using MT as a language bridge, an alarm bell, a critical sword, and a creativity springboard. Three ideological factors—monolingual ideology, standard language ideology, and a translanguaging stance—were found to shape these patterns of MT use.

Use of AI tools for academic endeavours: With the penetration of generative artificial intelligence (AI) tools like ChatGPT into higher education, critical thinking (CT) is increasingly paramount in students' academic writing (Shen, Y., & Chen, L. 2025). However, little is known about EFL students' application of such tools for academic writing, especially how CT is embedded in this

process. The findings revealed that participants applied ChatGPT mainly for language editing, knowledge inquiry, and inspiration seeking, underpinned by the rationales including language enhancement, information search efficiency, and broadening perspectives. Additionally, students demonstrated CT in their multifaceted roles as code breakers, text participants, text users, and text analysts, integrating core CT skills in this social literacy practice. In conclusion, students demonstrated a sound understanding of ChatGPT's affordances for academic writing and a tendency of 'critical chatting' rather than 'casual cheating,' despite varying depth. These findings inform future pedagogical strategies and policymaking regarding integrating AI tools in EFL students' academic pursuits.

Hybrid Human-AI Collaboration in Translanguaging: The integration of AI-powered machine translation (MT) with human input is reshaping second language (L2) writing, creating a collaborative ecosystem where learners, teachers, and AI tools interact dynamically. Use of AI in Classroom Teaching: Artificial Intelligence (AI) is transforming education by enhancing teaching efficiency, personalizing learning, and automating administrative tasks. Its integration into classrooms supports both educators and students, making education more adaptive, engaging, and accessible. AI-powered systems analyse student performance and tailor instruction to individual needs. Adaptive Learning Platforms (e.g., DreamBox, Khan Academy) adjust difficulty levels in real time based on student progress.

a. Intelligent Tutoring Systems (ITS) provide one-on-one support, offering customized exercises and feedback (e.g., Carnegie Learning's MATHia).
b. Learning Analytics, track student behavior to predict struggles and suggest interventions.

Example: AI-driven platforms like Squirrel AI (China) use machine learning to create personalized study plans for K-12 students.

3.1. Role of AI in Classroom Teaching

Artificial Intelligence (AI) transforms education by enhancing teaching efficiency, personalizing learning, and automating administrative tasks. Its integration into classrooms supports both educators and students, making education more adaptive, engaging, and accessible. Below are key areas where AI is making an impact:

3.1.1. Personalized & Adaptive Learning

2. AI-powered systems analyze student performance and tailor instruction to individual needs.
3. Adaptive Learning Platforms (e.g., DreamBox, Khan Academy) adjust difficulty levels in real time based on student progress.
4. Intelligent Tutoring Systems (ITS) provide one-on-one support, offering customized exercises and feedback (e.g., Carnegie Learning's MATHia).
5. Learning Analytics track student behavior to predict struggles and suggest interventions.

Example: AI-driven platforms like Squirrel AI (China) use machine learning to create personalized study plans for K-12 students.

3.1.2. Automated Grading & Feedback

AI reduces teacher workload by automating repetitive tasks.

1. Essay Scoring (e.g., Turnitin's Gradescope, ETS's e-rater) evaluates written work for grammar, coherence, and plagiarism.
2. Math & Science Problem Checkers (e.g., Photomath, Wolfram Alpha) provide instant feedback on assignments.
3. Speech Recognition for Language Learning (e.g., Duolingo, ELSA Speak) corrects pronunciation in real time.

Example: Google's AI Tutor (in development) will offer real-time feedback to students in digital classrooms.

3.1.3. Enhanced Student Engagement

AI makes learning interactive and immersive.

1. Chatbots & Virtual Assistants (e.g., Jill Watson, an AI TA at Georgia Tech) answer student queries 24/7.
2. Gamified Learning (e.g., Kahoot!, Minecraft Education) uses AI to adapt challenges based on student responses.
3. AI-Generated Content (e.g., Canva Magic Write, ChatGPT for lesson plans) helps teachers create engaging materials.

Example: ChatGPT in classrooms assists in brainstorming, tutoring, and generating quiz questions.

3.1.4. Supporting Diverse & Inclusive Education

AI helps bridge learning gaps for students with disabilities and language barriers.

1. Speech-to-Text & Text-to-Speech (e.g., Microsoft Immersive Reader) aids dyslexic students.
2. Real-Time Translation Tools (e.g., Google Translate, Otter.ai) assist multilingual learners.
3. AI for Special Education (e.g., Cognii's virtual assistant) provides tailored support for

neurodiverse students.

Example: Seeing AI (Microsoft) narrates the world for visually impaired students.

3.1.5. Teacher Assistance & Professional Development

AI supports educators in planning, assessment, and skill enhancement.

1. Automated Lesson Planning (e.g., Education Copilot, Curipod) generates structured lesson ideas.
2. Classroom Management AI (e.g., ClassDojo) tracks student behavior and engagement.
3. Professional Development via AI (e.g., Edthena) analyzes teaching videos to provide feedback.

Example: IBM's Teacher Advisor uses Watson AI to recommend teaching strategies.

3.1.6. Predictive Analytics & Early Intervention

AI identifies at-risk students before they fall behind.

1. Dropout Prediction (e.g., Civitas Learning) flags students needing extra support.
2. Emotion Recognition AI (e.g., Affectiva) detects disengagement or stress in online learning.

Example: Georgia State University reduced dropout rates using AI-driven advising systems.

3.2. Future of AI in Classrooms

1. AI-Augmented VR/AR Learning (e.g., Meta's AI-powered virtual classrooms).
2. Generative AI for Customized Textbooks (e.g., OpenAI's GPT-4 for dynamic content).
3. AI-Driven Lifelong Learning (personalized upskilling for workforce readiness).

3.3. Challenges & Ethical Considerations

While AI offers immense benefits, challenges remain:

1. Data Privacy (ensuring student data security under laws like FERPA & GDPR).
2. Bias in AI Models (needing diverse training data to avoid discriminatory recommendations).
3. Over-reliance on AI (balancing tech with human mentorship).
4. Teacher Training (educators need upskilling to use AI tools effectively).

4. FINDINGS

AI is not replacing teachers but empowering them with tools to enhance learning efficiency, accessibility, and engagement. The future of education lies in a human-AI collaborative model, where teachers focus on mentorship while AI handles administrative and adaptive learning tasks.

The findings of this study show that translanguaging as developed and implemented for classroom teaching was a successful learning experience with positive learning outcomes based on student's perceptions and their performance scores. Findings suggest that students felt more comfortable in using their holistic communicative repertoire as they familiarized themselves with the use of multiple digital tools in various aspects of the course activities. These tools assisted them to improve their association with digital and online spaces, in general. Furthermore, online interactions among native speaker peers played a fundamental role in making the experience effective and engaging, by contributing both in the enhancement of language acquisition and of the complete learning and social experience of the intervention. Considering the future implementations of the learning design of this study, it was found that the new pedagogy and processes of the course were effective. The findings from this study support the work of second/foreign language learning teachers, vernacular language teachers, educational technology providers and governments to develop more advanced and real-life digital solutions, policies, and instructional schemes with the goal of preparing students to become independent digital learners while also supporting translanguaging pedagogy in learning. Pedagogical practices in language learning are in a state of flux given the effects of digital media and new technologies in our contemporary lives. The ability of learners to exploit appropriately available digital media elements and tools creates new challenges and opportunities for language teaching and learning practices.

Therefore, the combination of translanguaging and the role of new digital technologies in the field of language learning needs further investigation. The study through case study proved that using translanguaging with the inclusion of AI generative would be an engaging pedagogy for English language learners. This pedagogy will help them improve English language speaking.

WORKS CITED

A.S. Canagarajah. (2103) Negotiating translingual literacy: An enactment. Research in the Teaching of English, 48 (1) (2013), pp. 40-67, https://www.jstor.org/stable/24398646

Baker, C. (2001). Foundations of bilingual education and bilingualism (3rd ed.). Clevedon, UK: Multilingual

Matters.
Baker, C. (2003). Biliteracy and transliteracy in Wales: Language planning and the Welsh National Curriculum. In N.H. Hornberger (Ed.), Continua of biliteracy: An ecological framework for educational policy, research and practice in multilingual settings (pp. 71–90). Clevedon, UK: Multilingual Matters.
Baker, C. (2006). Foundations of bilingual education and bilingualism (4th ed.). Clevedon, UK: Multilingual Matters. Baker, C. (2007). A parents' and teachers' guide to bilingualism (3rd ed.). Clevedon, UK: Multilingual Matters.
Baker, C. (2010). Increasing bilingualism in bilingual education. In D. Morris (Ed.), Welsh inthe 21st Century (pp. 61–79). Cardiff, UK: University of Wales Press.
Baker, C. (2011). Foundations of bilingual education and bilingualism (5th ed.). Clevedon, UK: Multilingual Matters. Blackledge, A., & Creese, A. (2010). Multilingualism: A critical persp). MultilingualismK: Continuum.
Canagarajah, S. (2011a). Code meshing in academic writing: Identifying teachable strategies of translanguaging. The Modern Language Journal,95, 401–417.
Canagarajah, S. (2011b). Translanguaging in the classroom: Emerging issues for research and pedagogy. In L. Wei (Ed.), Applied linguistics review 2(pp. 1–27). Berlin, Germany: De Gruyter Mouton.
Cook, V. (2016). Second Language Learning and Language Teaching (5th ed.). Routledge. https://doi.org/10.4324/9781315883113
Cope, B., & Kalantzis, M. (2020b). Making Sense: Reference, Agency, and Structure in a Grammar of Multimodal Meaning. Cambridge University Press. https://doi.org/10.1017/9781316459645
Cope, B., Kalantzis, M., & Tzirides, A. O. (Olnancy). (2021). Meaning without Borders: From Translanguaging to Transposition in the Era of Digitally Mediated, Multimodal Meaning. In K. K. Grohmann (Ed.), Multifaceted Multilingualism. John Benjamins.
Creese, A., & Blackledge, A. (2010). Translanguaging in the bilingual classroom: A pedagogy for learning and teaching? The Modern Language Journal,94, 103–115.
Creese, A., & Blackledge, A. (2011). Ideologies and interactions in multilingual education: What can an ecological approach tell us about bilingual pedagogy? In C. He´lot & M. O´Laoire (Eds.), Language policy for the multilingual classroom (pp. 3–21). Bristol, UK: Multilingual Matters.
Cummins, J. (2008). Teaching for transfer: Challenging the two solitudes assumption in bilingual education. In J. Cummins & N.H. Hornberger (Eds.), Encyclopaedia of language and education (2nd ed., Vol. 5: Bilingual Education, pp. 65–76). New York, NY: Springer.
D.R. Cotton, P.A. Cotton, J.R. Shipway Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International (2023), pp. 1-12, 10.1080/14703297.2023.2190148
Drury, R. (2007). Young bilingual learners at home and school: Researching multilingual voices. Stoke on Trent, UK: Trentham.
Estyn. (2002). Developing dual literacy: An Estyn discussion paper. Cardiff, UK: Estyn.
Faltis, C. (1990). New directions in bilingual research design: The study of interactive decision making. In R. Jacobson & C. Faltis (Eds.), Language distribution issues in bilingual schooling (pp. 45–57). Clevedon, UK: Multilingual Matters.
Fang, T., Yang, S., Lan, K., Wong, D.F., Hu, J., Chao, L.S., et al. (2023). Is ChatGPT a highly fluent grammatical error correction system? A comprehensive evaluation. arXiv. doi: 10.48550/arXiv.2304.01746
Fortune, T.W., Tedick, D.J., & Walker, C.L. (2008). Integrated language and content teaching: Insights from the immersion classroom. In T.W. Fortune & D.J. Tedick (Eds.), Pathways to multilingualism: Evolving perspectives on immersion education (pp. 71–96). Clevedon, UK: Multilingual Matters.
Garcı´a, O. (2009a). Bilingual education in the 21st century: A global perspective. Oxford, UK:Wiley-Blackwell.
Garcı´a, O. (2009b). Education, multilingualism and translanguaging in the 21st century. InA.K. Mohanty, M. Panda, R. Phillipson, & T. Skutnabb-Kangas (Eds.),Multilingual education for social justice: Globalising the local (pp. 128–145). New Delhi, India: Orient Black Swan.
Garcı´a, O. (2011). Educating New York's bilingual children: Constructing a future from the past. International Journal of Bilingual Education and Bilingualism,14, 133–153.
Garcı´a, O., & Sylvan, C.E. (2011). Pedagogies and practices in multilingual classrooms: Singularities in pluralities. The Modern Language Journal,95, 385–400.
García, O. (2009). Education, multilingualism and translanguaging in the 21st century. In A. Mohanty, M.

Panda, R. Phillipson, & T. Skutnabb-Kangas (Eds.), Multilingual Education for Social Justice: Globalising the local (pp. 140±158). Orient Blackswan (former Orient Longman). https://ofeliagarciadotorg.files.wordpress.com/2011/02/educationmultilingualism-translanguaging-21st-century.pdf

García, O., & Wei, L. (2018). Translanguaging. In C. Chapelle (Ed.), The Encyclopedia of Applied Linguistics (pp. 1-7). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781405198431

Grosjean, F. (2008). Studying bilinguals. Oxford, UK: Oxford University Press.

Grosjean, F. (2010). Bilingual: Life and reality. Cambridge, MA: Harvard University Press.

Gwyn Lewis w.g.lewis@bangor.ac.uk, Bryn Jones & Colin Baker (2012) Translanguaging: origins and development from school to street and beyond, Educational Research and Evaluation, 18:7, 641-654, DOI: 10.1080/13803611.2012.718488

Hornberger, N.H. (2003), Continua of biliteracy. In N.H. Hornberger (Ed.), Continua of biliteracy: An ecological framework for educational policy, research, and practice in multilingual settings (pp. 3–34). Clevedon, UK: Multilingual Matters.

Hornberger, N.H., & Link, H. (2012). Translanguaging and transnational literacies in multilingual classrooms: A biliteracy lens. International Journal of Bilingual Education andBilingualism,15, 261–278.

Hoshino, N., & Thierry, G. (2011). Language selection in bilingual word production: Electrophysiological evidence for cross-language competition. Brain Research,1371, 100–109.

Howard, E.R., Sugarman, J., Christian, D., Lindholm-Leary, K., & Rogers, D. (2005). Guiding principles for dual language education. Washington, DC: Center for Applied Linguistics.

J. Escalante, A. Pack, A. Barrett. (2023) AI-generated feedback on writing: Insights into efficacy and ENL student preference International Journal of Educational Technology in Higher Education, 20, p. 57, 10.1186/s41239-023-00425-2

J. Steiss, T. Tate, S. Graham, J. Cruz, M. Hebert, J. Wang, C.B. Olson Comparing the quality of human and ChatGPT feedback of students' writing Learning and Instruction, 91 (2024), Article 101894, 10.1016/j.learninstruc.2024.101894

Jacobson, R. (1983). Can two languages be acquired concurrently? Recent developments in bilingual methodology. In H.B. Altman & M. McClure (Eds.), Dimensions: Language '82, (pp. 110–131). Louisville, KY: University of Louisville Press.

Jacobson, R. (1990). Allocating two languages as a key feature of a bilingual methodology. In R. Jacobson & C. Faltis (Eds.), Language distribution issues in bilingual schooling (pp. 3–17). Clevedon, UK: Multilingual Matters. Educational Research and Evaluation

Jasone Cenoz, Alaitz Santos, Implementing pedagogical translanguaging in trilingual schools,

Jones, B., & Lewis W.G. (in press). Language arrangements within bilingual education in Wales. In I. Mennen & E.M. Thomas (Eds.), Unravelling bilingualism: A cross-disciplinary perspective. Bristol, UK: Multilingual Matters.

Jones, W.R. (1959). Bilingualism and intelligence. Cardiff, UK: University of Wales Press.

L. Wei. (2003) Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. Frontiers in Psychology, 14 . Article 1261955, 10.3389/fpsyg.2023.1261955

Lambert, W.E. (1974). Culture and language as factors in learning and education. In F.E. Aboud & R.D. Meade (Eds.), Cultural factors in learning and education (pp. 91–122). Bellingham, WA: 5th Western Washington Symposium on Learning.

Lamperiello, Luca. Learning Languages from the Same Language Families: Pros and Cons. Smart Language Academy. 2021. https://www.lucalampariello.com/language-families-pros-and-cons/

Lewis, G., Jones, B., & Baker, C. (in press). 100 bilingual lessons: Distributing two languagesin classrooms. In C. Abello-Contesse & R. Chaco´n Beltra´n (Eds.), Bilingualism in a school setting. Bristol, UK: Multilingual Matters.

Lindholm-Leary, K., & Howard, E.R. (2008). Language development and academic achievement in two-way immersion programs. In T.W. Fortune & D.J. Tedick (Eds.), Pathways to multilingualism: Evolving perspectives on immersion education (pp. 177–200). Clevedon, UK: Multilingual Matters.

Lindholm-Leary, K.J. (2001). Dual language education. Clevedon, UK: Multilingual Matters.

Maillat, D., & Serra, C. (2009). Immersion education and cognitive strategies: Can the obstacle be the advantage in a multilingual society? International Journal of Multi-lingualism,6, 186–206.

Menken, K., & Garcı´a, O. (Eds.). (2010). Negotiating language policies in schools: Educators as policymakers. New York, NY: Routledge.

Met, M. (2008). Paying attention to language: Literacy, language and academic achievement. In T.W. Fortune & D.J. Tedick (Eds.), Pathways to multilingualism: Evolving perspectives on immersion education (pp. 49–70). Clevedon, UK: Multilingual Matters.

O. García, W. Li. (2014) Translanguaging: Language, bilingualism and education. Palgrave Macmillan, New York, NY.

Peal, E., & Lambert, W.E. (1962). The relationship of bilingualism to intelligence. Psychological Monographs,76(27), 1–23.

Plitnichenko, Lisa. (2021) AI in Education: How to Transform Learning Experience. https://jellyfish.tech/blog/artificial-intelligence-in-education/

Prator, C., & Celce-Murcia, M. (1979). An outline of language teaching approaches. In M. Celce-Murcia & L. McIntosh (Eds.), Teaching English as a second or foreign language. Newbury House.

Saer, D.J. (1922). An inquiry into the effect of bilingualism upon the intelligence of young children. Journal of Experimental Pedagogy,6, 232–240 and 266–274.

Saer, D.J. (1923). The effects of bilingualism on intelligence. British Journal of Psychology,14,25–38.

Shen, Y., & Chen, L. (2025). 'Critical chatting' or 'casual cheating': how graduate EFL students utilize ChatGPT for academic writing. Computer Assisted Language Learning, 1–29. https://doi.org/10.1080/09588221.2025.2479141

Strimel, G., Reed, P., Dooley, G., Bolling, J., Phillips, M., & Cantu, D. V. (2014). Integrating and Monitoring Informal Learning in Education and Training. Techniques: Connecting Education & Careers, 89(3), 48 - 54.

Swain, M., & Lapkin, S. (2005). The evolving socio-political context of immersion educationin Canada: Some implications for program development. International Journal of AppliedLinguistics,15, 169–186.

Swain, M., Kinnear, P., & Steinman, L. (2011). Sociocultural theory in second language education: An introduction through narratives. Bristol, UK: Multilingual Matters.

System, Volume 92, 2020, 102273,

Thierry, G., & Wu, Y.J. (2007). Brain potentials reveal unconscious translation during foreign language comprehension. Proceedings of the National Academy of Sciences, USA,104,12530–12535.

W. Dai, J. Lin, F. Jin, T. Li, Y. Tsai, D. Gasevic, G. Chen. (2023) Can Large Language Models Provide Feedback to Students? A Case Study on ChatGPT (Orem, UT, USA) IEEE International Conference on Advanced Learning Technologies (ICALT) (2023), pp. 323-325, 10.1109/ICALT58122.2023.00100

Wei, L. (2011). Moment analysis and translanguaging space: Discursive construction of identities by multilingual Chinese youth in Britain. Journal of Pragmatics,43, 1222–1235.

Williams, C. (2003). Defnyddio trawsieithu i ddatblygu llythrennedd deuol [Using translanguaging to develop dual literacy]. In G. Roberts & C. Williams (Eds.),Addysg Gymraeg – Addysg Gymreig(pp. 288–312). Bangor, UK: School of Education.

Williams, C. (1994).Arfarniad o ddulliau dysgu ac addysgu yng nghyd-destun addysg uwchraddddwyieithog[An evaluation of teaching and learning methods in the context of bilingual secondary education] (Unpublished PhD thesis). University of Wales, Bangor, UK.

Williams, C. (1996). Secondary education: Teaching in the bilingual situation. In C. Williams, G. Lewis, & C. Baker (Eds.), The language policy: Taking stock (pp. 39–78). Llangefni, UK: CAI.

Williams, C. (2002).Ennill iaith: Astudiaeth o sefyllfa drochi yn 11–16 oed[A language gained: A study of language immersion at 11–16 years of age]. Bangor, UK: School of Education. Retrieved from http://www.bangor.ac.uk/addysg/publications/Ennill_Iaith.pdf

Wu Y.J., & Thierry, G. (2010). Chinese English bilinguals reading English hear Chinese. The Journal of Neuroscience,30, 7646–7651.654G. Lewis et al.

Yu, R., & Jiang, L. (2025). Exploring patterns of AI-powered machine translation use in second language writing: a translanguaging perspective. Computer Assisted Language Learning, 1–27. https://doi.org/10.1080/09588221.2025.2498096

Z.Z. Zheng, A.G. Drybrough. (2023) Translanguaging in the academic writing process: Exploring Chinese bilingual postgraduate students' practices at a British university Journal of English for Academic Purposes, 65, Article 101269, 10.1016/j.jeap.2023.101269