

**The Impact of Artificial Intelligence Tools on Bilingual Students in U.S. Education:
A Study on Academic Language-learning, Cultural Sensitivity and Inclusiveness**

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Abstract

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This study explores the impact of Artificial Intelligence (AI) on the education of bilingual students with a focus on academic language learning experience, cultural sensitivity and inclusiveness. As AI technologies like ChatGPT and Grammarly become more prevalent in education can be used to enrich the learning experience of bilingual students. Through in-depth interviews with three bilingual students and three bilingual educators, the study identifies challenges such as language learning difficulties, identity negotiation, and code-switching complexity. Findings suggest that AI tools provide adjunctive support by providing personalized explanations, improving learning efficiency, and reducing language-related anxiety. This study mentions significant challenges related to cultural sensitivity and inclusivity, as current AI technologies often struggle to accurately translate idioms and cultural references. The study emphasizes the need for comprehensive training, fair use of AI and culturally sensitive algorithms, as well as proposing clear ethical guidelines for the use of AI in education. Addressing these challenges helps create a more inclusive and supportive learning environment.

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Introduction

Since the year 2020, the education landscape worldwide has changed dramatically, driven by the unpredictable challenges of the global pandemic (B. et al., 2023; Netswera et al., 2022). This period of disruption has accelerated the adoption of digital technologies and highlighted the integral role of Artificial Intelligence (AI) in transforming the education paradigm (Górriz et al., 2020). While not a novel presence, AI is being integrated into education at an unprecedented level, driven by the urgent need to adapt to distance learning environments and meet diverse educational needs. There has been a significant increase in the number of education-related research publications on AI, such as a systematic review of AI education in online higher education and some study the use of AI in medical education (Crompton & Burke, 2023). Experimentation with AI in educational settings reflects its evolving complexity and multi-functionality, with the transition from basic capabilities to advanced applications such as generative AI¹ (Crompton & Burke, 2023; Ha et al., 2023). Among most of the insights in education, AI can personalize learning, automate tasks, and provide insights based on data, making it help to support or even replace teachers (Crompton & Burke, 2023; Wang et al., 2023), with a common example being Turnitin's Grade Mark, which automatically grades assignments, quizzes, and exams. The ability to personalize to meet an individual's language needs, cultural background, and learning style has the potential to create a more inclusive and effective learning environment (Liang et al., 2021). However, this technological advancement raises important questions about the implications of AI for vulnerable student populations, particularly bilingual students.

¹ Generative AI refers to a type of artificial intelligence that creates new content by learning patterns from existing data, such as text, images, audio, or video (Washington Office of Superintendent of Public Instruction, 2024). Unlike traditional AI, which focuses primarily on analysis and prediction based on input data, generative AI models can generate raw output that imitates their training data (Crompton & Burke, 2023).

Bilingual students, who often navigate the challenges of mastering a new language while maintaining their native language, face unique educational barriers. Research highlights that bilingualism is not merely the coexistence of two separate language systems but a dynamic, integrated process of language use (García & Li, 2014; Cummins, 2000). This understanding explained the need for AI tools to support the fluid linguistic practices of bilingual students, rather than compartmentalizing languages.

Preliminary findings suggested that, despite the potential benefits, the implementation of AI in education brings to the fore issues of cultural sensitivity, ethical data use, and the digital divide. Historically, the education system in the United States has oscillated between supporting and marginalizing bilingual education. The English-only movement, which gained momentum during the early 20th century, led to policies that marginalized non-English-speaking communities and suppressed bilingual education programs (Moore, 2021). Such historical contexts highlight the importance of ensuring that AI in education does not perpetuate these inequities but rather promotes inclusiveness and cultural sensitivity.

The purpose of this thesis is to explore the impact of AI on the educational experiences of bilingual students, with a focus on cultural sensitivity and inclusiveness. Specifically, this study seeks to answer the following three research questions:

1. How do bilingual students and educators perceive the role of AI tools in improving academic English proficiency and the overall learning experience in U.S. educational settings?
2. What are the specific benefits and challenges of using AI tools to support bilingual students' academic achievement and integration into the U.S. educational environment?

3. How do these technological tools affect cultural sensitivity and inclusiveness in learning environments?

This study aims to bridge the gap in our understanding of how AI can be utilized to address the unique challenges faced by these students, thereby contributing to a more equitable and inclusive educational environment. By applying a phenomenological approach as the qualitative research methodology, I intend to develop an in-depth, contextualized understanding of the lived experiences and perceptions of these students (Merriam & Tisdell, 2016). In this study, I began to explore the impact of AI on the educational experiences of bilingual students, grounding the analysis in a blend of theoretical insights and experiential data.

Rational

My language learning experience was full of challenges, from assimilating into a completely new culture to overcoming emotional barriers caused by unfamiliar surroundings. I grew up in a non-English speaking country and my initial immersion in my native language and culture shaped my early identity and communication style. When I moved to an English-speaking country, I was faced with the daunting task of learning a new language while trying to understand and assimilate into a different cultural context. This transition involved navigating various social norms, adapting to a different educational system, and dealing with the emotional stress of feeling out of place. I believe those challenges were shared by countless bilingual students, just like Adnan Oflaz (2019) mentioned: “approximately one-third of students studying a foreign language experience at least a moderate level of foreign language anxiety” (p. 71). Recognizing the stress and anxiety that most language learners experience during the language-learning process, it is hoped that by exploring language through different learning methods, students will be exposed to comfortable cultural perspectives and expressions

(MacIntyre, 2017). The support of technology for education should increase students' cultural awareness and sensitivity, enable educators to use AI in a way that recognizes and celebrates cultural and linguistic diversity in the classroom, and create a more inclusive and supportive learning environment for all students.

My graduate program in Curriculum and Instruction: Language, Literacy, and Culture at the University of Washington has allowed me to gain insight into current issues and has fueled my passion for exploring AI's potential in education, to commit to exploring ways to re-imagine and revitalize contemporary educational strategies to meet the needs of an increasingly diverse student body. This thesis is driven by a desire to bridge the gap between technology and pedagogy, ensuring that AI is utilized to make education more accessible, responsive, and effective for bilingual students. In the midst of limited conditions, I focused on the bilingual student population in higher education. However, I am also aware that these perspectives can lead to my own personal bias by overemphasizing the struggles and needs of these students, which may overlook other important aspects of the educational experience.

For colleagues and educators, I expect the study to provide a collaborative platform to address the challenges and opportunities presented by the convergence of technology and education. The insights gained from this research will contribute to a collective understanding of how AI can be utilized to support diverse student populations. It encourages dialog among educators and fosters communities of practice² (CoP) dedicated to innovating and improving pedagogy. By sharing best practices and lessons learned, this research will empower educators to make informed decisions in the classroom that will improve their ability to meet the needs of their students effectively. With these ideas and perspectives, this study is not only to innovate but

² A community of practice is a term coined by Jean Lave and Etienne Wenger in 1991 to refer to a group of people who share a common concern, problem, or passion for a topic and who are committed to innovating and improving pedagogy by deepening their knowledge and expertise in the field through ongoing interactions (Wenger, 1998).

to create an educational environment that values diversity, promotes cultural understanding, and allows students to thrive in a multicultural world. That being said, I remain mindful of potential biases and strive to maintain a balanced perspective that recognizes the impact of my experiences on my research while critically engaging with the broader educational context.

Literature Review

Bilingual concepts

The book *Translation: Language, Bilingualism and Education* is an important addition to this research. The work by Ofelia García and Li Wei (2014) provided a groundbreaking perspective on bilingual education, introducing the concept of translanguaging as a dynamic process of bilingualism. The authors mentioned that bilingualism is not merely the coexistence of two separate language systems, but a dynamic, integrated process of language use that reflects the complex linguistic abilities of bilingual individuals "the language practices of bilinguals [which are] complex and interrelated; ... do not emerge in a linear way or function separately since there is only one linguistic system" (García & Li, 2014, p. 14).

The perspective is an intersection-shift in that it recognizes that bilinguals are not two monolinguals, but holistic language speakers whose linguistic practices naturally involve linguistic mixing and blending. This process involves "various cognitive skills, including internalizing new ideas that students hear or read in one language, assigning their understanding to the concept, and simultaneously and immediately conveying the message in their other language(s) in spoken or written mode" (Tian, 2020, p. 21). Such an approach views languages not as isolated systems but as interconnected, enabling students to navigate and articulate complex ideas across different linguistic landscapes more effectively. This understanding is critical to the use of AI in education as it emphasizes the need for AI tools and resources to be

inherently flexible and adaptable to support the fluent language practices of bilingual students. Vygotsky's sociocultural theory also provided a valuable perspective, emphasizing the role of social interaction and cultural context in language learning (Vygotsky, 1978). These theories underscore the importance of supporting both conversational and academic language development in bilingual students. With this in mind, AI tools for bilingual students should not aim to compartmentalize or strictly separate languages but rather embrace and facilitate students' natural translanguage practices.

Those critical frameworks offered the understanding of bilingualism in a way that is closely related to the development and implementation of AI in education. It pressures educators, researchers, and technologists to rethink traditional conceptualizations of language learning and to advocate a more inclusive, dynamic, and holistic approach to supporting bilingual students in the digital age.

Challenges for bilingual students

In the United States, even the name "bilingual" has been deliberately eradicated as part of the "No Child Left Behind" policy. Reviewing the historical trail, Sarah Moore (2021) mentioned the English-only movement in the United States, which gained momentum during World War I and World War II. Between 1917 and 1922, 34 states passed legislation requiring the use of English as the language of instruction in schools (p. 27). Using the Immigration Act of 1924 as a primary source, the author asserts that it led to the Americanization and English-only movements, which aimed to "assimilate" immigrants into American culture and required the use of English only as a litmus test of loyalty and patriotism (Moore, 2021, p. 27). This meant that many immigrants who did not speak English were effectively excluded from the country. The English-only movement also affected the education of Spanish-speaking students in the

Southwest, where a strict English-only policy was implemented, and Spanish-speaking children were punished for speaking their native language (p. 32, 37). The movement has led to the marginalization of non-English speaking communities and the suppression of bilingual education programs. This leads to a certain amount of marginalization that has a long-term negative impact on educational opportunities and outcomes for bilingual students.

Yet bilingual students face more than just these challenges, such as the emotional barriers mentioned earlier, which are the socio-emotional challenges closely related to their experiences with language and cultural challenges. These students may experience higher levels of stress, anxiety, and frustration, which may affect their overall well-being and academic engagement (MacIntyre, 2017). Cummins (2000) distinguishes between basic interpersonal communication skills (BICS) and cognitive academic language proficiency (CALP). Academically, bilingual students face difficulties in achieving proficiency in their native language while maintaining content in their second language. While bilingual students typically acquire conversational fluency relatively quickly, developing academic language proficiency can take years, making it difficult for them to keep up with their monolingual peers in academic settings (Cummins, 2000).

The role of AI in education

With the fast development of technology in the last decade, awareness of AI has been reflected in a number of educational concepts. Some scholars have conducted systematic reviews of specific subject areas, such as Crompton and Burke's (2023) comprehensive analysis of AI applications across geographic regions, disciplines, and levels of education. Crompton and Burke (2023) noted that "the 21 studies from the USA places it second behind China.... a rapid trend in Chinese researchers publishing more papers on AI and securing more patents than their US

counterparts in a field that was originally led by the US" (p. 8-9). This trend is indicative of the growing interest in AI in the global academic community.

In their study, Crompton and Burke (2023) identified five major applications of AI in higher education. The first is "Assessment/Evaluation", the authors suggested that AI systems can efficiently process large amounts of data to provide detailed analysis and feedback, which is a challenge to implement manually (p. 13). The second application is "Predicting", where AI-supported predictive analytics can identify students who may be struggling, allowing for early intervention (p. 13). Then there is "AI Assistant", which increases the likelihood of engagement through driven virtual assistants that support administrative tasks and enhance student services by providing immediate responses to common problems (p. 15). The fourth application is the "Intelligent Tutoring System", which Crompton and Burke observed could be adapted to an individual's learning style and pace, providing customized support and enhancing the learning experience (p. 16). Finally, there is "Managing Student Learning", where AI tools help track and manage student progress, promoting a more structured and efficient learning environment (p. 17).

Specializing with bilingual students for AI applications, the study "Education for Bilingual Children in the Age of Artificial Intelligence" delves into the educational strategies and tools used for bilingual children in the context of artificial intelligence. It pointed to the current state of technology and the prevalence of electronics, "the U.S. AI market in the education industry is expected to grow at a Compound Annual Growth Rate (CAGR) of 47.77% during the period 2018-2022" (Zhou, 2020, p. 437). In this study, Zhou highlighted the transformative potential of AI in personalizing the learning experience to meet the emotional challenges and cultural needs of bilingual students. It lays the foundation for understanding the multifaceted role

of AI in language learning and cultural integration. Based on this foundation, the author also indicates some of the challenges that may arise in the ongoing phase. For example, technological factors and how to coordinate the work of different sectors, such as educational administration, schools, and families, to integrate AI into the education of bilingual children (Zhou, 2020). It is also important to take into account the human dimension, to ensure the fairness and completeness of the data collected and, importantly, to prioritize the quality of the data.

This is complemented by the study "A bilingual/L2 hybrid intervention model: combining human and machine intelligence" (Chen, 2021), which proposed an innovative approach to bilingual education. The author looked at the learning experiences of traditional bilingual educators, leaving behind the inefficient rote memorization methods of the past in favor of the translators that more students now use. The study aims to make navigation and access to information more efficient and effective for struggling learners and also emphasizes the importance of collaborative interactions between humans and AI to create more dynamic and responsive educational environments.

While these reports identified AI brings many benefits, these scholars also commonly raise important ethical and pedagogical concerns, and there is a lack of critical reflection on the ethical implications and challenges of AI in education (Chen, 2021; Crompton & Burke, 2023; Zawacki-Richter et al., 2019).

Educator Perspective on AI

With the prospect of integrating AI into education, it is critical to consider the perspectives of educators, as they are at the forefront of implementing and adapting to these technological changes. I chose the sections on educators' ability to confront English language learners' writing skills in Benesch's book *Emotion and English Language Teaching: Exploring*

the Emotional Labor of Teachers (2017), which provides valuable insights into the emotional dimensions of teaching and learning, considering some of the challenges that educators encounter in the face of technology. In Chapter 5, Benesch (2017) raises the question that has endured in the second language composition literature: "Whether teachers' written comments on student writing are beneficial and, if so, what types of feedback might be most effective in the short and long run" (p. 80). The author provided an in-depth investigation into the concept of emotional labor in teaching and learning, highlighting the emotional challenges that educators face when dealing with issues such as plagiarism. According to Zawacki-Richter et al., (2019), AI has the potential to significantly enhance the learning experience and provide personalized learning paths through which these capabilities can free educators from the burden of cumbersome schedules. On the other hand, this transformed into concerns about the authenticity of AI-assisted work and the potential for AI to detect and inadvertently encourage plagiarism. It also creates new questions about how educators can be enabled to ensure the effective and ethical integration of these technologies.

In mid-January of 2024, the state of Washington released guidelines for pioneering the use of AI in public schools called *Human-Centered Artificial Intelligence in Schools* (2024). In this guide, they present three concepts, a human-centered approach to AI, implementation of AI in student learning, and the use of sensitive or confidential data to ensure personal privacy. In addition, there is a five-tiered rubric to analyze the way high school students use AI. The scale includes the following level: Level 1 - No AI Assistance, where students complete tasks without any AI support; Level 2 - AI-Assisted Brainstorming, in which AI is used to generate ideas and facilitate brainstorming; Level 3 - AI-Supported Drafting, where AI aids in the drafting process by providing suggestions and improvements; Level 4 - AI Collaborative Creation, involving

students and AI working together collaboratively to create content; and Level 5 - AI as Co-Creator, where AI acts as an active co-creator, contributing significantly to the creation process. This guide aims to create opportunities for educators to rethink how students learn, using "human-AI-human" to build human reflection and understanding as the key to AI generation. Three months later, on March 27, 2024, the educational institution released the second version of its instruction guide, which was updated with practical implementation guidelines, frequently asked questions, key AI terms, and a leadership checklist.

Methodology

Phenomenological Approach

This study used a phenomenological approach to gain insight into the lived experiences of bilingual students and educators using AI in their educational settings. The goal of this approach was to capture the experiences and perceptions of the participants and enable a comprehensive exploration of how AI technology impacts their educational journeys. Phenomenology prioritizes these subjective experiences, making it an aspirational approach to address issues centered on perception and experience. According to Merriam & Tisdell (2016), phenomenology helps in "understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experience" (p. 15). This approach was chosen to examine in depth the detailed and multifaceted experiences of bilingual individuals and educators, providing a rich and detailed understanding of their interactions with AI technology in educational settings.

Study Design and Participant Selection

Before selecting particular individuals to interview, I used two questionnaires to gauge the interest of potential research participants in the topic (see Table 1). Each version has ten

separate YES/No questions to help participants engage more actively, with only a few questions requiring a short text answer. Most of the questions asked about the ways in which they use AI, and I hoped to see diverse perspectives through these questions. It also helped in determining the follow-up interview questions, ensuring that these questions were tailored to explore the depth and breadth of the participants' experiences. Students and educators within our academic network were invited to participate and encouraged to share the questionnaire with others in their professional and social circles. The educator-focused questionnaire was designed to understand their perceptions of the usefulness, impact, and concerns of AI in their teaching practices, gathering both positive and negative feedback. The student-centered questionnaire focuses on their direct experiences with AI tools in language learning or other educational settings, identifies the specific technologies they use, and evaluates hypotheses about the positive impact of AI on bilingual students' learning abilities.

Table 1

Educator-focused questionnaire	Student-centered questionnaire
<ol style="list-style-type: none"> 1. Have you used AI tools to support learning in your classroom? 2. Have you received adequate training to integrate AI into your teaching? If not, what areas need more focus? 3. Do you think AI tools help in creating a more inclusive learning environment for bilingual students? 4. Do you believe that AI can help preserve linguistic diversity in educational contexts? 5. Have you noticed an improvement in students' academic learning after 	<ol style="list-style-type: none"> 1. What kind of home language do you speak? 2. What is the purpose of learning a new language? (e.g., academic achievement, personal interest, career opportunities) [Provide multiple choice options] 3. Have you used AI tools to assist you with language learning in your study? 4. Have you felt more engaged in class when AI tools are used? 5. Do you find AI tools helpful in understanding and using multiple

<p>incorporating AI into your teaching methods?</p> <p>6. Do you believe that AI can help address the cultural needs of bilingual students?</p> <p>7. What areas of professional development do you think are necessary for teachers to effectively use AI in language education?</p> <p>8. Are you concerned about the ethical implications of using AI in language education?</p> <p>9. What are the main challenges you face in integrating AI in the classroom?</p> <p>10. Would you recommend the use of AI tools to other educators?</p>	<p>languages?</p> <p>6. Do you believe that AI tools help you express yourself better in both your native and second languages?</p> <p>7. Have you received any guidance on how to effectively use AI for language learning?</p> <p>8. Have you experienced an improvement in your language skills since using AI in your learning process?</p> <p>9. Do you feel more confident in your language abilities when using AI as a learning tool?</p> <p>10. Are you concerned about privacy or data security when using AI tools for language learning?</p>
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For the follow-up interview study, I selected six participants based on my personal time capacity from three teacher questionnaire responses and fifteen higher education student questionnaire responses with different identities and interests in the topic, to bring different analytical perspectives to the study. The participants were divided into two groups: three higher education students and three educators. The first group (see Table 2.1) consisted of college international students and English as a Second Language (ESL) learners, through whom insight was gained into the impact of AI technology on their academic learning. The second group (see Table 2.2) consisted of educators with experience using AI tools in their teaching practice, particularly those who had worked with bilingual students or were bilingual learners themselves. The interview questions were designed to provide qualitative insights from both learner and educator perspectives.

Table 2.1 - Participant Demographics: Students

Name	Alex (He, Him)	Elara (She, Her)	Tina (She, Her)
Origin	China	China	China
Field of Study	University of Washington; freshman	University of Washington; freshman	University of California, Davis; freshman
Language Proficiency	Native Chinese speaker, advanced English learner	Native Chinese speaker, advanced English learner	Native Chinese speaker, advanced English learner
AI Tools	ChatGPT, Grammarly	ChatGPT, Duolingo, DeepL	ChatGPT, DeepL
Time Used	Less than a year	Less than a year	Less than a year

Table 2.2 - Participant Demographics: Educators

Name	Aric (He, Him)	Sophia (She, Her)	Xinzi (She, Her)
Origin	Mexico	China	China
Current Position	Educator and administrator	Graduate student currently; math teacher	Graduate student and language educator at the University of Washington
Years of Teaching	15 years	7 years	3-4 years
Language Proficiency	Native Spanish speaker, primary language in English	Native Chinese speaker, advanced English learner	Native Chinese speaker, fluent in English, used to be interpreter
AI Tools	ChatGPT, Grammarly, Gemini	AI for PDF, ChatGPT, Copilot, Duolingo	ChatGPT
Time Used	One and half years	Less than a year	Less than a year

Data Collection

Data were collected from in-depth, semi-structured interviews with both groups, in a style that had structural components with a clear purpose but also allowed the exact wording of each question to change depending on the participant's previous answers. Interview guide questions were used to facilitate dialog and ensure a space where participants could freely share their perspectives on their unique experiences. Participants were given the simple interview process guidelines in advance when necessary (see Table 3).

Interviews were conducted face-to-face or via videoconference, depending on participant preference and geographic location, and each interview lasted approximately 30-45 minutes. All interviews were audio-recorded with the consent of the participants to ensure accuracy and were transcribed afterward to facilitate data analysis.

The interview process began with an explanation of the purpose of the study and obtaining informed consent from participants. This included an overview of how the interviews would be conducted, their expected duration, and how the data would be used. They were assured that their responses were confidential, that their real names would be hidden, that pseudonyms would be used, and that they had the right to withdraw at any time, thus creating a comfortable and trusting environment for honest and open discussion.

Table 3

Planned Interview Process	Description (30-45 mins)
Warm-Up Questions	<ul style="list-style-type: none">- Ask about their educational background and the languages they use (home language or other learning languages).- Discuss the role of language learning in their academic or professional journeys.
Experiences with AI in	<ul style="list-style-type: none">- Participants recount their experiences with AI tools in educational settings.

Education	<ul style="list-style-type: none"> - Specific instances where AI had a notable impact on language learning or teaching were discussed.
Perceptions of AI and Cultural Sensitivity	<ul style="list-style-type: none"> - The effectiveness of AI tools in addressing cultural diversity among students was examined. - Participants identify the biggest challenges faced when using AI in education.
Suggestions for Improvement	<ul style="list-style-type: none"> - Suggestions for improving AI educational tools to better support culturally inclusive learning. - Envision the ideal role of AI in supporting bilingual students.
Closing	<ul style="list-style-type: none"> - Participants are invited to share any additional thoughts on their experiences with AI in education.

Data Analysis

Following each interview, I organized the data by thoroughly re-reading the records. This included detailed notes about impressions, the context of the responses, and any nonverbal cues or emotions that added depth to the verbal responses. Since some participants prefer to use Chinese as the main language of the interviews, I additionally translated the data into English for the needs of this study. I coded these data to capture better salient themes in participants' experiences and perceptions based on Merriam and Tisdell (2016). Codes were then grouped into underlying themes that represented broader patterns and insights.

Potential themes in the analysis code include language learning tools mentioned by each individual, the use of AI in education, minor language translations, the ability of AI to deal with multilingual environments, and the impact of differentiation based on the skill level of the student.

Results

Across the six interview conversations, participants expressed a range of positive and varied thoughts about the application of AI in education. All participants were bilingual and none of them were native speakers of English. Of these participants, five of the interviewers' native language was Chinese and one educator interviewer's native language was Spanish. The majority identified AI as a valuable tool to assist in learning, with many specifically mentioning the use of ChatGPT. The interviewers who were educators all highlighted the challenges of teaching language and the transformative potential AI holds for the future. This section presents the experiences of students and educators with AI applications based on key themes from the data analysis, supported by participant quotes.

The Meaning of Language Learning

Alex, Elara, and Tina are all freshman international students from China currently attending different universities in the United States. They were all introduced to AI through the dissemination of information on the Internet around the time they entered college and have completed or are currently enrolled in a required English language course at their university during this academic year. For instance, at the University of Washington, the English Composition course is a required part of the freshman curriculum for most degrees and schools.

When it came time to discuss their name, they coincidentally all chose English names as their pronouns. To this I added an extra question: what does an English name mean to them? Elara described, "My English name doesn't feel like my real name, it's kind of a pseudonym." The difference is that Tina mentioned the Chinese name is unpronounceable for foreigners³, therefore it can also be considered part of her real name to communicate better with other locals.

³ Most Chinese people would refer to any race other than Chinese as "foreigners", even if they live in other countries. This is a linguistic habit resulting from culture.

For international students, adopting an English name may facilitate smoother communication and integration into the university community. However, as Elara pointed out, these adopted names may feel like a "pseudonym," implying a separation between their personal and external identities in the new cultural environment. They all identified the choice of English names to better accommodate the academic and social environment where English is the dominant language.

The differences in linguistic preferences resulting from English names are also seen among the educator interviewees; Sophia and Xinzi, both Chinese educators currently completing graduate programs at the University of Washington. They expressed similar but more indescribable aspects of cultural and linguistic adaptation to the student body. As educators, they are torn between their original cultural identities and the expectations of the academic environments in which they teach and learn. Sophia chose to use the English name because it sounds good and is easy to use in a professional setting. Xinzi chose to continue using its pinyin Chinese name after arriving in the United States, carrying on the original structure of the name.

As indicated by the name of the participant as a proxy reflecting their bilingual identity and the cultural dynamics they navigated. The motivations of participants for language learning differed and were often influenced by personal, academic, and professional factors. For example, Tina said:

“其实英语对于我来说就是类似于刚开始记事的时候，然后学校就已经在教了。所以，就是那种类似于教育要求。第二点就是，因为当下世界上会说英语的人很多，如果说我能够掌握这门语言的话，可能之后的就业面...选择会更多一些。”

"Actually English for me is something like when I first started to remember and then it was already taught in school. So, it's just kind of like an educational requirement. The second thing is because there are a lot of people who speak English in the world at the

moment, and if I can master the language, maybe after that, the employment side... there will be a little bit more options."

Sophia and Xinzi also learned a second language because of the requirements of their jobs; Xinzi mentioned that she worked as a Chinese-English interpreter in China, which required not only a good knowledge of her mother tongue but also for both languages. On the other hand, Sophia learned English because she was teaching in China and her students were bilingual, even though she was a math teacher, she needed to have a certain level of English proficiency. In addition to the same two reasons as Tina, Sophia gave a third point, that she must continue to learn English after her job. When Sophia recruits teachers as her job responsibility, they are foreign teachers and need to use English, including adjusting to new teaching materials, and that she needs to improve her English all the time.

Aric, the only non-Chinese group among the three teacher-interviewees whose native language is Spanish, stated that his motivation for learning English was the need to adapt effectively to an English-speaking environment. He mentioned the importance of early and supportive language education:

"Especially when I was growing up, since it [English] was my primary language, and I didn't have a whole lot of exposure to anything other than Spanish until I entered school. When I was in 1st [grade] in school, I was fortunate enough that I was in a language learning, like a dual immersion class, so I-I was practicing both and my teachers all spoke Spanish as well, that helped to use the transition [from Spanish to English]."

For Aric, even with English as his primary language for daily work, there are barriers when it comes to writing. He described the process of phonetically pronouncing words in Spanish before writing them out in English during the writing process. This type of linguistic

interaction demonstrates the complex and often subconscious code-switching practices that bilinguals often experience.

The code-switching as the language challenge is not unique to Aric. It was a recurring theme in several of the interviews, reflecting the wide range of experiences of bilingual people who have to constantly modify their use of language to be appropriate in different contexts. Similarly, Sylvia's dialogues contained specific English phrases within long Chinese narratives. Terms such as "language learning", "scaffolding", "translanguage" and "improvement" were expressed in English. This reflects the bilingual experience of combining terms from both languages to better express specific educational concepts.

Integration with Artificial Intelligence Tools

Educator participants reflected on their own educational journeys and discussed the contrast between the technology available to them when they were students and the advanced AI tools used by the students of today. While they were students, the technological landscape was noticeably different, characterized by more basic and primary tools. The limited and fundamental character of technological tools affects the learning experience by placing greater emphasis on traditional teaching methods. For example, Aric said:

"We didn't have AI when I was growing up. But I think that access to movies and to TV shows, and in that sense, technology did play a role, because that's what was most available in this country. We did watch Spanish language programming; my parents would watch that in Spanish movies. So music and TV and movies, films help me acquire language a little bit faster."

Similarly, Xinzi pointed out there are many contexts in which technology is used in teaching and learning in both China and the United States. For example, there are multimedia uses in the classroom, including access of Canvas to allow teachers and students to communicate

through technology-enabled platforms. The use of translation and vocabulary programs for learning aids is particularly noticeable in the findings from the student groups, with the aim of helping them to be more professional and academically oriented in their expression and comprehension. These programs such as: DeepL⁴, Baicizhan⁵, Shanbei Danci⁶. These tools have helped them bridge the gap between their native language and English and facilitated a smoother learning experience.

When comparing past experiences to the current technological landscape, educators reported surprisingly how artificial intelligence and digital tools are transforming education. The concept of assisted learning through AI tools emerged as a key finding from the interviews, which highlighted the benefits and challenges of integrating AI into educational practices.

The multifunctionality of AI tools in supporting diverse linguistic needs is one of the key findings. Many participants highlighted the use of ChatGPT to assist them in their academic language-learning practice. These tools have become an integral part of their daily learning, providing them with tailored explanations and support to help them gain a deeper understanding and more effective mastery of the language in an academic setting. For example, Alex described how translation software and ChatGPT can be used to understand complex concepts and improve vocabulary. He explained that while translation tools help with comprehending hard-to-understand vocabulary, ChatGPT can clearly explain basic concepts and almost act as a personal tutor. Similarly, Tina explained the role of AI in assisting with vocabulary acquisition and comprehension. For example, she mentioned the word: “penetrating”, which she would combine the use of translation software such as DeepL or vocabulary apps with AI to support her better understanding. Elara considered that as a language learner, in one of the few situations

⁴ One kinds of webpage translator.

⁵ Mobile apps for memorizing vocabulary.

⁶ Another type of mobile app for memorizing vocabulary that is more targeted towards TOEFL and IELTS students.

where she has used AI tools to assist in language learning, she found that the usual translation programs could not accurately interpret Chinese idioms or proverbs. Instead, AI can authentically translate them for bilingual learners to learn their true culture and meaning. She explained that when she input with the appropriate commands, it can be effective in learning colloquial sentences or more specialized vocabulary.

For other participants, AI tools were useful for composing and proofreading. Like Aric relied on AI to draft and proofread his documents for clarity and accuracy. He explained:

“For my work, I've used it to help me proofread and make sure that important messages go out to families and to our directors, that it's the message is clear and there's no errors. I think that for me, being not a native English speaker, I-I have a lot of anxiety about whether or not my message is coming across clearly. So I tend to overthink and over edit as I write.”

The reliance on AI for Aric brings to focus the role of the tool in mitigating the anxiety and cognitive burden that comes with writing in a non-native language. I asked Aric to consider more about how AI is as a tool to assist students with the challenges of language learning. He thought about it for a moment and added:

“I think that it's a very useful tool, and used correctly, I think it could be really helpful for students, you know, who may be neurodivergent [or] who have learning differences, for those who struggle with, not speaking their native tongue of wherever they are at.”

By providing real-time feedback and correction, AI tools seem to enable bilinguals to focus more on the content and less on the mechanical aspects of writing. This finding was particularly strong in the responses of the three student participants. They each discussed how AI tools could improve their writing skills by providing structured support and constructive feedback. Tina explained the way she used ChatGPT to assist on her English writing class:

“我用AI主要是类似就是让它帮我提供一个具体那种思路。比如说像我需要一个支持一个论点，然后可能会把这个论点输进去，让它帮我想一想有没有什么各种就是我生活中的论据支持这个论点的。”

"I use AI mostly similarly just to have it help me with a specific kind of thought. Like for example like I need support for an argument, and then maybe feed that in and have it help me think about if there's any kind of is my arguments in my life that support that thesis."

I asked her to provide a specific example of how she used AI to help her accomplish a paper better. Tina explained the time when she was doing her English composition class:

“上学期我写过一个作文，大概就是说，修改作文的意义在哪里。然后我就把这个问题让它帮我拿出去，让它帮我进行分析。大概就是类似，就是它会跟我说...比如说像改作文，它能够帮助，找到自己的薄弱项在哪里。去帮助你自己一个更好的writing skill。它更多是给我一种开阔我的思路，这么一个作用。”

"Last semester I wrote an essay about what it means to revise an essay. And then I asked it to take that question out for me and have it analyzed it for me. It was probably something like, that it would say to me [Pause and thought] for example like revising an essay, it can help, find out where your weaknesses are. It's more of a way to open up my mind, so that's what it does."

Grammarly was frequently mentioned by participants as a cloud-based typing assistant to improve the quality of their writing. Aric and other participants use Grammarly to check grammar, ensure clarity, and improve writing. Alex noted that Grammarly not only checked his grammar, but he also believed that as an ESL learner in many cases of writing, he will use a lot of the same word. He wanted to increase his vocabulary through AI rewriting to be more diverse in vocabulary. While discussing embedded AI programs like Grammarly, Aric mentioned that a lot of text editing websites have their own "AI writing" features. For example, Google Doc's "ask

Gemini" and Gmail's "Workspaces Labs". This information shows how fast-moving technologies have re-imagined the way online platforms are utilized over the years.

Educators reported that AI has helped them perform their work more efficiently to a certain extent. For example, Sophia uses AI tools to plan and create exercises, utilizes AI to generate practice materials that are tailored to the specific needs of her students. She noted that it saved her time, as well as maintaining a high level of education by keeping the content relevant and challenging for the students.

Beyond that, Elara has a different approach to utilizing ChatGPT. She said that she was less exposed to these tools in terms of learning languages, but instead used them to a much-increased extent after learning to program code. She considers coding to be something that AI is specialized in, and therefore can function like a teacher providing some inspiration and guidance. Elara said, "AI is good at coding; it provides me with a framework and helps solve problems I couldn't solve on my own." This has demonstrated the utility of AI beyond traditional learning, providing substantial support in specialized areas such as programming.

Xinzi has used AI tools less in her own work as an educator, but she's well aware of the impact these tools might have on her students. She said:

“我的学生对于这些科技是非常敏感的，比如说ChatGPT他们都是知道的。然后我也能察觉出来他们是使用了ChatGPT，通过写作方式和技巧。比如说突然有一篇essay写的特别好，变化是非常大的。当然不能完全去判定，但是能确定学生是使用了辅助。”

"My students are very sensitive to these technologies like ChatGPT they are aware of it. And then I can also notice that they are using ChatGPT, through writing styles and techniques. For example, suddenly there is an essay written particularly well, the difference is very dramatic. Of course [I] can't go completely to determine that, but [I] can determine that the student is using assistance."

I then asked Xinzi more about her opinions on AI, she stated that she are in favor of herself and her students knowing more about AI, that current developments have great possibilities for the future, and that tech-enabled development is always beneficial. She also brought up the key concern of how to use AI appropriately. Especially in the face of the use of AI enhancement for the purpose of combining and stimulating an increase in student engagement in the classroom.

Another finding was that participants reported that AI tools such as ChatGPT can promote self-directed learning skills among students and encourage students to explore topics more deeply and think critically about the material they are learning. The student Alex emphasized how AI improved his learning and encouraged independent learning. He mentioned that with the use of AI tools, he was able to understand complex concepts faster and more efficiently, which allowed him to spend more time exploring topics on his own. Educator participants felt that by allowing educators to create tailored learning materials and practice exercises, AI supports a personalized approach that encourages students to explore topics at their own pace. Students are more likely to be motivated and engaged in the learning process when they are provided with materials tailored to their interests and proficiency levels.

The Challenges and Concerns for Utilize AI

Although there are many advantages, participants pointed out the challenges and concerns of using AI tools for self-directed learning. These problems need to be addressed to maximize the benefits of AI while mitigating the potential disadvantages. Key findings identified include accuracy and reliability, cultural sensitivity and inclusiveness, ethical considerations and data privacy, and overreliance and critical thinking.

The primary concern of participants was the accuracy and reliability of AI-generated content. Inaccuracies in educational materials can lead to misunderstandings, misinformation,

and ultimately hinder the learning process. Alex considered the need for human oversight, he commented that ChatGPT is like a large search engine and said:

“有的时候如果你想让AI理解你的意思的话, 可能需要很多的词汇。就是有时候你不知道它会具体写什么, 就是要一直去跟它说你想要什么, 这样才能达到你想要的效果。所以我觉得从一开始对问题的描述应该是需要比较有技巧。”

"There are times when it can take a lot of words if you want the AI to understand what you're saying. Just sometimes you don't know exactly what it's going to write, and you have to keep going to it and telling it what you want so that you can get the effect that you want. So I think as far as the description of the question in the beginning should be needed to be more skillful."

Alex's perspective reflected a broader concern that AI tools, while powerful, are not infallible and can sometimes produce incorrect or misleading information. It is written on the official website of ChatGPT's use as well, "ChatGPT may also make mistakes. Please verify important information." such words to remind the user.

Similarly, Elara shared the same worries, as she discussed how there were cases where the AI provided incorrect answers so that she could not trust it 100%, which would certainly increase her own checking workload. Tina said that when checking AI-generated text, she described AI-generated passages as, "not speaking human language," and that they would use a lot of tricky vocabulary, requiring them to read through and correct the vocabulary used by the AI. She explained the thought:

“[AI的]逻辑论述是车轱辘话, 不会是新的点子。对于语言学习者不是一个很好的习惯, 对于初期学习者来说需要一个逻辑。前期的GPT使用多了可能会导致学习者非常依赖这种结构。”

“The [AI's] logical discourse is cartwheeling⁷ and will not be a new idea. Not a good habit for language learners, and logistics is needed for early learners. Using GPT much more in the early stages may cause learners to rely on this structure.”

Student participants commonly addressed the reduction in their critical thinking skills as a result of using AI-assisted tools like ChatGPT. Tina explained that while it makes learning more efficient, there is no thought process and the understanding of the problem is not as thorough. Then Tina shared:

“用了AI, 可能会变成公式化的理解, 不会去推导每一步是怎么理解的, 结果就是遇到问题的时候直接进行一个代入。”

“With AI, it can become a formulaic understanding that doesn't involve deducing how each step is understood, and results in a straightforward substitution [formula] when encountering a problem.”

Similarly, Elara has used AI for editing code, and she found the advantages of these tools to be in clarifying ideas and solving problems. The disadvantage is that it can easily lead to not thinking for on their own and thinking in a one-sided way about certain difficult points, which also leads to a more partial level of understanding of the knowledge.

From an educator's perspective, Sophia believed that students themselves could lack judgment in the early learning stage, they may not accurately judge the usefulness of what was coming out of the AI production. She argued that many students are not very capable of asking questions to make AI better support their learning, to receive useful information. She felt that there was a need to consider whether these generated texts add a certain amount of bias.

The second finding in this theme exposed significant challenges in cultural sensitivity and inclusiveness when using AI tools in education. Participants noted that while AI has the potential

⁷ A Chinese word that means repetitive, rambling words.

to meet diverse linguistic and cultural needs, the limitations of current AI technologies often lead to misunderstandings and miscommunication, especially for less common linguistic and cultural backgrounds. AI tools often fail to capture the cultural differences embedded in language. For bilingual students, this means that cultural references, and context specific meanings can be lost or mistranslated. Sophia mentioned her native language as a Teochew:

“对于大多数语言还是非常ok的，可以翻译。但是对于少数民族，就像是我自己说潮汕话，自己的家乡话并不能被翻译，目前效率不高。包括印第安人的语言，AI的输出能不能包含这些文化呢？”

“For most [dominant] languages it's still very ok and can be translated. But for minorities, like myself speaking Teochew, my own home language isn't able to be translated, and it's not very efficient at the moment. [Pause for thought] Including Indian languages, can the output of AI include these cultures?”

Xinzi similarly has this perspective, where she considered cultural sensitivity and inclusiveness, hoping that existing languages would be accommodated to AI. She said:

“翻译小众方言，是需要看市场的需求，但是市场需求小了并不代表它不重要。因为每一种语言都是有自己的文化和重要性。”

"Translating a niche dialect depends on the market demand, but just because the market demand is small doesn't mean it's not important. Because every language has its own culture and importance."

Then I asked Xinzi for her thoughts on AI's biggest challenges, she made three points. First, she argued that when one's language reaches a certain depth, they will realize all the database is the developer input into it, and that the information sources of the GPT are unreliable. The second point is about the comprehensiveness of information, she discussed that the information known to humans is not completely in the database of the AI. Therefore, at a certain level, the

information collected by the AI is very situational and not comprehensive. When discussing the third statement, she suggested that currently there is no absolute way or method of assessing and justifying the authenticity of AI. I was very impressed with these three points; therefore I asked an additional question, I wanted to know how she considered the idea of whether or not AI could replace humans. She shared:

“相比一个个人而言是很大的信息库，和个体相比没有思考能力。人类的发展是从不知道到知道，原来是这样，有一个过程。我不认同会取代人类，可能会替代或者辅助人类学习的功能。AI的大脑是人为的。”

"[AI] compared to an individual it's a big pool of information, and compared to an individual there's no ability to think. Human development is from not known to know, it turned out to be so, there is a process. I do not agree that [AI] will replace humans, it may replace or assist the function of human learning. [Because] the brain of AI is artificial."

In the same way, Sophia considered the presence of a teacher as irreplaceable. In comparison to AI, teachers are able to help students scaffolding their learning step by step. She described the need for students to learn to utilize AI and have more effective conversations.

Participants also provided some ideas for policy directions for ethical use of AI and data privacy. For example, Aric discussed the importance of clear policies to protect personal information, especially in educational settings. He also suggested that policies should ensure that students and parents have control over their personal information. For example, obtain explicit consent from students and their guardians before using AI tools. He described:

“Probably there's general safety concern. I think, uh, from an adult perspective, or from a, you know, parent's perspective. I think that if we're interfacing with AI, we can create those filters as needed. But if the students are given open access to it, like ChatGPT or

Gemini, whatever other AI platform, we have to make sure that there's like, safeguards in place, right?"

Aric discussed the need for transparency and accountability when using AI tools in education. Policies should require educational institutions to provide clear information about the AI tools they use, the data they collect, and the purposes for which the data are used. This finding for those participants discussed the importance of professional development and training for educators in the ethical use of AI. They found that it is difficult to find public guidelines on the use of AI as a learning support tool. During the process of the interview, Xinzi asked, "I'm wondering if they have a policy for the use of AI. Do teachers have training? Does the school have a policy?" She believed that the policies that are currently in use, the workshops are very early stage. Aric recommended increased regulatory oversight and collaboration between stakeholders, including educational institutions, policy makers, AI developers, and privacy advocates.

Discussion

The findings suggest that Artificial Intelligence tools such as ChatGPT and Grammarly provide valuable assistance in language learning and writing, increasing efficiency and encouraging self-directed learning. By delving into the experiences, perceptions, and challenges of students and educators, I understand how AI can be a powerful ally in crafting an educational environment that is not only linguistically and culturally inclusive, but also emotionally and socio-culturally dynamic for learning. Centered on in-depth interviews with bilingual students and educators, it recognized the multifaceted nature of bilingualism and the critical role of

educators in navigating the affective labor of teaching and learning, guiding educators, policymakers, and technicians to make informed decisions.

The experiences of bilingual students and educators highlighted the complexities of language learning in academic settings were answer the overarching question of how AI tools can be effectively integrated to support and enhance the academic performance and cultural inclusivity of bilingual students in U.S. educational environments. For international students like Alex, Elara, and Tina, the use of English names to facilitate communication and integration into the university community demonstrated a combination of acculturation and identity negotiation. Which Elara called her English names as "pseudonyms," that indicated a deeper struggle to maintain their personal and cultural identities while navigating a new environment. The importance of a supportive learning environment in easing the transition from one language to another was demonstrated by the experience of Aric's early language education in a bilingual immersion program. His reliance on phonetically translating Spanish into English in his writing reflects the unconscious code-switching that bilinguals often engage in, a recurring theme in the interview.

The concepts of “Translanguage” and “Code-switching” are often confused by many unprofessional. To better understand this concept, I looked up García and Beardsmore (2009) to get an overview to analyze the difference between the two. Simply speaking, code-switching is the act of alternating between two or more languages or dialects in a conversation, sentence, or discourse. For example, when Xinzi described the perception of AI as a tool, she said: “AI缺少了一定的参与度, 看不见process, only see the result。它只是一个结果化的体现。”(AI lacks a certain level of engagement, can't see the process, only see the result. It's just a result-oriented

expression.) This quote gives an example of how bilinguals can switch languages seamlessly and even convey the meaning of delicate expressions in the same sentence.

From the reports of the participants interviewed, it was found that the process of learning a new language while maintaining proficiency in their mother tongue can be both laborious and stressful. As MacIntyre (2017) suggests the emotional stress that bilinguals face psychologically, the obstacles Aric encountered in his writing are a good demonstration of this challenge, even though English is the primary language of his daily work.

Based on these reported language challenges for bilinguals, participants felt that the combination of AI tools and education could help address some of these challenges. For example, Alex and Tina use AI to understand complex concepts and improve vocabulary, demonstrating the potential of AI as a personal teacher, providing tailored explanations and support. This demonstrates that AI can provide personalized interpretations to help students learn at their own rhythm and with their unique needs. With its flexibility to adjust the difficulty and focus of the practice material, AI can promote a more effective learning experience by ensuring that students feel neither overwhelmed nor under-challenged.

Artificial intelligence tools could also improve learning by providing real-time feedback and corrections. For example, Aric relies on AI to draft and proofread documents to help him reduce his mental overwhelm. This support allows learners to focus more on the content rather than the mechanical aspects, which increases their overall learning experience. The immediate feedback provided by AI tools helps students quickly identify and correct errors, reinforcing learning and boosting confidence.

Though AI tools hold significant promise for increasing the learning experience and supporting bilingual students, AI does not currently fully address the challenges of cultural

sensitivity and inclusivity. For example, while AI tools can be very effective at generating grammatically correct sentences and providing detailed explanations, they sometimes fail to capture specific contextual information in all its detail. This can result in output that, while it seems accurate, may not be entirely appropriate for a particular educational context or a student's specific needs.

Elara mentioned that the AI has a better performance in translating Chinese idioms and proverbs, and Xinzi referred to this phenomenon as a result of the fact that Chinese culture has a stronger voice at the international level. Xinzi and Sophia provided a more insightful reflection, and their experiences highlight the need for AI to better adapt to different linguistic contexts. The concern of Sophia that AI cannot accurately translate Teochew, and Xinzi's emphasis on the cultural importance of minority dialects, highlights the limitations of current AI technology. She argued that we need to be sure that AI tools are able to handle these complexities in order to create an inclusive learning environment that respects and supports the cultural backgrounds of all students. In considering the inclusivity of AI, Xinzi believed that educational institutions should provide the necessary resources, such as iPads or laptops, to bridge the digital divide so that all students can benefit from an AI-enhanced learning experience.

Similarly, one of the more important themes was the significant concern expressed by participants about the policy over education. Aric explained the need for clear policies to protect personal information, particularly in educational settings. Transparency and accountability were also key issues. He advocated for policies that require educational institutions to disclose how AI tools collect and use data. Furthermore, educator participants noted the need for professional development and training for educators to use AI ethically. Xinzi questioned the current state of

AI policy and teacher training as a gap in current practice. Educators need clear guidelines and ongoing training to use AI tools responsibly and effectively.

Limitations

The study is relatively small and the participants of the study are very internalized from the number of questionnaires at the very beginning and the number of interviewers at the end. Most of the participants, including the researcher themselves, shared a certain background in Chinese culture. Based on the fact that the expectations of the perspective come from different educational backgrounds and personal development, this means that this study is not representative enough of the wide range of bilinguals' experiences. Therefore, I believe that more research populations and different cultural groups are needed to corroborate the applicability of AI to language learning. Again, since these conclusions are based completely on the data collected during the interviews, which reveal only the ideas and experiences that the participants are aware of and are willing to share. Moreover, the use of the tool in a recognized AI process may identify a certain plagiarism or "fake production" bias on the use of the user. Taking this aspect into consideration, the transparency and authenticity of all data cannot be guaranteed. Finally, AI is updated at an extremely rapid rate, and much of the data and perspectives may change radically in a short period of time, therefore the timeframe of the study needs to be identified. Continued research is needed to keep up with the rapid development of AI and its use in education.

Implications

The purpose of this study is more than academic; it is a response to the pressing needs of our increasingly diverse and technologically integrated society. The positive interactions with the

participants along the way made me realize that it was not only an exploration of other perspectives but also a learning opportunity. As the starting point of this study, technological innovations are used to obtain more effective learning environments for students. The results of this study have several implications for future practice and research in the field of convergence of educational technology and artificial intelligence, to find potential directions for my investigation afterwards.

To better support bilingual students, AI tools must continuously evolve to handle different linguistic and cultural contexts. As Xinzi suggested, this includes developing more sophisticated algorithms and training AI on different datasets that reflect a wide range of linguistic and cultural experiences. Not only are improvements being made in the AI technology itself, but educators have cited the need for comprehensive training programs for students and educators on how to use AI tools effectively and ethically, such as workshops, public seminars, or more practice-oriented reports. These programs should focus on developing critical thinking skills and making users aware of the limitations and potential biases of AI-generated content. The first step can be taken in the direction of educators advocating for a balanced approach to the use of AI to be sure that it is complementing, not a replacement for traditional learning methods.

Also, collaboration between educational institutions, policymakers, AI developers, and privacy advocates can develop comprehensive policies and ensure compliance to help users with private information and ethical concerns.

Considering language learning capabilities, AI has facilitated the programming community by assisting them in becoming more efficient at code writing. Zawacki-Richter et al. (2019) discussed the origins of research in the field of Artificial Intelligence in computer science and engineering, and noted that AI as a technology has introduced many interdisciplinary

properties. For example, Allen found that AI tools greatly improved her ability to learn and write code. This suggests that the utility of AI is not limited to academic language-learning, but also provides substantial support in specialized areas such as programming.

This expanded use of AI has far-reaching implications, and hopefully this will allow AI to be integrated into a variety of educational disciplines to support diverse learning needs. Upcoming research could investigate the specific impact of AI on subjects such as math, science, and the arts, as well as its potential to enhance critical thinking and problem-solving skills in different educational contexts. There is also a need to examine the long-term impact of AI-assisted learning on student achievement and to develop best practices for incorporating AI into the curriculum in an ethical and effective manner. By interacting with international students and educators from China, as Crompton and Burke (2023) mentioned that the world's interest in these technologies has increased, my future research direction could be to understand the local education in China's perception of AI, how students are implementing it, how institutions are approaching it, and what is the public sentiment in the society. By expanding the scope and geographic reach of AI in education, we can fully utilize its potential to create more inclusive, engaging, and efficient learning environments for all students.

Appendix

Process	Planned Interview Questions (30-45 mins)
Introduction	<p>Briefly introduce the purpose of the study and ensure the participant's comfort and confidentiality.</p> <ul style="list-style-type: none"> - Today, we will explore your experiences with AI in education, focusing on its integration and cultural sensitivity aspects. Please remember that all responses will be kept confidential, and feel free to share as much or as little as you're comfortable with. - Make sure to ask the questions w/ bold.
Warm-Up Questions	<ol style="list-style-type: none"> 1. What is your educational background, what language you are using? 2. How has language learning played a role in your academic or professional journey? 3. How has technology been incorporated into your learning or teaching practices? Are there specific tools or resources that have been particularly impactful?
Experiences with AI in Education	<ol style="list-style-type: none"> 1. What has been your experience with AI tools in your learning or teaching environments? 2. Could you recount a specific instance where an AI tool had a notable impact on your language learning or teaching? 3. How do you perceive the impact of AI on your/student's learning efficiency and engagement? 4. Have you noticed any measurable changes in student outcomes since integrating AI into your learning environment?
Perceptions of AI and Cultural Sensitivity	<ol style="list-style-type: none"> 1. From your perspective, how effectively do AI tools address the cultural diversity of students?

	<ol style="list-style-type: none"> 2. What are the biggest challenges you or your students face when using AI in education? 3. Have you encountered any challenges with AI tools in maintaining cultural sensitivity within the learning environment? If so, could you describe these challenges?
Suggestions for Improvement	<ol style="list-style-type: none"> 1. What improvements or features would you like to see in AI educational tools to better support culturally inclusive learning/teaching? 2. How do you envision the ideal role of AI in supporting bilingual students in educational settings? 3. How should data from AI learning tools be handled to respect student privacy and security?
Closing	<ol style="list-style-type: none"> 1. Is there anything else you'd like to share about your experience with AI in education that we haven't covered? 2. Thank the participants for their time and valuable insights.

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