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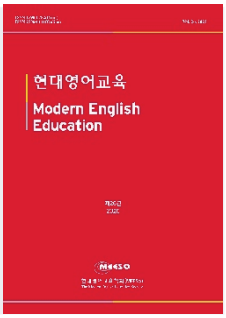

Generational Gap in Accepting AI Integration in Korean EFL Classrooms: Comparing Pre-Service and In-Service Teachers Within Technology Acceptance Model

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generational differences, AI-based language teaching, technology acceptance model
세대 차이, 인공지능 기반 언어 교수, 기술 수용 모형

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Abstract

This study explored generational differences in acceptance and use of AI-based language learning technologies among pre-service GenZ and in-service GenX&Y English teachers in Korean EFL (English as a Foreign Language) context. As AI tools like machine translators and ChatGPT become more prevalent in classrooms, understanding how different generational groups perceive and adopt these technologies is crucial for their successful integration. Using a mixed-methods approach with 70 participants, the study analyzed both quantitative and qualitative data. Results indicate that GenZ pre-service teachers are more open to adopting generative AI technologies, recognizing their potential to facilitate personalized learning tailored to individual student needs. However, their enthusiasm was accompanied by concerns about administrative challenges, particularly in managing AI-related tasks. In contrast, GenX&Y in-service teachers showed a more cautious approach, preferring traditional non-generative AI tools such as online translators and grammar-checking applications. They primarily regard AI as a supplementary tool to enhance existing teaching practices, with limited interest in its use for core instructional tasks. Instead, they emphasized its role in post-class tasks, such as grading, assignment management, and providing prompt feedback. These findings highlight the importance of designing generation-specific teacher training programs that address the distinct needs and challenges of each group.

INTRODUCTION

The integration of Artificial Intelligence (AI) into education has significantly transformed teaching and learning, particularly in English as a Foreign Language (EFL) contexts. AI tools, such as chatbots and adaptive learning platforms, are increasingly

used to personalize education and enhance student engagement. Among these, generative AI technologies like ChatGPT mark a substantial innovation in language learning by providing real-time interaction and personalized feedback, thus enabling adaptive teaching strategies that cater to diverse learner needs (Lo, 2023).

South Korea has implemented policies to incorporate AI tools into its national curriculum. Initiatives like AI Digital Textbooks (AIDT) reflect the government's commitment to advancing education through cutting-edge technologies (S.-Y. Kim & J.-R. Kim, 2022). AIDT may encourage Korean EFL practitioners to incorporate the AI technology into the classroom contexts (Park et al., 2024). However, the effective integration of AI in classrooms remains a challenge, as it requires addressing the varying perceptions and pedagogical priorities of teachers.

Generational differences further complicate AI adoption in education (Benscik et al., 2016; Chan & Lee, 2023; Mosca et al., 2019; Turner, 2015). Pre-service teachers from Generation Z (GenZ), who grew up in a digital environment, naturally integrate technology into their teaching practices (Moorhouse & Kohnke, 2024). In contrast, in-service teachers from Generations X and Y (GenX&Y) often approach AI cautiously, perceiving it as a supplemental tool to traditional methods (Chan & Lee, 2023). Understanding these generational dynamics is crucial for designing professional development programs and ensuring the effective implementation of AI in Korean EFL classrooms.

This study investigates the technology acceptance model (TAM) of AI-based language learning technologies among pre-service GenZ and in-service GenX&Y teachers regarding within Korean K-12 EFL contexts. By exploring generational differences, the research provides insights into how these groups prioritize and engage with AI tools, with implications for teacher training and policy development.

LITERATURE REVIEW

The Role of AI in EFL Education

AI technologies have become central to educational innovation, with applications like chatbots, automated translation tools, and adaptive learning systems proving effective in improving language proficiency (Lo, 2023). The integration of AI tools in foreign language education has fundamentally transformed both teaching practices and student engagement. Discriminative AI models, such as those underpinning tools like Duolingo, Google Translate, and computer assisted pronunciation training (CAPT) systems, have become instrumental in automating language learning tasks (Deng & Li, 2013; Goodfellow et al., 2016; R. Kim, 2024a; Oh et al., 2022). Within intelligent computer assisted language learning (ICALL) framework, these tools have helped foreign language teachers provide structured feedback on language translation, grammar checking, and pronunciation improvement, contributing to greater efficiency in the classroom (Alshumaimeri & Alshememry, 2023; Deng & Yu, 2014).

Generative AI represents a more advanced technological leap in comparison to discriminative AI. While discriminative AI focuses on classification tasks by processing and analyzing existing data, generative AI autonomously creates new content, such as generating sentences, conversations, and adaptive dialogues (Bengio et al., 2003; Goodfellow et al., 2020). ChatGPT is a leading example of this technology, which allows for the real-time generation of language based on context, making it particularly useful for creating personalized learning experiences (Vaswani et al., 2017). Unlike traditional AI models, generative AI goes beyond structured responses by continuously adapting to the learner's input, creating dynamic interactions that enhance language learning through authentic, human-like communication (Karatas et al., 2024).

In Korea, the Ministry of Education has prioritized AI integration into classrooms to modernize language education. Projects like AIDT aim to personalize learning by addressing individual student needs, fostering autonomy, and enhancing engagement (R. Kim, 2024b). However, successful implementation depends on teachers' abilities to adapt these tools into their instructional practices, necessitating a deeper understanding of their perceptions and experiences (Karatas et al., 2024).

Technology Acceptance Model (TAM)

The successful integration of emerging technologies in educational settings is fundamentally influenced by teachers' acceptance of such technologies (Quintana-Ordorika et al., 2024; Teo, 2012). Figure 1 illustrates the technology acceptance model (TAM) proposed by Davis (1989).

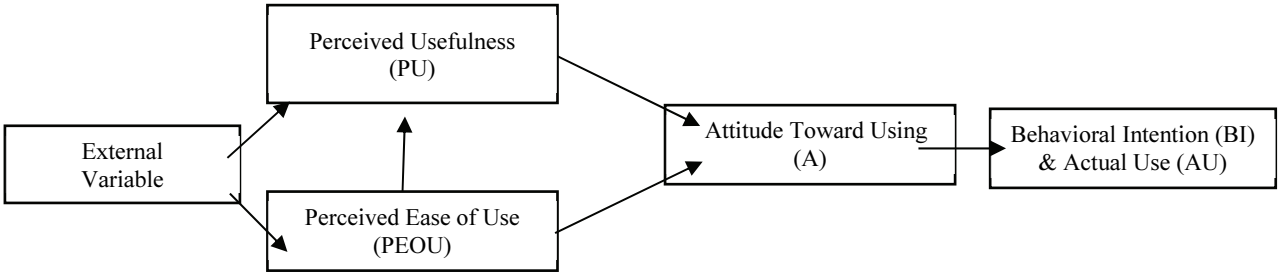

FIGURE 1
Technology Acceptance Model (TAM) (Davis, 1989)

According to Figure 1, the Technology Acceptance Model (TAM; Davis, 1989) suggests that Behavioral Intention (BI), which reflects a person's readiness to adopt a new technology, and Actual Use (AU) are influenced by multiple interconnected factors. The model identifies Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as the two key determinants of technology adoption. PEOU directly influences PU, as users who find a technology easy to use are more likely to perceive it as beneficial. This relationship is particularly relevant for EFL teachers, as their willingness to integrate AI tools into language instruction depends not only on the perceived advantages AI offers—such as personalized feedback and automated assessments—but also on how easily they can incorporate these tools into their teaching practices without extensive training. Additionally, PEOU and PU both shape teachers' Attitude Toward Using (A) AI tools, which in turn impacts their Behavioral Intention (BI) and Actual Use (AU). External factors, such as teachers' technological proficiency, institutional support, and pedagogical beliefs, further influence their perceptions of ease of use and usefulness, thereby shaping AI acceptance in EFL education.

External Variable: Generational Differences in AI Technology Acceptance

Generational differences significantly influence attitudes toward technology adoption in education. GenZ, comprising pre-service teachers in this study, are digital natives who integrate emerging technologies, including AI, seamlessly into their lives and teaching (Mosca et al., 2019). Research shows that GenZ educators perceive AI as transformative, particularly for personalized learning and real-time feedback (Chan & Lee, 2023). Conversely, GenX&Y in-service teachers often view AI as an enhancement to existing methods rather than a replacement. These educators emphasize human-centered learning, prioritizing collaboration and teacher-student interaction while using AI for administrative and repetitive tasks (Bencsik et al., 2016; Hernandez-de-Menendez et al., 2020). Their cautious approach reflects their transitional experience with digital technologies.

Perceived Usefulness and Perceived Ease of Use of AI Technology Acceptance

According to the model, when individuals encounter a new technology, their decision to adopt and use it is determined by two primary constructs: perceived usefulness (PU) and perceived ease of use (PEOU). As defined by Davis (1989), PU refers to the degree to which a person expects that using a particular system would be useful enough to enhance their job performance, highlighting whether the technology aligns with the user's goals and tasks. PEOU refers to the degree to which a person believes that using a particular system would be free from effort, emphasizing the importance of intuitive and user-friendly design in reducing barriers to adoption.

From the perspective of the Technology Acceptance Model (TAM), Zhang et al. (2023) identified PU and PEOU as the most influential factors shaping pre-service teachers' intentions to adopt AI technology, with perceived usefulness exerting a more pronounced impact than perceived ease of use. This finding aligns with prior research on technology acceptance, which consistently emphasizes the greater significance of perceived usefulness in influencing adoption behaviors (Teo, 2012; Zhang et al., 2023).

Attitude Toward Using: Concerns About AI Technology

Although AI technologies have been introduced in K-12 education, there remains a notable lack of research investigating

teachers' attitudes toward their adoption. Over the past two decades, studies on technology acceptance have consistently shown that many teachers exhibit negative attitudes and hesitation toward integrating new technologies into their teaching practices (Istenic et al., 2021; Tallvid, 2016).

These psychological barriers are realized as ethical and practical concerns further complicate AI adoption in education. Privacy risks, data security issues, and diminished teacher-student interaction are recurring challenges cited in the literature (Mhlanga, 2023; Moorhouse, 2024). AI systems, especially generative models, depend on vast datasets for training, which raises significant concerns about the collection and usage of personal information (Mhlanga, 2023). Without robust transparency and data protection measures in place, there is a heightened risk of sensitive information being misappropriated, leading to breaches of privacy (Moorhouse, 2024). Furthermore, generative AI poses additional challenges, particularly about plagiarism and ensuring the authenticity of students' work (Huang et al., 2022). These ethical dilemmas demand careful navigation by educators and institutions to ensure that AI integration in education safeguards students' data security and upholds academic integrity (Go et al., 2023; H. Kim et al., 2020).

Furthermore, teachers frequently express concerns about the increased administrative workload involved in managing AI systems, underscoring the importance of providing comprehensive training and ongoing support to facilitate effective AI integration (Ludwig & Tassinari, 2023). In fact, there is growing concern that AI technologies may increase the administrative burden on teachers. Although AI is often touted as a tool to streamline educational processes, its implementation requires teachers to manage and troubleshoot these systems, adding to their existing workload (Ludwig & Tassinari, 2023). Instead of reducing teacher tasks, AI could inadvertently lead to additional responsibilities, such as monitoring AI tools, ensuring ethical use, and continuously updating technology systems (H. Kim, et al., 2020).

Generational Differences in Accepting AI Technology in Foreign Language Learning Context

Given the heightened expectations and concerns surrounding the integration of AI technologies into educational contexts, implementing these technologies in the Korean EFL classroom requires careful consideration and strategic planning. However, pre-service GenZ and in-service GenX&Y English teachers hold differing perspectives on the incorporation of AI into their teaching practices (Choi, 2024; Go et al., 2023; A. Kim & Ahn, 2020; S. H. Kim & Choi, 2024; S.-Y. Kim & J.-R. Kim, 2022; Koehler et al., 2013; Lemon & Garvis, 2016; Ludwig & Tassinari, 2023).

GenX and GenY: Technology as a Complement to Traditional Pedagogy

GenX, born between 1960 and 1980, are often referred to as "digital immigrants," having adapted to digital tools later in life. They tend to view technology as a complement to, rather than a replacement for, traditional teaching methods (Bitegeko et al., 2024; Hernandez-de-Menendez et al., 2020; Lai &Hong, 2015; Linnes & Metcalf, 2017; Sánchez-Mena et al., 2017). Educators from this generation prioritize collaborative learning that emphasizes real-world applications, fostering meaningful teacher-student interaction. In general, GenX educators adopt a cautious approach to technological integration, ensuring that digital tools support, rather than dominate, established pedagogical practices.

Similarly, GenY, born between 1980 and 1995, grew up during the rise of the internet and social media, which has shaped their comfort and proficiency with digital tools. Like GenX, they prefer interactive learning environments that encourage collaboration and networking (i.e., padlet) (Bencsik et al., 2016; Isaacs et al., 2020). However, GenY educators tend to adopt a more balanced approach, blending digital tools with human-centered learning experiences.

The use of AI by GenX and GenY educators reflects these generational preferences. Both groups commonly utilize discriminative AI tools such as Duolingo, Google Translate, and Computer-Assisted Pronunciation Training (CAPT) systems, which are designed to automate repetitive tasks and enhance language learning efficiency (Deng & Yu, 2014). These tools provide structured, real-time feedback, enabling students to improve their pronunciation, grammar, and vocabulary while freeing up teachers' time for more interactive and personalized instruction (R. Kim, 2024a).

However, GenX and GenY generally view AI as a supportive tool rather than a central component of the learning process (Hernandez-de-Menendez, 2020; Mosca et al., 2019; Turner, 2015). Their use of AI is largely focused on repetitive tasks, such as automated grading, and homework assignments. In personalized learning contexts, GenX&Y educators tend to make students' learning paths that allow students to practice autonomously but still engage in teacher-facilitated activities that emphasize real-world problem-solving. In these environments, teachers act as facilitators, guiding students through human interaction and AI-driven feedback.

GenZ: Embracing AI-driven Personalized and Adaptive Learning

Generation Z (GenZ), born between 1995 and 2012, grew up in a fully digitalized world and is highly proficient with technology from an early age. This generation is known for favoring short, concise messages and visual content over long-form text, which has implications for how educators and administrators communicate with them (Mosca et al., 2019). GenZ learners also expect immediate feedback and dynamic learning environments, often relying on technology to provide real-time solutions (Dolenc & Brumen, 2024).

GenZ's approach to AI reflects their preference for immediacy and personalization in learning. They readily embrace AI-powered adaptive learning systems, particularly generative AI tools like ChatGPT, which allow for dynamic, real-time interaction that adjusts to their input (Chan & Lee, 2023; Dolenc & Brumen, 2024). These tools enable students to engage with context-specific content and receive instant feedback, making them an integral part of the personalized learning experience (Sun et al., 2016).

Unlike GenX&Y, GenZ integrates AI across all stages of instruction, using it not only for content delivery but also for independent learning and adaptive learning paths (Dolenc & Brumen, 2023). For GenZ learners, AI is essential in creating individualized learning environments that cater to their needs, allowing them to work at their own pace while receiving continuous feedback from AI systems (Moorhouse & Kohnke, 2024).

The role of teachers for GenZ shifts significantly compared to earlier generations. Rather than acting as the primary source of instruction, GenZ teachers view themselves as designers of personalized learning environments where AI plays a central role (Bitegeko et al., 2024; Hernandez-de-Menendez et al., 2020; Lai &Hong, 2015; Linnes & Metcalf, 2017; Sánchez-Mena et al., 2017; Tarhini et al., 2014; Tsai & Chai, 2012). These teachers rely on AI to handle much of the content creation, assessment, and feedback processes, positioning themselves more as curators of learning experiences. This shift reflects a more independent, technology-centered learning experience, where the teacher's role is to design a course for students to travel through AI-driven adaptive learning paths rather than providing direct instruction (Go et al., 2023; H. Kim et al., 2020).

However, despite their enthusiasm for AI, concerns persist about the potential over-reliance on technology for problem-solving and critical thinking. GenZ learners may become too dependent on AI tools for instant solutions, potentially weakening their ability to engage in deeper cognitive processes (Alieto et al., 2024; Bitegeko et al., 2024; Chan & Lee, 2023; Go et al., 2023; Tsai & Chai, 2012)

In addition to employing AI tools for personalized learning, GenZ educators also integrate gamification elements or stimulated reality components (i.e., virtual reality) to enhance student engagement (Chung & Choi, 2024). This generation tends to prefer individualized learning environments that allow them to focus and maintain a personalized pace, in contrast to Millennials, who emphasize collaboration and teamwork (Seemiller & Grace, 2017). AI supports these individual learning preferences by offering self-paced instruction, real-world simulations, and authentic learning experiences that extend beyond the traditional classroom.

Research Gaps and the Present Study

It should be noted that previous studies have not specifically examined the direct use of AI-based educational tools within the Korean English as a Foreign Language (EFL) context. This gap suggests that perceived usefulness may hold a more significant influence than perceived ease of use in shaping Korean EFL teachers' acceptance of AI technology. Additionally, age-related factors, such as differences between pre-service GenZ and in-service GenX&Y English teachers, may also impact the acceptance of AI technology among Korean EFL educators.

To address the identified research gap, this study explores the acceptance of AI technology among pre-service Generation Z (GenZ) teachers and in-service Generation X and Y (GenX&Y) teachers within Korean English as a Foreign Language (EFL) contexts. Specifically, the study investigates generational differences in the actual use of AI technologies, attitudes toward their adoption, and perceptions of perceived usefulness (PU) and perceived ease of use (PEOU). The following is the research question:

1) How do pre-service GenZ and in-service GenX&Y teachers differ in their adoption and instructional use of AI technologies in Korean EFL classrooms?
2) What are the attitudes of pre-service GenZ and in-service GenX&Y teachers toward the adoption of AI technologies in Korean EFL contexts, and how do these attitudes vary across generational groups? Specifically, what barriers and challenges do Korean EFL teachers face when integrating AI technologies into their teaching practices, and how do these challenges vary by generation?

3) What differences exist in the perceptions of perceived usefulness (PU) of AI technologies between pre-service GenZ and in-service GenX&Y teachers in Korean EFL classrooms?
4) How do pre-service GenZ and in-service GenX&Y teachers perceive the perceived ease of use (PEOU) of AI technologies?

METHOD

Research Design

This study employed a mixed-methods online survey to investigate the acceptance of AI technology within Korean EFL context. Participants included pre-service GenZ and in-service GenX&Y English teachers.

Participants

Participants in this study included in-service and pre-service English teachers, representing different generational groups. In recruiting the participants, this study employed snowball sampling, a form of chain-referral sampling classified as a non-probability sampling technique. In this approach, initial participants identify and refer other eligible individuals, facilitating a progressively expanding sample. Table 1 outlines background information of all participants, including details on teaching experience and specific educational contexts.

TABLE 1
Background Information: Teaching Experience in Korean EFL Classroom

	GenX&Y (*n*=35)	GenZ (*n*=35)
4-week-practicum	-	6
4-month-practiuum	-	29
Less than 5 years in-service	6	-
5-9 years in service	15	-
10-14 years in service	8	-
15-19 years in service	4	-
Over 20 years in service	2	-

The in-service participants from Generation X and Y (GenX&Y) had extensive experience teaching in English secondary schools in Korea (M = 9.57 years, SD = 4.92, range: 2–20 years). Based on prior studies, participants born between 1960 and 1994 were classified as GenX&Y, combining Generation X and Generation Y into a single category. Among the 35 GenX&Y teachers who completed the questionnaires, 18 were teaching in middle schools, while 17 were teaching in high schools. The gender distribution included 20 male and 15 female teachers. These participants were employed in various regions, including Seoul, Gyeonggi, Incheon, Daegu, Gwangju, and Mokpo.

The study also included pre-service teachers from Generation Z (GenZ), defined as individuals born in 1995 or later. These participants gained hands-on experience in English instruction through teaching practicums in public middle and high schools. During data collection, all pre-service participants had recently completed one of two required practicum programs: either a mandatory four-week practicum or an extended four-month teaching practicum for teacher preparation. Among the 35 GenZ pre-service teachers, 20 had middle school teaching experience, while 15 had experience in high schools. The gender distribution consisted of 13 male and 22 female participants, with all individuals from the regions of Seoul, Gyeonggi, and Incheon.

Instruments

The primary data collection instrument was a survey, designed to measure teachers' actual use, their attitudes toward its adoption, as well as their perceptions of its usefulness, and its ease of use regarding AI technology in the Korean EFL context. Participants' background information, including teaching experience, was collected in the survey's background information section. Appendix presents the complete list of survey questions.

To investigate the research questions, the present study employed both closed-ended and open-ended questions. The survey was developed based on Venkatesh and Bala's (2008) Technology Acceptance Model (TAM), with only relevant items adapted to assess participants' acceptance of AI tools in language learning. Additionally, insights from previous studies on AI integration in second and foreign language learning were incorporated to refine the survey items (Chee & Hong, 2023; Dolenc & Brumen, 2024; Go et al., 2023; H. Kim et al., 2020; S.-H. Kim & Shin, 2021; Park et al., 2024).

The survey instrument consisted of 19 items categorized under four key constructs of the Technology Acceptance Model (TAM): Actual Use of AI Technology, Attitudes Toward Using AI Technology, Perceived Usefulness of AI Technology, and Perceived Ease of Use of AI Technology. A five-point Likert scale (1 = strongly disagree to 5 = strongly agree) was employed to measure participants' responses. The Actual Use of AI Technology section included six items assessing participants' prior implementation of AI-powered tools in English instruction, such as online collaboration tools (e.g., Google Docs, Padlet), learning management systems (e.g., Google Classroom), virtual reality-based contextual learning tools, educational courseware (e.g., Duolingo), generative AI technologies (e.g., ChatGPT), and online translation or grammar-checking tools (e.g., Google Translate). The Attitudes Toward Using AI Technology section comprised three items evaluating participants' concerns about AI adoption, including issues related to privacy invasion, the reduction of social interaction in school settings, and the potential increase in administrative workload for teachers. The Perceived Usefulness of AI Technology section contained six items measuring participants' expectations regarding AI's role in facilitating individualized instruction, supporting higher-order cognitive learning through task-based and project-based activities, and providing personalized feedback, adaptive input materials, and authentic interaction opportunities. Lastly, the Perceived Ease of Use of AI Technology section included four items assessing participants' self-reported proficiency in using AI tools and their perceived ease of integrating AI at different instructional stages, such as pre-class (e.g., pre-experience activities and student level identification), during class (e.g., customized problem-solving activities), and post-class (e.g., data-driven supplementary learning).

To ensure clarity and validity, the survey underwent two rounds of piloting with 10 pre-service GenZ and in-service GenX&Y teachers, who were excluded from the main study. These participants provided feedback on item clarity, coherence, and content relevance, leading to targeted refinements. Subsequently, the final version was reviewed and refined by two experts in AI-assisted English education, who confirmed its appropriateness for investigating AI adoption in the Korean EFL context. For transparency, the full survey instrument is provided in Appendix.

Open-ended questions were designed to complement closed-ended items, allowing participants to elaborate their responses. After each subsection's closed-ended questions, an open-ended question elicited participants' reasoning behind their responses. Participants' responses first appeared in Korean but were translated into English for this study.

Data Collection and Analysis

Data collection was conducted via online surveys administered using Google Forms. To ensure clarity for participants, the survey was presented in Korean. All participants provided informed consent, ensuring they were appraised of the study's objectives and their rights. Figure 2 presents a sample screenshot of the survey questions. The survey included 19 closed-ended and 5 open-ended items. Quantitative data from the closed-ended questions were analyzed using descriptive statistics to illustrate generational trends between GenZ pre-service English teachers and GenX&Y in-service English teachers. An independent t-test was utilized to examine generational differences between these groups. This method was chosen because Levene's test indicated no significant variance differences across test items, justifying the assumption of equal variance. Statistical analysis of quantitative data was performed using R software (R Development Core Team, 2008). The effect size, represented by Cohen's d, was also calculated (Cohen, 1988). According to conventional benchmarks, Cohen's d values of .2, .5, and .8 correspond to small, medium, and large effect sizes, respectively, while values exceeding 1.0 indicate a very large effect.

Subsequently, the qualitative data from open-ended questions were analyzed using thematic analysis, following the approaches of Charmaz (2006) and Glaser & Strauss (1967), to explore participants' perspectives on AI integration in English language education. A data-driven coding framework was developed, allowing themes to emerge inductively rather than relying on pre-defined categories. Throughout the analysis, recurring concepts and key remarks were identified, and central themes were refined through multiple discussion rounds to ensure clarity and distinctiveness. To ensure the validity and reliability of the analysis, two researchers independently coded the open-ended responses, adhering to the established framework. Intercoder reliability was assessed, yielding an agreement rate of 91.3%, which indicates a high level of reliability. Any disagreements were resolved through discussion until consensus was reached. Additionally, validity was ensured through investigator triangulation and iterative refinement of the themes. To maintain participant anonymity,

individuals were assigned coded identifiers based on their generational group and participant number (e.g., GenZ_1 or GenX&Y_1).

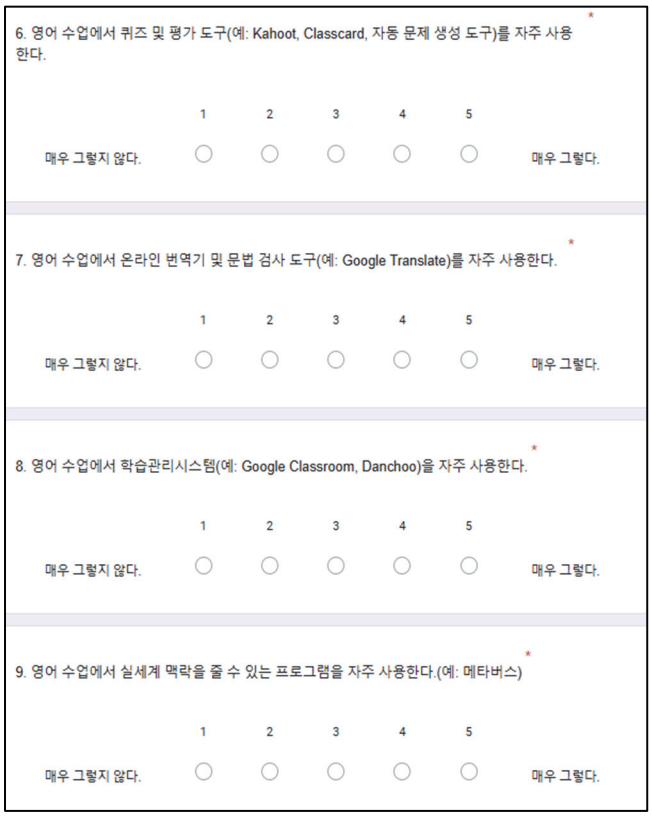

FIGURE 2
Sample Screenshot of the Survey Questions

FINDINGS AND DISCUSSION

RQ (1): Actual Use of AI Technology within Korean EFL Context between GenZ and GenX&Y

Table 2 shows actual use of AI technology by Korean pre-service and in-service English teachers. There was no significant difference between the two groups regarding uses of online interaction and collaboration tools, such as Google Docs and Padlet (M_{GenZ} = 3.48, SD_{GenZ} = 1.15; $M_{GenX\&Y}$ = 3.77, $SD_{GenX\&Y}$ = 1.04; t = 1.07, p =.28) [Item1].

Also, no statistical difference was found in Learning Management Systems (LMS) between GenZ pre-service teachers (M_{GenZ} = 2.77, SD_{GenZ} = 1.19) and GenX&Y in-service teachers ($M_{GenX\&Y}$ = 2.54, $SD_{GenX\&Y}$ = 1.13; t = -.81, p =.421) [Item2], Virtual Reality (VR) applications (M_{GenZ} = 2.28, SD_{GenZ} = 1.08; $M_{GenX\&Y}$ = 2.25, $SD_{GenX\&Y}$ =.78; t = -.13, p =.908) [Item3], and the use of software and courseware designed for English education, like Duolingo (M_{GenZ} = 2.62, SD_{GenZ} = 1.04; $M_{GenX\&Y}$ = 2.20, $SD_{GenX\&Y}$ =.95; t = -1.69, p =.08) [Item4].

Significant differences were found in [Item5] and [Item6]. GenZ pre-service teachers reported more frequent use of generative AI technologies, like ChatGPT (M_{GenZ} = 4.17, SD_{GenZ} =.97), compared to GenX&Y in-service teachers ($M_{GenX\&Y}$ = 2.85, $SD_{GenX\&Y}$ = 1.15), showing a significant difference (t = -3.14, p =.002). The effect size, as measured by Cohen's d, was d = 1.24, indicating a very large effect size [Item5]. Conversely, GenX&Y in-service teachers reported higher use of online translation and grammar-checking tools like Google Translate ($M_{GenX\&Y}$ = 4.05, $SD_{GenX\&Y}$ =.85), compared to GenZ pre-service teachers (M_{GenZ} = 2.88, SD_{GenZ} =.95)—a highly significant difference (t = 5.33, p <.001). The Cohen's d, was d = -1.29, indicating a very large effect size [Item6].

TABLE 2
Actual Use of AI Technology

	GenZ Pre-service English Teachers (n=35)		GenX&Y In-service English Teachers (n=35)		*MD*	*t*	*Cohen's d*	*p*
	M	*SD*	*M*	*SD*				
[Item1] …online interaction and collaboration tools (i.e., Google Docs, Padlet) …	3.48	1.15	3.77	1.04	-.29	1.07	-.26	.28
[Item2] … learning management systems (i.e., Google Classroom) …	2.77	1.19	2.54	1.13	.23	-.81	.19	.421
[Item3] … tools providing real-world contextualization (i.e., virtual reality) …	2.28	1.08	2.25	.78	.03	-.13	.03	.908
[Item4] … software and courseware designed for English education (i.e., Duolingo) …	2.62	1.04	2.2	.95	.42	-1.69	.42	.08
[Item5] … generative AI technologies (i.e., ChatGPT) …	4.17	.97	2.85	1.15	.8	-3.14	1.24	.002**
[Item6] … online translation and grammar-checking tools (i.e., Google Translate) …	2.88	.95	4.05	.85	-1.17	5.33	-1.29	<.001***

Note: 1. Significance levels are reported as $p < .001$***, $p < .01$**, $p < .05$*.

2. For Q3~Q10, the questionnaire items were composed as "I have implemented _____for English teaching in Korean EFL classroom."

Responses from open-ended questions revealed that GenX&Y and GenZ teachers tend to use AI technology due to its familiarity. For instance, GenX&Y_15 stated, "I use Google Translate every day because I've been using it for more than five years." Similarly, GenZ_3 remarked, "I rely on ChatGPT constantly, since I was a sophomore. I even use it for homework. I honestly don't think I could live without ChatGPT!" The responses from open-ended questions further revealed a generational divide in their actual use toward generative AI. GenX&Y teachers hesitated to use AI in classrooms, citing concerns about its disruption of teaching processes. GenX&Y teachers indicated discomfort with ChatGPT, explaining that even for grammar tasks, it often rewrites paragraphs, disrupting their lesson plans. Instead, GenZ teachers displayed greater familiarity and positive experiences with AI, particularly during their teaching practicum. For example, GenZ_4 noted using image generation AI, which quickly engaged students and made the presentation task enjoyable.

RQ (2): Attitudes toward Using AI Technology: Focusing on Concerns between GenZ and GenX&Y

Table 3 presents the attitudes toward using AI technology of GenZ pre-service and GenX&Y in-service English teachers regarding the utilization of AI in the Korean EFL context. It highlights three key concerns: privacy invasion and data breaches, the potential loss of socialization in schools, and the administrative burden AI may impose on teachers.

For concerns about privacy invasion and data breaches [Item7], both groups expressed similar levels of concern, with GenZ pre-service teachers reporting a mean score of 2.48 (SD_{GenZ} =.967) and GenX&Y in-service teachers a mean of 2.37 ($SD_{GenX\&Y}$ =.928) without statistical significance (t = -.49, p =.621). Regarding the potential loss of socialization in schools due to AI's impact on teacher-student and student-student interaction [Item 8], both groups showed comparable levels of concern, with GenZ pre-service English teachers reporting a mean score of 2.54 (SD_{GenZ} = 1.15) and GenX&Y in-service teachers reporting 2.45 ($SD_{GenX\&Y}$ =.87). This difference was not statistically significant (t = -.34, p =.117).

There was a highly significant difference between the two groups regarding the concern that AI would raise administrative burdens on teachers [Item 9]. GenZ pre-service teachers expressed considerably more concern (M_{GenZ} = 4.31, SD_{GenZ} =.88) than GenX&Y in-service teachers ($M_{GenX\&Y}$ = 2.57, $SD_{GenX\&Y}$ = 1.10), with a statistically significant difference (t = -7.18, p < .001). The Cohen's d value was 1.74 for Item 9, signifying a very large effect size. This indicates that pre-service teachers are more apprehensive about the additional administrative workload AI might introduce.

TABLE 3
Attitudes toward Using AI Technology

	GenZ Pre-service English Teachers (*n*=35)		GenX&Y In-service English Teachers (*n*=35)		*MD*	*t*	*Cohen's d*	*p*
	M	*SD*	*M*	*SD*				
[Item7] AI use will raise concerns about privacy invasion and data breaches.	2.48	.97	2.37	.93	.11	-.49	.11	.621
[Item8] AI will lead to the loss of schools' socialization potential due to a lack of teacher-student and student-student interaction.	2.54	1.15	2.45	.87	.08	-.34	.08	.117
[Item9] AI will increase the burden of administrative tasks for teachers.	4.31	.88	2.57	1.10	1.72	-7.18	1.74	<.001***

Note: Significance levels are reported as $p < .001$***, $p < .01$**, $p < .05$*.

Qualitative results of participants' attitudes toward administrative tasks revealed generational differences in how GenX&Y and GenZ teachers perceive their responsibilities when AI is integrated into classroom activities. A GenX&Y teacher (GenX&Y_30) viewed AI as a way to reduce repetitive tasks like grading, reports, and homework management. In contrast, GenZ teachers expressed concerns that the introduction of AI in educational settings might increase their administrative workload. A GenZ participant (GenZ_7) reported that based upon her teaching practicum experience, younger teachers were often responsible for tasks like managing EdTech accounts, maintaining devices, and troubleshooting issues with wireless internet during AI-based lessons. This participant noted that equipment-related responsibilities frequently fall to younger teachers, exacerbating their existing challenges in managing classroom activities, adding to an already demanding workload.

RQ (3): Perceived Usefulness of AI Technology between GenZ and GenX&Y

According to Davis (1989), perceived usefulness encompasses the expectations regarding the potential benefits and the effectiveness of AI technology in achieving desired outcomes.

Expectations

The expectations of pre-service and in-service teachers regarding AI integration into Korean EFL classrooms appear in Table 4.

TABLE 4
Expectations Regarding AI Utilization into Korean EFL Context

	GenZ Pre-service English Teachers (*n*=35)		GenX&Y In-service English Teachers (*n*=35)		*MD*	*t*	*Cohen's d*	*p*
	M	*SD*	*M*	*SD*				
[Item10] AI will help improve effectiveness in realizing individualized, level-based customized instruction.	3.94	.98	4.05	1.06	-.11	.45	-.11	.466
[Item11] AI will help promote group activities, task-based learning, and project-based learning, which engage higher-order cognitive skills.	3.2	1.14	3.57	.99	-.37	1.43	-.35	.157
[Item12] Generative AI will improve the quality of teaching.	4.2	.88	3.6	.93	.6	-2.72	.67	.008**

Note: Significance levels are reported as $p < .001$***, $p < .01$**, $p < .05$*.

There was no significant difference in their expectations that AI would help realize individualized, level-based customized instruction (M_{GenZ} = 3.94, SD_{GenZ} =.98; $M_{GenX\&Y}$ = 4.05, $SD_{GenX\&Y}$ = 1.06; t =.45, p =.466) [Item10]. Both groups showed moderate agreement that AI would reduce lecture-based instruction and promote more group activities, task-based learning, and project-based learning (M_{GenZ} = 3.20, SD_{GenZ} = 1.14; $M_{GenX\&Y}$ = 3.57, $SD_{GenX\&Y}$ =.99; t = 1.43, p =.157) [Item11].

However, pre-service teachers had significantly higher expectations that generative AI would improve the quality of teaching (M_{GenZ} = 4.20, SD_{GenZ} =.88) compared to in-service teachers ($M_{GenX\&Y}$ = 3.60, $SD_{GenX\&Y}$ =.93). The Cohen's d value was .67, indicating a moderate to large effect size, which indicates a significant generational difference (t = -2.72, p =.008). [Item12].

Responses from open-ended questions revealed a shared expectation among GenX&Y and GenZ teachers for individualized learning; however, their views on the role of generative AI in achieving this goal diverged. GenZ pre-service teachers exhibited greater optimism regarding AI's potential to enhance personalized learning, as exemplified by GenZ_12's remark that AI could facilitate the delivery of tailored lessons by providing materials specifically suited to each student's level. In contrast, GenX&Y teachers emphasized the necessity of teacher involvement in personalizing instruction and expressed skepticism about the effectiveness of generative AI. GenX&Y_22 noted that while tools like ChatGPT or AIDT can be useful for monitoring student progress, it remains the teacher's responsibility, rather than AI's, to provide personalized instruction. Moreover, they raised concerns that generative AI, such as ChatGPT, may be overestimated, as its use can lead to plagiarism.

Effectiveness

Table 5 demonstrates differences in perceptions between GenZ pre-service English teachers and GenX&Y in-service English teachers regarding perceived effectiveness of AI technology. Regarding the potential for AI-powered technologies to provide students with interactional opportunities for solving challenging tasks or engaging in authentic interaction [Item13], no significant difference existed between GenZ pre-service teachers (M_{GenZ} = 3.25, SD_{GenZ} = 1.15) and GenX&Y in-service teachers ($M_{GenX\&Y}$ = 3.34, $SD_{GenX\&Y}$ = 1.14), (t = -.08, p = .76).

However, GenZ pre-service teachers (M_{GenZ} = 4.11, SD_{GenZ} = 1.19) expressed significantly stronger agreement than GenX&Y in-service teachers ($M_{GenX\&Y}$ = 3.2, $SD_{GenX\&Y}$ = 1.14) regarding AI's ability to provide personalized input materials, like reading or listening passages, adaptive to students' levels (t = -3.23, p = .001). The Cohen's d value was .78, indicating a large effect size [Item14]. Similarly, in-service teachers ($M_{GenX\&Y}$ = 4.11, $SD_{GenX\&Y}$ = 1.14) rated AI's potential to offer automated, personalized feedback to students' errors significantly higher than pre-service teachers (M_{GenZ} = 3.51, SD_{GenZ} = 1.32), (t = 2.01, p = .04). The Cohen's d value of .49 reflects a moderate effect size [Item15].

TABLE 5
Effectiveness of AI Technology

	GenZ Pre-service English Teachers (n=35)		GenX&Y In-service English Teachers (n=35)		*MD*	*t*	*Cohen's d*	*p*
	M	*SD*	*M*	*SD*				
[Item13] AI-powered tools are effective in providing students with interactional opportunities to solve cognitively challenging tasks or have authentic interaction.	3.25	1.15	3.34	1.14	-.08	.31	-.08	.76
[Item14] AI-powered tools are effective in providing reading or listening input materials that correspond to students' proficiency level through personalization.	4.11	1.19	3.2	1.14	.91	-3.23	.78	.001**
[Item15] AI-powered tools are effective in providing automated, personalized feedback to students' errors through artificial intelligence.	3.51	1.32	4.11	1.14	-.6	2.01	.49	.04*

Note: Significance levels are reported as p < .001***, p < .01**, p < .05*.

The open-ended responses revealed clear generational differences. GenZ pre-service teachers favored AI-driven adaptive tools for improving reading and listening skills, with one noting during their practicum the effectiveness of an English courseware (GenZ_4). In contrast, GenX&Y in-service teachers emphasized the burden of providing error correction and emphasized the potential relief AI could offer in handling this task automatically (GenX&Y_5).

RQ (4): Perceived Ease of Use of AI Technology between GenZ and GenX&Y

Table 6 reports the perceptions of AI integration across different teaching stages between GenZ pre-service teachers and GenX&Y in-service teachers within the Korean EFL context.

TABLE 6
Perceived Ease of Use of AI Technology

	GenZ Pre-service English Teachers (*n*=35)		GenX&Y In-service English Teachers (*n*=35)		*MD*	*t*	*Cohen's d*	*p*
	M	*SD*	*M*	*SD*				
[Item16] I am proficient to use AI tools for English instruction within classroom contexts.	2.28	.94	2.91	1.02	-.65	2.68	-.64	.008**
[Item17] It is easy to utilize AI before class step to provide pre-experience activities and identify student levels.	4.03	1.08	3.05	1.35	.97	-3.27	.47	.001***
[Item18] It is easy to utilize AI during class to facilitate customized problem-solving activities.	3.85	.98	2.74	1.2	1.11	-4.17	1.01	<.001***
[Item19] It is easy to utilize AI after class to support data-driven supplementary learning.	4.03	1.06	3.94	1.01	.09	-.34	.08	.73

Note: Significance levels are reported as $p < .001$***, $p < .01$**, $p < .05$*.

Despite varying experiences with AI adoption, both generational groups exhibited similar perceptions regarding their proficiency in using AI tools for English instruction. GenX&Y in-service teachers rated their proficiency higher ($M_{GenX\&Y}$ = 2.91, $SD_{GenX\&Y}$ = 1.02) compared to GenZ pre-service teachers (M_{GenZ} = 2.28, SD_{GenZ} = .94). This difference was statistically significant (t = 2.68, p =.008) [Item 16]. However, both groups reported low confidence in effectively integrating AI into teaching practices, as their mean scores fell below 3.0. This suggests a shared sense of uncertainty about the successful implementation of AI-based English instruction.

According to an open-ended survey, respondents commonly indicated that their lack of confidence stemmed not from the technological aspects of AI integration but from challenges related to classroom management. For instance, a GenZ pre-service teacher explained, "Using AI technology itself is not difficult at all. However, when using AI, students tend to rely on the technology to obtain answers directly, bypassing their cognitive engagement. What we truly want is for students to utilize their linguistic and cognitive resources, with AI serving as a supportive tool. To address this issue, it is imperative for me to carefully consider when and how to incorporate AI technologies during teaching and learning processes. Additionally, in task-based language teaching, I struggle to assign roles to students effectively. These considerations are critical, yet I have not been taught how to design lesson plans that address such challenges (GenZ_19)."

Despite the overall challenges in integrating AI technologies into teaching and learning processes, a significant generational difference emerged regarding the implementation of AI technology itself before class for pre-experience activities and assessing student levels. GenZ pre-service teachers (M_{GenZ} = 4.03, SD_{GenZ} = 1.08) expressed significantly stronger agreement compared to GenX&Y in-service teachers ($M_{GenX\&Y}$ = 3.05, $SD_{GenX\&Y}$ = 1.35), indicating a notable generational difference (t = -3.27, p = .001). The Cohen's d value of .47 suggests a moderate effect size [Item17]. Similarly, for using AI during class to facilitate customized problem-solving activities, GenZ teachers (M_{GenZ} = 3.85, SD_{GenZ} = .98) demonstrated significantly higher agreement than GenX&Y teachers ($M_{GenX\&Y}$ = 2.74, $SD_{GenX\&Y}$ = 1.20), showing a marked difference between the groups (t = -4.17, p < .001) with the Cohen's d value of 1.01 indicating a very large effect size [Item18]. No significant difference existed between GenZ pre-service teachers (M_{GenZ} = 4.03, SD_{GenZ} = 1.06) and GenX&Y in-service teachers ($M_{GenX\&Y}$ = 3.94, $SD_{GenX\&Y}$ = 1.01) in their perceptions of using AI for post-class data-driven

supplementary learning (t = -.34, p = .73) [Item19]. This shared perception reflects a broader consensus across both generational groups, indicating that educators, regardless of generation, generally recognize and agree on the value of AI as a tool for enhancing supplementary learning activities beyond the classroom.

In the open-ended questionnaire on AI integration within the instructional cycle, GenX&Y teachers generally found it easy to use AI technology in the post-class phase for tasks like assigning and checking homework. One participant expressed doubts about AI's ability to accurately assess students' levels before class, stating that real-time adjustments during lessons were impractical (GenX&Y_15). Another noted that AI often distracts students during class and is ideal for homework management to save time (GenX&Y_22).

Discussion

The findings of this study underscore significant generational differences between pre-service GenZ and in-service GenX&Y Korean EFL teachers in their acceptance and use of AI technologies. While both groups utilize AI tools, their preferences and attitudes diverge sharply, particularly regarding generative AI (GenAI) and non-GenAI technologies. Figure 3, which focuses on pre-service GenZ teachers' technology acceptance model, highlights the unique technology acceptance patterns of this younger group, offering a contrast to their GenX&Y counterparts.

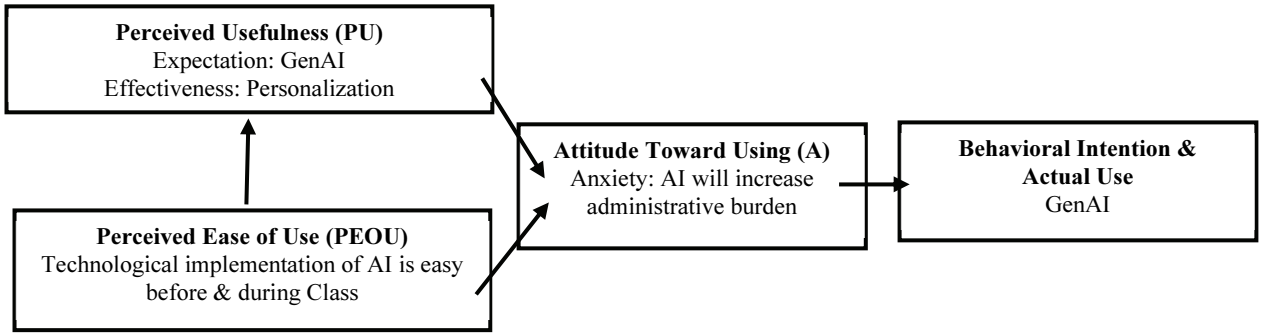

FIGURE 3
Technology Acceptance Model of GenZ Pre-service English Teachers in Korean EFL Context

Figure 3 illustrates that pre-service GenZ teachers exhibit distinct acceptance patterns of AI technologies compared to in-service GenX&Y teachers. GenZ teachers demonstrated higher perceived ease of use (PEOU), finding it easier to adopt AI technologies, including GenAI, within classroom contexts. This ease of use translated into more frequent use of AI tools for instructional purposes, particularly GenAI technologies like ChatGPT, which they perceived as effective for enhancing pedagogy and personalizing learning experiences (Dolenc & Brumen, 2024). Despite expressing concerns about increased administrative burdens, such as managing EdTech accounts and troubleshooting issues, their overall adoption rates of GenAI remained significantly higher than those of GenX&Y teachers.

In contrast, in-service GenX&Y teachers demonstrated a preference for using AI tools in post-class activities, such as managing assignments and grading, rather than integrating them directly into classroom instruction. Their lower engagement with GenAI technologies reflects a lower perceived usefulness (PU) for these tools in classroom contexts. While GenX&Y teachers expressed generally positive attitudes toward AI adoption and showed no significant anxiety about its implementation, they tended to rely more on traditional, non-GenAI tools such as online translators and grammar-checking software (Bencsik et al., 2016; Moorhouse & Kohnke, 2024) for prompt feedback. These tools were seen as more aligned with their established teaching practices and less disruptive to their instructional workflows (Hernandez-de-Menendez et al., 2020; Mosca et al., 2019; Turner, 2015).

These findings highlight a clear generational divide in AI acceptance patterns. GenZ teachers, as digital natives, are more inclined to adopt innovative GenAI tools due to their higher PEOU and stronger perceptions of GenAI's pedagogical effectiveness (Karatas et al., 2024; R. Kim, 2024b). In contrast, GenX&Y teachers favor more traditional, task-specific AI technologies and exhibit a cautious approach to integrating newer AI tools into their teaching practices. This generational divergence highlights the need for tailored support and training programs that address the specific needs and concerns of each group, facilitating the effective and equitable integration of AI technologies into Korean EFL education.

CONCLUSION

This study highlights how generational perspectives shape the acceptance of AI technology in EFL contexts. As AI becomes an increasingly integral part of foreign language teaching practices, this study offers insights into generation-specific requirements of pre-service and in-service teachers.

Developing effective training programs that enhance both technical skills and pedagogical strategies is crucial for ensuring the successful integration of AI into classrooms. To achieve this, training should encompass not only the technical proficiency required to operate AI-powered tools but also the pedagogical competence necessary to integrate these tools into meaningful instructional practices. Educators need to be equipped with hands-on experience in using AI-driven platforms, understanding their capabilities and limitations, and applying them to various teaching contexts. Such training programs may include workshops, peer collaboration, and case studies, to facilitate the gradual adoption of AI in instructional settings. Furthermore, addressing ethical considerations, data privacy concerns, and strategies for maintaining student engagement in AI-enhanced learning environments is essential. By providing comprehensive, practice-oriented training, educators can develop the confidence and expertise needed to effectively leverage AI for improving learning outcomes.

However, the present study is not without limitations. First, the instrument was modified based on several studies, as no existing scale was available to specifically measure the acceptance of AI-based educational tools among in-service and pre-service teachers in Korea (Zhang et al., 2023): Although the scale demonstrated good validity and reliability during pre-testing, certain constructs may still require further refinement. Second, the study's small sample size and focus on the Korean EFL context present limitations. Future research should include a broader range of participants and explore these generational differences in various educational settings. Additionally, longitudinal studies should examine how AI adoption evolves over time and how it influences teaching practices and learning outcomes. Future studies could examine how AI can be integrated at various stages of EFL instruction by teachers from different generational groups.

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Appendix

Survey Items

TAM Category		Survey Items
Actual Use of AI Technology		[Item1] I have implemented online interaction and collaboration tools (i.e., Google Docs, Padlet) for English teaching in Korean EFL classroom.
		[Item2] I have implemented learning management systems (i.e., Google Classroom) for English teaching in Korean EFL classroom.
		[Item3] I have implemented tools providing real-world contextualization (i.e., virtual reality) for English teaching in Korean EFL classroom.
		[Item4] I have implemented software and courseware designed for English education (i.e., Duolingo) for English teaching in Korean EFL classroom.
		[Item5] I have implemented generative AI technologies (i.e., ChatGPT) for English teaching in Korean EFL classroom.
		[Item6] I have implemented online translation and grammar-checking tools (i.e., Google Translate) for English teaching in Korean EFL classroom.
Attitudes toward Using AI Technology		[Item7] AI use will raise concerns about privacy invasion and data breaches.
		[Item8] AI will lead to the loss of schools' socialization potential due to a lack of teacher-student and student-student interaction.
		[Item9] AI will increase the burden of administrative tasks for teachers.
Perceived Usefulness of AI Technology	Expectations	[Item10] AI will help improve effectiveness in realizing individualized, level-based customized instruction.
		[Item11] AI will help promote group activities, task-based learning, and project-based learning, which engage higher-order cognitive skills.
		[Item12] Generative AI will improve the quality of teaching.
	Usefulness	[Item13] AI-powered tools are effective in providing students with interactional opportunities to solve cognitively challenging tasks or have authentic interaction.
		[Item14] AI-powered tools are effective in providing reading or listening input materials that correspond to students' proficiency level through personalization.
		[Item15] AI-powered tools are effective in providing automated, personalized feedback to students' errors through artificial intelligence.
Perceived Ease of Use of AI Technology		[Item16] I am proficient to use AI tools for English instruction within classroom contexts.
		[Item17] It is easy to utilize AI before class step to provide pre-experience activities and identify student levels.
		[Item18] It is easy to utilize AI during class to facilitate customized problem-solving activities.
		[Item19] It is easy to utilize AI after class to support data-driven supplementary learning.