

## Tech-Infused Empowerment: How Low-, Mid-, and High-Tech Integration Approaches Alleviate Teaching Anxiety among EFL Teachers

Nasser Sabourianzadeh<sup>1</sup>, Masoume Ahmadi<sup>2</sup>

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### Abstract

While extensive research exists on learning anxiety, teaching anxiety remains a relatively unexplored area, especially in the context of technology integration and the emotional responses of English as a Foreign Language (EFL) teachers. This study examined the effectiveness of low-, mid-, and high-tech interventions in reducing teaching anxiety among Iranian EFL teachers. Ninety-six Iranian EFL teachers were divided into three groups of 32 participants each and received low-tech (e.g., peer collaboration), mid-tech (e.g., mobile apps), or high-tech (e.g., ChatGPT) interventions. The participants completed the Teacher Anxiety Scale before the intervention and self-reported their baseline anxiety levels. Then, each group attended a three-day workshop and was post-tested after a one-semester interval (50 days). Quantitative data analysis revealed significant differences in anxiety levels among the groups, with the high- and mid-tech interventions showing greater efficacy in reducing teaching anxiety. Corroborating the quantitative findings, the qualitative data from follow-up interviews with 10 participants from each group provided further insights into anxiety reduction factors at each tech-integration level. Practical implications and future research directions are discussed.

**Keywords:** Anxiety, EFL teacher, high-tech integration, low-tech integration, mid-tech integration.

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1. Department of English Language Teaching, Farhangian University, Tehran, Iran (Corresponding author). [nassersabourianzadeh@cfu.ac.ir](mailto:nassersabourianzadeh@cfu.ac.ir)

2. Department of English Language Teaching, Farhangian University, Tehran, Iran.  
[masoumeahmadi@cfu.ac.ir](mailto:masoumeahmadi@cfu.ac.ir)



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## Introduction

Advancements in technology have revolutionized English as a Foreign Language (EFL) education with a growing emphasis on technology's role in enhancing educational quality (Kühl & Wohninsland, 2022). While technology's impact on EFL student language learning outcomes has been extensively studied, its effects on EFL teachers remain underexplored. Incorporating technology in education has streamlined student progress monitoring, simplified grading, and improved attendance management (Bushweller, 2020). It also allows for customized instruction, enhancing personalization and adaptability (Wang, 2021), and boosts teachers' self-efficacy (Chen, 2020). Despite these advancements, a discernible knowledge gap persists in the assessment of how technology integration alleviates teaching anxiety, especially in the context of EFL instruction. This under-researched aspect in current literature is crucial for supporting teachers in attaining greater longevity and confidence, ultimately leading to increased success for teachers and students (Henderson & Corry, 2021).

Ferguson et al. (2012) highlighted the significant anxiety and stress experienced by teachers, which significantly impact their well-being, job satisfaction, and retention. Likewise, this concern is a prevailing problem among EFL teachers (Horwitz, 2001). The challenges faced by EFL teachers, including language proficiency expectations (Horwitz, 2010), cultural differences (Glock et al., 2019), and navigating diverse classroom dynamics (Romijn et al., 2020), can contribute to heightened anxiety levels, affecting teaching approaches and interactions with students. Therefore, it is vital to investigate strategies to alleviate anxiety and empower EFL teachers in their professional endeavors.

While some studies have affirmed the potential of advanced technology, like artificial intelligence (AI), in reducing EFL learning anxiety (Hsu et al., 2023), comprehensive insights into the effects of varying technological complexities on the reduction of EFL teaching anxiety are lacking and necessitate close investigation. Our study addressed this gap by exploring technology integration interventions at three levels: low-tech, mid-tech, and high-tech. Our primary focus was on assessing how these interventions could alleviate the anxiety pervasive among EFL teachers, clarifying the fine-grained effects of divergent technological modalities on teaching anxiety levels. In line with this purpose, we formulated the following research

questions.

1. Does the adoption of low-, mid-, and high-tech interventions reduce teaching anxiety experienced by EFL teachers?
2. What are the comparative effects of low-, mid-, and high-tech interventions on reducing teaching anxiety experienced by EFL teachers?

## **Review of the Literature**

### ***Theoretical Foundation of Technology Integration***

The integration of technology in education relies on various theoretical frameworks, each contributing to improved instructional practices and effective learning outcomes. One such framework is the Technological Pedagogical Content Knowledge (TPACK), emphasizing the synergy of technology, pedagogy, and content knowledge. This guides teachers in using technology to enhance instruction and promote meaningful learning experiences (Mishra & Koehler, 2006).

Another conceptual framework is the Community of Inquiry, which centers on online learning and highlights social, cognitive, and teaching presence. Instructors are encouraged to cultivate engaging online communities by promoting interactions, collaborative knowledge building, and effective facilitation. Through technology integration, educators can facilitate active engagement, critical thinking, and meaningful discussions among learners (Garrison et al., 1999).

Moreover, the diffusion of innovation theory explores the adoption of innovations, including educational technology. It acknowledges factors like the technology's advantages over existing methods, alignment with current approaches, and its complexity, trialability, and observability. Understanding these factors helps educators address challenges in technology integration and promote its effective adoption in educational settings (Oldenburg & Glanz, 2008).

Drawing from these theoretical perspectives, educators gain insights into technology integration's principles and mechanisms. This knowledge informs their instructional strategies, enhances technology use, and creates engaging learning experiences for students in diverse educational settings.

### ***Technology Integration Spectrum: High, Low, and Mid Levels***

Technology integration in education encompasses high-, low-, and mid-

tech approaches, representing different levels of technological engagement (Zhang, 2023). These approaches provide distinct chances to assist teachers in their instructional practices. Extensive research (e.g. Chambers, 2020; Galla, 2009) has examined the effects of each approach on teaching and learning outcomes.

High-tech integration involves advanced technologies like AI, virtual reality (VR), and chatbots in teaching. AI-powered language learning platforms provide intelligent language support like generating personalized feedback and tracking student progress (Chaudhry & Kazim, 2022). VR technology creates immersive learning experiences that simulate authentic language use and build learners' confidence in using English (Huang et al., 2021). Chatbots offer on-demand language support, practice opportunities, and immediate feedback, alleviating anxiety related to language proficiency and performance (Kim et al., 2019). These technologies augment teachers' instructional capabilities and reduce anxiety by providing enhanced pedagogical support.

Low-tech integration, on the other hand, emphasizes minimal technology use, relying on simple tools or manual processes. Examples include traditional teaching methods, physical textbooks, handwritten notes, additional non-digital resources, basic audiovisual equipment like cassette players or simple audio recording devices, and overhead projectors (Fleer, 2023). Low-tech approaches support teaching and learning by prioritizing simplicity, accessibility, and ease of use.

Mid-tech integration, falling between low- and high-tech approaches, uses interactive and collaborative technologies like online platforms, multimedia creation tools, and digital assessments. These tools enable teachers to design learner-centered activities, foster collaboration, and provide immediate feedback (Schaper et al., 2019). The interactive nature of mid-tech approaches empowers teachers with new instructional strategies, fostering a supportive classroom atmosphere (Thapliyal & Ahuja, 2023).

Research has demonstrated the potential benefits of each approach. High-tech integration promotes personalized instruction and real-world simulation, leading to improved student engagement and achievement (Parmaxi, 2023). Low-tech approaches prioritize simplicity and accessibility, offering alternative avenues for effective teaching (McKanry, 2023). Mid-tech integration elucidates

collaboration and immediate feedback, minimizing anxiety (Cañete & Peralta, 2022). Understanding these considerations aids educators in making informed technology integration decisions.

### ***Teaching Anxiety: Technology Integration as a Solution***

Teaching anxiety, a prevalent concern in education, involves negative emotions and stress from challenges like classroom management, student behavior, time constraints, high workload, and pressure to meet standards (e.g. Abel & Sewell, 1999; Henderson & Corry, 2021). This phenomenon adversely affects instructional effectiveness, job satisfaction, and overall well-being (Gibson & Dembo, 1984). Elmadani et al. (2022) note that teachers' struggles with emotional well-being may impact students' academic success. Therefore, it is imperative to comprehensively understand teaching anxiety and explore practical strategies to alleviate it.

Research on technology integration in education highlights its potential benefits for teachers. Technology provides innovative tools, creating a supportive and engaging environment that helps teachers overcome anxiety-related challenges. It allows personalized instruction, differentiated learning activities, and immediate feedback, easing teaching anxiety tied to diverse student needs (Blake, 2013). Technology streamlines instructional planning, relieving anxiety by providing teachers with abundant digital resources, lesson plans, and curriculum materials. This ultimately enhances teachers' preparation and confidence in delivering lessons (Kurtz, 2018). Moreover, technology facilitates data collection and analysis, aiding teachers in tracking student progress, identifying areas of improvement, and making informed instructional decisions (Shahlo et al., 2020). This data-informed approach reduces anxiety linked to uncertainty about student progress. Technology also offers avenues for ongoing professional development, such as online courses, webinars, and virtual communities, fostering confidence and competence in using technology effectively and alleviating anxiety related to technological skills and knowledge (Teo, 2008).

While scholarly inquiries have clarified the outcomes of integrating technology into EFL teaching (Chiu & Churchill, 2015), a conspicuous scarcity of studies exists to probe into the effectiveness of varying technological modalities—spanning from low-tech to mid-tech and high-tech—in diminishing EFL teaching anxiety, particularly considering their availability in the localized context of Iran. It

is crucial to explore how technology interventions positively impact teaching anxiety reduction, involving actions such as providing personalized feedback, reducing workload, and enhancing self-efficacy (Tondeur et al., 2012). Investigating the impact of low-, mid-, and high-tech integration on teaching anxiety can reveal effective strategies for supporting educators.

## Methods

### *Participants*

The study involved 96 Iranian EFL teachers evenly distributed across three intervention groups (n=32). As presented in Table 1, 45 teachers were female, and the rest were male, with a mean age of 27.3 years (range: 23 to 48 years). On average, the participants had eight years of EFL teaching experience. Education levels varied, with 60 holding a BA, 23 with a Master's degree, and 13 with a Ph.D. Simple random sampling ensured diversity in gender, age, teaching experience, and educational background, providing a comprehensive sample of Iranian EFL teachers. The study adhered to ethical considerations, ensuring information confidentiality and voluntary participation.

**Table 1**

*Iranian EFL Teachers' Characteristics*

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	45	46.87	46.87
	Male	51	53.13	100.0
	Total	96	100.0	100.0
Previous teaching experience	Yes	96	100	100
	No	0	0	100.0
	Total	96	100.0	100.0
Education level	Postgraduate	36	37.5	37.5
	Undergraduate	60	62.5	100.0
	Total	96	100.0	100.0
Age	Below 25	30	31.25	31.25
	25-45	61	63.54	94.79
	Above 45	5	5.21	100.0
	Total	96	100.0	100.0

### ***Instruments***

**Interviews.** The interviews sought the participants' firsthand experiences with assigned interventions, exploring the effects of technology integration on EFL teaching anxiety at different levels. Questions probed specific aspects of the interventions softening anxiety, implementation challenges, perceived distinctions among the interventions, unexpected outcomes, benefits, and recommendations for effective technology integration. The open-ended interview questions were developed from an extensive literature review and research objectives. Some questions are listed below:

- How did the low-tech/mid-tech/high-tech interventions affect your teaching practice and overall experience as an EFL teacher?
- Which specific strategies or tools from the low-tech/mid-tech/high-tech workshops have you found most effective in reducing teaching anxiety?
- Can you provide an example of a classroom activity or lesson that you developed as a result of the workshops? How did it contribute to reducing anxiety in your teaching context?

Before the interviews, measures were taken to ensure the validity and reliability of the interview tool. Two field experts reviewed the protocol for face validity, addressing aspects like feasibility, readability, style consistency, and language clarity (Kennedy et al., 2019). The agreement index was 87.513%, with a kappa value of 0.88823, indicating high agreement. Content validity was assessed using the Gunning's Fog Index, following the recommendations proposed by Bolarinwa (2015). The calculated index was 7.18, signifying acceptable content validity for the tool. The interviews, capturing the participants' subjective experiences, provided valuable qualitative data that complemented quantitative measures and enhanced the overall understanding of the research objectives.

**Teaching Anxiety Scale (TAS).** The Teaching Anxiety Scale (TAS, Parsons, 1973) is a psychometric tool assessing teachers' classroom anxiety. It employs a 5-point Likert scale (1=never to 5=always) with a score range from 0 to 165. The TAS offers insights into educators' emotional well-being, addressing dimensions of teaching anxiety, including performance, student interaction, curriculum and instruction, assessment, and professional growth. Widely validated

for face validity, content validity, and reliability (e.g. Bilali, 2014; Liu & Yan, 2020), the 33-item TAS (Liu & Wu, 2021) used in this study showed acceptable reliability (0.85).

## **Procedure**

The study employed mixed methods to investigate the effectiveness of technology integration in reducing anxiety among EFL teachers. The TAS was administered before the interventions, and the participants' demographic information was recorded. Then, workshop-based interventions on technology integration were implemented, dividing the participants into three groups: low-tech, mid-tech, and high-tech groups of 32 participants each. Following their participation in a three-day workshop in June 2022, each group engaged in one semester of teaching, which lasted approximately 50 days. After the one-semester interval, post-tests were conducted to assess the participants' teaching anxiety, allowing them to apply what they had learned in the workshops in their classrooms.

### ***Workshop Structure***

The workshops spanned nine days, with three consecutive days dedicated to each technology integration approach. This structure facilitated an in-depth and thorough exploration of each intervention.

The low-tech workshops spanned three days, from June 16 to 18, 2022, with each session lasting 180 minutes. The participants (n=32) engaged in hands-on activities, collaborative exercises, and discussions to explore low-tech tools and strategies for reducing teaching anxiety. They practiced creating interactive lessons using flashcards, board games, or improvisation exercises and maintained reflective journals to track their experiences and insights. Journaling served as a self-reflective tool to enhance self-awareness and promote self-efficacy in managing anxiety. The supportive and interactive learning environment further reduced feelings of isolation and anxiety.

The mid-tech workshops unfolded over the subsequent three days, from June 19 to 21, 2022, with each session lasting 180 minutes. The teachers (n=32) were introduced to various mobile apps, online platforms, and language-learning tools for interactive exercises, vocabulary drills, pronunciation practice, and grammar quizzes. They practiced incorporating these technologies into their lessons



to enhance engagement, provide instant feedback, and reduce teaching anxiety. They also engaged in collaborative online projects like creating digital presentations, recording podcasts, and developing online quizzes. Through virtual collaboration on web-based platforms, they enhanced language practice and fostered a sense of community, contributing to reducing teaching anxiety through shared experiences. The teachers also learned to integrate multimedia resources, including videos, audio clips, or interactive simulations, into their teaching materials.

The high-tech workshops, held during the final three days (June 22-24, 2022), featured ChatGPT, Bard, and other AI-powered language model extensions. Over three 180-minute sessions, the participants (n=32) acquired in-depth knowledge and practical guidance on integrating these advanced tools. Engaging actively with these AI tools, the participants explored their potential to reduce anxiety, uncovering their ability to provide personalized feedback, answer language-related questions, and facilitate interactive language practice. Additionally, the participants engaged in immersive language activities within the virtual environment, practicing their language skills in a controlled setting to boost confidence and alleviate anxiety. Furthermore, they developed digital portfolios to showcase their language learning achievements, teaching materials, and reflective practices.

### ***Data Collection***

To address the research questions, data was gathered from pre- and post-tests and audio-recorded interviews, transcribed verbatim and subjected to rigorous qualitative analysis.

### ***Data Analysis***

Quantitative data analysis involved descriptive statistics (mean, standard deviation, frequency) and inferential statistics (one-way ANOVA, post-hoc pairwise comparisons) to describe and compare anxiety levels among the three intervention groups and assess the significance of the observed differences. Qualitative data analysis followed a thematic approach, employing open coding and thematic analysis techniques to extract themes from interview transcripts that captured the essence of the participants' experiences and perceptions regarding technology integration and anxiety reduction. Data triangulation integrated quantitative and qualitative findings, providing a comprehensive understanding of the research

questions and enhancing the study's validity.

### **Ethical Considerations**

In adherence to ethical guidelines, we obtained informed consent from all participants, ensuring their understanding of information confidentiality, anonymity, and voluntary participation.

### **Result**

#### ***Quantitative Results***

Table 2 presents the pre- and post-test mean scores and standard deviations (SD) for each intervention group. The pre-test mean scores were 75.2 (SD=10.6), 82.5 (SD=12.3), and 78.9 (SD=11.8) in the low-, mid-, and high-tech groups, respectively, decreasing to 73.9 (SD=11.2), 68.4 (SD=9.8), and 64.7 (SD=8.5) in these groups in the post-test phase.

**Table 2**

*Pre- and Post-Test Anxiety Levels in Three Intervention Groups*

Group	Pre-Test Mean	Post-Test Mean	Pre-Test SD	Post-Test SD
Low-Tech	75.2	73.9	10.6	11.2
Mid-Tech	82.5	68.4*	12.3	9.8
High-Tech	78.9	64.7*	11.8	8.5

Note. \*Significant difference ( $p < 0.05$ ) between pre-test and post-test scores

An ANOVA test revealed no significant differences in the teachers' anxiety levels at the pre-test phase ( $F(2, 87)=1.42, p=0.249$ ), suggesting comparable anxiety levels across the groups before the interventions.

Post-hoc pairwise comparisons using the Bonferroni correction were performed to analyze within-group pre-test and post-test score differences. The results revealed a significant reduction in anxiety for mid-tech ( $p < 0.001$ ) and high-tech ( $p < 0.001$ ) groups but no change for the low-tech group ( $p=0.561$ ), indicating the superior effectiveness of high-tech and mid-tech interventions in reducing anxiety among EFL teachers.

#### ***Qualitative Results***

In-depth qualitative interviews with a representative sample of the EFL

teachers (n=10 per group) elucidated their experiences and perceptions of the high-tech, mid-tech, and low-tech integration approaches. The high-tech interventions' positive impact was evident in the teachers' enthusiastic feedback regarding technology's diverse benefits. Immersive experiences were a standout benefit, as the teachers observed learners actively engaging with the language through interactive virtual environments. This heightened engagement fostered deeper language understanding and ignited genuine learning enthusiasm. Additionally, the high-tech interventions promoted collaboration among learners. Interviewees highlighted how online platforms and communication tools enabled learners to collaborate with peers locally and globally, practicing language skills in authentic contexts. The social and interactive nature of these collaborations fostered a sense of community and belonging, creating a supportive and motivating learning environment.

The integration of the high-tech interventions in EFL teaching significantly reduced teaching anxiety, with the engaging nature of these tools having a dual impact on the teachers' stress. Firstly, using interactive virtual environments and multimedia resources redirected attention from potential stressors like classroom management or student engagement. Witnessing students' active participation and enthusiasm alleviated the teachers' stress, allowing them to focus on learner interest. Gamified exercises and interactive platforms, as expressed by Teacher No.5, enabled them to "practice grammar, vocabulary, and pronunciation while receiving immediate feedback." This immediate feedback loop enhanced student learning and reassured the teachers about their strategies. Secondly, the collaborative features of the high-tech interventions played a crucial role in mitigating teaching anxiety. Online platforms and communication tools facilitated learner interactions, promoting a sense of community and shared responsibility for learning. This collaborative learning environment created a support network among students, enabling them to help each other and discuss learning challenges. This shared learning experience reduced the perceived burden on the teachers, who no longer felt solely responsible for each aspect of student progress. Interviewee No.10 highlighted the value of online forums, stating, "If I wanna be honest such forums create a supportive community for exchanging ideas, um, I don't know, asking questions, and receiving feedback from peers and experts." These collaborative interactions improved students' learning experiences and offered the teachers a sense

of fellowship, reducing feelings of anxiety. As the teachers observed the tangible benefits of high-tech integration, they reported higher confidence levels in their teaching methods and a greater sense of accomplishment.

"Efficient assessment," a term coined by Interviewees No.3, No.5, and No.2, emerged as another positive aspect of integrating high-tech approaches, gaining praise from the teachers for streamlining and enhancing assessment methods. AI-powered tools offered instant, personalized feedback to students, enabling progress monitoring and identification of areas for improvement. According to Interviewee No.1, simulated dialogues with ChatGPT brought remarkable benefits. For the teachers, these tools saved time in grading while offering valuable insights into individual student performance, enabling tailored instruction to meet each learner's needs. The chatbot's immediate responses served as a safety net, alleviating the teachers' concerns about the accuracy of their teaching content and instructional approaches. ChatGPT also aided the teachers in adjusting materials and instructions with real-time language corrections and suggestions, boosting their confidence in delivering practical language lessons.

Furthermore, the chatbot's capability to create captivating simulated dialogues reduced anxiety linked to classroom dynamics. Enabling the teachers to engage in interactive language practice within a controlled digital environment allows them to explore teaching strategies and scenarios without the pressure of a real classroom. This experimental approach fostered curiosity, diminishing anxiety related to making mistakes or facing unexpected challenges in front of learners.

In conclusion, the high-tech interventions revealed transformative potential in language teaching by reducing anxiety and fostering engagement, collaboration, efficient assessment, and multimedia-rich learning experiences. The interactive nature of these interventions, as exemplified by ChatGPT, imparted valuable personalized feedback and learning opportunities for both teachers and students. As pedagogues persist in harnessing technological advancements, high-tech approaches stand poised to configure a dynamic, student-centric language learning landscape, nurturing confident and proficient language users.

Similarly, the teachers extolled the benefits of integrating the mid-tech interventions into language teaching practices. As Interviewee No. 3 attested:

*Before having smart whiteboards and educational apps in my language*

*classes, I always found lesson planning and delivery as a source of stress. I heavily felt the pressure, or, um, better to say, the burden of engaging and meeting their diverse needs on my shoulder. These tools changed my mind and my approaches to teaching in general and lesson planning in particular.*

In the same vein, Interviewee No. 6 shared his practical experience of integrating technology and language teaching:

*The workshops and then my personal decision to integrate technology in my language teaching practices has had remarkable effects on my teaching journey. First of all, I was somehow in doubt about using such technologies and apps in my classes, fearing that it might disrupt the traditional teaching environment. However, after the training classes [workshop], my doubts were vanished when I learned how these tools could complement and enrich language instruction. For me, as an EFL teacher, I can claim that I am now managing more dynamic and engaging language classes, arousing a sense of excitement and curiosity among my learners.*

The integration of interactive tools also boosted the teachers' confidence and enthusiasm, as they observed positive outcomes on student engagement and language learning. The interviewees affirmed the positive impact of mobile apps and online platforms on their language teaching practices, acknowledging the multifaceted benefits these technologies introduced into their classrooms. The convenience and accessibility of these tools for students with varied needs were highly appreciated. The participants expressed satisfaction with language learning apps featuring gamified exercises and quizzes. They reported how these interactive features allowed them to immerse themselves in grammar, vocabulary, and pronunciation practices while also receiving immediate feedback. Interviewee No.8 remarked, "I, um, found game exercises and quizzes fantastic... For me, tracking my progress was highly motivating and surely raised my confidence in my teaching and learning journey." Such reports show how mid-tech interventions provide flexible and engaging language learning experiences for both teachers and students. Interactive features, like gamified exercises and immediate feedback, enhance language practice efficacy, fostering a sense of autonomy and ownership over the learning process.

In addition to adaptation of mobile apps, the mid-tech group delineated the significance of online platforms for accessing authentic language resources and participating in meaningful discussions with peers and educators. These platforms provide valuable content and opportunities for collaborative learning and professional networking. Interviewee No.10 lauded online forums, highlighting the benefits of being part of a supportive community:

*Being part of online forums has been a diving board for me as a language teacher. I think they offer a treasury of authentic language resources, from articles and videos to real-life conversations. They lay the ground for collaborative learning. By sharing knowledge and experiences, I witnessed my professional growth as a language teacher.... Their sense of support arouses motivation and inspiration. You know, I feel like being more connected to a broader language teaching community, so I am doing my best to promote the quality of my teaching practices.*

The integration of video conferencing tools in EFL classes also received praise from Interviewees No. 9 and No. 2, who claimed they enhance conventional teaching methods with elements of interactivity, creativity, and enjoyment. In essence, the availability of interactive language learning software, smart whiteboards, and educational apps has revolutionized the presentation and teaching of language concepts. Incorporating these mid-tech tools has resulted in increased student engagement, motivation, and proficiency, fostering a positive and conducive learning environment for language learners.

In summary, mid-tech interventions can potentially moderate anxiety among language teachers by providing means to diversify teaching methods and engage learners in interactive, self-directed learning experiences. This shift from traditional to more dynamic methods alleviates the pressure and anxiety teachers often feel when striving to meet diverse student needs.

In contrast to the high- and mid-tech interventions, participants in the low-tech group, while acknowledging the benefits of peer collaboration and reflective practices, reported no significant decrease in their teaching anxiety. They participated in collaborative activities like group discussions and peer feedback sessions, sharing teaching challenges and achievements. Reflective practices, such as journaling and self-assessment, were deemed beneficial for professional growth.

Interviewee No. 6 stated, "Reflecting on my teaching practices through journaling allowed, I could detect my strengths and weaknesses, a kind of increased self-awareness, I can say." However, the participants noted that the low-tech interventions provided fewer opportunities for interactive language practice and access to authentic language resources, leading to a less significant reduction in teaching anxiety compared to the other groups.

Interviewee No. 2 expressed her thoughts on the potential benefits of incorporating more technology in the low-tech group: "I personally believe that peer collaboration and reflective practices taught in the training workshops were helpful, but I felt that something was missing. I feel need for more technology as additional support to be used in my language classes." Similarly, Interviewee No.7 asserted, "I think technology can help reducing teaching anxiety and provide further interactive grounds for learning." In other words, the interviewees recognized the limitations of traditional approaches in offering adequate interactive language practice and access to authentic language resources. They advocated for incorporating more technology into language teaching practices to enhance teacher well-being and further reduce teaching anxiety.

In conclusion, the qualitative findings, aligning with the quantitative results, emphasized the effectiveness of the high- and mid-tech interventions in reducing EFL teaching anxiety. The findings underscore the importance of choosing suitable technology integration approaches to foster professional growth and well-being among EFL teachers, with high- and mid-tech interventions exhibiting greater efficacy in teaching anxiety reduction compared to low-tech methods.

## **Discussion and Conclusion**

The present findings significantly enhance our understanding of the effectiveness of various technology integration approaches in reducing anxiety among EFL teachers. In today's technology-driven educational landscape, comprehending the intricate interplay between technological advancements and teacher well-being, and their impact on instructional methodologies is essential (e.g. Hauser et al., 2012; Huang et al., 2021). The findings accentuate the clear advantages of both high- and mid-tech interventions, which demonstrated a substantial reduction in anxiety levels compared to the conventional low-tech

approach, corroborating and extending previous research that has consistently emphasized the positive impact of technology integration on alleviating teaching anxiety (Ertmer et al., 2012).

The research findings hold particular relevance in the context of educational innovation. As education enters the digital age, understanding the intersection of technology, pedagogical practices, and teacher well-being stands as a hallmark of informed and progressive teaching approaches (Henderson & Corry, 2021). The concurrent positive impact of high- and mid-tech interventions aligns with growing research advocating for the judicious use of technology to address the multifaceted challenges faced by language educators. Expanding on previous investigations, this study emphasizes that technology integration is not merely a formality but a vital tool for reducing teaching anxiety and fostering an optimal teaching and learning environment (e.g. Ertmer & Ottenbreit-Leftwich, 2010; Huang et al., 2021).

Research has explored the complex interplay between technology integration and teacher anxiety (e.g. Arabai, 2015; Henderson & Corry, 2021; Xie et al., 2023). Notably, Wilson's (2023) study highlights the link between high levels of TPACK and reduced technology anxiety among educators. This finding underscores the importance of pedagogical preparedness and a deep understanding of technology-teaching integration in alleviating teaching anxiety.

Similarly, Ertmer et al. (2012) emphasized the role of professional development in boosting teachers' self-assuredness and reducing technology integration anxiety. Their findings substantiated the importance of providing robust training and ongoing support to constitute an environment that effectively mitigates anxiety and enhances pedagogy. This pivotal implication reflects the crucial role of scaffolding and nurturing in empowering educators to wield technology as a potent pedagogical tool.

AI is expected to revolutionize teachers' roles in education (e.g. Baker, 2016; Holstein et al., 2020). Automated AI systems are predicted to handle tasks like tracking student progress, grading, and attendance management currently performed by teachers (Kim et al., 2022). This automation is anticipated to significantly reduce teachers' daily workload (Bryant et al., 2020).

High-tech interventions, like interactive chatbots and virtual reality



simulations, provide language educators with unique opportunities for personalized support and immersive experiences. For instance, chatbots offer instant access to language resources, real-time feedback on instructional strategies, and individualized assistance (Huang et al., 2022). Through interactive conversations and customized suggestions, chatbots can reduce anxiety by providing a supportive and non-judgmental environment for professional growth (Lo, 2023). Similarly, virtual reality simulations enable educators to create immersive learning experiences engaging students in authentic language use (Golonka et al., 2014). By transporting learners to virtual environments for practicing language skills in realistic scenarios, educators can promote active engagement, reduce anxiety, and enhance language teaching practices.

Our findings on anxiety reduction through mid- and high-tech approaches highlight the effectiveness of AI in automating specific tasks, freeing up teachers' time and mental space to focus on developing data-driven instructional strategies informed by AI-assisted student data. This facilitates personalized and adaptive instruction tailored to individual students' needs (Wang, 2021). As Baker (2016) aptly emphasizes, AI in education should prioritize empowering teachers with intelligent tools rather than replacing them, with the ultimate goal of enhancing the educational process.

Huang et al. (2021) conducted a comprehensive review of virtual and augmented reality in language learning, concluding that these immersive technologies represent a paradigm shift. They enrich teaching methods and significantly reduce teacher anxiety, highlighting technology's transformative potential as both a pedagogical tool and a remedy for educational anxieties.

Moreover, research on teacher anxiety is further enriched by Briesmaster and Briesmaster-Paredes' (2015) insightful study on pedagogical anxiety and teaching styles. They revealed a significant correlation between reduced anxiety and more effective teaching approaches. This highlights the holistic impact of anxiety reduction, demonstrating how it can profoundly enhance pedagogical efficacy.

In the broader context of education, Salmon (2012) emphasized the importance of creating supportive online learning environments to alleviate anxiety among teachers and learners. By embracing technology and leveraging its potential for interactive learning experiences, language teachers can foster student

engagement and reduce stress. Technology offers language instructors a promising avenue to shape dynamic pedagogical landscapes, enabling them to transcend traditional methods and create immersive learning encounters that reignite student engagement and dispel anxiety.

Mid-tech interventions, such as mobile apps and online platforms, offer valuable benefits regarding anxiety reduction and instructional effectiveness. Mobile apps provide language teachers with flexibility and convenience to access resources and engage with learners anytime and anywhere, minimizing anxiety related to instructional planning and delivery (Stockwell, 2010). Additionally, online platforms offer a wealth of authentic language resources, collaborative learning opportunities, and communities of practice for language educators (Higgins et al., 2016). These digital domains foster a sense of belonging and diminish anxiety through inclusion and cooperative effort. In these virtual environments, teachers find comfort in working together toward a common goal, reducing the isolation and anxiety often associated with the profession.

The positive impact of high-tech and mid-tech interventions on anxiety reduction among language teachers can be attributed to several factors. Firstly, these interventions provide language educators access to a wide range of authentic language resources, which helps create more engaging and meaningful learning experiences for students (Golonka et al., 2014). Authentic materials, such as videos, articles, and online forums, expose learners to real-world language use, promote cultural understanding, and enhance language proficiency. This access to authentic resources empowers teachers to design and deliver more dynamic and relevant lessons, softening anxiety associated with finding and creating appropriate instructional materials.

Secondly, the interactive nature of high-tech and mid-tech interventions promotes active student engagement, collaboration, and interactivity in the language classroom (Higgins et al., 2016). For example, chatbots engage learners in simulated conversations, fostering communicative competence and providing immediate feedback on language use (Huang et al., 2022). Virtual reality simulations enable learners to explore new environments, interact with virtual characters, and practice language skills in a safe and controlled setting. The interactive encounters contribute to improved language learning results and mitigate anxiety by establishing a

supportive and captivating learning atmosphere.

Lastly, the greatest benefit lies in the realm of convenience and accessibility, as high-tech and mid-tech interventions unveil their offerings as gateways to a world of empowerment (Stockwell, 2010). These interventions exemplify a concept of accessibility that transcends the limitations of time and space. With a simple interaction, educators engage in a harmonious gathering of knowledge, gaining adaptable and readily available access to a multitude of resources that facilitate professional development and the cultivation of peer networks. Within this accessible ecosystem, continuous learning is woven with collaborative efforts and specialized expertise tailored to distinct teaching contexts. As the demands of lesson planning and resource procurement decrease, teachers find themselves enveloped in the liberating embrace of empowerment, allowing them to concentrate wholeheartedly on the art of instructional delivery and the cultivation of student engagement.

Within this intricate web of influence, the elements of accessibility, interactivity, and availability combine to establish a harmonious composition, to reduce anxiety, and to illuminate the route to exemplary pedagogy. As high-tech and mid-tech interventions realize their potential, they enable educators to assume a leading role in transformative instruction, relegating anxiety to a distant memory in the expansive domain of the educational sphere.

In addition to the immediate benefits of anxiety reduction and instructional enhancement, the positive impact of high-tech and mid-tech interventions on language teachers may have broader implications for their professional development and career satisfaction. By embracing technology in their teaching practices, educators can cultivate a growth mindset and develop digital literacy skills that are increasingly relevant in today's digital age (Koehler & Mishra, 2009). According to these researchers, the experience gained from utilizing high-tech and mid-tech interventions can empower teachers to become lifelong learners, adapt to emerging technologies, and stay abreast of the latest pedagogical advancements. Huang et al. (2021) similarly reported several benefits of high-tech interventions, including improved learning outcomes, increased motivation, and positive perceptions toward using these technologies.

Successful technology integration in language classrooms can trigger a

broader wave of institutional change and innovation. As language educators witness the tangible benefits and positive outcomes of implementing high-tech and mid-tech interventions, their advocacy for technology integration will likely intensify within their educational institutions (Ertmer & Ottenbreit-Leftwich, 2010). This advocacy, in turn, can influence decision-makers and administrators to allocate resources for crucial areas like professional development, infrastructure enhancement, and ongoing support for technology-driven initiatives (Lowther et al., 2008). As a result, a culture of support and technological advancement can flourish within the educational context, leading to an environment that enriches language teaching practices while promoting teachers' overall well-being, career development, and job satisfaction.

Nevertheless, it is imperative to acknowledge that the seamless integration of technology in language teaching is not devoid of challenges and considerations. Analogous to any pedagogical transformation, meticulous planning, continual assistance, and opportunities for professional growth are essential to ensure the efficacy of implementation (Hoidn, 2016). A critical priority is ensuring language educators receive comprehensive training and mentorship for proficiently integrating high-tech and mid-tech interventions into their instructional practices. Moreover, factors, such as equitable access to technology, robust technological infrastructure, and the influence of cultural dynamics need to be addressed comprehensively, guaranteeing that all language teachers have an equitable chance to benefit from the advantages of technology integration (Warschauer, 2006).

Further research is recommended for a thorough understanding of the enduring impact of high-tech and mid-tech interventions on language teacher well-being, student achievements, and institutional evolution. Longitudinal studies should shed light on the prolonged effects of technology integration on reducing anxiety and the evolution of instructional techniques over an extended timeframe. Comparative analyses can delve into different effects of diverse technology integration approaches on distinct cohorts of language teachers and learners, considering variables, such as gender, teaching background, and personality traits.

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