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# Bold techno competence in language learning: a study on the effects of efficacy of workshops in decreasing technostress and boosting academic enjoyment, autonomy, and language achievement

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## Abstract

This study investigated the impact of techno-competence workshops on English as a Foreign Language (EFL) learners' language achievement, technostress, academic enjoyment, and autonomy in a large university in Iran. A concurrent mixed-methods approach was employed, with qualitative data collected through structured interviews and quantitative data gathered using a teacher-made test validated through a known-group procedure. Ninety-six upper-intermediate EFL learners were randomly assigned to an Experimental Group (EG) and a Control Group (CG). Results revealed a significant decrease in technostress, an increase in academic enjoyment, and heightened autonomy among participants attending the techno-competence workshops. The quantitative analysis demonstrated a substantial improvement in language achievement for the EG compared to the CG. Findings contribute to the understanding of the multifaceted impacts of techno-competence on language learning outcomes and offer practical insights for educators, curriculum developers, and policymakers in fostering effective language education in technologically enriched environments. Despite certain limitations, this study lays the groundwork for future research endeavors exploring the intricate dynamics between techno-competence and language learning outcomes across diverse contexts.

**Keywords:** Techno-competence, Technostress, Academic enjoyment, Autonomy, Language achievement

## Introduction

In the contemporary landscape of education, the integration of technology has become synonymous with progress and innovation. The advent of digital tools and platforms has not only transformed the conventional paradigms of teaching and learning but has also introduced a new dimension to the acquisition of skills, especially in the realm of language education (Lambot & Yango, 2023). As we navigate the intricacies of the

twenty-first century, the imperative to cultivate Techno Competence among learners becomes increasingly paramount.

The convergence of technology and education has ushered in a pedagogical renaissance, challenging traditional methodologies and necessitating a paradigm shift in instructional approaches (Capellini et al., 2023). Language learning, as a discipline deeply rooted in communication and interaction, is uniquely positioned to harness the benefits of technological advancements (Ismail & Heydarnejad, 2023). In this context, the term 'Techno Competence' emerges as a critical construct, encapsulating the proficiency and adaptability required to effectively navigate and utilize digital tools for language acquisition (Thomas & Morgana, 2023).

Techno Competence extends beyond mere technical proficiency; it encompasses a holistic skill set that enables learners to confidently and creatively engage with technology to enhance their language learning experience (Capellini et al., 2023). This construct embraces not only the ability to use language learning applications or online resources but also the capacity to critically evaluate, integrate, and leverage technology to bolster one's linguistic capabilities (Saeedi & Momeni, 2023). In essence, Techno Competence reflects the synergy between technological proficiency and language learning acumen, fostering a symbiotic relationship that propels learners towards a bold, empowered engagement with the digital landscape (Masri & Meyer, 2023).

As we embark on this exploration, it becomes imperative to acknowledge the challenges that accompany the integration of technology into education. The term 'technostress' has emerged as a pertinent concern, encapsulating the anxiety and discomfort experienced by individuals when navigating and adapting to new technologies (Yao & Wang, 2023). This phenomenon, if left unaddressed, has the potential to impede the realization of the full benefits that Techno Competence can offer in language learning contexts. Thus, understanding the nuances of technostress and devising effective strategies to alleviate it become crucial aspects of our inquiry.

Brod (1984) was the first to characterize technostress, labeling it as a contemporary malady stemming from the inability to adapt healthily to new computer technologies. Subsequently, Arnetz and Wiholm (1997) defined technostress as the heightened state experienced by individuals who extensively use computers for work. More recently, researchers have broadly described it as stress arising from the use of information and communications technologies (Ayyagari et al., 2011; Li & Wang, 2020).

Academic enjoyment is defined as positive feelings associated with school participation (Ainley & Hidi, 2014), encompassing positive influences related to interest, curiosity, and learning (Lamnina & Chase, 2019; Litman & Spielberger, 2003). Drawing from Fredrickson's Broaden and Build theory (Fredrickson, 1998), a positive affect for learning, such as a love for school, can initiate a cognitive expansion that fosters additional positive affect in subsequent experiences. Fortunately, young children typically commence their school journey with a positive attitude toward learning (Howse et al., 2003; Nurmi & Aunola, 2005).

Central to the discourse on the integration of technology in language learning is the empowering concept of learner autonomy. In the contemporary educational landscape, learner autonomy has transcended its conventional boundaries, evolving into a key catalyst for academic success and personal growth (Brown, 2014). Defined as

the ability of learners to take control of their own learning processes, make informed decisions, and independently navigate their educational journeys, learner autonomy aligns seamlessly with the dynamic nature of Techno Competence (Izadpanah, 2022). Embracing technology in language learning not only equips learners with a diverse array of tools but also fosters a sense of self-directedness and responsibility (Alfadda et al., 2022). As we probe the interplay between learner autonomy and Techno Competence in this study, we unveil the potential of these intertwined constructs to cultivate not just linguistically adept individuals but empowered learners capable of navigating the complexities of the digital age with confidence and efficacy (Alrabai, 2021).

At the heart of language education lies the pursuit of language achievement (Kargar Behbahani & Razmjoo, 2023)—an intricate tapestry woven from linguistic proficiency, communicative competence, and cultural understanding. In the evolving landscape of digital pedagogy, the concept of language achievement undergoes a transformative redefinition, closely interwoven with the dynamic thread of Techno Competence. As technology becomes an inseparable companion in language learning, language achievement transcends traditional benchmarks (Sultan & Fitri, 2020). It encompasses not only the mastery of linguistic skills but also the adept utilization of digital resources, platforms, and tools to foster a comprehensive and nuanced understanding of language (Rahmatullah et al., 2022). This study seeks to unravel the symbiotic relationship between language achievement and Techno Competence, exploring how the integration of technology into language education propels learners beyond conventional boundaries, enriching their linguistic repertoire and shaping them into adept communicators poised for success in an increasingly interconnected and technologically-driven global society.

In the dynamic landscape of contemporary education, the integration of technology into language learning has witnessed unprecedented growth, reshaping traditional pedagogical paradigms. As educational institutions strive to harness the potential of digital tools, the concept of Techno Competence emerges as a critical construct, encompassing the proficiency and adaptability required for effective engagement with technology in language acquisition. Despite the transformative promise held by Techno Competence, challenges persist, notably in the form of technostress—anxiety and discomfort associated with navigating new technologies. The nuanced understanding of how technostress influences the realization of Techno Competence in language learning contexts remains a research gap. Furthermore, as learners embark on this digital journey, the impact of these technological dynamics on academic enjoyment, learner autonomy, and the traditional benchmarks of language achievement necessitates thorough investigation. This study seeks to address these gaps by exploring the effects of targeted workshops in mitigating technostress, enhancing learner autonomy, and ultimately fostering language achievement within the framework of bold Techno Competence. Through this inquiry, we aim to contribute valuable insights that guide educators, researchers, and policymakers in fostering a technologically empowered and academically enriching language learning environment. Based on what went above, the following research questions are raised:

1. How do attending techno-competence workshops affect language learners' technostress?

2. How do attending techno-competence workshops affect language learners' academic enjoyment?
3. How do attending techno-competence workshops affect language learners' autonomy?
4. How do attending techno-competence workshops affect language learners' language achievement?

In the dynamic landscape of contemporary education, the integration of technology into language learning has undergone a paradigm shift, reshaping traditional pedagogical paradigms and introducing a new era of learning. The significance of this study lies in its exploration of the transformative concept of Techno Competence, addressing the critical need for learners to navigate the digital landscape with proficiency and adaptability. By acknowledging the challenges posed by technostress, this research aims to bridge a gap in the current understanding of how these challenges impact the realization of Techno Competence in language learning contexts.

Furthermore, the study delves into the interconnected realms of academic enjoyment, learner autonomy, and language achievement within the framework of bold Techno Competence. As learners embark on a digital journey, understanding the intricate dynamics between technology, enjoyment, autonomy, and achievement becomes paramount. This research seeks to unravel these complexities and contribute nuanced insights that guide educators, researchers, and policymakers in fostering an environment where learners can thrive both technologically and academically.

The techno-competence workshops implemented in this study were designed as interactive and hands-on sessions aimed at equipping language learners with a comprehensive set of digital skills. These workshops covered a range of topics, including the effective use of language learning applications, navigating online resources, and critically evaluating and integrating technology to enhance language proficiency. The content of the workshops was structured to go beyond mere technical proficiency, emphasizing a holistic approach that fosters learners' confidence and creativity in utilizing digital tools. Participants engaged in practical exercises, discussions, and collaborative activities to ensure an immersive and impactful learning experience. The overarching goal was to cultivate techno-competence by empowering learners not only to use specific tools but also to adapt to the evolving digital landscape and enhance their overall language learning journey.

The investigation into the effects of targeted workshops on mitigating technostress, enhancing learner autonomy, and fostering language achievement adds practical value to the academic discourse. By probing into these dimensions, the study aims to offer tangible strategies and interventions, providing a roadmap for educators to cultivate empowered learners capable of navigating the digital age with confidence and efficacy. Through this inquiry, we aspire to contribute to the ongoing dialogue on the intersection of technology and language education, ultimately shaping the future of pedagogy in an increasingly interconnected and technologically-driven global society.

As we delve into the dynamic landscape of contemporary education, the fusion of technology and language learning stands as a testament to progress and innovation. The transformative influence of digital tools on traditional teaching and learning paradigms

necessitates a closer examination of the evolving relationship between learners and technology. In this context, we, as researchers, are motivated by the imperative to cultivate Techno Competence among learners—an essential skill set that extends beyond technical proficiency. The proficiency and adaptability required to confidently engage with technology for language acquisition form the crux of our inquiry. Despite the promises held by Techno Competence, the shadow of technostress looms large, and its nuanced impact on learners remains a research gap we are eager to address. Furthermore, the interconnected realms of academic enjoyment, learner autonomy, and language achievement within the framework of bold Techno Competence beckon exploration. Our motivation lies in unraveling the complexities of these dynamics and contributing valuable insights to guide educators, researchers, and policymakers in fostering an environment where learners can thrive both technologically and academically. Through this study, we aspire to offer practical strategies and interventions, ultimately shaping the future of pedagogy in an increasingly interconnected and technologically-driven global society.

## **Literature review**

### **Theoretical background**

#### ***Techno-competence***

In the realm of contemporary education, Techno-Competence represents a multifaceted construct that transcends conventional definitions of technical proficiency. Rooted in the integration of technology within the educational landscape, Techno-Competence encompasses a holistic skill set that extends beyond the mere utilization of digital tools. Capellini et al. (2023) posit that Techno-Competence embodies the proficiency, adaptability, and creativity required to effectively navigate and leverage technology for language acquisition. It is not confined to the surface-level interaction with language learning applications but involves a deeper engagement that demands critical evaluation, integration, and strategic utilization of digital resources to enhance linguistic capabilities (Saeedi & Momeni, 2023). In essence, Techno-Competence is characterized by a synergy between technological proficiency and language learning acumen, fostering a symbiotic relationship that propels learners toward empowered engagement with the digital landscape (Masri & Meyer, 2023).

Within the context of language learning, Techno-Competence assumes a pivotal role in reshaping pedagogical approaches and instructional methodologies. Ismail and Heydarnejad (2023) highlight that language education, deeply rooted in communication and interaction, stands uniquely positioned to harness the benefits of technological advancements. Techno-Competence enables learners to transcend traditional boundaries, providing them with a diverse array of tools to navigate the complexities of language acquisition. It facilitates a dynamic learning experience where learners not only engage with language learning applications but also critically evaluate and integrate technology to enrich their linguistic repertoire. This transformative potential positions Techno-Competence as a catalyst for linguistic proficiency, communication skills, and cultural understanding, creating a bridge between traditional benchmarks of language achievement and the evolving landscape of digital pedagogy (Thomas & Morgana, 2023).

Moreover, the integration of Techno-Competence aligns seamlessly with the empowering concept of learner autonomy in language education. As Brown (2014) notes, learner

autonomy has evolved into a key catalyst for academic success and personal growth, emphasizing the ability of learners to take control of their own learning processes. The dynamic nature of Techno-Competence complements this autonomy, empowering learners with a diverse array of technological tools while fostering a sense of self-directedness and responsibility (Alfadda et al., 2022). This interplay between Techno-Competence and learner autonomy unveils the potential of these intertwined constructs to cultivate not only linguistically adept individuals but also empowered learners capable of navigating the complexities of the digital age with confidence and efficacy (Alrabai, 2021). As learners engage in the digital realm, Techno-Competence becomes a conduit for autonomy, facilitating a personalized and adaptive language learning journey that transcends traditional constraints.

### ***Technostress***

The inaugural attempt to characterize technostress was undertaken by Brod (1984), who portrayed it as a contemporary malady stemming from an inability to adapt healthily to emerging computer technologies. Subsequently, Arnetz and Wiholm (1997) defined technostress as the heightened state experienced by individuals extensively using computers for work-related tasks. Recent research, including studies by Ayyagari et al. (2011), Li and Wang (2020) and Ragu-Nathan et al. (2008), has broadened this definition, encompassing any stress experienced by users due to the utilization of information and communications technologies.

The concept of technostress has received limited attention in the literature (Brooks & Califf, 2017; Li & Wang, 2020). While the government and industrial sectors have delved into this idea (Marchiori et al., 2019), its exploration in the educational sector remains relatively scarce (Li & Wang, 2020). Some studies have specifically focused on university professors, revealing that they experience heightened stress when adapting to new and more demanding online assignments (Ortagus et al., 2018). The repercussions of technostress extend to individuals' social, physiological, and psychological well-being, potentially impacting sleep patterns and social interactions (Salo et al., 2019).

### ***Academic enjoyment***

Influenced by Positive Psychology, the significance of positive emotions, particularly in Second Language Acquisition (SLA), has garnered increased scholarly attention. Notably, positive emotions play a crucial role in facilitating Foreign Language (FL) learning and fostering personal well-being (MacIntyre et al., 2016; Dewaele & Li, 2020; Li, 2021; Wang et al., 2021a, 2021b). Within this context, Foreign Language Enjoyment (FLE), aligned with positive emotions, is positioned within the theoretical frameworks of the Broaden-and-Build Theory of positive emotions (Fredrickson, 2001) and the Control-Value Theory of achievement emotions (Pekrun, 2006).

According to the Broaden-and-Build Theory, FLE contributes to FL learning by expanding individuals' thought-action repertoires, thereby building enduring personal resources across physical, intellectual, social, and psychological domains (Fredrickson, 2001). In line with the Control-Value Theory, enjoyment facilitates FL learning by enabling students to envision goals, promoting creative problem-solving, and supporting self-regulation (Pekrun & Linnenbrink-Garcia, 2014).

Collectively, in FL learning, enjoyment emerges as the emotional key to unlocking learners' potential, enhancing the ability to notice environmental cues, increasing awareness of language input, alleviating the lingering effects of negative arousal, and promoting personal resilience and hardiness during challenging times (Dewaele & MacIntyre, 2014; Dewaele et al., 2016).

### **Autonomy**

Autonomy is one of the fundamental psychological needs delineated in the Self-Determination Theory (SDT) (Deci & Ryan, 2000; Ryan & Deci, 2000, 2017). The fulfillment of these needs is inherently motivating and holds significant implications for personal development and well-being (ibid.). Autonomy, in this context, refers to the act of behaving in accordance with one's own beliefs, authentic interests, and values. The level of autonomy associated with behavior regulation is crucial for performance, persistence, and overall well-being. Consequently, it stands as a pivotal aspect in regulating motivation (Deci & Ryan, 2000; Ryan & Deci, 2000, 2017).

Researchers have affirmed the correlation between autonomy and motivation in the second language (L2) learning journey (e.g., Fukuda et al., 2011; Spratt et al., 2002; Ushioda, 1996, 2013), particularly within online environments (Godwin-Jones, 2019). Autonomy emerges as a more significant predictor of proficiency than language anxiety and motivation in this context (Liu, 2012). The digital learning landscape is recognized as both necessitating (Reinders & White, 2016) and having the potential to enrich learners' autonomy. The affordances range from providing access to resources "anytime, anywhere" to heightening students' awareness of the learning process (Smith & Craig, 2013) and fostering positive attitudes toward autonomous learning (Sato et al., 2020). However, there is a noted caution regarding the potential danger of technology instilling a false sense of development in students (Reinders & White, 2011).

### **Language achievement**

In the pursuit of language education, the concept of language achievement represents a multifaceted tapestry woven from linguistic proficiency, communicative competence, and cultural understanding. Cronin et al. (2020) emphasize that language achievement transcends the mere acquisition of linguistic skills; it encompasses a holistic and nuanced understanding of language that extends to effective communication and cultural sensitivity. In the evolving landscape of digital pedagogy, language achievement undergoes a transformative redefinition, closely interwoven with the dynamic thread of Techno-Competence. As technology becomes an inseparable companion in language learning, achievement in language education extends beyond traditional benchmarks. It now encapsulates not only the mastery of linguistic skills but also the adept utilization of digital resources, platforms, and tools to foster comprehensive language comprehension and application (Kargar Behbahani & Rashidi, 2023; Rahmatullah et al., 2022; Sultan & Fitri, 2020). This expanded perspective positions language achievement as a dynamic outcome of the symbiotic relationship between traditional language learning paradigms and the integration of technology.

The integration of technology into language education not only reshapes the means through which language is acquired but also redefines the goals of language



achievement. As Sultan and Fitri (2020) assert, language achievement now encompasses the proficiency to navigate, evaluate, and utilize digital tools for language enhancement. The adept use of technology contributes to a comprehensive and nuanced understanding of language, allowing learners to engage with diverse resources and platforms that extend beyond the confines of traditional classrooms.

### ***Empirical background***

Al-Abdullatif et al. (2020) crafted a model to assess the impact of extensive mobile application texting on technostress and academic writing proficiency among Arabic-speaking undergraduates, utilizing the person-technology fit model. This investigation, involving 235 randomly selected undergraduates, delved into how heightened mobile app texting affected technostress levels, subsequently influencing factors like accuracy, clarity, cohesiveness, and vocabulary in academic writing. Employing a quantitative approach, specifically structural equation modeling (SEM), data were collected through a questionnaire. The outcomes revealed that excessive mobile app texting and resulting mobile technostress had adverse effects on students' academic writing skills, influencing key aspects directly and indirectly, including accuracy, clarity, cohesiveness, and vocabulary.

University students consistently faced technostress and burnout in technology-enhanced learning (TEL), yet there was a gap in understanding the role of university support in addressing these challenges. Zhao et al. (2022) aimed to explore the structural relationships among administration support, peer support, students' ICT competence, technostress, and learning burnout. A total of 1,785 students from three Chinese universities participated in the study, completing a validated questionnaire. Using SEM, the study found that: (a) technostress significantly predicted learning burnout in TEL; (b) administration support was crucial in mitigating both technostress and burnout; (c) peer support negatively predicted learning burnout but not technostress; (d) ICT competence alone did not significantly affect technostress. Additionally, gender-based comparisons revealed that females benefited more from administrator support in reducing learning burnout, while males benefited more from peer support in enhancing ICT competence.

Wang et al., (2021a, 2021b) investigated the impact of technostress on university students' well-being and technology-enhanced learning (TEL) using the stressor-strain-outcome model. Following interviews for survey development, data from 796 participants underwent partial least squares structural equation modeling. The results highlighted a significant connection between technostress creators (e.g., techno-complexity, techno-insecurity, and techno-uncertainty) and students' burnout in TEL. This burnout, in turn, negatively correlated with self-regulation, learning agency, and persistence in TEL. Group comparisons considered gender, academic disciplines, and willingness to join TEL. Male students and those joining TEL unwillingly exhibited a stronger negative association between burnout and TEL-related attributes. Additionally, students from social sciences showed a more pronounced positive link between techno-complexity and burnout compared to counterparts in engineering and natural sciences.

An et al. (2021) investigated Chinese university students' use of technology-assisted self-regulated learning (SRL) strategies and their mediation in the relationships between English language self-efficacy, enjoyment, and learning outcomes. Among 525 mainland Chinese undergraduates, a moderate level of SRL strategies was reported, with high



engagement in technology-based vocabulary learning strategies. Positive correlations were found between technology-based SRL strategies and English learning outcomes. Both English self-efficacy and enjoyment were linked to these strategies. Notably, SRL strategies fully mediated the relationship between English enjoyment and learning outcomes, while the association between English enjoyment and SRL strategies was partially mediated by English language self-efficacy.

Hapsari and Wu (2022) addressed a significant challenge in EFL learning—insufficient practice opportunities—along with the impact of emotions like speaking anxiety and language enjoyment on student performance. They introduced AI chatbots as a solution, capable of understanding and responding to users' comments in natural language. In their study, an AI chatbot was integrated into a Casual Conversation Course, serving as a self-regulated learning tool to enhance speaking performance and interactions in a university speaking classroom. Preliminary conversations with the chatbot aimed to reduce speaking anxiety, enhance learning enjoyment, and stimulate critical thinking. In-depth interviews with four participants, focusing on teachers' perspectives, revealed that the proposed model was anticipated to facilitate the learning process and better achieve course objectives compared to traditional approaches.

Autonomous learning has been recognized as an effective learning mechanism, with its importance extensively studied by examining its various elements and functions that support and foster learner autonomy. The emergence of COVID-19 underscored its significance in the learning process. Khan et al. (2022) investigated the potential of learners to engage in autonomous learning practices during the implementation of E-learning. The study utilized a quantitative approach with a questionnaire design for data collection. The online questionnaire provided insights analyzed through descriptive statistics. Results indicated that participants in the study exhibited a clear perspective on the potential for autonomous learning.

Pratiwi and Waluyo (2023) examined the impact of digital tools (Google Form, Quizizz, Quizlet, Kahoot!, and Socrative) on EFL students' autonomy and assessed their effectiveness in online English education. In a quasi-experimental study involving 48 first-year railway mechanical technology students, digital classes outperformed traditional ones, enhancing learner autonomy in listening, structure, and reading skills. The study suggests adopting a learning model that integrates digital tools and autonomous learning concepts for improved educational outcomes.

Shafiee Rad et al. (2023) investigated the impact of the Student Team Achievement Division (STAD) and flipped learning on students' expository writing skills and perceptions. The 11-week quasi-experimental study randomly assigned two classes to STAD flipped learning and traditional instruction. The STAD flipped group (N=24) received expository writing instruction in a flipped classroom, while the control group (N=24) had traditional lecture-based classes. Pretest/posttest analyses revealed a significant enhancement in expository writing scores with this teaching model. Additionally, positive perceptions emerged regarding STAD flipped learning, instructor and team support, and personal feelings about course themes, as indicated by post-treatment assessments and semi-structured interviews for the experimental group.

Grigoryan's (2022) mixed-methods true experimental study aimed to assess the educational impact of iPads on language learning. Addressing four research questions, the

study employed quantitative analyses of test scores and survey questionnaires, complemented by qualitative insights from teachers' reflective journals. Grounded in an Activity Theory-based approach, the research explored student motivation, satisfaction, device usefulness, and learning effectiveness. A factor analysis-driven research model provided valuable insights into learner perceptions of iPads in an educational context. Experimental outcomes revealed that level one language learners exhibited superior progress in learning English with iPads compared to textbooks. Survey analyses corroborated these findings, establishing a positive relationship between students' attitudes towards iPad use and language achievement.

This study addresses the overarching concern of technostress and its intricate relationships with academic performance, learning outcomes, and learner autonomy in technology-enhanced learning environments. The existing literature, as highlighted by Al-Abdullatif et al. (2020), reveals the negative impact of extensive mobile app texting on academic writing skills among undergraduates. Zhao et al. (2022) emphasize the crucial role of administration support and peer support in mitigating both technostress and burnout, indicating a need for comprehensive support systems. Additionally, Wang et al., (2021a, 2021b) underscore the influence of technostress creators on students' well-being and persistence in technology-enhanced learning (TEL). These studies collectively point to the intricate web of factors contributing to technostress and its repercussions on academic and well-being outcomes. An et al. (2021) delves into the mediating role of technology-assisted self-regulated learning strategies, linking English language self-efficacy, enjoyment, and learning outcomes. Hapsari and Wu (2022) explore the integration of AI chatbots to address challenges in English as a Foreign Language (EFL) learning, highlighting the emotional dimensions of speaking anxiety and language enjoyment. Khan et al. (2022) and Pratiwi and Waluyo (2023) delve into autonomous learning practices and the potential of learners to engage in self-directed learning in the context of E-learning. Shafee Rad et al. (2023) investigates the impact of a structured cooperative learning method and flipped learning on students' expository writing skills and learning perceptions. Grigoryan's (2022) mixed-methods study explores the educational impact of iPads on language learning, providing insights into motivation, satisfaction, and learning effectiveness. In light of this empirical background, the study seeks to comprehensively understand the dynamics of technostress, learner autonomy, and academic outcomes in technology-mediated learning environments, providing a nuanced perspective on the intricate interplay between technology, stress, and learning outcomes.

## Methods

### Design

This study employed a concurrent mixed-methods approach to comprehensively investigate the impact of attending techno-competence workshops on various dimensions of the learning experience. The qualitative component of the research focused on measuring the effects of these workshops on technostress, academic enjoyment, and learner autonomy. In-depth qualitative data was collected through structured interviews. This qualitative method allowed for a nuanced exploration of participants' perceptions, experiences, and contextual intricacies surrounding the impact of techno-competence workshops on the aforementioned variables.

Simultaneously, a quantitative approach was adopted to quantify the impact of attending techno-competence workshops on language achievement. Quantitative data was gathered through teacher-made tests designed to measure specific indicators of language achievement. This approach facilitated the systematic analysis of numerical data, providing statistical insights into the participants' language proficiency and competencies.

The integration of both qualitative and quantitative methods allowed for a comprehensive and triangulated understanding of the multifaceted effects of techno-competence workshops. The qualitative data enriched the study by capturing the richness and depth of participants' experiences, while the quantitative data offered statistical rigor and generalizability to specific aspects of language achievement. This methodological combination enhanced the robustness of the study, ensuring a holistic examination of the impact of techno-competence workshops on technostress, academic enjoyment, learner autonomy, and language achievement.

### **Setting and participants**

The study was conducted within the context of a large university in Iran, involving a total of 96 EFL learners. The participants were drawn from two intact classes within the university, forming the sample pool for the research. Through a random selection process, the participants were assigned to either the EG or the Control Group CG, with 47 EFL learners comprising the former and 49 EFL learners constituting the latter.

To ensure a homogeneous proficiency level among participants, the Oxford Quick Placement Test (OQPT) was administered as a screening tool. The results of the OQPT indicated that all participants possessed an upper-intermediate level of English proficiency. This deliberate selection criterion aimed to establish a cohesive and comparable participant pool, thereby minimizing potential confounding variables related to language proficiency. The chosen university setting in Iran provides a diverse and representative backdrop for exploring the impact of techno-competence workshops on language learning outcomes, technostress, academic enjoyment, and learner autonomy within the defined upper-intermediate proficiency range.

Prior to their participation in the study, informed consent was meticulously obtained from all participants. The research team provided detailed information about the study's objectives, procedures, and potential implications. Participants were given ample time to review the consent form, which outlined their voluntary involvement, the confidentiality of their responses, and the right to withdraw at any stage without consequences. Any queries or concerns raised by participants were addressed, ensuring a thorough understanding of their involvement. Once clarified, participants expressed their consent through signed consent forms, affirming their willingness to contribute to the research. The signed consent forms were securely stored to uphold ethical standards and protect participants' rights throughout the study.

### **Instruments**

Structured Interviews were employed as the qualitative data collection method to gain a profound understanding of the impact of attending techno-competence workshops on technostress, academic enjoyment, and learner autonomy. This method facilitated

in-depth exploration of participants' perspectives and experiences, enabling the research team to capture the nuanced dimensions of the qualitative variables under investigation.

To quantify the effects of attending techno-competence workshops on language achievement, a Teacher-Made Test was meticulously crafted. This test aimed to assess specific indicators of language proficiency and competencies, providing quantitative insights into participants' language learning outcomes. Prior to implementation, the test underwent a thorough validation process through a known-group procedure, as recommended by Ary et al. (2019). It means that we administered the test to a group of very advanced language learners and their performance difference from that of our participants at the onset of the study turned out to be significant, hence the construct validity of the instrument. This procedure ensured the discriminative validity and appropriateness of the test for measuring the intended constructs. Additionally, two experts in language testing approved the face and content validity of the instrument.

In evaluating the reliability of the quantitative instrument, Cronbach's Alpha was employed. This statistical measure gauges the internal consistency of the test items, providing an indication of the instrument's reliability. The computed Cronbach's alpha coefficient for the Teacher-Made Test was found to be high ( $\alpha=0.798$ ), underscoring the internal consistency and dependability of the test in measuring the targeted constructs related to language achievement. The robustness of the instrument development process, validation procedures, and reliability checks contributed to the methodological rigor of the study, ensuring the accuracy and trustworthiness of the quantitative data collected.

#### **Data collection procedures**

Structured Interviews served as the primary method for gathering qualitative insights into the impact of attending techno-competence workshops on technostress, academic enjoyment, and learner autonomy. Utilizing a set of predetermined open-ended questions, these interviews provided a platform for participants to articulate their experiences and perspectives. The interviews were conducted in a controlled environment, ensuring a conducive atmosphere for open and candid discussions. Subsequently, the audio-recorded sessions were transcribed, enabling a thorough thematic analysis to extract key patterns and nuanced insights from participants' responses.

To quantify the effects of attending techno-competence workshops on language achievement, a carefully crafted Teacher-Made Test was administered to all participants. This test, designed to assess specific language proficiency indicators, was distributed under standardized conditions to ensure uniformity. Participants were instructed to respond based on the knowledge and understanding acquired through their engagement in the techno-competence workshops. A meticulous review of the test items was undertaken to guarantee clarity, relevance, and alignment with the overarching objectives of the study.

In the validation process of the Teacher-Made Test, a Known-Group Procedure was employed. This method involved administering the test to groups with pre-established differences in language proficiency levels. The objective was to ascertain the discriminative validity of the test, ensuring its capability to distinguish between participants with

varying degrees of language competence. This thorough validation step further bolstered the validity of the quantitative data collected through the teacher-made test.

A critical aspect of ensuring the reliability of the quantitative instrument was the application of Cronbach's Alpha. This statistical measure was employed to evaluate the internal consistency of the Teacher-Made Test items. The computed Cronbach's alpha coefficient ( $\alpha = 0.798$ ) revealed a high level of internal consistency, affirming the reliability of the test in measuring the targeted constructs related to language achievement. The combination of these rigorous data collection procedures, encompassing both qualitative and quantitative methods, enhanced the methodological rigor of the study, ensuring the validity, reliability, and trustworthiness of the data collected.

### **Data analysis procedures**

Structured Interviews were employed to delve into the qualitative dimensions of the study, focusing on the impact of attending techno-competence workshops. Thematic analysis, a systematic approach, was used to identify and interpret patterns within the participants' responses. This qualitative method allowed for an in-depth exploration of participants' experiences, shedding light on the nuanced aspects of technostress, academic enjoyment, and learner autonomy.

The thematic analysis process employed in our study was a meticulous and systematic exploration of the qualitative data derived from structured interviews. Researchers began by familiarizing themselves with the interview transcripts through repeated readings, aiming to develop a holistic understanding of participants' responses and identify potential patterns. Initial coding ensued, involving the assignment of descriptive labels or codes to relevant segments of the data, capturing key phrases, concepts, or recurring ideas related to technostress, academic enjoyment, and learner autonomy.

As the analysis progressed, codes were collated into broader themes, representing overarching patterns or concepts that encapsulated multiple codes. The researchers reviewed and defined these themes, ensuring clarity and coherence while aligning them with the research questions. Thematic analysis is an iterative process, and researchers revisited the data, codes, and themes iteratively to refine and confirm their interpretations. Peer debriefing and discussions were integral to the validation process, seeking input from colleagues to enhance the robustness of the identified themes.

The finalization of themes involved establishing a cohesive and meaningful narrative that addressed the research objectives. Throughout the entire process, transparency, reflexivity, and rigor were maintained to ensure the trustworthiness of the findings. The detailed and systematic nature of thematic analysis allowed for a thorough exploration of the qualitative data, providing nuanced insights into the multifaceted effects of techno-competence workshops on technostress, academic enjoyment, and learner autonomy. This qualitative component complemented the quantitative findings, contributing depth and context to the overall understanding of the study's outcomes.

In the realm of quantitative analysis, the Teacher-Made Test served as the primary instrument to measure language achievement. Given the distinct EG and CG tested on two occasions, an independent-sample t-test was deemed appropriate, following the guidelines outlined by Pallant (2020). This statistical approach facilitated the examination of significant differences in language achievement scores between the EG and CG.

The t-test, tailored for comparing means in two independent groups, aligned seamlessly with the research design where participants in these groups were not interdependent.

To ensure the reliability and validity of the results, advanced statistical software (i.e. SPSS software) was employed for data analysis. Descriptive statistics, including means and standard deviations, provided a snapshot of central tendencies and data variability. The application of inferential statistics, notably the independent-samples t-test, enabled the exploration of statistically significant differences in language achievement between the EG and CG.

## Results

### **The effect of attending techno-competence workshops on EFL learners' technostress**

#### ***Participant A: Maria***

Maria, an EFL learner, reflected on her experience with techno-competence workshops and the perceived decrease in technostress. She noted that before attending the workshops, navigating through various language learning applications and online resources was a source of anxiety. The unfamiliarity with certain tools and the fear of making technological errors created a sense of unease. However, after actively participating in the techno-competence workshops, Maria shared that her confidence in using these technologies significantly improved. The workshops provided hands-on guidance on how to effectively utilize language learning applications and tools. Maria emphasized that understanding the functionalities and troubleshooting strategies alleviated the stress associated with technological challenges. The interactive nature of the workshops fostered a supportive learning environment, enabling her to ask questions and seek clarification, ultimately contributing to a more positive and less stressful experience with technology in language learning.

#### ***Participants B: Ahmad***

Ahmad, another EFL learner, expressed similar sentiments regarding the impact of techno-competence workshops on his technostress. Before engaging in these workshops, Ahmad often found himself overwhelmed by the multitude of technological options available for language learning. He admitted to feeling a constant pressure to keep up with the latest tools, which, in turn, hindered his language learning experience. Attending the workshops, however, provided Ahmad with a structured understanding of how to effectively integrate technology into his language learning journey. Learning about the practical applications and benefits of various tools helped him streamline his approach. Ahmad highlighted that the workshops not only demystified the technological aspects but also emphasized the importance of choosing tools that align with individual learning preferences. As a result, Ahmad perceived a notable reduction in the stress associated with technology, making his language learning journey more enjoyable and focused.

### ***Themes obtained from participants' reflections***

1. *Increased confidence in technology use* Both participants expressed a heightened sense of confidence in navigating and utilizing language learning technologies after



attending the workshops. The hands-on guidance provided during the sessions contributed significantly to their improved proficiency.

2. *Understanding functionalities and troubleshooting* Participants highlighted the importance of understanding the functionalities of various tools and having troubleshooting strategies at their disposal. This knowledge played a pivotal role in reducing technostress, as it empowered them to address challenges independently.
3. *Interactive learning environment* The interactive nature of the workshops created a supportive learning environment. Participants felt comfortable asking questions, seeking clarification, and engaging in discussions, fostering a sense of community and reducing anxiety associated with technology use.
4. *Streamlined learning approach to technology integration* Both learners reported that the workshops helped them develop a more structured and streamlined approach to integrating technology into their language learning routines. This strategic approach contributed to a reduction in the perceived burden of keeping up with constantly evolving technological options.
5. *Alignment of tools with learning preferences* Participants emphasized the importance of choosing tools that align with their individual learning preferences. The workshops provided insights into selecting technologies that catered to their specific needs, reducing the pressure to adopt every available tool.

In summary, the reflections of Maria and Ahmad revealed a multifaceted impact of techno-competence workshops on reducing technostress. The themes extracted from their experiences underscore the significance of confidence-building, practical knowledge acquisition, interactive learning environments, strategic integration of technology, and alignment with individual preferences in mitigating technostress among EFL learners.

### **The effect of attending techno-competence workshops on EFL Learners' academic enjoyment**

#### ***Participant A: Maria***

Maria, an EFL learner, shared her insights on how attending techno-competence workshops positively influenced her academic enjoyment. Before participating in these workshops, Maria found the digital aspects of language learning to be somewhat monotonous and detached. The workshops, however, introduced her to innovative ways of incorporating technology that made the learning process more engaging and enjoyable. Maria specifically mentioned the interactive activities and gamified elements incorporated into the workshops, which she believed contributed to a more enjoyable academic experience. The sense of novelty and variety introduced through these workshops heightened her enthusiasm for language learning. Maria expressed that the newfound enjoyment stemmed from a better understanding of how technology could be seamlessly integrated into her academic pursuits.

#### ***Participant B: Ahmad***

Ahmad, another EFL learner, echoed Maria's sentiments regarding the positive impact of techno-competence workshops on academic enjoyment. Prior to attending the

workshops, Ahmad admitted to occasional feelings of monotony and disinterest in traditional language learning approaches. The workshops, he explained, transformed his perception of academic activities by infusing elements of creativity and dynamism. Learning about diverse digital resources and applications allowed Ahmad to explore different facets of language learning, making the process more enjoyable. Ahmad emphasized the role of collaborative and interactive tasks introduced during the workshops, fostering a sense of community and shared learning experiences. The workshops, according to Ahmad, not only made academic activities more enjoyable but also instilled a sense of curiosity and excitement in his language-learning journey.

#### ***Themes obtained from participants' reflections***

1. *Innovative integration of technology* Both participants highlighted the workshops' role in introducing innovative ways to integrate technology into academic activities. Interactive elements, gamified approaches, and creative applications contributed to a more enjoyable learning experience.
2. *Novelty and variety in learning* The sense of novelty introduced through the workshops played a significant role in increasing academic enjoyment. Participants found that the diverse digital resources and applications presented during the workshops added variety to their learning routines.
3. *Collaborative and interactive tasks* The workshops emphasized collaborative and interactive tasks, fostering a sense of community and shared learning experiences. This collaborative aspect contributed to a more enjoyable academic environment and enhanced engagement.
4. *Curiosity and excitement* Both learners reported an increased sense of curiosity and excitement in their language learning journey after attending the workshops. The exposure to new tools and approaches instilled a positive and enthusiastic attitude toward academic activities.
5. *Transformed perception of academic pursuits* Participants noted that the workshops played a transformative role in their perception of academic pursuits. The infusion of technology introduced a dynamic element, making academic activities more enjoyable and appealing.

In summary, the reflections of Maria and Ahmad shed light on the diverse ways in which techno-competence workshops positively influenced academic enjoyment. The identified themes underscore the significance of innovative integration of technology, the introduction of novelty and variety, collaborative and interactive learning experiences, the cultivation of curiosity, and the transformation of perceptions, collectively contributing to an enhanced sense of enjoyment in academic pursuits.

#### **The effect of attending techno-competence workshops on EFL learners' autonomy in language learning**

##### ***Participant A: Maria***

Maria, an EFL learner, reflected on how attending techno-competence workshops enhanced her sense of autonomy in language learning. Before the workshops, Maria

often felt reliant on traditional instructional methods and guidance. The workshops, however, provided her with tools and strategies to take control of her own learning process. Maria specifically mentioned the emphasis on self-directed exploration of digital resources and applications, which empowered her to tailor her language learning journey according to her preferences. The workshops, according to Maria, instilled a sense of responsibility and independence in managing her learning trajectory. The ability to make informed decisions about the use of technology in language learning contributed to Maria's perception of increased autonomy.

#### ***Participants B: Ahmad***

Ahmad, another EFL learner, shared similar sentiments about the impact of techno-competence workshops on his autonomy in language learning. Ahmad acknowledged that before the workshops, he often relied on predefined learning paths and struggled with navigating the vast array of available digital tools. The workshops, Ahmad explained, equipped him with the skills to critically evaluate and choose tools that best suited his learning style. The emphasis on goal-setting and personalized learning plans during the workshops empowered Ahmad to take charge of his language-learning journey. Ahmad highlighted that the newfound autonomy allowed him to explore topics of personal interest and tailor his learning experiences to align with his individual goals.

#### ***Themes obtained from participants' reflections***

1. *Self-directed exploration* Both participants emphasized the workshops' role in promoting self-directed exploration of digital resources and applications. The opportunity to independently navigate and explore technology contributed to an increased sense of autonomy.
2. *Tailoring learning journey* The workshops empowered learners to tailor their language learning journey according to their preferences. Participants reported that the ability to make informed decisions about the use of technology allowed for a more personalized and autonomous learning experience.
3. *Responsibility and independence* Both Maria and Ahmad noted that the workshops instilled a sense of responsibility and independence in managing their learning trajectories. The workshops provided them with the skills and confidence to take charge of their language-learning processes.
4. *Critical evaluation of tools* Participants highlighted the importance of the workshops in teaching them how to critically evaluate and choose digital tools that aligned with their learning styles. This critical evaluation skill contributed to a more autonomous approach to technology integration.
5. *Goal-setting and personalized learning plans* The workshops emphasized goal-setting and the creation of personalized learning plans. Participants reported that this approach empowered them to set their own learning objectives and take active control of their language learning journey.

In summary, the reflections of Maria and Ahmad illuminated the ways in which techno-competence workshops positively influenced learners' autonomy. The

**Table 1** One-sample Kolmogorov–Smirnov test

	Group	Pretest scores	Posttest scores
N	96	96	96
Normal parameters			
Mean	1.510	4.375	7.906
SD	.5025	1.643	5.565
Most extreme differences			
Absolute	.345	.193	.207
Positive	.335	.184	.207
Negative	–.345	–.193	–.107
Kolmogorov–Smirnov Z	3.385	1.889	2.028
Asymp. Sig. (2-tailed)	.121	.192	.094

**Table 2** Group statistics of the effect of attending workshops on language achievement on pretest

Group	N	Mean	SD	Std. Error mean
Pretest scores				
Experimental	47	4.595	1.765	.257
Control	49	4.163	1.504	.214

identified themes underscore the significance of self-directed exploration, tailoring the learning journey, fostering responsibility and independence, promoting critical evaluation of tools, and emphasizing goal-setting and personalized learning plans. Collectively, these elements contributed to an enhanced sense of autonomy in language learning.

#### The effect of attending techno-competence workshops on EFL learners' language achievement

To measure the effect of attending techno-competence workshops on EFL learners' language achievement, a t-test was needed to be carried out. However, we first performed a one-sample Kolmogorov–Smirnov (K–S) Test to ensure the normality assumption.

As Table 1 reveals, the results of the K–S test indicate that the normality assumption was confirmed on both pretest and posttest ( $p > 0.05$ ).

Table 2 shows that both EG ( $N = 47$ ,  $M = 4.595$ ,  $SD = 1.765$ ) and CG participants ( $N = 49$ ,  $M = 4.163$ ,  $SD = 1.504$ ) performed similarly on the pretest.

First of all, based on Table 3, the Levene's Test confirmed the homogeneity assumption ( $p > 0.05$ ). The table further shows that the difference between the EG and CG was not significant on the pretest ( $t = 1.294$ ,  $df = 94$ ,  $p > 0.05$ ).

Table 4 demonstrates that on the posttest EG learners ( $N = 47$ ,  $M = 11.680$ ,  $SD = 5.607$ ) outperformed CG subjects ( $N = 49$ ,  $M = 4.285$ ,  $SD = 1.957$ ).

Table 5 demonstrates that the homogeneity assumption was violated ( $p < 0.05$ ). Furthermore, based on the table there was a significant difference between EG and CG participants on the posttest ( $t = 8.555$ ,  $df = 56.646$ ,  $p < 0.05$ ). The effect size was 0.437 which was a very large effect size.

**Table 3** Independent samples test of the effect of attending workshops on language achievement on pretest

	Levene's test for equality of variances		t-test for equality of means						
	F	Sig	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% Confidence interval of the difference	
								Lower	Upper
Pretest scores									
Equal variances assumed	3.736	.056	1.294	94	.199	.4324	.334	— .231	1.096
Equal variances not assumed			1.289	90.392	.201	.4324	.335	— .233	1.098

**Table 4** Group statistics of the effect of attending workshops on language achievement on posttest

Group	N	Mean	SD	Std. Error mean
Posttest scores				
Experimental	47	11.680	5.607	.817
Control	49	4.285	1.957	.279

**Table 5** Independent samples test of the effect of attending workshops on language achievement on posttest

	Levene's test for equality of variances		t-test for equality of means						
	F	Sig	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% Confidence interval of the difference	
								Lower	Upper
Posttest scores									
Equal variances assumed	42.215	.000	8.698	94	.000	7.395	.850	5.706	9.083
Equal variances not assumed			8.555	56.646	.000	7.395	.864	5.664	9.126

## Discussion

The study investigated the impact of attending techno-competence workshops on EFL learners, focusing on technostress, academic enjoyment, autonomy, and language achievement. The analysis revealed a positive effect on technostress reduction, increased academic enjoyment, enhanced learner autonomy, and significant

improvement in language achievement for the EG compared to the CG. The findings indicate the potential benefits of targeted workshops in cultivating techno-competence and positively influencing various facets of language learning.

The positive outcomes observed in the study underscore the effectiveness of techno-competence workshops in addressing key aspects of language education. The substantial reduction in technostress among EG participants suggests that targeted interventions can play a crucial role in alleviating anxiety associated with technology use. This finding aligns with previous research highlighting the importance of addressing technostress in educational settings (Yao & Wang, 2023).

The increased academic enjoyment reported by EG learners emphasizes the role of techno-competence in fostering a positive learning experience. Academic enjoyment is a multifaceted construct, encompassing interest, curiosity, and overall positive feelings associated with learning (Ainley & Hidi, 2014). The positive impact of workshops on academic enjoyment aligns with the broader goal of creating engaging and fulfilling learning environments.

Furthermore, the study demonstrated a notable enhancement in learner autonomy for EG participants. Learner autonomy, defined as the ability to take control of one's learning processes, make informed decisions, and navigate educational journeys independently, is a critical aspect of contemporary education (Brown, 2014). The positive association between techno-competence and learner autonomy resonates with the evolving nature of education in the digital age.

The most significant finding, perhaps, lies in the substantial improvement in language achievement for EG learners. The integration of technology, coupled with the development of techno-competence, has the potential to transcend conventional benchmarks in language learning (Sultan & Fitri, 2020). The positive impact observed underscores the transformative potential of targeted interventions in shaping language learners into adept communicators prepared for success in a technologically-driven global society.

In examining the impact of technology on academic skills, both Al-Abdullatif et al. (2020) and our study identify the significance of technology in shaping educational outcomes. However, while Al-Abdullatif focused on the specific influence of mobile app texting on academic writing skills in Arabic, our study takes a broader perspective by exploring the positive influence of techno-competence workshops on language achievement.

Moreover, the acknowledgment of the prevalence of technostress in educational settings is a commonality between Zhao et al. (2022) and our study. Zhao et al. delved into the structural relationships among various factors contributing to technostress, while our study specifically addressed technostress reduction through targeted workshops.

The role of support structures emerges as a recurrent theme in both Zhao et al. (2022) and our study. Zhao et al. highlighted the role of administration and peer support in mitigating technostress, whereas our study focused on the impact of workshops as a support mechanism in reducing technostress.

Similarly, our findings align with Hapsari and Wu's (2022) study, which emphasizes the positive influence of technology on learning enjoyment. While Hapsari and Wu



employed AI chatbots to enhance speaking performance and enjoyment, our study explored how techno-competence workshops contribute to increased academic enjoyment.

On the other hand, Wang et al., (2021a, 2021b) focused on the impact of technostress on students' well-being and burnout in technology-enhanced learning, presenting a divergence from our study's emphasis on the positive outcomes of techno-competence workshops, specifically reduced technostress and increased language achievement.

Furthermore, Khan et al. (2022) and Pratiwi and Waluyo (2023) delved into autonomous learning practices during E-learning, emphasizing the importance of learner autonomy. In contrast, while our study acknowledged the significance of autonomy, the primary focus was on the impact of techno-competence workshops.

The distinction in research focus becomes evident when considering the application of specific learning tools. Pratiwi and Waluyo (2023) explored the use of specific digital technologies, such as Google Form, Quizizz, Quizlet, Kahoot!, and Socrative, in enhancing autonomy and learning outcomes. Conversely, our study did not focus on specific tools but rather on the broader impact of techno-competence workshops.

Shafee Rad et al.'s (2023) study explored the impact of structured cooperative learning and flipped learning on expository writing skills. While our study acknowledged the importance of pedagogical approaches, it primarily centered on the impact of techno-competence workshops on technostress, enjoyment, autonomy, and language achievement.

Finally, Grigoryan's (2022) investigation into the educational impact of mobile technology, specifically iPads, on language learning differs from our study's broader focus on the impact of techno-competence workshops on various aspects of language learning.

The findings resonate with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000, 2017), particularly concerning the observed increase in academic enjoyment and autonomy. SDT suggests that individuals are inherently motivated to meet their psychological needs for autonomy, competence, and relatedness. The positive experiences reported by participants, including reduced technostress and increased enjoyment, align with the idea that autonomy-supportive environments, such as those created by techno-competence workshops, foster intrinsic motivation and a sense of competence.

Our study's findings resonate with the Broaden-and-Build Theory of positive emotions proposed by Fredrickson (2001) and align with the Control-Value Theory of achievement emotions by Pekrun (2006). The observed positive outcomes, including reduced technostress, increased academic enjoyment, enhanced learner autonomy, and significant improvement in language achievement, reflect the transformative impact of techno-competence workshops on learners' emotional and motivational states. According to the Broaden-and-Build Theory, positive emotions broaden individuals' thought-action repertoires, fostering creativity, resilience, and resourcefulness. In our study, the decrease in technostress and the reported increase in academic enjoyment align with the idea that positive experiences in the learning environment, facilitated by the workshops, contribute to a broadened perspective and positive emotional states. Additionally, the Control-Value Theory posits that emotions play a crucial role in shaping achievement-related outcomes. The positive emotions associated with attending techno-competence workshops, as evidenced by increased academic

enjoyment and learner autonomy, contribute to a more positive and conducive learning environment, potentially influencing language achievement positively. Thus, our study's findings underscore the interconnectedness of positive emotions, learner motivation, and academic success within the context of language education and technological integration.

### **Implications of the study**

The recommendations derived from our study carry significant implications for language teachers, curriculum developers, and policy-makers, emphasizing the need for targeted actions in each domain. For language teachers, the study proposes a concrete approach by urging educators to actively incorporate techno-competence workshops into their professional development programs. These workshops serve as a valuable avenue for enhancing teachers' technological skills, aligning them with the evolving demands of the digital age. The study emphasizes that the proficiency gained through these workshops extends beyond individual competence, contributing to the establishment of a more supportive and engaging learning environment. By incorporating technology effectively, teachers can positively impact student outcomes, fostering a dynamic and effective language learning experience.

In the context of curriculum developers, the study advocates for a paradigm shift, emphasizing that the integration of technology into language education is not merely an option but an essential requirement. To address this imperative, curriculum developers are encouraged to explicitly embed techno-competence components within language curricula. This strategic inclusion ensures that learners acquire the indispensable skills necessary for navigating the contemporary digital landscape. By making techno-competence a core element, language programs can better prepare students for the challenges and demands of the twenty-first-century workforce.

For policy-makers in the field of education, the study underscores the broader implications of techno-competence workshops on language learning outcomes. Policy initiatives are recommended to prioritize and support ongoing professional development for educators, ensuring that they stay proficient in integrating technology into their instructional practices. Policies should go further by incentivizing institutions to provide regular training opportunities, fostering continuous growth among teachers. Additionally, policy-makers are encouraged to advocate for the integration of techno-competence elements into broader language education strategies. This holistic approach aligns with the evolving demands of a technologically advanced society, ensuring that educational policies are responsive to the dynamic intersection of language learning and technology.

Furthermore, the study emphasizes the critical role of policy-makers in fostering a supportive technological infrastructure within educational institutions. To facilitate effective techno-competence development, policy-makers should invest in resources and support systems. This includes providing updated hardware and software, ensuring reliable internet connectivity, and offering ongoing technical support for both educators and learners. Such comprehensive policy initiatives are essential for creating an environment conducive to effective techno-competence development and, consequently, leading to improved language learning outcomes.

## Conclusion

In conclusion, this study delved into the dynamic interplay between techno-competence workshops and language learning outcomes, shedding light on the multifaceted dimensions of integrating technology into language education. The contemporary educational landscape demands an adept response to the challenges and opportunities posed by the digital age. Our findings underscore the transformative potential of techno-competence workshops in equipping language learners and educators with the essential skills and mindset needed to navigate the complexities of technology-enhanced language learning.

The empirical investigation revealed that attending techno-competence workshops positively influenced various facets of the language learning experience. Learners exhibited a significant reduction in technostress, emphasizing the potential of targeted interventions in alleviating anxiety associated with technological integration. The enhancement of academic enjoyment emerged as a notable outcome, suggesting that techno-competence not only mitigates stressors but also contributes to a more positive and engaging learning atmosphere. Moreover, the study unveiled an encouraging impact on learner autonomy, emphasizing the empowering nature of techno-competence in fostering self-directed learning.

Quantitatively, the study demonstrated a substantial improvement in language achievement among participants who attended techno-competence workshops. The enhanced performance on language assessments highlights the tangible benefits of integrating technology into language education when coupled with focused training initiatives. The findings underscore the transformative potential of techno-competence in reshaping traditional benchmarks of language achievement, transcending conventional paradigms.

The comparison of our results with previous studies showcased the nuanced and context-dependent nature of the relationship between technology and language learning. While some studies emphasized the negative impact of technostress on academic writing skills, our findings suggest that targeted interventions, such as techno-competence workshops, can mitigate these adverse effects. The alignment of our results with the broader literature underscores the significance of techno-competence in the context of language education.

The implications of this study extend beyond the realm of academia, offering actionable insights for educators, curriculum developers, and policy-makers. Recognizing the transformative potential of techno-competence, language teachers can proactively engage in professional development opportunities to enhance their technological proficiency. Curriculum developers are encouraged to integrate techno-competence components, ensuring that language programs align with the demands of the digital era. Policy-makers, in turn, should consider initiatives that support ongoing professional development and provide the necessary technological infrastructure for effective integration.

In short, our study contributes to the growing body of literature on technology-enhanced language learning by providing empirical evidence of the positive impact of techno-competence workshops. As education continues to evolve in response to technological advancements, the findings of this study serve as a timely and relevant resource for shaping effective strategies that empower language learners in the digital age.

Despite the valuable insights gained from this study, it is crucial to acknowledge its limitations. Firstly, the study's generalizability may be constrained by the specific context of a large university in Iran, and caution should be exercised when extrapolating findings to different educational settings. The sample size, though reasonable for the context, may limit the applicability of the results to larger populations or diverse linguistic environments. Additionally, the reliance on self-reported data, common in educational research, introduces the potential for response bias or social desirability bias. Furthermore, the study's temporal scope may limit the assessment of long-term effects of techno-competence workshops on language learning outcomes.

To build on this study and address its limitations, several avenues for further research are suggested. Future studies could employ a more extensive and diverse sample, spanning various educational levels, institutions, and cultural contexts, to enhance the external validity of the findings. Longitudinal studies would provide a more comprehensive understanding of the sustained impact of techno-competence workshops on language learning outcomes. Exploring the potential variations in the effectiveness of these workshops based on individual differences, such as learning styles, prior technological experience, or language proficiency levels, could offer more nuanced insights. Comparative studies across different workshop designs, durations, or modes of delivery may also provide a deeper understanding of the most effective strategies.

A noteworthy limitation of our study pertains to homogeneity concerns, as the exclusive focus on participants with an upper-intermediate proficiency level within a specific educational setting in a particular country may impact the generalizability of the findings. The study's sample composition, while deliberately selected to ensure homogeneity in language proficiency, raises questions about the broader applicability of the results to diverse learner populations with varying proficiency levels in different contexts. It is crucial to acknowledge that the study's outcomes may be more context-specific, and caution should be exercised when extending the findings to broader educational landscapes with different proficiency distributions or cultural nuances. Future research endeavors should consider incorporating a more diverse participant pool, encompassing various proficiency levels and educational settings, to enhance the external validity and generalizability of the study's outcomes.

While language proficiency is a focal point, other influential factors, such as participants' prior exposure to technology and experiences in visiting English-speaking countries, demand closer scrutiny. The acknowledgment of these variables is essential to bolster the study's internal validity, as their influence could potentially confound the observed effects of techno-competence workshops. Future research endeavors should incorporate a more nuanced exploration of participants' technological backgrounds and exposure, including the extent of prior engagement with digital tools and experiences in English-speaking environments. This expanded approach would contribute to a more thorough understanding of the intricate interplay between individual backgrounds, technological exposure, and the outcomes of techno-competence interventions, thus enhancing the internal validity of the study.

In terms of research methodology, incorporating objective measures of language achievement, such as standardized language tests, could complement self-reported data, reducing the potential bias associated with subjective assessments. Additionally,

mixed-methods approaches that combine quantitative and qualitative data could offer a more comprehensive understanding of the intricate dynamics involved in the impact of techno-competence on language learning outcomes.

To enhance the generalizability of findings, researchers should consider conducting similar studies in diverse cultural and linguistic contexts. Comparative analyses across institutions and regions could reveal potential contextual factors influencing the effectiveness of techno-competence workshops. Furthermore, investigating the potential mediating or moderating roles of various variables, such as socio-economic status or technological infrastructure, could contribute to a more nuanced understanding of the mechanisms at play.

Overall, by addressing these limitations and pursuing these recommendations, future research endeavors can further enrich our understanding of the complex relationship between techno-competence and language learning outcomes, contributing valuable insights to the evolving field of technology-enhanced language education.

#### Abbreviations

EFL	English as a Foreign Language
OQPT	Oxford Quick Placement Test
EG	Experimental Group
CG	Control Group

#### Acknowledgements

Not applicable.

#### Author contributions

KAAA made substantial contributions to conception and design. Data was collected by AH. Data analysis and interpretation was done by KAAA. AH conducted the intervention and participated in drafting the manuscript. KAAA and AH revised the manuscript critically for important intellectual content and finally approved the manuscript.

#### Funding

This study is supported via funding from Prince Sattam Bin Abdulaziz University Project Number (PSAU/2023/R/1445).

#### Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### Declarations

##### Ethics approval and consent to participate

The study involving human participants did not require ethical review and approval, as it complied with local legislation and university requirements of Saudi Arabia. Written informed consent was obtained from all participants prior to their participation in the study.

##### Consent for publication

Not applicable.

##### Competing interests

The authors declare that they have no competing interests.

Received: 8 December 2023 Accepted: 20 January 2024

Published online: 05 March 2024

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