A Golden Key with Techno Competence in CALL: Technological stress, Immunity, Self-evaluation, and Autonomy Are in Focus

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Abstract

Maximizing the potential of Computer-Assisted Language Learning (CALL) necessitates techno competence to employ technology effectively. Learners with a high level of technological proficiency are better prepared to navigate CALL's technological components, reducing frustration and anxiety and enabling them to concentrate on language acquisition. Additionally, applying positive psychology principles can be influential in developing techno competence by inspiring learners to perceive barriers to technology as possibilities for success and growth. However, the significance of learners' technical skills has not been well investigated in CALL. Hence, the present research examined how techno competence influences technological stress, immunity, self-evaluation, and autonomy among (English as a Foreign Language) EFL learners. Furthermore, implementing positive psychology perspectives was examined as an avenue to promote these beneficial outcomes. The sample consisted of 93 university students from Saudi Arabia who were randomly assigned to the experimental group (EG) or control group (CG). Data was collected and analyzed using a Multivariate Analysis of Variance (MANOVA) approach. The results indicate that improvements in techno competence, combined with implementing positive psychology, significantly positively impacted the EG's levels of technological stress, immunity, self-evaluation, and autonomy compared to the CG. These findings highlight the crucial role of developing techno competence and leveraging positive psychology to optimize EFL learners'

experiences and outcomes within CALL environments. Implications for language teaching practices and future research directions are discussed.

Keywords: Techno competence, Technological stress, Immunity, Self-evaluation, Autonomy, CALL, EFL learners

Introduction

CALL, the term used to describe the incorporation of technology into language learning, has become an increasingly significant component of contemporary education. CALL is related to including digital technologies, such as computers, mobile devices, and the internet, in the language learning process (Pyo & Lee, 2024). CALL environments often include multimedia elements, engaging activities, and individual instruction, which may pique student engagement and enhance the pleasure of language learning (Alotumi, 2018). CALL materials may give students chances for real-world, contextualized language instruction and instantaneous performance feedback (Huang, 2024). More efficient language learning and development of many language abilities, including reading, writing, listening, and speaking (Wrigglesworth, 2020), may follow. CALL may also encourage students to participate more actively in their language-learning process by letting them access language materials and practice quickly and conveniently (Christiansen & Els, 2019). This may assist students to feel more accountable and in charge of their education, eventually resulting in more sustainable and efficient language growth.

The use of technology in language acquisition may have positive and negative consequences. While CALL environments offer numerous benefits, they can also be a source of stress for some learners (Manegre & Sabiri, 2020). Learners with limited technological proficiency may feel overwhelmed by the need to navigate unfamiliar digital tools and platforms, leading to increased anxiety and cognitive load (Parmaxi & Zaphiris, 2016). This technological stress can negatively impact their language learning experience and outcomes, as their cognitive resources are diverted from the language tasks (Pyo & Lee, 2024). Addressing technological stress through targeted support and training is crucial for ensuring that CALL is a positive and empowering experience for all learners.

In contrast to technological stress, immunity is crucial for successful CALL implementation. Immunity in education refers to an individual's ability to adapt and cope with technological challenges, which can be essential for navigating the digital landscape of CALL environments. Learners with stronger technological immunity are more resilient in the face of technical difficulties, viewing them as opportunities for growth and learning rather than insurmountable obstacles (Pyo & Lee, 2024). Developing technological immunity can involve exposure to various CALL tools and resources, cultivating problem-solving skills, and a growth mindset toward technology (Grenner, 2018). Fostering technological immunity

in language learners can enhance their overall CALL experience and lead to more successful language acquisition.

Unlike technological stress, the premise of immunity is essential for the practical application of CALL. Learner immunity (LI) pertains to an individual's capacity to adjust and manage technical obstacles, which is crucial for traversing the digital terrain of CALL environments. Individuals with productive immunity exhibit more adaptability when confronted with technical challenges, seeing them as chances for personal development and acquiring knowledge rather than overwhelming barriers (Pyo & Lee, 2024). Cultivating immunity entails exposure to various CALL tools and resources while fostering problem-solving abilities and adopting a growth perspective toward technology (Aldosari et al., 2023; Parmaxi & Zaphiris, 2016). Developing resistance to technology in language learners may improve their overall CALL experience and result in more effective language acquisition.

Furthermore, CALL settings often provide learners with prompt feedback and chances for self-evaluation (SE), which may substantially influence their self-evaluation and metacognitive awareness (Nurjamin et al., 2023). In CALL environments, learners can carefully observe their progress, recognize their areas of proficiency and areas for improvement, and adapt their learning tactics appropriately (Riswanto et al., 2023). The improved SE may result in more precise views of one's language competency and a deeper comprehension of their own learning methods and preferences (Nemati et al., 2021). Through the promotion of SE, CALL may enable learners to assume a more proactive stance in their language development, eventually resulting in enhanced and enduring learning results.

Another noteworthy aspect of CALL's influence is its capacity to promote learner autonomy (LA). CALL can enable learners to exert more control over their learning process by offering them access to diverse language resources, tools, and opportunities for self-directed practice. This sense of agency and ownership may result in developing essential skills, including goal-setting, self-regulation, problem-solving, and increased motivation. Enhancing LA through CALL can result in more effective and personalized language learning, as individuals can customize their experiences to meet their requirements and preferences (Little, 2022).

Students' psychological equilibrium may be compromised due to the proliferation of novel technologies, their integration into the domains of instruction and evaluation, and the emergence of an array of additional challenges. They are strategically designing and implementing practical instructional approaches that enable students to develop and refine strategies to surmount potential obstacles that impede their progress and evaluation. Even though techno-competence, techno-stress, LI, SE, and LA have been validated as critical in the success or failure of students, no study has examined the connections between them, particularly.

In addition, this research void is conspicuously absent from the current corpus of academic literature on EFL virtual instruction. Given the limitations mentioned above in research and the importance of the variables assigned to learners concerning their academic performance, this study aimed to examine the effects of teaching and practicing technological strategies needed for online instruction on techno-stress, LI, SE, and LA. By keeping these factors in mind, the subsequent research query was formulated:

RQ: Does techno-competence influence the level of EFL students' technostress, immunity, self-evaluation, and autonomy?

Literature Review

Positive Psychology in CALL

The discipline of positive psychology has gained significance in the realm of CALL. Positive psychology is a field of study that examines the positive aspects of human nature, such as strengths, well-being, and thriving. This area of research has important implications for language acquisition and teaching in the CALL setting. Studies have shown that positive emotions, such as pleasure, curiosity, and excitement, may boost language acquisition by enhancing cognitive flexibility, problem-solving abilities, and general drive (Aydın & Tekin, 2023). Language learners who encounter positive emotions while learning are more inclined to participate in the learning process actively, persevere in the face of difficulties, and eventually get superior learning results.

The design of CALL spaces may also use positive psychology ideas to improve students' health and motivation to study. Learners' autonomy, competence, and relatedness-essential aspects of self-determination theory- can be boosted via gamification, adaptive feedback, and individualized learning experiences. These factors have been associated with improved language acquisition (MacIntyre, 2021; Wong, 2011). Furthermore, treatments and tactics for language acquisition may be informed by positive psychology to foster students' resilience, growth mindset, and self-regulation abilities (Dewaele et al., 2019). These qualities are essential for overcoming the obstacles and difficulties that come with learning a new language, and they may help you succeed and become fluent in the long run. Finally, there is a lot of hope that language instruction and learning may benefit by incorporating positive psychology into CALL. Improved language results may result from more engaging, motivating, and successful learning experiences made possible via CALL's emphasis on learners' well-being and personal development.

Technostress

The widespread use of technology has resulted in negative user experiences, such as technostress. Brod (1984) initially used the word "technostress," which he characterized as an "adaptive illness" caused by an individual's incapacity to navigate new forms of computer technology successfully. A more precise definition of technostress would be any negative

effect on an individual's mental state, behavior, or physiological processes that can be traced back to technology (Khlaif et al., 2023). While technostress has been studied in various contexts, its prevalence in a field where computers are increasingly used has yet to be examined: higher education. Long-term health issues, including burnout, depression, and fatigue, have been connected to technostress (Upadhyaya & Vrinda, 2020). Technostress is not always the outcome of working in a technologically demanding environment. Several strategies exist for mitigating technostress and its adverse consequences (Ahmed Abdel-Al Ibrahim & Hashemifardnia, 2024; Wang et al., 2020). This is why it is crucial to address technostress not only once its detrimental consequences become apparent but also during its whole life cycle. Technostress has been investigated to determine how it affects people's openness to new technology. According to Qi research (2019), teachers' tendency to employ technology solutions decreases when they experience technostress. In addition, Maier et al. (2019) found that technostress negatively mediates the relationship between the perceived usefulness of digital textbooks and the willingness to purchase them. When people are under much stress from technology, they are less likely to let their appreciation of its practicality affect their decision to use it.

Learner Immunity in CALL

As the literature review reflected, the concept of immunity is relatively new. It pertains to the psychological fortification that individuals employ to safeguard themselves from the potential adverse effects of education. Much like biological immunity, LI may be valuable or detrimental (Hiver, 2017). Students with trouble adapting to new information or changing environments are more likely to develop inappropriate immunity (Hiver & Dörnyei, 2017). A robust immune system protects students against uncomfortable emotions, worry, fear, and difficulties. The failure of the learners to adapt to development or alteration is the root cause of maladaptive immunity. LI is closely related to digital literacy, encompassing the skills, knowledge, and attitudes necessary to use digital technologies, including language learning (Hiver, 2015).

Previous studies discovered some crucial components that assist in the formation of effective immunity. Self-efficacy is a significant determinant. According to Hadamitzky et al. (2020), learners who have a strong sense of confidence and ease in using technology are more likely to approach CALL activities with a positive mindset and a readiness to try new things and discover the array of digital resources that are accessible. Moreover, learners who see the use of technology in language learning as pertinent, captivating, and advantageous to their language progress are more inclined to cultivate effective resistance and actively engage in CALL practices (Huang et al., 2024). Higher levels of digital literacy, which include proficiency in utilizing different digital tools and platforms, contribute to learners' successful engagement with CALL activities and their ability to use technology to enhance language acquisition (Hadamitzky et al., 2020).

Self-organization theory, a branch of complexity theory, lends credence to school immunity, as Rahimpour et al. (2020) stated. According to the self-organization theory, when faced with external disruptions, humans can use an adaptive strategy to alter the internal mechanism (Rahmati et al., 2019). Furthermore, Aldosari et al. (2023) endeavored to determine the effects of immunity on language learners. They maintain that immunity is a framework that offers students the emotional and social support necessary to surmount challenges. Promoting learner autonomy and offering chances for self-directed learning via technology might strengthen productive immunity as learners assume more control and responsibility for their language learning process. To promote effective immunity, teachers and curriculum designers should prioritize incorporating clear and direct instruction on digital literacy. They should also create opportunities for learners to develop a strong belief in their ability to use technology effectively.

Self-evaluation

Students' confidence in their skills is reflected in their self-evaluation, a unified way of thinking about themselves. Since it fosters an optimistic outlook on life and increases pleasure, SE is linked to greater engagement in educational activities (Judge et al., 2003). Students regularly exposed to positive self-evaluation are more likely to maintain an optimistic worldview when faced with adversity. In the words of Ismail and Heydarnejad (2023), students who participate in considerable quantities of self-evaluation are better equipped to shield themselves against a wide variety of academic problems. A significant concept connected to self-evaluation in CALL is the notification hypothesis (Nagata, 1993), which indicates that giving learners fast feedback and the opportunity to self-evaluate might promote language acquisition. This corresponds with theories of self-regulated learning, which highlight the role of metacognitive abilities, such as self-monitoring and self-evaluation, in the learning process (Zimmerman, 2000).

Previous research has shown that teenagers with high levels of self-evaluation are better able to regulate their emotions and connect positively with adults and their peers (Nemati et al., 2021; Ritonga et al., 2023). CALL systems can offer personalized feedback based on learners' self-assessments, leading to more targeted and compelling learning experiences (Zheng et al., 2023). Similarly, Wicaksono et al. (2023) demonstrated how students' favorable behavioral patterns influenced their SE and stress-management skills. It was also underlined that EFL students with high levels of SE may have greater control over their psychological situations and are more effective in language acquisition (Riswanto et al., 2022). Similarly, Prasad et al. (2023) highlighted the potential for students to influence their emotional development by using the SE lens in this context. In general, the literature indicates that self-assessment is an essential element of effective CALL environments, as it allows learners to actively participate in their language acquisition and enhance their metacognitive

abilities. Nevertheless, additional research is required to investigate the potential of self-assessment in emerging CALL technologies and approaches and resolve the difficulties and constraints noted in this path.

Autonomy

To be autonomous is to make decisions based on one's internal state and interpretation of the world around them. Students who are free to make their own decisions may be more likely to regulate their behavior (Reeve, 2016). To succeed in school, students must develop and use their skills in real-world situations and be inventive in their ongoing involvement with the social milieu. External variables may be used to evaluate a person's abilities or competencies and motivate them to grow in certain areas (Little., 2022). Learners who feel secure in their place in the group are more likely to take part in activities that increase their feeling of belonging, laying the groundwork for the growth of their independence as students (Benson, 2013). Teachers' efforts to educate in a way that accommodates students' learning styles and promotes two-way communication with instructors are directly correlated with the degree to which their students' autonomy demands are met (Ludwig & Tassinari, 2021). Specifically, teachers' actions and attitudes are powerful tools for identifying and fostering students' latent motivational strengths.

When teachers encourage their students to make classroom decisions, they become more invested in their own learning, perform better, and achieve more (Little, 2022). They will be more motivated to learn and actively participate in class if their specific needs are met. This has been linked to increased probabilities of improved mental and physical health and enhanced scholastic achievement (Voller, 1997). Similarly, Gustavsson et al. (2019) found that blogging encouraged students to feel more in control of their learning. Furthermore, Little (2009) argued that students' levels of learning autonomy increased when they had access to study spaces built explicitly for them to utilize technology. Overall, integrating positive psychology principles into the design and implementation of CALL can create more engaging, motivating, and effective language learning environments. By focusing on positive emotions, intrinsic motivation, strengths-based approaches, resilience, and social connections, CALL can support learners' language acquisition and foster a more positive and fulfilling learning experience.

Methodology

Participants and Procedures

This research included a sample of EFL university students from Saudi Arabia divided into EG (n=48) and CG (n=45). Their ages ranged from 19 to 22, and they were all men. Based on their curriculum, they were expected to complete Top Notch 3 for their

discussion class successfully. Enrollment in this research was optional, and the students provided informed permission to participate in this investigation.

First, the OQPT was administered to assess the trainees' English proficiency. The cut value of 0.4-0.6 represented intermediate English skill level. Students with greater (between 0.7 and 0.9) and lower (between 0.1 and 0.4) scores, indicating high and low levels of language ability, were excluded. As intended, learners with intermediate English skills may participate in this study. Consequently, 93 students were classified as CG (n=45) or EG (n=48). This study used a quasi-experimental design. To ensure the trustworthiness of the findings, the participants were told not to attend any extra English courses throughout the trial. A pretest was carried out before the treatment. This test is divided into five sections that evaluate participants' techno-stress, immunity, self-evaluation, and autonomy in the virtual classes.

Second, the training process began. Top Notch 3 was taught for EG and CG throughout 14 sessions (one semester) in 2023. Learners in CG and EG participated in online classes delivered using webinar platforms (Big Blue Button). To increase their technical competence, the EG received concentrated instruction incorporating technology competency with positive psychology principles via a private What's App group. There was no similar training offered to the CG. Pertinent and associated materials inspired these tactics. A posttest (i.e., the test of techno-stress, immunity, self-evaluation, and autonomy) was administered to both CG and EG in session 14 before the final evaluation of the participants to measure the EFL learners' development and the project's success. Three EFL instructors evaluated the reliability of the outcomes by assessing pre- and posttests.

Measures

The OQPT is applied to select intermediate students. This test, developed by Oxford University Press, is a versatile test of English competence used to make this determination. This exam contains 60 multiple-choice questions on vocabulary and grammar, and learners with scores ranging from 40 to 47 are rated intermediate. The dependability coefficient for OQPT has been determined to be 0.828, suggesting a satisfactory metric.

The Techno-stress Scale (T-S S) was used by Wang et al. (2022) to assess the level of techno-stress experienced by EFL students. The eight distinct items were taken into consideration while developing this scale. It applied a Likert scale with a point value of 1, representing significant disagreement, and a point value of 5, representing strong agreement. In addition, T-S S dependability was found to be within acceptable levels (from 0.79 to 0.83).

Respondents' immunity was measured using a modified version of the Language Teacher Immunity Instrument developed and validated by Hiver and Dörnyei (2017). The 39-item Language Teacher Immunity Instrument is divided into seven subscales, each with a set of Likert-scale questions. The revised Language Learner Immunity Instrument (LLII)

consists of seven subsections and 39 questions, all of which are measured on a Likert scale from 1 (= strongly disagree) to 6 (= strongly agree). It assessed a sense of self-efficacy in the classroom (7 items), burnout (5), resilience (5), attitudes toward learning (5), openness to change (6), classroom affectivity (6), and coping (5). The Cronbach alpha coefficient for evaluating LLII 's dependability was satisfactory at (α= 0.873).

The students' academic performance at the institution was assessed using the core self-evaluation questionnaire (CSEQ) described by Judge et al. (2003). There is a set of twelve unique items, each assigned a rating on the Likert scale, encompassing a range from one to five. This scale captures the degree of agreement or disagreement, with one representing strong disagreement and five indicating strong agreement. The range of the scores in CSEQ can vary from 12 to 60 on this scale. A significant score on this scale means the participant had a favorable self-perception. Based on the results obtained from this investigation, it has been determined that the coefficient of reliability for the CSEQ is 0.869, suggesting a reasonable degree of dependability.

To gauge the extent to which the participants could direct their English language learning, a learner autonomy questionnaire (LAQ) was utilized (Zhang & Li, 2004). This survey has 11 questions, each with a 5-point Likert scale answer option. Researchers discovered acceptable results after calculating the instrument's internal consistency (α= 0.854).

Statistical Analysis

MANOVA was conducted to study the efficacy of technology adaptation workshops on techno-stress reduction and enhancement in immunity, self-evaluation, and autonomy. Analyses and evaluations of the associated assumptions were performed before MANOVA was conducted. The normality of the data, the size of the sample, the presence or absence of outliers, the linearity of the data, and the homogeneity of the regression were among these.

Results

As the initial step, the researchers must ensure the normal distribution of the data. Thus, the Kolmogorov–Smirnov test was run, and the results showed that the data were normal and using parametric statistics such as independent samples t-test and MANOVA were safe to be used. In the next step, it was necessary to ensure both groups' performance before the treatment; thus, checking the pretests of the EG and CG was done through an independent samples t-test.

Tab1e 1: *Descriptive Statistics Results Comparing EG and CG on the pretests of TS, LI, SE, and LA*

	Groups	N	Mean	Std. Deviation	Std. Error Mean
TS Pre	EG	48	29.3750	7.00949	1.01173
	CG	45	27.1111	6.57206	.97970
LI Pre	EG	48	128.5208	20.35430	2.93789
	CG	45	134.2000	21.70630	3.23578
SE Pre	EG	48	38.9792	24.64945	3.55784
	CG	45	39.8889	10.34677	1.54240
LA Pre	EG	48	38.3958	11.69422	1.68792
	CG	45	35.5556	25.94799	3.86810

Table 1 illustrates the EG and CG performances on the pretests of technological stress, learners' immunity, self-evaluation, and autonomy. A close look at the means values shows no remarkable differences existed; however, the Table below is recommended to be run to ensure any possible discrepancies.

Tab1e 2: *Independent Samples T Test Comparing EG And CG on The Pretests of TS, LI, SE, and LA*

		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
TS Pre	Equal variances assumed	.703	.404	1.604	91	.112	2.26389	1.41130
	Equal variances not assumed			1.607	91.000	.111	2.26389	1.40834
LI Pre	Equal variances assumed	.445	.507	-1.302	91	.196	-5.67917	4.36138
	Equal variances not assumed			-1.299	89.503	.197	-5.67917	4.37053
SE Pre	Equal variances assumed	.012	.913	-.229	91	.819	-.90972	3.96738

	Equal variances not assumed			-.235	63.915	.815	-.90972	3.87779
LA Pre	Equal variances assumed	.788	.377	.688	91	.493	2.84028	4.13011
	Equal variances not assumed			.673	60.305	.504	2.84028	4.22034

Based on Table 2, as all the *p* values under the *Sig.* (2-tailed) column in is higher than the significance level (.05), it could be readily understood that the difference between all the pretests of the EG and CG learners was not statistically significant.

The last step was checking the performance of both groups after the treatment. Thus, one-way MANOVA was utilized to compare the posttest scores of the EG and CG learners. The following Tables deal with comparing the EG and CG learners on the posttest of technological stress, learners' immunity, learners' self-evaluation, and learners' autonomy:

Table 3: *Descriptive Statistics Results Comparing EG and CG on the posttests of TS, LI, SE, and LA*

	Groups	Mean	Std. Deviation	N
TS Post	EG	20.4583	7.61007	48
	CG	34.0222	5.25482	45
	Total	27.0215	9.44662	93
LI Post	EG	176.5208	29.24292	48
	CG	133.1556	17.38593	45
	Total	155.5376	32.49902	93
SE Post	EG	48.0000	6.22281	48
	CG	34.4889	11.46065	45
	Total	41.4624	11.34399	93
LA Post	EG	47.3542	5.49076	48
	CG	25.8000	9.95124	45
	Total	36.9247	13.41822	93

The mean scores of both groups on the four dependent variables are illustrated in Table 3. As can be seen, remarkable differences existed between the mean scores of the two

groups. To make sure whether the differences were of statistical significance or not, the researcher had to refer to the MANOVA table below:

Table 4: *MANOVA Results Comparing EG and CG on the posttests of TS, LI, SE, and LA*

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.993	2957.494	4.000	88.000	.000	.993
	Wilks' Lambda	.007	2957.494	4.000	88.000	.000	.993
	Hotelling's Trace	134.432	2957.494	4.000	88.000	.000	.993
	Roy's Largest Root	134.432	2957.494	4.000	88.000	.000	.993
Groups	Pillai's Trace	.859	134.110	4.000	88.000	.000	.859
	Wilks' Lambda	.141	134.110	4.000	88.000	.000	.859
	Hotelling's Trace	6.096	134.110	4.000	88.000	.000	.859
	Roy's Largest Root	6.096	134.110	4.000	88.000	.000	.859

A close look at Table 4 shows that Wilk's Lambda's associated *Sig.* Value was .00, lower than the significance level (.00 < .05). Thus, the two groups of EG and CG significantly differed on their posttest regarding the TS, LI, SE, and LA. Now, to see which of the four dependent variables caused the difference between the two groups, the Table below should be checked:

Table 5: *Test of Between-Subjects Effects for TS, LI, SE, and LA*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Groups	TS Post	4273.063	1	4273.063	98.770	.000	.520
	LI Post	43677.228	1	43677.228	74.303	.000	.449
	SE Post	4239.874	1	4239.874	50.772	.000	.358
	LA Post	10790.294	1	10790.294	170.053	.000	.651

In Table 5, all the *p* values for the TS, LI, SE, and LA posttest were less than the significance level (.05). This means that the treatment used in this study (Virtual Language Learning) developed the learners' immunity, autonomy, and self-evaluation. More importantly, students' technological stress was remarkably decreased.

Discussion

The study's overarching goal was to examine how gaining techno-competence influences stress relief, immunity, self-evaluation, and autonomy in the context of online education. To reach this purpose, quasi-experimental research was performed in Saudi Arabian EFL teaching. MANOVA results showed that EFL learners who develop suitable levels of techno-competency can effectively manage their experienced anxiety in online assessment. As a result, the level of LI, SE, and LA is increased in the EG. This result was not unexpected, considering that the EFL anxieties of learners are impacted by what they experience in online teaching and evaluation. If learners are at ease and motivated to accomplish their learning tasks, they do not experience stress or have it at a much lower degree.

The study findings demonstrate that when EFL students prepare to employ technology and related applications by learning and practicing efficient methods and showcasing their ability, they are more likely to do well and have less anxiety. This is because they can exhibit their actual degree of expertise. To succeed in this online instruction and assessment, learners and teachers must acquire the skills necessary to prepare for online learning and recover from a test efficiently. EFL students need helpful strategies to get to this level of learning. By doing practice runs, they may learn to control their stress, provide a suitable performance, and keep track of the time.

Logically, pupils' language skills would improve if they had access to online self-paced, self-directed language instruction. Ismail and Heydarnejad (2023) found the same thing: there are direct relationships between self-efficacy and personal best goals. Students may develop a sense of independence and responsibility if given the necessary resources to succeed academically. Furthermore, frequent practice of critical thinking has been shown to improve concentration, mood, and other aspects of mental health (Wongdaeng, 2022), in addition to physical health. Thus, EFLs with a high techno-competence are more likely to react positively to barriers by establishing realistic targets and intentionally attempting to adapt to their new social networks and cultural expectations.

Other study results disclosed that techno competency might aid LI, SE, and LA development. The results showed that techno competency can affect LI, SE, and LA among EFL university students in a Big Blue Botton environment. Feeling upbeat and confident, learners used strategies that helped them immunize productively, think critically, manage their emotions, and act autonomously. Since no similar studies had been conducted, there was much to learn about the interplay between techno-competence, LI, SE, and LA. Prasad et al. (2023) believe combining SE and learner autonomy is crucial for successful remote education and evaluation. They further concluded that self-directed language students are more invested in their education.

In other words, the effective immunity of students is the result of practicing necessary information and evaluation strategies. Learners actively engaged in SE can better identify

their weaknesses and contribute to informed pedagogical decisions. The results indicated that tecno-competence mediated the relationships between the various components of LI. These components were learning self-efficacy, burnout, resilience, learning attitudes, openness to change, classroom affectivity, and coping. In the same line of inquiry, Wicaksono et al. (2023) provided evidence supporting this outcome. They concluded that self-evaluation was critical in people's sense of competence and identity. Academic emotion management is crucial in EFL students' self-assessment, as noted by Nemati et al. (2021). In addition, the research conducted by Namaziandost et al. (2024) demonstrated the interconnected relationships between identity formation, autonomy, motivation, emotional regulation, and productive immunity. Hence, self-awareness and the application of knowledge are fundamental to the functioning of the immune system in learners, especially in the CALL domain. These cognitive processes are associated with skillful decision-making L2 fortitude and self-efficacy (Zhang & Li, 2004; Wongdaeng, 2022).

It was found that SE serves as a go-between in how students of foreign languages experience fear. Based on the findings of this study, the more the EFL learners critically scrutinize themselves, the less anxiety they suffer from an online evaluation. As a result of using SE, students can track their progress closely and evaluate their performance. To successfully complete this evaluation, higher-order thinking skills, a sense of self-worth, and learner confidence. Trainees experience anxiety if their goals are too lofty in comparison to their abilities, as stated by Al-Hoorie et al. (2022). Therefore, EFL learners must be equipped with self-assessment to adequately control their unpleasant emotions, such as nervousness, in the educational context.

Social-cognitive theory's Bandura (2012) underlying premises lend credence to this finding by emphasizing the significance of students' active participation in self-management and self-examination to support improvement in their sense of efficacy. Students who have developed a healthy sense of self-worth via SE can better apply effective intellectual, metacognitive, and solution-focused strategies (Ritonga et al., 2023) to their academic challenges. Students who possess a healthy dose of the solution-oriented, metacognitive, and intellectually successful self-concept that results from SE can implement such strategies (Nurjamin et al., 2023). Students encounter unique obstacles during the progressive language acquisition process; however, the data analysis indicates that self-evaluation conveys an exceptionally positive message regarding strategies to assist language learners in overcoming these challenges.

Therefore, EFL learners can gain confidence and control, which reduces the anxiety and aggravation associated with navigating new digital tools by receiving comprehensive training and support for utilizing technology in language learning. Techno competence can cultivate a sense of immunity, or the capacity to adapt and flourish in the presence of technological obstacles. More importantly, positive psychology promotes well-being by

cultivating personal strengths and resources (Aydın & Tekin, 2023). As a result, learners are more inclined to persist and surmount any challenges they may face when they feel empowered to utilize technology in their language learning effectively. This, in turn, improves their CALL experience. In summary, techno competence can substantially contribute to CALL's overall effectiveness and success from a positive psychology perspective by regulating technological stress, building immunity, nurturing positive self-evaluation, and promoting autonomy.

Conclusion and Pedagogical Implications

The fundamental goal of this research was to shed light on the efficacy of tecno-competence and its role in techno-stress, LI, SE, and LA in CALL. Notwithstanding the challenges associated with acquiring a new language, it has been determined that developing qualities such as tecno-competence in online instruction is crucial. Implementing self-help strategies and virtual instruction in language education and assessment warrants the attention of policymakers, curriculum developers, content creators, test administrators, and language instructors. This will ensure the academic success of students and, above all else, the betterment of society at large.

Further empirical research in this seemingly nascent discipline could illuminate a pathway that enhances students' academic achievements and ensures effective pedagogy. Policymakers, curriculum designers, content producers, test developers, and language educators must acknowledge the benefits of incorporating psychological factors to alleviate students' tension levels during language assessments. I also encouraged work that assists EFL learners in applying effective technology-assisted learning and self-help frameworks beyond the classroom. Self-awareness and self-confidence are abilities that ought to be developed from the outset of language study, particularly in the context of online instruction. By adopting this approach, EFL students will be more likely to succeed with technology, educators will be able to customize their lessons for each student more effectively, and all parties involved will benefit.

Given the increasing importance of online and virtual education and the rapid advancement of technology, integrating psychological and mental aspects into the curriculum can improve students' capacity to access course materials from any location and at any time, even outside of class hours. Therefore, Instructors must acquire digital literacy to utilize technological platforms for assessment and language instruction. As stated previously, it is imperative to cultivate the positive psychology of students throughout their academic journey. Instructors and students are recommended to possess knowledge regarding self-help concepts and their potential consequences on their mental and physical well-being.

Quantitative methods were used to collect the data for this study; nevertheless, qualitative methods could enhance the reliability of future research. Furthermore, the

subsequent research endeavors may examine the effects of various educational tools and platforms on language subskills. In this study, no female participants were included. Future research may investigate the implications of including individuals of both genders. Foreign language learners of English were the focus of this inquiry. Further research is warranted to examine the potential impacts of the above-mentioned variables in online assessments across various subject areas.

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References

Ahmed Abdel-Al Ibrahim, K., Hashemifardnia, A. (2024). 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. *Asian. J. Second. Foreign. Lang. Educ. 9*, 33. https://doi.org/10.1186/s40862-024-00258-0

Aldosari, M., Heydarnejad, T., Hashemifardnia, A., & Abdalgane, M. (2023). The interplay among self-assessment, using reflection for assessment, classroom enjoyment, and immunity: Into prospects of effective language learning. *Language Testing in Asia*. 13(1). https://doi.org/10.1186/s40468-022-00213-1

Al-Hoorie, A. H., Oga-Baldwin, W. Q., Hiver, P., & Vitta, J. P. (2022). Self-determination mini-theories in second language learning: A systematic review of three decades of research. *Language Teaching Research*, 9. https://doi.org/10.1177/13621688221102686

Alotumi, M. (2018). The effect of CALL-based instruction on students' score attainment on the TOEFL iBT in a Yemeni context. *International Journal of Computer-Assisted Language Learning and Teaching, 8*(1), 50–62. https://doi.org/v:8:y:2018:i:1:p:50-64

Aydın, S., & Tekin, I. (2023). Positive psychology and language learning: A systematic scoping review. *Review of Education, 11*(3), 1–27. https://doi.org/10.1002/rev3.3420

Bachman, L. F. (2015). Justifying the use of language assessments: Linking test performance with consequences. *JLTA Journal*. 18, 3–22.

Bachman, L. F., Palmer, A. S., & Palmer, A. S. (2010). *Language assessment in practice: Developing language assessments and justifying their use in the real world*. Oxford: Oxford University Press.

Bandura, A. (2012). Social cognitive theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. *Higgins (Eds.), Handbook of theories of social psychology (pp. 349–373).* Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n18.

Benson, P. (2013). *Teaching and researching autonomy (2nd ed.).* London: Routledge. https://doi.org/10.7916/D8CV4HB8

Brod, C. (1984). *Technostress: The Human Cost of the Computer Revolution*. Addison-Wesley Publishing Company, Reading, USA. https://doi.org/10.1177/089443938600400428

Christiansen, I. M., & Els, R. (2019). The CALL of Zulu: reflections on the development of a computer-assisted language learning package. *Computer Assisted Language Learning,10*(4), 1–24. https://doi.org/10.1080/09588221.2019.1604552

Dewaele, J.-M., Chen, X., Padilla, A. M., & Lake, J. (2019). The flowering of positive psychology in foreign language teaching and acquisition research. *Frontiers in Psychology*, 10, 2128. https://doi.org/10.3389/fpsyg.2019.02128

Grenner, C. (2019). The effect of the use of CALL on pupils' motivation and language development in English. *Journal of Educational Media, 6*(3), 1–25. https://doi.org/150807087

Hadamitzky, M., Lückemann, L., Schedlowski, M. & Engler, H. (2020). How learning shapes immunity. *Neuroforum, 26*(3), 179-184. https://doi.org/10.1515/nf-2020-0017

Hiver, P. (2015). Once burned, twice shy: *The dynamic development of system immunity in language teachers*. In Z. Dornyei, P. D. MacIntyre, & A. Henry (Eds.), Motivational dynamics in language learning, (pp. 214–237). Multilingual Matters. https://doi.org/10.21832/9781783092574-017

Hiver, P. (2017). Tracing the signature dynamics of language teacher immunity: A retrodictive qualitative modeling study. *The Modern Language Journal. 101*(4), 669–690. https://doi.org/10.1111/modl.12433. https://doi.org/10.1111/modl.12433

Hiver, P., & Dörnyei, Z. (2017). Language teacher immunity: A double-edged sword. *Applied Linguistics. 38*(3), 405–423. https://doi.org/10.1093/applin/amv034

Huang, L., Al-Rashidi, A.H. & Bayat, S. (2024). Teacher support in language learning: a picture of the effects on language progress, academic immunity, and academic enjoyment. *BMC Psychol. 12*, 124. https://doi.org/10.1186/s40359-024-01602-2

Huang, M. (2024). Empowering oral proficiency in a large-scale class: video-recorded oral presentations and mobile-assisted peer assessment in a Chinese Middle school. *Computer Assisted Language Learning*, 1–21. https://doi.org/10.1080/09588221.2024.2382851

Ismail, S. M., & Heydarnejad, T. (2023). Probing into the influence of EFL learners' self-assessment and evaluation apprehension in predicting their personal best goals and self-efficacy skills: a structural equation modeling. *Language Testing in Asia*. 13, 8. https://doi.org/10.1186/s40468-023-00219-3

Judge, T. A., Ereza, A., Bono, J. E., & Thoreson, C. J. (2003). The core self-evaluation scale (CSAs): Development of a measure. *Personnel Psychology*. 56, 303–331. https://doi.org/10.1111/j.1744-6570.2003.tb00152.x

Khlaif, Z.N., Sanmugam, M., Joma, A.I., Odeh, A., & Barham, K. (2023). Factors Influencing Teacher's Technostress Experienced in Using Emerging Technology: A Qualitative Study. *Tech Know Learn*. 28, 865–899. https://doi.org/10.1007/s10758-022-09607-9

Little, D. (2009). *Learner autonomy, the European language portfolio and teacher development.* In R. Pemberton, S. Toogood, & A. Barfield (Eds.), Maintaining control: Autonomy and language learning (pp. 147-174). Hong Kong: Hong Kong University Press. https://doi.org/10.1017/S0261444808005636

Little, D. (2022). Language learner autonomy: Rethinking language teaching. *Language Teaching*. *55*(1), 64-73. https://doi.org/10.1017/S0261444820000488

Ludwig, C., & Tassinari, M. G. (2021). Foreign language learner autonomy in online learning environments: the teachers' perspectives. *Innovation in Language Learning and Teaching, 17*(2), 217–234. https://doi.org/10.1080/17501229.2021.2012476

MacIntyre, P. D. (2021). *Exploring applications of positive psychology in SLA*. In K. Budzinska & O. Majchrzak (Eds.), Positive psychology in second and foreign language education (pp. 17–34). Springer. https://doi.org/10.1007/978-3-030-64444-4_1

Maier, C., Laumer, S., Wirth, J., & Weitzel, T. (2019). Technostress and the hierarchical levels of personality: A two-wave study with multiple data samples. *Eur. J. Inf. Syst*. 28, 496–522. https://doi.org/10.1080/0960085X.2019.1614739

Manegre, M., & Sabiri, K. A. (2020). Online language learning using virtual classrooms: an analysis of teacher perceptions. *Computer Assisted Language Learning, 35*(5-6), 973–988. https://doi.org/10.1080/09588221.2020.1770290

Nagata, N. (1993). Intelligent computer feedback for second language instruction. *The Modern Language Journal, 77*(3), 330-339. https://doi.org/10.1111/j.1540-4781.1993.tb01980.x

Namaziandost, E., Heydarnejad, T., Rezai, A., & Javanmard, K. (2024). A voyage of discovering the impacts of teacher immunity and emotion regulation on professional identity, autonomy, and work motivation in Iranian EFL landscape. *BMC Psychology, 12*, 43- 54. http://doi.org/10.1186/s40359-024-01544-9

Nemati, M., Ghafoori, M., Birjandi, P., & Izadpanah, S. (2021). Self-assessment, peer assessment, teacher assessment and their comparative effect on EFL learners' second

language writing strategy development. *Journal of English Language Teaching and Learning. 13*(28), 201–216. https://doi.org/10.22034/ELT.2021.48543.2

Nurjamin, A., Salazar-Espinoza, D. E., Saenko, N., & Bina, E. (2023). Learner-oriented assessment matters: testing the effects of academic buoyancy, reflective thinking, and learner enjoyment in self-assessment and test-taking anxiety management of the EFL learners. *Language Testing in Asia*. 13, 30. https://doi.org/10.1186/s40468-023-00247-z

Parmaxi, A., & Zaphiris, P. (2016). Web 2.0 in Computer-Assisted Language Learning: a research synthesis and implications for instructional design and educational practice. *Interactive Learning Environments, 25*(6), 704–716. https://doi.org/10.1080/10494820.2016.1172243

Prasad, K., Aladini, A., Normurodova, N.Z. & Belton, B. (2023). Take language assessment easy: the mediator impacts of self-assessment, test-taking skills in predicting student evaluation apprehension, foreign language learning self-esteem, and language achievement in online classes. *Language Testing in Asia*. 13, 34. https://doi.org/10.1186/s40468-023-00246-0

Pyo, J., & Lee, C. H. (2024). Developing learner autonomy and EFL listening skills through mobile-assisted blended learning. *Innovation in Language Learning and Teaching*, 1–16. https://doi.org/10.1080/17501229.2024.2372068

Qi, C. (2019). A double-edged sword? Exploring the impact of students' academic usage of mobile devices on technostress and academic performance. *Behaviour & Information Technology. 38*(12), 1337–1354. https://doi.org/10.1080/0144929X.2019.1585476

Rahimpour, H., Amirian, S., Adel, S., & Zareian, G. (2020). A model of the factors predicting English language teacher immunity: A path analysis. *Indonesian Journal of Applied Linguistics. 10*(1), 73–83. https://doi.org/10.17509/ijal.v10i1.24990

Rahmati, T., Sadeghi, K., & Ghaderi, F. (2019). English as a foreign language teacher immunity: An integrated reflective practice. *Iranian Journal of Language Teaching Research. 7*(3), 91–107. https://doi.org/10.30466/ijltr.2019.120738

Reeve, J. (2016). *Autonomy-supportive teaching: What it is, how to do it, In J. C. K. Wang, W. C. Liu, & R. M. Ryan's (Eds.).* Motivation in educational research: Translating theory into classroom practice (Chpt. 7, 129–152), Springer. rev3.3420. https://doi.org/10.1007/978-981-287-630-0_7

Riswanto, Heydarnejad T., Saberi Dehkordi, E., & Parmadi, B. (2022). Learning-oriented assessment in the classroom: The contribution of self-assessment and critical thinking to EFL learners' academic engagement and self-esteem. *Language Testing in Asia*. 12, 60. https://doi.org/10.1186/s40468-022-00210-4

Ritonga, M., Shaban, A.A., Al-Rashidi, A.H. & Chilani, N. (2023). Engagement in Online Language Assessment: are test-taking skills, self-assessment, resilience, and

autonomy critical? *Language Testing in Asia.* 13, 25. https://doi.org/10.1186/s40468-023-00236-

Upadhyaya, P., & Vrinda. (2020). Impact of technostress on academic productivity of university students. *Education and Information Technologies*. https://doi. org/10.1007/s10639-020- 10319-9

Voller, P. (1997). *Does the teacher have role in autonomous language learning*. In P. Benson & P. Voller (Eds.), autonomy and independence in language learning, (pp. 98-113). Longman. https://doi.org/10.4324/9781315842172-9

Wang, Q., Zhao, G., & Cheng, Z. (2022). Examining the moderating role of technostress and compatibility in EFL Learners' mobile learning adoption: A perspective from the theory of planned behavior. *Frontiers in Psychology*. 10, 13:919971. https://doi.org/10.3389/fpsyg.2022.91997

Wang, X., Tan, S. C., & Li, L. (2020). Technostress in university students' technology-enhanced learning: An investigation from multidimensional person-environment misfit. *Computers in Human Behavior*. 105, 106208. https://doi.org/10.1016/j.chb.2019.106208

Wicaksono, B.H., Ismail, S.M., Sultanova, S.A. & Abeba, D. (2023). I like language assessment: EFL learners' voices about self-assessment, self-efficacy, grit tendencies, academic resilience, and academic demotivation in online instruction. *Language Testing in Asia*. 13, 37. https://doi.org/10.1186/s40468-023-00252-2

Wong, P. T. P. (2011). Positive psychology 2.0: Towards a balanced interactive model of the good life. *Canadian Psychology, 52*(2), 69–81. https://doi.org/10.1037/a0022511

Wongdaeng, M. (2022). *The role of metacognition in the learning of English as a foreign language.* In N. Siddiqui, & S. Gorard (Eds.), Making your doctoral research project ambitious: Developing Large-Scale Studies with Real-World Impact. Routledge. https://doi.org/10.4324/9781003201366-10

Wrigglesworth, J. (2020). Using smartphones to extend interaction beyond the EFL classroom. *Computer Assisted Language Learning, 33*(4), 413–434. https://doi.org/10.1080/09588221.2019.1569067

Zhang, L. X., & Li, X. X. A. (2004). Comparative Study on Learner Autonomy between Chinese Students and West European Students. *Foreign Language World*. 4, 15–23. https://sid.ir/paper/618901/en

Zheng, C., Wang, L., & Chai, C. S. (2023). Self-assessment first or peer-assessment first: Effects of video-based formative practice on learners' English public speaking anxiety and performance. *Computer Assisted Language Learning, 36*(4), 806–839. https://doi.org/10.1080/09588221.2021.1946562

Zimmerman, B. J. (2000). *Attaining self-regulation: A social cognitive perspective*. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation (pp. 13–39). Academic Press. https://doi.org/10.1016/B978-012109890-2/50031-7