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Language Teachers' Immunity in Technology-Integrated Classrooms in Light of Activity Theory: A Case of Public Schools versus Private Institutes

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Abstract
Language teacher immunity (LTI), i.e., the ability to confront professional challenges, has recently gained momentum in applied linguistics research. However, the impact of technology integration on its development across diverse educational contexts has not yet received the attention it deserves. The present study aims to fill this gap by exploring the immunity of 10 language teachers from public and private institutions with respect to the integration of technological instruments in their actual practices. Data were collected through narrative frames and semi-structured interviews drawing on Activity Theory (AT). The data analysis revealed that both groups of teachers experienced maladaptive immunity due to insufficient infrastructure, inequitable assessment standards, lack of technological support, administrative greed, and inadequate TPACK in their educational environments. To address these triggers, public sector teachers endeavored to adapt external resources while private sector teachers practiced autonomy and engaged in professional development courses. The participating teachers found self-reliant strategies more beneficial and reported that engaging in these processes led to a range of self-perceptions, from feeling highly autonomous to feeling demotivated. This study provides implications for language teachers, policymakers, and teacher educators.

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Introduction

Language teacher immunity (LTI) is "a robust armoring system that emerges in response to high-intensity threats and allows teachers to maintain professional equilibrium and instructional effectiveness" (Hiver & Dörnyei, 2017, p. 669). This acts as a double-edged sword that can manifest itself in either productive or maladaptive guises. Productive immunity provides "an adaptive outcome against chronic demands" (Hiver & Dörnyei, 2017, p. 11) such as excessive workload, while maladaptive immunity serves as a crippling mechanism against innocuous threats, including novel teaching techniques or modern technologies (Kazemi et al., 2022). Language teachers (LTs) with maladaptive LTI are more vulnerable to common workplace challenges such as insufficient preparation time for the lessons, demands for excessive paperwork (Boroujeni et al., 2021), the need for consistently instructing large classes without adequate support (Yalçın Arslan & Almacıoğlu, 2023), and being marginalized in decision-making processes (Haji Jalili et al., 2023). On the other hand, LTs who have fostered productive LTI are capable of staying in and even excelling in their profession despite unfavorable circumstances (Hiver, 2014). Likewise, they would be capable of shielding their emotional and physical well-being (Namaziandost et al., 2022), enhancing their job satisfaction and self-efficacy in the classroom (Haghi et al., 2025; Sarıçoban & Kırmızı, 2021), and addressing numerous conflicts constantly rising within the educational sector (Rahmati et al., 2019).

Technology integration (i.e., web-based tools) has currently become an essential component of the learning process in nearly all educational settings (i.e., face-to-face or online), posing both benefits and barriers to instructors (e.g., Rashtchi & Porkar, 2020; Xerri et al., 2025). Although technological tools can facilitate the quality of instructional process and boost learners' engagement and productivity (Cahyono et al., 2024) in language skills such as improved writing outcomes in low-interactivity technology-supported distance learning (Sison & Munoz, 2025), they are recognized as a potential source of challenge in the language learning process (Wang et al., 2021). Given that LTI plays a significant role in helping teachers sustain professional equilibrium and instructional effectiveness (Hiver, 2017), the relationship between this variable and technology integration, to the best of our knowledge, has not been adequately addressed. English as a foreign language (EFL) instruction is delivered in two distinct contexts in Iran, namely public schools and private language institutes. Each of these educational milieus has structural particularities and maintains various technological infrastructures (Rahimi & Zhang, 2015). Exploring the potential impacts of these varied contexts on LTI drawing on the AT framework can illuminate the current EFL teachers' immunity. To address this, the current study aims to investigate the following research question (RQ):

RQ: How has technology integration affected LTs' LTI development in both public and private sectors from an AT perspective?

Literature Review

The Origin of LTI

LTI is grounded in Complexity Theory (CT; Larsen-Freeman, 2012), which posits that the enhancement of teacher immunity occurs through a self-organized and emergent process where teachers dynamically recreate their intrinsic systems in response to situational disruptions, adapting, changing, and advancing professionally (Hiver, 2014). Inspired by the concept of the body's immune system, Hiver (2014) characterized teacher immunity as a resistance to external factors. This immunity evolves in response to disruptions and functions as a protective measure against the demands imposed on the teachers and the distressing incidents that lead to emotional exhaustion and burnout. Specified by the context of the current study on EFL instruction, LTI is described as a coping strategy that LTs employ to shield themselves from the inevitable obstacles of their occupation (Hiver & Dörnyei, 2017). As articulated by Hiver and Dörnyei (2017), self-organization comprises four stages including triggering (disruptions in various system functions), coupling (the reconfiguration of a system's function in response to the disturbances), realignment (the restoration of equilibrium through establishing a reciprocal relationship between a specific disturbance and response to it), and stabilization (transformations made in the system which can mitigate future disturbances).

LTI and Contextual Factors

This category addresses studies that have investigated the impact of contextual factors on LTs' immunity and yielded contradictory results in some cases. Canbay and Sönmez (2023) reported a substantial variability in language teachers' immunity in Turkey and Qatar based on their workplace and teaching experience. In contrast, Sarıçoban and Kırmızı (2021) did not disclose any inconsistencies regarding Turkish language teachers' immunity and their teaching experience, but school type exerted a determining role on teachers' immunity levels. These discrepant findings suggest that although LTI development may be influenced by experience, it is not the sole determining factor, and additional contextual factors also warrant further investigation. More recently, a multi-level study was conducted by Sun et al. (2025) in China to examine the relationship between teacher immunity, school climate, and student-reported teaching quality. The results revealed that teacher immunity can positively predict teaching quality, provided that the school enjoys a supportive climate.

In an attempt to assess public and private sector EFL teachers' perceptions of their immunity, Haji Jalili et al. (2023) concluded that private sector EFL teachers experienced lower levels of immunity than their public counterparts, attributed to factors such as insufficient governmental superintendence, a substantial number of unemployed graduates, employers' avarice, and the diminishing societal value of education. This study calls the prevailing assumption regarding the benefits of private sector employment into question and underscores the significance of job security and professional recognition as critical factors in LTI development. In another study, Pourbahram and Sadeghi (2020)

examined the correlation between motivation and LTI in public and private contexts and obtained no significant relationships in either context. However, in the qualitative phase, the difficulties were initially determined to stem from the personality types of both language teachers. Secondly, working with heterogeneous groups of language learners concerning their age and gender would displace the instructors from their comfort zone; however, public educators indicated that heterogeneity in learners' proficiency levels and behavioral issues would induce significant stress. Regarding educational triggers, the inability to furnish students with realistic performance feedback in private sectors and having to teach a course book replete with educational deficiencies in public schools were identified. Ultimately, concerning contextual considerations, the presence of a supervisor in private sectors induced uneasiness, while their public counterparts identified a lack of time compared to content volume as a contributing issue. To address these pressures, educators chose to engage in prior classroom preparation, refrain from preconceived judgments, and strive to improve both their content and psychological expertise. In a comparable classification, Boroujeni et al. (2021) reported that the destabilizing factors for LTs might be categorized as educational, organizational, and personal in nature. Educational triggers were known to be rooted in textbooks, learners, teaching methods, assessment, and the existing curriculum. Organizational factors were based on inadequate payment, equipment, autonomy, training, and social support. Personal disturbances were attributed to demographic features, negative attitudes, limited content knowledge, and negative personality traits.

Given the significance of LTI in shaping the teachers' responses to adversities, Songhori et al. (2018) and Boroujeni et al. (2021) examined the predominant kind of LTI among Iranian LTs and the mechanisms through which this immunity is shaped. The researchers found that Iranian EFL teachers were mostly maladaptively immunized and their immunity underwent four stages of triggering, coupling, realignment, and stabilization. In contrast, Maghsoudi's (2021) study findings revealed that student-teachers demonstrated three types of immunity: maladaptive, productive, or neutral, with the productive one being predominant. Teaching experience was identified as a crucial component influencing the immunity level of language instructors. In a complementary vein, Rahmati et al. (2019) discovered that in-service language teachers first encounter low self-confidence, students' demotivation, insufficient income and facilities, restricted time for interaction, parental expectation, and negative attitudes. They subsequently addressed these issues through prior preparation, fostering a positive relationship with learners, and exerting autonomy in supplying necessary resources and negotiating goals with parents. A novel form of immunity, imposed maladaptive, stemming from policymakers' lack of support, was also identified by Iranian EFL teachers.

LTI and Technology Integration

The studies in this category examine the potential correlation between LTI and technology integration, although offering disparate findings. For example, in a mixed-

methods study by Beyranvand and Mohammadi Zenouzagh (2021), the qualitative data revealed that teacher engagement is strongly correlated with LTI and may serve as a substantial predictor of it, but Technological Pedagogical Content Knowledge (TPACK) is neither connected with nor predictive of LTI. Given that the abrupt surge of the Covid-19 pandemic necessitated a rapid transition to online instruction, language teachers perceived a strong need for LTI as a protective armor against potential threats compared to times gone by. Keeping this in mind, Azizpour et al. (2023), who examined the impact of contributing factors on LTI formation. The findings indicated that there was a pairwise association among LTI, occupational stress, teaching experience, and teaching enjoyment. Research has further demonstrated that there were varying alterations in multiple aspects of teachers' immunity. These changes were mostly attributable to language teachers' expertise with online instruction, skepticism, and limited learners' engagement. This study actually aimed to demonstrate the crucial influence of context and support networks in the development of LTI.

In language instruction, the implications of AI have recently seen growing attention (e.g., Kamali et al., 2024; Satvati et al., 2025; Wang et al., 2025). For example, Heydarnezhad and Cakmak's (2024) study results demonstrated that LTI, along with work passion, significantly contributes to achieving equilibrium in job satisfaction and occupational and psychological well-being. Regarding the popular implications of computer-assisted language assessment, Alam et al. (2024) found that LTI and reflective teaching are essential for integrating AI into language assessment, thereby ensuring job satisfaction and grit. Khan et al. (2024) and Huang et al. (2024) investigations highlighted the significance of learners' immunity, which is improved by AI-assisted assessments, boosting immunity and online instruction.

Predictors of LTI

The second category of LTI-related research concerns the impact of various factors on the LTI degree and its formation. Research has shown a positive correlation between LTI and reflective practices. In other words, contemplating the teaching process could improve educators' knowledge of their instructional methods, affective factors, and professional growth (Yalçın Arslan & Almacıoğlu, 2023). Further research revealed that offering educators training in autonomy, commitment, and emotion regulation can enhance their productive immunity (Azari Noughabi et al., 2020) and improve their resilience, grit, and, more importantly, immunity (Ismail & Nikpoo, 2023). This positive correlation was confirmed in Namaziandost et al. (2022) study in which they reported a significant correlation between Iranian EFL teachers' reflective teaching and emotion regulation with their immunity.

Regarding EFL teachers' personality traits, Khazaeenezhad and Davoudinasab (2022) found substantial correlation between teachers' self-efficacy, conscientiousness, and LTI. Likewise, Ahmadi et al.'s (2020) study indicated a relation between LTI and demographic

features such as gender, age, and teaching experience. In another study on Chinese language educators by Li (2022) revealed a direct relationship among EFL teachers' immunity, mindfulness, and work engagement. To develop a model that identifies predictors of LTI, Rahimpour et al. (2020) also found that agreeableness, extroversion, and emotionality indirectly influenced LTI through job insecurity and reflective teaching, which had direct impacts on it. Furthermore, Bapiri et al. (2025) found a negative correlation between LTI and classroom management. In fact, openness to change and teaching self-efficacy, which are two factors of LTI, were identified as predictors of classroom management.

After reviewing previous studies on LTI, the researchers identified three main gaps that the present study sought to address. The first gap relates to a body of research which focused solely on language teachers' self-perceptions in public and private school contexts without considering structural factors such as differences in resource allocation between these sectors. Second, the existing literature on LTI and technology is context-independent. Third, to the best of our knowledge, prior investigations have not been undertaken within a rigorous theoretical framework. Consequently, the present study seeks to examine the relationship between LTs' LTI development and technology integration in their unique workplace within an AT framework.

Theoretical Framework

This study relies on Engestrom's (1987) AT model, which consists of six integral components of human conduct, illustrated as a triangle. The three vertices above (tools, subject, and object) signify individual elements of an activity, while the base (rules, community, and division of labor) denotes collective aspects.

Various studies have employed this framework so far (e.g., Kamali & Alpat, 2025; Kamali et al., 2024; Soleimani et al., 2025), in which the subject denotes the individuals engaged in a particular activity, viewed from the standpoint through which the activity is conceptualized. For instance, in this study, LTs working in the public and private sectors are subjects. The object pertains to the final objective the individuals seek to achieve (e.g., improving the quality of his/her instruction). Subjects utilize tools (e.g., technical tools) to attain their objectives while they are complying with both implicit and explicit norms (e.g., organizational rules) which can either enhance or hinder performance. Community corresponds to the organization to which individuals belong while participating in activities (e.g., public and private sectors). Last but not least, the division of labor encompasses the collective obligations of community members, incorporating roles and power dynamics among them (e.g., LTs instructional endeavors). Every activity entails interaction among all these six elements, facilitating a comprehensive understanding of the activity under investigation. Each component influences and is influenced by other parts and is incapable of being separately analyzed (Engstrom, 2015).

Context of the Study

The present study was carried out in Iran, where English Language Teaching (ELT) is provided in two contexts, namely public schools and private language institutes. State-run schools necessitate learning a foreign language, which is mostly English, from grade 7 to grade 12 with the aim of advancing communicative competence (Frahady & Hedayati, 2009). However, the kind of instruction practically rendered by the teachers does not align with this claim. In fact, instructions were mainly based on explicit teaching of grammar and reading (Hayati & Mashhadi, 2010). This incoordination might be rooted in large class sizes, lack of the required equipment, EFL teachers' low proficiency levels, and students' discrete-point assessment (Moradkhani & Haghi, 2017).

Students who cannot achieve their desirable communicative competence levels in public schools tend to seek help from institutes that follow the basic principles of communicative language teaching (Zhang & Rahimi, 2014). Writing and speaking skills are equally prioritized in these contexts as most individuals intend to take part in international tests such as the International English Language Testing System (IELTS) and Tests of English as a Foreign Language (TOEFL) (Rahimi & Zhang, 2015). Despite the optimism of LTs in Iran regarding the integration of technological tools into their instructional practices (Jahanban-Isfahan et al., 2017), obstacles persist, including insufficient TPACK, inadequate resources, unreliable internet connectivity (Taghizadeh & Yourdashi, 2020), budgetary limitations (Farahani et al., 2015), and the absence of a unified policy to support technology integration, which may impede the effective utilization of these tools.

Design of the Study

The current study adopted a narrative inquiry approach (Clandinin & Conneley, 2000) to explore LTs LTI development while integrating technology in their classes in two distinct contexts. This approach is of great assistance in disclosing the participants' personal experiences and enables the researchers to draw a connection between the individual's current and former involvement in their field (Fan & Jong, 2019).

Participants

Participants of this study included 10 LTs in total. Five LTs were working at state schools, and the remaining five were involved in language teaching in the private sector. These individuals, drawn through convenience sampling (Creswell, 2009), were called upon via direct calls and social networks.

All of the participating teachers were born in Iran and had Persian as their first language. Their age ranged from 28 to 47 (M= 37.7). They hold academic credentials in English-related majors and were teaching students of diverse proficiency levels at the time of the study. Their teaching experience spanned from 5-20 years (M=12.6). The existing demographic variations in this study complicate the findings and enrich the data by

incorporating distinct perspectives within the Iranian EFL teaching context. With regard to the ethical concerns, the purpose of the study was clarified for the participants, and they were informed that their contribution to the study is voluntary and they can withdraw from the study at any time. Moreover, the participants were assured about the anonymity of their identities. Thus, the researchers utilized pseudonyms throughout the study findings.

Data Collection

The required data for the current study were collected through narrative frames and semi-structured interviews. Firstly, narrative frames were distributed among the participants either in hard copies (4 numbers) or via Google Forms (6 numbers). These guiding blueprints were supposed to scrutinize the plausible impacts of technology integration on the language teachers' immunity in both public and private sectors. As Barkhuizen and Wette (2008) put it, narrative frames contribute to the purposeful collection of data using the sentence starters they contain. The narrative frames utilized in this study reinforced the rigorous data-gathering process. For instance, one of the narrative frameworks was

> *There are/are not enough technological tools in my workplace. The implementation of these tools leads to/ does not lead to effective instruction and goal achievement because …….*

As the narrative frames were collected, the researchers invited the participants to attend interview sessions. The narrative structures and interview questions were both guided by the leading constituents of the AT. Although the skeleton structures during the first phase of data collection helped the researchers gain an overall perception of the LTs' involvement with technological tools, the interview queries created a chance to elaborate thoroughly on the unnoticed factors in the former stage. Researcher positionality played a key role in shaping the dynamics of the data collection process. The data was gathered by the first researcher. The interviews were conducted in Persian and were audio-recorded after receiving the language teachers' consent. Each of the interviews took about 45 minutes.

Data Analysis

After collecting data from narrative frames and interviews, they were first transcribed verbatim and then subjected to the participants to clarify the member-checking process (Cohen et al., 2007). The data of this study were analyzed using thematic analysis (Merriam, 2014). It consists of three stages of constructing, sorting, and naming the categories. In the initial stage, the categories were constructed by reviewing the data to grasp a sense of LTs' perceptions of their technology-related experiences and their potential impacts on their immunity. After that, themes were identified and classified. Finally, all researchers specified labels underlying each theme's content for each class.

The reliability of the coding stages was ensured through inter-rater reliability (Gass & Mackey, 2000). To do so, a research assistant evaluated the transcription and classified the data. The research assistant and the first researcher conducted independent analyses of the data and initially achieved 78% agreement. Discrepancies later discussed until a consensus was achieved (final agreement = 94). It is noteworthy that the research assistant received the theoretical framework and coding rules in advance. The other researchers evaluated the final coding framework and theme organization, offering further validation of the analytical procedure.

Findings

This section explores how LTs develop their immunity in technology-integrated classrooms by exploring the triggers, coupling strategies, realignment and stabilization stage using AT as a theoretical framework. Each phase is scrutinized through the six pillars of AT (tools, rules, community, division of labor, subject, and object) to offer an in-depth overview of how contextual factors affect LTI development in public and private language instruction settings.

Triggers

Tools

LTs in both groups asserted that they have been struggling with inadequate technical tools and poor performance of the available ones. Public school trainers alluded that their classes are devoid of any technological devices, with only one computer site in each state school building. Teachers must inform the school authorities about the exact date they plan to utilize it. Otherwise, they are almost certainly deprived of delivering any electronic content to the students. The main source of frustration for these teachers was that they constantly had to postpone their education plans and stick to traditional teaching methods, despite being aware of the benefits of technology-integrated classes. As T3 barely uttered, working in this situation has diminished their desire to "*transfer content via technical tools due to the dearth of equipment*" (T3, narrative). While discussing the underlying reasons, state-run teachers believed that "*the amount of budget apportioned to schools for equipping the classrooms is insufficient and cannot be invested in preparing each class*" (T1, interview). Although private teachers described their classes as being equipped with small screen TVs and DVD players, they all complained, "*the technical tools in classes are antiquated and uninteresting to the students*" (T6, narrative).

Further clarification in the interview section revealed that those devices disrupted students' learning, as they were unable to observe what was being displayed on the screen. This failure in transferring the subject matter "*after downloading visuals with the aim of facilitating learners' understanding*" (T10, interview), agitated the language teachers and turned their instructional endeavor into a "*guessing game*" (T10, interview). Another factor perturbing teachers in both public and private contexts was the absence of a language laboratory. Almost all of the participants believed that this deficiency had a

negative impact on the learners' listening skills. Although teachers were aware that school principals and administrators were responsible for allocating a place and funds to equip language labs, they felt the onus of students' learning was on themselves and just kept thinking that "*as there are not adequate equipment to expose the learners to authentic language use, their listening skill is weak*" (T6, interview). LTs unanimously believed that the addition of language laboratories would revolutionize English teaching in both contexts, as the new students, known as "*generation Z*" (T7, interview), are real computer geeks who welcome working with computers. The internet access was another issue brought up by language teachers in both groups, but in different ways. While public school teachers were griping about poor network infrastructure and frequent internet outages, leaving them "*stressed and drenched with sweat*" (T2, interview), their counterparts were criticizing "*not having access to the internet*" and, as a result, "*depriving learners of multimedia content*" (T9, interview).

Rules

An important source of perturbation implicitly disarranging the stability of language teachers was found to be the surveillance of technology-related assessment criteria in their workplace. Public teachers expressed their disapproval of having their performance assessed based on the proper, purposeful implementation of technological tools in their classroom. This condition was described as "*inequitable*" (T1, T3, Interview) for teachers as they "*were required to expose learners to innovative teaching methods while they only have access to a white board*" (T5, interview). According to participating teachers, the assessment forms designed by the Department of Education and Training contain technology integration criteria that were impossible to meet given classroom realities, potentially perceiving teachers as items that are absent in classes. "*incapable trainer*s" (T2, interview). As stated by LTs, the alleged disconformity was deep-rooted in the "*lack of budget allocated to smartening up the schools*" (T2, T4, T1, Interview).

Although private-sector language teachers have limited access to a few outdated technical devices in their classes, they complained about the existing rules for their implementation. They identified themselves as "*unaided teachers*" (T6, narrative), who have to make the most out of the available obsolete resources on one hand, and increase their knowledge in this regard on the other hand. As they expounded, "*lesson planning based on the available old-fashioned tools is a tedious process*" and "*there is no room to express their creativity*" (T6, narrative). Four of the participants believed that they had experienced "*on the edge*" (T7, narrative) conditions when their class was observed by the education supervisor. They stated that they were apprehensive about sudden, probable malfunctions in the devices while "*being assessed against a criterion for which we are not only poorly qualified but also have access to very basic devices*" (T10, interview).

Community

State-run teachers noted that having to grapple with technical problems would impose extra unpleasant feelings on them when students who belong to "*a tech-savvy generation*" (T2, interview) would step in to find a solution for the trouble made. They presumed that learners would perceive them as "*incompetent teachers*" (T1, interview).

As various subject matters are taught in public schools, EFL teachers would sit adjacent to teachers of other domains like chemistry. That is why participants were of the opinion that they "*were not able to discuss technology implementation in their own teaching domain*" (T3, interview). In contrast, teachers of non-state-run sectors maintained that they had always "*enjoyed the collegial atmosphere dominating the staffroom*" (T 10, narrative). As teachers are working in similar fields, they can seek each other's advice and benefit from it. Considering the role played by administrators in both teaching communities, language teachers hold the idea that it is primarily the responsibility of administrators to provide technical tools which are usually "*outdated in appearance and application*" (T8, interview). However, for most of the private sector managers, earning more money takes precedence over innovative, updated teaching methodologies.

On the other hand, teachers postulated that in state-owned schools, principals had the power to request more budget from the Ministry of Education. However, equipping the classes or upgrading the existing devices is their last priority and this would perturb their comfort as they consider themselves "*responsible for the students' learning*" (T5, narrative). As the participants further explained, this situation highly depends on the school's location. If it is located in underserved regions, the budget received will be allocated to non-negligible, vital aspects. For example, they might decide to give priority to setting up the school's cooling/heating system. On the contrary, the budget disbursement for privileged schools is determined by the principal's attitude.

Division of labor

Teachers from both communities expressed their dissatisfaction with the absence of an expert in the field of educational technology in their workplace. Three of the public school teachers asserted that although a computerized site is available at school, instructors are not technically backed up in the face of unforeseen challenges. As they stated, under such circumstances, they are "*on the rack*" (T3, interview) waiting for a miracle to occur and save them.

Additional information gathered in this regard revealed that not all schools' administrative staff are strapped for a technical assistant workforce. In reality, schools educating 350 students are allowed to hire a technical assistant to accompany their education staff. However, as the country is currently suffering from "*lack of teaching workforce*" (T3, interview), the priority has been given to providing teaching staff in schools.

Subjects

The last but not least technology-related trigger was found to be the subject's lack of technological pedagogical content knowledge (TPACK). Language teachers believed that although triggers are an ineluctable part of the teaching process, they lose control of the class due to "*not being equipped with the relevant knowledge*" (T9, interview). However, they maintained that if they could rely on this knowledge, they would be able to diminish the intensity of perturbations. As specified by the language teachers, the inability to overcome the existing distress and surrender to the rules was attributed to the kind of education teachers had received during their university years and incoherent on-the-job training courses held by their current workplace. At the time of university, they had all been exposed to traditional teaching methods, and the books that pointed to the role of technology in the training process were sporadic and theoretical. In addition, courses for in-service teachers do not provide "*coherent and purposive training for the employment of technical tools*" (T6, interview). The trainers do not enjoy a developmental outlook and cannot impress the teachers. Pre-service teacher training courses only "*superficially address technology integration*" (T9, interview). More importantly, the implementation of the content transferred via workshops is never pursued by the course organizers.

Coupling Strategies

Tools

To deal with the triggers that have dislodged the teachers from their comfort level, both public and private instructors took various stances. To start with, 3 of the study subjects from the private sector stated that they have compensated for the lack of technical devices by carrying their tools to class. They stated that they would "*bear the burden of taking personal laptops to class because of the satisfying smile appearing on the learners' face*s" (T8, narrative).

Another LT disclosed that she has adapted her lesson plan "*in a way that it does not need any technical tools beyond the classroom supplies*" (T6, narrative). The last teacher from the private community asserted that based on the importance of the content to be taught, she would bear the cost of printing out the visuals and worksheets for the learners "*to simulate a technology-integrated atmosphere for the learner*s" (T10, interview) and "*diminish the intensity of feeling guilty for pursuing conventional pedagogies*" (T9, interview).

Concerning public school teachers, they desisted from wrestling with technological problems and instead took an adaptive step, although emotionally unrewarding toward them. A closer look at this issue throws light on the fact that the big size of the classes in state-run schools has put strong constraints on the teachers' academic freedom. For example, trying to figure out the technical problems in a class of almost 30, would lead to "*losing control of the class*" (T3, interview).

It is worth pointing out that LTs in state schools have access to a nationalized application known as "*Shad*". As the instructors highlighted, especially at the time of "*unexpected events, like extreme weather conditions or pandemics*" (T4, interview), they can take advantage of this software and share the e-learning content they have developed with the learners. As they declared, by utilizing this application, the disturbances they have gone through are "*remarkably untangled*" (T2, interview).

To address the absence of language laboratories, LTs from both backgrounds opted for distinct plans. Public school teachers, who did not have routine access even to computerized sites, had settled on uploading the audio files in the school-specific application, Shad. They believed that by doing so learners would have a chance of "*listening to the files repeatedly*" (T3, interview). It is noteworthy that learners are not allowed to carry their cell phones to schools and "*their performance is not supervised at home*" by the teachers (T5, interview). Moreover, two of the other teachers alleged that they had made use of their personal speakers and smartphones "*to play the audio files and expose students to the targeted pronunciation*" (T2, interview).

In relation to LTs in the private sector, although they had quite consistent access to very basic devices like DVDs and TV sets, with which they could play the files. They believed that they "*could do nothing to make amends for their low sound quality, especially when external noise aggravates the situation*" (T8, interview), except to become habituated to it during class time.

Three non-public teachers averred that to rectify the ongoing undersupply, they have given direction to the learners to exploit the updated content of listening skill improvement software (e.g., 6-minute English). Further explanations on this strategy revealed that teachers had assigned such listening files as homework and required the students to send them related reports. Doing this, language teachers "*have been able to boost students' listening skills and get rid of the chronic stress caused by the lack of equipment*" (T9, interview)

LTs from both working milieus handled internet connectivity problems by consuming their personal internet supply. Although this action imposed an excessive cost on the instructors, they expressed their contentment by stating that they do not like to sacrifice their "*career success for the tactlessness of the authorities in charge*" (T7, interview).

Rules

LTs from both settings reported that their primary reaction to unfair assessments was to raise the issue through discussion and to highlight the inadequacies of those responsible. As they explained, addressing teachers' concerns and providing them with the required resources is either ignored or takes too much time given that "*authorities never accomplish their promises*" (T9, interview). That is the reason why teachers in public

schools prefer to adapt themselves to the ongoing conditions. On the contrary, as promotion opportunities are more for private sector language teachers, they are inclined towards an improvised solution that relies on their own personal devices.

Community

As language teachers from private settings mentioned, they are able to deal with the administrative non-cooperation and predisposition by "*changing their teaching milieu and keeping on in another education center*" (T6, interview). However, most of the public school teachers would rather be compatible with the current circumstances.

Division of labor

Given that both teachers are deprived of having direct contact with ICT professionals, state-run language teachers would first "*take refuge in search engines like Google*" (T10, interview). As they are quite proficient in the English language, they are able to find a solution immediately. They would, secondly, "*seek advice from their colleagues*" (T4, narrative).

Subjects

Following private language teachers' agreement with the lack of technology-related knowledge and skill, which is an internal source of technical barriers in the classrooms, they stated that "*desiring not to lag behind peers in technology integration*" (T8, interview), they had taken up some on-the-job training courses offered by accredited centers to enhance their expertise in this regard.

State-run teachers similarly stated that during their occasional assemblies, language teachers would ask for training sessions on the integration of relevant technologies from the educational leaders who are "*quite helpful and approachable*" (T3, interview). This request is then referred to the education department and after several weeks of clerical work, the authorities would assign an expert to this professional development course.

Realignment Stage

At this stage of the study, LTs were encouraged to reflect on the effectiveness of the strategies they had implemented to identify a repertoire of valuable approaches for overcoming challenges (Hiver, 2014). Public school teachers reported that their adaptive strategies, including surrendering to technical problems by ignoring them, were not particularly effective, as the recurrent nature of these challenges disrupted their comfort. For example, T1 noted that "*ignoring the challenges and trying to adapt my teaching methodologies are short-term solutions. However, to enjoy the repose teachers deserve, a constructive step needs to be taken*" (T1, interview). Teachers also believed that their sense of equilibrium could be restored with the help of taking practical actions, such as discussing issues with authorities. T4 shared, "*whenever I have done something to*

overcome my distress and remove the source of disturbances, I have felt to have a more balanced mind" (T4, interview).

On the other hand, private sector language teachers, in particular, found that relying on coupling strategies derived from internal sources was crucial for regaining stability in their internal systems. T7 emphasized, "*I always count on myself at first. In most cases, I can handle the problems and soothe the tension caused*" (T7, interview). Despite these efforts, participants acknowledged that discussing existing problems with administrative groups was often futile, as the authorities frequently rejected their criticisms or postponed addressing their needs. As T10 observed, "*talking to supervisors and administrators about the ongoing undersupplies has changed to a mechanized convention in private language centers. However, our requests are rarely taken care of*" (T10, interview).

Stabilization Stage

According to Hiver (2014), when the effectiveness of a strategy in dealing with a certain perturbation is proved, the acquired experience would have an impact on the individuals' identity and enrich their knowledge in this regard. This phase of self-organization might eventually lead to forming productive or maladaptive teacher immunity (Hiver, 2014).

Given what has been said, EFL teachers in both groups described themselves as adaptive, self-reliant (5 private language teachers, 3 public teachers), eager to learn, and demotivated (2 public teachers). Language teachers who identified themselves as adaptive believed that "*years of teaching experience have made them compatible*" (T2, narrative). That is, they know how to "*say goodbye to ideal teaching and adjust their instructional endeavors to the available resources*" (T4, interview). They further explained that the achievements made as a result of relying on their knowledge and skills "*have solidified a sense of autonomy*" (T6, interview) within teachers.

Knowing that technology integration is part and parcel of the au courant education system in the world has necessitated teachers "*to conform to the latest teaching methods*" (T8, interview). Having to deal with numerous disturbances caused by technical tools every session, language teachers felt the urge to enhance their technological pedagogical content knowledge (TPACK). Having to work in a context where "*changes are dispraised and slow-moving, malfunctions of the technical tools are recurrent, authorities are inattentive, and lack of budget*" (T3, T9, interview) are always plausible hurdles, as they reported, have demotivated them.

Discussion

This study aimed at gauging the potential impacts of context (i.e., private and public) on the actualization of technical tools in EFL classes from an AT standpoint. This framework enabled the researchers to scrutinize various perturbations arising from the activity

system's components, identify their interactions, and subsequently explore the coping strategies employed (See Table 1).

Table 1

Triggers and Coupling Strategies of Public and Private LTI in Technology-Integrated Classrooms

	Subject			
	Public		Private	
	Triggers	Coupling Strategies	Triggers	Coupling Strategies
Tools	Technology scarcity	Taking adaptive steps and ignoring the problems	Technology scarcity	Carrying their tools
	Absence of specialized equipment	Sharing e-learning content via the Shad application	Obsolete tools	Bearing the cost of printing materials
		Using personal speakers to play audio files		Adapting lesson plans
	Poor network infrastructure	Relying on personal supply	Absence of language labs	Training learners to exploit related software
				Assigning tasks via social media
			Internet inaccessibility	Relying on personal supply
Rules	Assessment inequity	Discussing the issue with the authorities	Assessment inequity	Discussing the issue with the administrative staff
		Adapting to the condition		Taking steps to improve their expertise in this regard
Community	Administrative inadequacy	Adapt themselves	Administrative staff avarice	Not bearing the situation and changing the working environment
	Ineffectual collegial aura	Asking approachable leaders if available		
Division of labor	Absence of a technical expert	Asking for training sessions	Absence of a technical expert	Benefiting from search engines
				Seeking advice from colleagues

Regarding the context-specific disturbances, the educators from both cohorts initially highlighted the deficiency of technical resources or even the absence of them, such as language laboratories, in their field of work, attributed to financial constraints or managerial disposition, a finding corroborated by Haji Jalili et al. (2023) and Boroujeni et al. (2021), who reported that low LTI levels can be ascribed to administrative voraciousness and inadequate supplies, respectively. Furthermore, LTs expressed grievances about internet inaccessibility or substandard connectivity (Wang et al., 2021)

in both private and public sectors. What aggravated the ramifications of this disruption was that LTs linked this shortcoming to students' learning challenges and their inability to obtain the newly developed material, consolidating Cahyono et al. (2024)'s assertion that technology may further learners' efficiency as well as engagement. According to AT, the insufficiency of instruments may interfere with individuals' success in achieving goals.

In addition, nearly all educators underscored that being evaluated on the effective use of technical devices without being supplied with the necessary tools or training has displaced them from their comfort zone, verifying Azari Noughabi et al. (2020) and Pourbahram and Sadeghi (2020) proclamations that instructors' lack of autonomy and supervisors' periodic appraisals may bring about low levels of LTI.

The non-contributory collegial atmosphere among public educators, which hindered their ability to seek subject-specific guidance, had caused issues of concern, a finding affirmed by Boroujeni et al. (2020) regarding EFL teachers without addressing their particular work setting. However, their private sector counterparts capitalized on the synergistic aura in the staff room, as all members shared the same academic background. Considering the AT framework, it can be inferred that the heterogeneous community in public schools has impeded field-specific synergy, but the homogeneous community in the private sector has facilitated productive LTI developmental trajectories.

The final, yet not the least likely trigger, was identifed as language teachers' dearth of TPACK in both scenarios. Although this finding concurs with allegations of Azizpour et al. (2023), who pointed out the critical role of technical expertise in LTI formation, it disputes Beyranvand and Mohammadi Zenouzagh's (2021) findings, which indicated that there was no correlation between TPACK and LTI. Considering the AT framework, it is also evident that an absence of TPACK will disrupt the mediation between tools and objects.

The second category of outcomes pertains to the procedures employed by LTs to address technology-related triggers. In response to the scarcity of technical devices and their potential malfunctions, the majority of public school teachers implemented adaptive strategies, designed lesson plans based on the available resources, or assigned some tasks to the learners, especially listening files, thereby solidifying Hiver and Dörnyei's (2017) assertion that LTs can mitigate challenges by adjusting to them. Conversely, their counterparts opt for exercising agency by carrying their personal gadgets into the classroom, echoing Rahmati et al.'s (2019) findings.

To address the internet connectivity issues (Cahyono et al., 2024), both groups of participants opted to utilize their own resources. Employing this compensatory strategy

in today's technology-driven world reflects the instructors' mindfulness, which may serve as a significant predictor of LTI (Li, 2022).

Although the importance of periodic assessments was acknowledged, it seemed that public school instructors neglected them. It was attributed to the responsibility of authorities and therefore fostered a maladaptive immunity (Hiver & Dörnyei, 2017). Nevertheless, private school teachers have undertaken proactive measures to improve their teaching level by enrolling in professional development courses. In a similar vein, literature reveals that attending training courses might improve language teachers' productive immunity (e.g., Azari Noughabi et al., 2020; Pourbahram & Sadeghi, 2020).

To foster greater TPACK level, both groups of participants employed the former strategy, pursuing courses either externally or within their professional environment. Considering the significance of administrators' roles, teachers in both public and private sectors adopted diverse perspectives. While the former maintained a compatible stance, the latter expressed their preference to respond to the authorities' misconduct by changing their workplace. Literature evidences that the first standpoint would yield adaptive immunity (Hiver, 2014), whereas the second would culminate in maladaptive immunity (Haji jalili et al., 2023).

The third major theme of the study deals with the effectiveness of the strategies utilized in addressing challenges. Language teachers believed that implementing practical measures rooted in self-reliance constituted the most effective strategy. On top of that, earlier research revealed that resilience in confronting difficulties (Hiver, 2014) and mindfully tackling the forthcoming challenges (Li, 2022) can "affect everything that teachers do in their careers" (Hiver, 2014, p. 226).

Teachers admitted the impact of this self-regulation process on their identity; however, most of them pinpointed that they perceive themselves as competent educators after years of experience. This finding contradicts the study conducted by Sarıçoban and Kırmızı (2021), who found that there is no correlation between teachers' experience and their immunity. But the findings align with Canbay and Sönmez (2023), who identified that variations in teachers' immunity are positively attributable to their teaching experience.

LTs portrayed themselves as autonomous individuals who enroll in workshops and love to know about the latest teaching methodologies, while elaborating on their identity fluctuations. This finding corresponds to the research suggesting that exercising autonomy can boost teachers' productive immunity (Azari Noughabi et al., 2020; Ismail & Nikpoo, 2023).

Public teachers who classified themselves as demotivated instructors renounced modern classroom technologies (Kazemi et al., 2022). They experienced a deficiency in TPACK, recognized as a resource for LTI variation (Azizipour et al., 2023), expressed dissatisfaction with device malfunction, and were unwilling to address the existing shortcomings. Not being immune against barriers, these educators experienced decreased motivation (Hiver, 2014).

Conclusion

This study tried to explore the impact of technology-integrated instruction on LTs' LTI development. According to the data, inadequate, dysfunctional, and out-of-date resources in the classroom settings caused disruptions for LTs from both groups. They voiced their displeasure with the unfair evaluation criteria pertaining to technology integration. In effect, LTs from both situations emphasized the lack of an AI specialist to consult with them when an issue occurred. LTs opted for distinctive strategies based on the context and facilities avaiable to them. For instance, LTs exercised agency, adjusted themselves, searched for advice from their peers, or invested in their professional development. This study also revealed that public teachers identified adaptive methods and negotiations in certain cases as contributing more to their stability. Consequently, they primarily regarded themselves as flexible LTs. However, private institutes' LTs practiced agency to reduce the intensity of technical disruptions. LTs perceived themselves as self-sufficient teachers who occasionally experienced demotivation because of inadequate support from their workplace authority.

LTs adopted a range of context-sensitive strategies to deal with these disruptions. They described exercising their agency by adjusting their own practices, seeking advice from colleagues, and investing in their professional development. The findings also showed that public-school teachers often felt that negotiation and the use of adaptive strategies helped them maintain a sense of stability; so, they primarily saw themselves as flexible practitioners. In private institutes, LTs similarly drew on their agency to reduce the impact of technical breakdowns. They tended to view themselves as independent educators, although they sometimes reported feeling demotivated when support from their superiors was lacking.

There are limitations to this study. First, we relied on self-perception of teachers as the only source. Future studies may triangulate data such as observation and reflective notes. To gain a deeper understanding of LTs immunity in conjunction with other technology-related aspects of instruction, we further encourage future researchers to conduct longitudinal studies.

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Ethics Declarations

This study adhered to the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants, and confidentiality and anonymity were maintained throughout the study.

Competing Interests

The authors have no conflicts of interest to declare.

Data Availability

Data is available and will be shared upon reasonable request.

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