Relationship between Students' Informal Digital Learning of English and Willingness to Communicate: Insights from the Vietnamese EFL Context

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ABSTRACT

Despite the impact of technology on education, little research has investigated Asian students' informal digital learning activities in relation to willingness to communicate (WTC). Driven by the desire to bridge the gap between technology and education, this study examines the extent to which digital informal digital learning of English (IDLE) can predict WTC in class, beyond class and in digital settings and identifies the mechanisms in IDLE that contribute to students' WTC. Employing an explanatory sequential mixed-methods design, the data collection procedure consisted of two main phases. First, questionnaires were administered to 365 Vietnamese university students to collect quantitative data. Subsequently, the sample was randomly stratified to select 15 students for semi-structured qualitative interviews. After the data cleaning stage, the quantitative data from the remaining sample of 328 was projected to SPSS version 27 for analysis. We employed normality tests, EFA, CFA, internal coefficient consistency, Pearson correlation, regression analysis, and descriptives. The qualitative data was analyzed thematically. The quantitative findings generally indicate a positive significant relationship between IDLE and WTC. In fact, IDLE was more associated with WTC in digital settings than that in the other contexts. The interview data show that the students prioritized some informal digital learning activities to solve their academic problems. Also, their level of WTC in the digital context was higher than that in class because the students could communicate freely, without being controlled and scared of being corrected. Their level of WTC outside the classroom was the lowest as it was mainly directed by their needs. The results suggest implications for education in the digital era.

Keywords: digital interaction, extracurricular activities, informal digital learning of English, self-regulated learning, willingness to communicate

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Introduction

The advent of digital technology has significantly reshaped the landscape of language education. Following this trend, Informal Digital Learning of English (IDLE) has emerged as a solution to the confines of the formal classroom (Lee & Chiu, 2024). In other words, learners will have access to an enormous number of digital resources and have the opportunity to conduct online learning tasks beyond the classroom, helping to support the learning outcomes (Lai et al., 2015; Lee, 2019). In terms of autonomy, IDLE is also likely to promote autonomy in a way that learners can design their learning themselves and interact with their peers in informal learning situations without teachers judging and correcting their language use (Reinders & Benson, 2017).

Regarding communication in language education, Willingness to Communicate (WTC) has been considered a great contributor to learners' oral production in the second or foreign language (L2). It has been broadly recognized as a factor affecting learning outcomes, communicative competence and discourse maintenance (Dewaele & MacIntyre, 2014; MacIntyre & Charos, 1996). However, while traditional WTC paradigms have been primarily restricted to face-to-face exchanges (MacIntyre et al., 1998), its recent modification has allowed for in-class, extra-class (Bettis & Coleman, 2010), and online contexts (Lee & Hsieh, 2019). Whereas recent studies have investigated WTC in online synchronous formats, the effects of IDLE on WTC, especially in L2, have not been well investigated. Moreover, current research literature is mostly concentrated on learners in well-studied areas such as East Asia and Western Europe, and few studies have looked at the Southeast Asian context which has not been explored in theory development (Thieu et al., 2011).

In the Asian context, L2 learners generally feel uncomfortable and reluctant in communication when they feel that they are being watched or judged (Divaharan & Atputhasamy, 2002; Thanh & Gillies, 2010). This fear of rejection due to negative feedback or criticism from their peers or teachers can cause them to be even less confident in their communication skills or ability to converse with others (Park, 2000; Vo, 2024). In this context, IDLE emerges as an influential factor in the development of learners' WTC in English as an L2. IDLE is an interesting area of study since the emergent discussions are key in creating low-anxiety communicative situations that encourage communication with interest (Liu et al., 2024a; Reinders & Wattana, 2015). However, how IDLE promotes L2 WTC in such socially high-context, teacher-centered education systems as that of Vietnam, is ambiguous.

Even though previous research suggests that IDLE can support students' L2 WTC, studies on the direct connection between IDLE and L2 WTC are still lacking. Most of existing studies are merely based on cross-sectional data and were narrow in scope and concerned with either IDLE or WTC but rarely both simultaneously. The complex interactive relationships between these two variables have rarely been investigated in context, especially with the employment of mixed-methods approach. As a response to this gap, the current study investigates the possible connection between IDLE and L2 WTC in the context of Vietnam's higher education, which is an under-researched Asian context, and provides additional empirical evidence to the emerging literature on the role of informal digital engagement in communicative behavior. Using an explanatory sequential mixed-methods design, this study incorporates qualitative data to make

sense of the relationship between IDLE and L2 WTC identified through a quantitative method. The results will be used for optimizing IDLE strategies to prepare learners to communicate more easily in the larger digital and physical English-speaking environment. Accordingly, the research questions under this study are as follows:

1. How do Vietnamese university students adopt and engage in IDLE?

2. What are the correlations between IDLE and L2 WTC within in-class, out-of-class, and digital environments?

Literature review

Informal digital learning of English

This digital era has witnessed the emergence of IDLE as a remarkable phenomenon in the field of technology-enhanced language learning, which points to the growing role of digital modalities in second language education. According to Azari Noughabi and Ghasemi (2024), this concept, which has been recently contextualized in Asia, refers to the learners' extracurricular activities in digital context such as using social media, watching online videos, or using digital tools/platforms beyond the digital space of traditional formal instruction. Originally studied as an incidental learning process, IDLE has received immense recognition as a strategic and effective approach for developing L2 language competence (Guan et al, 2024), which is well supported by strong theoretical frameworks such as Social Cognitive Theory (Bandura, 1986). The increasing roles of IDLE on language education have been widely recognized in the current literature.

Learner engagement and motivation

IDLE can advance formal language learning by providing learners with extra input of English in a more natural and interesting manner. This way, IDLE can introduce interest-driven activities in language learning and offer alternatives for learners to explore the language beyond the classroom settings, which can greatly help to enhance their learning motivation and retention (Rezai et al., 2024). This learners' autonomy-driven learning is in line with principles of Self-determination Theory (Deci & Ryan, 2000) where intrinsic motivation is necessary for continuous language practice beyond the context of the learners. Recent research (i.e. Liu et al., 2025) also suggests that IDLE can assist learners in developing confidence, lowering anxiety levels, and inducing them to take more communication risks. In particular, such advantages increase when learners can select for themselves resources or learning activities which are particularly related to their own interests, thereby highlighting the significant role of learner agency in informal learning environments.

Skill Development and Multimodal Input

Since digital content of IDLE may include resources in various formats such as text, audio, videos, or online interaction, it offers great flexibility in accommodating various students' learning styles and interests (Drajati et al., 2024). In addition, with its informal nature, IDLE also supports learners' development of vocabulary and pragmatic skills, which are often seen a challenge in for many Chinese learners (Wang et al., 2025). However, existing research on

IDLE is currently scattered regarding which modalities of its (e.g. video games or social media) can help L2 learners the most or how they can contribute differently to learners' development of linguistic sub-skills, thus necessitating further research to better understand its modality-specific impact on L2 learning.

Psychological and Meta-cognitive Development

IDLE can facilitate L2 development through interactive, engaging, and self-regulated learning via digital tools/platforms. This process can be explained under Social Cognitive Theory (Bandura, 1986), which suggests that the digital mediums have the potential to foster learning through observation, imitation, and reinforcement of the target language (Guan et al., 2024). Through direct exposure to authentic language outside the classroom, learners would acquire thinking patterns and culture of the target language speakers to an unconscious extent, aiding their communicative competence development (Rezai, 2024). In addition, IDLE also enables a high level of interactivity in which the learner can get dynamic feedback and improve their language use dynamically during the learning process (Fu,2025). Importantly, this feedback loop, when integrated with self-regulation mechanisms such as goal setting and reflection, has the potential to enhance learners' metacognitive development and L2 language investment in the long run (Zimmerman, 2000). Also, it is assumed that the active involvement in IDLE as content creators (vlogs, tweet, or forum) may result in a richer L2 processing and L2 (linguistic) creativity among the learners (Lee & Drajati, 2019; Wang et al., 2025). Also, IDLE can allow for active learning with learners' high involvement in creating and interacting with content through blogging, discussion, or collective storytelling (Wang et al., 2025). This type of self-regulated learning enables learners' metacognitive development by giving them the chance to establish their own goals, track their own progress and realizing their own learning strategies in an optimal way (Rezai, 2024).

Authentic Interaction and Communicative Competence

Besides facilitating language learning process in general, IDLE also plays a key role in improving communicative competence of L2 learners. In reality, IDLE provides the learners with a pleasant environment to access the authentic language, develop their interaction skills across different situations, and boost their communication confidence. According to Rezai, Soyoof, and Reynolds (2024), such digital language learning could offer learners with various linguistic input, encountering them with different accents, speaking rates, and communicative styles, hence making L2 learning more natural and contextually appropriate. Moreover, interactive environments provided by IDLE like idea exchange applications and online gaming communities can provide learners with good opportunities for authentic communication and reinforce their conversational skills of learners (Indrayani et al., 2024). Empirical research indicates that students who are immersed in IDLE activities, such as watching subtitled videos or participating in online discussions, demonstrate increased lexical variability and syntactic complexity in both their spoken and written work (Liu et al., 2025). Yet, it is not clear how the passive and active digital engagement can still differ in the way it can develop the language learning of students. While passive exposure may contribute to input, it is the interactive and creative use of the language that may lead to significant communicative gains (Lee & Drajati, 2019). Furthermore, although the existing literature has acknowledged the positive contribution

of IDLE in terms of motivation, skills and self-regulation, there is still a lack of critical comparison among the different types of IDLE activities as well as theoretical alignment. In addition, few studies have been conducted across IDLE platforms or taken into consideration the role of learner agency in a variety of sociocultural and technological contexts. Specifically, there is a need for theoretically grounded and contextually informed research that can attempt to address what learners do in IDLE and provide more understanding of how and why their IDLE practices contribute to an increase in their communicative confidence.

L2 Willingness to Communicate

L2 WTC has proved its importance in language education as it can influence learners' engagement in meaningful communication that is necessary for their growth of second language competency. Rather than focusing on linguistic competence per se, WTC stresses on psychological preparedness to use the target language in different contexts (MacIntyre et al., 1998). Research has highlighted the possible relationship between higher levels of WTC and improvement in L2 proficiency, effective communication strategies and also learning motivation (Peng & MacIntyre, 2025). Moreover, as mentioned by Henry and MacIntyre (2024), the development of WTC can result in higher learner autonomy and long-term language retention and is thus a key factor in effective language education. Given the fact that language learning is essentially an interactive process, the promotion of WTC is considered to yield more communicative experiences and pave the way for the development of L2 fluency and accuracy among learners (Szyszka & Lintunen, 2025). Encouraging WTC ultimately helps L2 students to use language in a more spontaneous and flexible way, particularly in socially and culturally diverse settings (Yashima, 2002).

WTC in L2 education has been found to rely on cognitive, affectual and situational factors that affect learners' readiness towards communication in L2. MacIntyre et al. (1998) has suggested a pyramid model demonstrating that L2 WTC is based on both stable characteristics, such as introversion, motivation, and dynamic variables, such as task difficulty and familiar interlocutors to interact. Also, psychological constructs such as communication confidence, motivation and enjoyment in using the L2 have been determined to influence students' L2 WTC as well (Peng & MacIntyre, 2025). In addition, recent studies suggest that emotional factors, like foreign language anxiety and self-perceived competence, profoundly influence L2 WTC levels (Li et al., 2024). This influence can come from various factors of classroom conditions, such as teacher support and peer interaction, which highlight the role of communicative settings in students' WTC development (Henry & MacIntyre, 2024). Also, WTC is reciprocal in the sense that the higher the L2 engagement is, the more exposure to the language it will cause, which strengthens the learners' communication confidence, thus making it a self-reinforcing cycle (Han and Li, 2025). This cycle is part of a wider principle known as reciprocal determinism in which the behaviors of learners, their personal beliefs and their environments are constantly interacting with one another (Bandura, 1986).

Empirical studies on L2 WTC have dramatically grown, aiming at exploring what factors affect L2 WTC, its implications, and contextual variations. Early research mostly focused on examining WTC as a personality-based construct, but recent studies have focused on its dynamic nature, which fluctuates across various tasks and learning contexts (Peng &

MacIntyre, 2025). For example, evidence from many idiodynamic studies suggest that WTC is different even inside a dialogue, depending on interlocutor response and the topic familiarity (Li et al., 2024). Instructional interventions, for example, collaborative learning and strategy training, have been also found to be successful in raising L2 WTC (Gao et al., 2024). Research also points to the impact of digital platforms, which may have a positive or negative impact on L2 WTC depending on the digital literacy and comfort of learners in using virtual platforms (Fu, 2025). However, further investigation is necessary to understand how specific digital contexts such as synchronous versus asynchronous interactions may modulate L2 WTC in real-time conditions (Reinders & Benson, 2017). Integrating insights from psychology, sociolinguistics, and educational technology to consider the effects of various kinds of digital conditions on WTC, subsequent studies can contribute to refining the strategies of instructing and learning English digitally in order to optimize students' L2 WTC.

Regarding communication environments, L2 WTC is not uniform in in-class, out-of-class and digital settings. In terms of classroom environments, WTC is determined by teaching strategies, teacher intervention and peer scenarios, and it is sometimes structured by activities that give space to language use (Szyszka & Lintunen, 2025). Some learners are hesitant to communicate for fear of being negatively evaluated or due to low confidence in their language skills (Sato 2024). In contrast, out-of-class conditions, such as studying abroad and informal conversations frequently enhance L2 WTC as the pressure of performance is lowered and the real-world task is promoted (Ma et al., 2024). Meanwhile, digital environments which encompass social media platforms along with online gaming and virtual exchanges offer unmatched possibilities for L2 WTC, in which learners can communicate with enhanced anonymity and lower pressure (Fu, 2025). However, digital WTC is very much reliant on learners' familiarity with the online discourse language and their motivation towards engaging in virtual communication (Sun, 2025). It is important to understand these contextual differences in order to design interventions that promote L2 WTC in different learning environments. Yet, digital WTC is also subject to the limits of technophobia, platform unfamiliarity or even privacy concerns, which stresses the delicate relationship between technological affordances and psychological readiness (Lamb, 2012).

The Link between IDLE and L2 WTC

Examining in particular the relationship between IDLE and L2 WTC is important for gaining insight into how digital learning environments assist in language learning. Since WTC is a powerful predictor of learners' communicative proficiency in L2, finding out how IDLE induces L2 WTC will elucidate more efficient language learning strategies (Ghasemi & Azari Noughabi, 2024). Unlike formal classroom teaching context where learners are usually under performance pressure and limited from real-world interaction, IDLE provides relaxed and low-stakes settings for learners to engage with English authentically, foster their communicative confidence and alleviate their anxiety (Fu, 2025). For example, social media, forums, and video-based learning can provide learners with authentic language use, encourage spontaneous communication, and address fear of risk-taking which are all fundamental to learners' acquisition of L2 WTC (Lee & Chiu, 2024).

The theoretical link between IDLE and L2 WTC may be understood more precisely through a

number of psychological mechanisms based on Social Cognitive Theory (Bandura, 1986). According to this theory, learning is the result of interactive dynamics between individual, behavioral and environmental influences. In the cases of IDLE pedagogical environments, learners can observe and model the use of the target language from both digital media and peer interactions, which helps develop their linguistic self-efficacy. In other words, the more confidence they gain from the digital environments, the more willing they become to communicate in the target language in the real world. Indeed, most of the processes through which IDLE promotes WTC are related to increased exposure, affective effects, and self-initiated participation. IDLE promotes L2 WTC by providing learners a continuous exposure to English through various digital media and gradually enhancing the communication confidence (Azari Noughabi & Ghasemi, 2024). Moreover, online platforms also provide informal and non-torturing settings for language learning that help to mitigate learners' language anxiety, a key problem facing L2 WTC in the classroom (Ghasemi & Azari Noughabi, 2024). Psychologically, IDLE can trigger learners' intrinsic motivation in that a learner can interact with content that is in his/her area of interest and thus it makes communication more natural and pleasurable (Fu, 2025). According to Social Cognitive Theory (Bandura, 1986), it can be implied that the digital interaction in online settings can lead to a higher self-efficacy and therefore improve learners' WTC in the target language (Lee & Chiu, 2024). However, some researchers have retreated to digital learning anxiety as one of the key factors impacting learners' WTC in online learning. Entering an environment with a fear of being judged negatively by others, high-stakes exchanges, and new technology can trigger anxiety and reduce students' WTC (Lee & Chiu, 2023). To cope with this, intuitive design, peer modeling and guided participation can be used to make it easier for learners to feel more comfortable and engaged in their digital language learning.

Another mechanism that possibly connects IDLE and L2 WTC is the process of self-regulation. As IDLE promotes autonomy, it tends to be associated with self-regulatory learning processes including goal settings, progress monitoring, and reflective assessment which are all important for preparing learners to become active participants in communicative activities (Zimmerman, 2000). As a matter of fact, such monitoring leads to higher learners' self-confidence and autonomy, both of which essentially contribute to higher L2 WTC (Zimmerman, 2000).

In addition, through IDLE with personalized learning technologies such as algorithm-based content recommenders or adaptive language applications, input may be modified to meet the needs and preferences of individual learners. Such tailoring is linked to greater perceived competence, as well as lower cognitive load which indirectly promotes L2 WTC in the learners (Kukulska-Hulme & Viberg, 2018). In fact, IDLE relieves cognitive overload by giving learners the opportunity to work through language input at their own pace.

Second, according to the Cognitive Load Theory (Sweller, 1994), IDLE is able to assist the learners in reducing extraneous load and fostering schema construction, which will further reinforce their preparedness to produce language spontaneously. This metacognitive scaffolding takes away time stress and anxiety, which allows for optimum conditions for learners to express themselves with ease and spontaneity. Current research has suggested that frequent digital language learning boosts learners' confidence and motivation (Fu, 2025). However, there are

still gaps in our current knowledge regarding the degree to which various types of IDLE activities affect WTC. In other words, while there have been many studies stressing the importance of engaging with digital materials through interactive means, there are also studies arguing that merely watching videos passively might have a limited effect on students' L2 communication (Ghasemi and Azari Noughabi, 2024). Moreover, it is clear that the informal learning preferences in digital environments vary among different cultures and individuals, which has questioned the generalizability of existing studies on the positive effects of IDLE (Azari Noughabi & Ghasemi, 2024). In particular, there is limited investigation into the different effects of various digital platforms/tools (e.g., YouTube, Discord, and language exchange apps) may have on learners' L2 WTC considering their learning profiles and preferences.

Taken together, these mechanisms, enhanced self-efficacy, reduction in anxiety, metacognitive self-regulation, and reduction in cognitive load, provide a theoretical basis for the usefulness of IDLE in improving students' L2 WTC. Basing the relationship between IDLE and L2 WTC on established learning theories and frameworks can help researchers and educators to create more focused and effective interventions that promote learners' informal digital learning routines and facilitate their L2 communicative self-efficacy in EFL contexts.

Methods

Design of the Study

Regarding the purpose of the study, we employed an explanatory sequential mixed-methods design with two distinct phases. The quantitative data collected from questionnaires were first utilized to figure out patterns in students' practices of IDLE and the relationship between IDLE and L2 WTC in class, beyond class, and in digital modality. Sequentially, we conducted semi-structured interviews based on students' questionnaire responses to further explore their perspectives and experiences, gaining deeper insights into the mechanisms underlying IDLE and L2 WTC relationship. The attempt to integrate these two phases was aimed at providing a comprehensive understanding of how IDLE is related to L2 WTC.

Pedagogical Setting & Participants

We recruited participants from four universities integrating digital learning into education. At the time of study, most, if not all, universities in Vietnam used digital platforms to necessitate extramural learning opportunities. A sample of 365 university students was selected from four universities through convenience sampling. However, after data cleaning, the data provided by 37 respondents were removed due to incomplete, leaving the remaining sample of 328 for data analysis (see Section 3.5). The sample size for the quantitative phase was deemed sufficient based on guidelines for correlation analysis, with a minimum requirement of 300 participants for detecting moderate effect sizes with adequate statistical power (Cohen, 1992). All these participants fulfilled the following three requirements: (1) full-time students, (2) intermediate English proficiency or higher, and (3) engagement in informal digital learning for a minimum of four hours per week. The participants' baseline information showcases a diversity in terms of gender and academic backgrounds, which helped to ensure the representativeness of the

sample and the internal variability of the data (see Table 1).

Table 1.

Participant characteristics

Specialization	N	Gender (%)		Age (M)	University (%)			
		Male	Female		1	2	3	4
Business Administration	59	57.6	42.4	19.61	45.8	33.9	20.3	
Accounting	56	48.2	51.8	19.68	17.9	32.1	30.4	19.6
Sociology	60	45.0	55.0	19.70	33.0	20.0	20.0	26.7
Tourism	53	50.9	49.1	19.64	34.0	39.6	26.4	
Finance	61	52.5	47.5	19.62	34.4		29.5	36.1
Marketing	39	56.4	43.6	19.87		56.4		43.6
TOTAL	328	51.5	48.5	19.67	29.3	28.4	22.3	20.1

In the qualitative phase, 15 students were selected by employing stratified purposive sampling method. The participant selection was based on questionnaire results. In particular, the students were grouped into three levels of digital engagement (high, mid, low) and three levels of WTC (strong, moderate, weak). Z-scores from the scales defined these levels. High engagement or WTC scored above +0.5 SD from the mean. Mid-level ranged from -0.5 to +0.5 SD. Low-level scored below -0.5 SD. The fifteen students were stratified as high (5 students), mid (4 students), and low (6 students) digital engagement and strong (4 students), moderate (6 students), and weak (5 students) WTC levels. This ensured diverse interview samples to reflect varied learner experiences and views.

Research Instruments

This study utilized a set of instruments for data collection. To collect quantitative data, two validated bilingual (Vietnamese and English) questionnaires to measure the participants' IDLE engagement and WTC level were administered. We adapted the IDLE questionnaire by Liu et al. (2024a) as it was validated, widely utilized in recent endeavors, and refers to the Asian EFL context. This questionnaire referenced prior IDLE scholarly works by Lee and Drajati (2019) and Lee and Lee (2021). Liu and colleagues (2024b) developed and validated the questionnaire with eight items assessing the frequency and diversity of students' use of technology for informal digital learning activities.

To ensure the alignment with the broader scope of informal digital learning, we replaced the term "AI" with *"technology-assisted"* in the questionnaire items. The initial phrasing was deemed too specific and did not fully capture the variety of platforms students use informally, such as social media, discussion forums, and mobile apps. For instance, Item 6 "*I autonomously*

engage in discussions with AI-powered chatbots to deepen my understanding and knowledge of English language culture." was changed to "*I autonomously engage in discussions in technology-assisted platforms to deepen my understanding knowledge of English language culture.*"

To operationalize L2 WTC, we adopted the questionnaire by Lee and Hsieh (2019) as it was a validated and widely recognized instrument for assessing L2 WTC across various learning contexts. This questionnaire assesses students' WTC in three settings: classroom, out-of-class, and informal digital learning of English. Each subscale includes four items rated on a five-point Likert scale (1=strongly disagree, 5=strongly agree).

For the qualitative data, we deployed an interview scheme recommended by Creswell and Creswell (2018). Accordingly, each interview consisted of three main parts: introduction, main content, and conclusion (see Appendix). In the introduction, we sketched the research purpose, participant rights, and ethical issues. Regarding the research aims, the interviews mainly aimed to gain insights into students' IDLE activities and understand the mechanisms in the relationship between IDLE and differnt aspects of L2WTC. Finally, we confirmed the main points in the students' answers and asked whether they would like to read the research report and how they would like to be anonymized, and whether they had any questions or concerns regarding the current study.

Data Collection

Prior to full-scale collection of data, a pilot study was conducted with 30 students (via questionnaires) and five students (via interviews) to make sure all the items in the research tools were clear and comprehensible. The feedback obtained was used to refine minor wording ambiguities. The official data collection took place during the middle of 2024. As the study concentrated mainly on IDLE, the questionnaires were distributed in online professional forums digital learning environments, and social media platforms in a digital format to approach the target population. A consent form was included, outlining the study's purpose and ethical considerations. Before completing the questionnaire, participants had to confirm their eligibility by selecting screening statements such as "*I use English as a second/foreign language*." and provide their demographic information (see Section 3.2). Those who did not fulfil these requirements were deemed ineligible for the study.

For qualitative data collection, the researcher conducted semi-structured interviews to gain a deeper understanding of how IDLE engagement influenced students' WTC. Each interview lasted 40 to 50 minutes and was conducted in Vietnamese via Zoom to ensure reliability and accessibility. The interview examined students' informal digital learning experiences, focusing on how technology affects their willingness of communication, emotional responses, and WTC across platforms like social media, forums, and virtual gaming. The interviewer clarified and verified responses throughout to maintain data trustworthiness. The participants were given enough time and opportunities to explain why they did such revealed IDLE activities and how they were related to L2WTC. Some sample interview questions include: (1) *Are you interested in IDLE? Why or why not?* (2) *What IDLE activities do you often involve yourself in? How and why do you choose them?* (3) *What challenges do you face in IDLE?* (4) *Do you have a sense*

of success or achievement in IDLE? If yes, how do you measure it?

Data Analysis

In the current study, the quantitative data and qualitative data were analyzed separately before they were mixed to answer the research questions. As we deployed an explanatory sequential design, the qualitative data was used to interpret and give additional insightful information about the quantitative data.

The quantitative data was imported into SPSS (IBM, NY) version 27 for analysis. Following the cleaning process, data provided by 37 students were excluded due to the missing consent, unanswered screening statements, and incomplete responses, resulting in the remaining dataset from a sample of 328 students for analysis. We applied the 5-step procedure proposed by Collier (2020) for quantitative data analysis. First, data distribution was evaluated using skewness and kurtosis, which are widely recognized measures for assessing normality in statistical analysis (Kline, 2015; Tabachnick & Fidell, 2019). Second, factor analysis was run. For exploratory factor analysis (EFA), we opted the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, principal axis factoring, eigenvalues greater than 1, Promax rotation, and absolute value for coefficients .5. Third, we examined the scale reliability by using internal coefficient consistency (Cronbach's alpha). Then, we conducted confirmatory factor analysis (CFA) and further assessed convergent and discriminant validity to ensure robustness of the constructs in measuring IDLE and WTC in Vietnamese context. Finally, Pearson correlation and simple linear regression analysis were employed to assess the relationships between IDLE and WTC across different contexts. These tests aimed to determine the strengths and significance of the predictive relationship between IDLE and students' English L2 WTC.

As for qualitative data, all interviews were recorded, transcribed verbatim in Vietnamese, and translated into English. Transcript analysis then followed Clarke's (2006) six-step process: familiarization, coding, theme development, review, definition, and interpretation. Coding step combined inductive and deductive methods to capture key patterns and align them with survey constructs. Coding was then refined through repeated review to ensure consistency. An assistant also helped the researcher to check the coding scheme and thematic structure. Three random participants were also asked to confirm the final interpretations. After all, qualitative and quantitative findings were integrated, and three main themes were identified as follows:

- IDLE supported learner control over goals, pace, and strategies.
- Students made use of IDLE to address individual learning gaps.
- Institutional digital platforms/tools lacked authentic and engaging content.

Findings

Initial Data Analysis

Results of data distribution tests (see Table 2) confirmed normality, with skewness and kurtosis values within ±1.96 (Field, 2018). The variances ranged from .28 to .36, while standard deviations fell between .45 and .60. These values thus indicate low variability in responses

among participants.

Reliability analysis (see Table 2) showed that the IDLE scale had high internal consistency (α = .905). The WTC subscales also demonstrated strong reliability: WTC inside class (α = .892), WTC outside class (α = .859), and WTC in digital settings (α = .851). These values confirm that the scales were suitable for further analysis and interpretation.

Table 2.

Results of data distribution and reliability test

n=328	Item N	SD	Variance	Skewness	Kurtosis	Cronbach's α
IDLE	8	.453	.21	-.63	.57	.905
WTC in Class	4	.596	.36	-.79	.68	.892
WTC outside Class	4	.537	.29	-.72	.61	.859
WTC in Digital Settings	4	.533	.28	-.75	.65	.851

EFA results confirmed adequate sampling (KMO = .854), with a significant Bartlett's test of sphericity (χ^2 = 5423.148, df = 190, p < .001). Four distinct factors explained 68.48% of the total variance, hence supporting the theoretical framework underlying IDLE and WTC constructs. The pattern matrix (see Table 3) showed strong factor loadings (> .50) for each item which verified the distinctiveness of the IDLE and WTC subscales.

Table 3.

Factor loadings of IDLE Items

Item (n=328)	IDLE	WTC in class	WTC outside class	WTC in digital settings
IDLE1	.721			
IDLE2	.805			
IDLE3	.665			
IDLE4	.782			
IDLE5	.692			
IDLE6	.722			
IDLE7	.667			
IDLE8	.698			
WTC4		.809		
WTC2		.778		
WTC1		.733		
WTC3		.675		
WTC10			.734	
WTC9			.720	
WTC11			.714	
WTC12			.581	
WTC7				.840
WTC6				.787
WTC8				.751

Item (n=328)	IDLE	WTC in class	WTC outside class	WTC in digital settings
WTC5				.602

IDLE engagement among Vietnamese university students

Questionnaire results (see Table 4) demonstrate that students frequently engaged in a wide range of technology-enhanced learning activities. The highest engagement was in English conversations on technology-powered platforms (*M*= 4.52, *SD*=.57). Another common activity was independently sourcing English learning materials using digital tools (*M*= 4.50, *SD*=.57). Additionally, students reported playing English-language games (*M* =4.48, *SD*=.60) and practicing writing on digital platforms (*M*= 4.50, *SD* = .57).

Table 4.

IDLE activities used by Vietnamese students

Item (n=328)	IDLE activity	M	SD
IDLE1	Engaging in English conversations on technology-powered platforms	4.52	.57
IDLE2	Using technological tools for speaking practice and feedback	4.46	.60
IDLE3	Playing games in English to expand vocabulary	4.48	.60
IDLE4	Using technology to acquire personalized English learning strategies	4.49	.57
IDLE5	Finding and obtaining English learning resources autonomously	4.50	.57
IDLE6	Engaging in online discussions to learn about English language culture	4.45	.61
IDLE7	Practicing English writing skills on digital platforms	4.50	.57
IDLE8	Using technology to simulate real-life English communication	4.49	.57

Qualitative data collected from interviews reveals three main interesting themes about Vietnamese university students' use of IDLE. These themes were interrelated and reflected the socio-cultural context of Vietnam to a certain extent. In general, the students confirmed the main quantitative findings.

First, the students were interested in IDLE because it gave them a sense of autonomy. Accordingly, they could schedule their learning to pursue their own goals. Also, they could adopt either explicit or implicit learning or a mix of these learning types. The affordances available in informal digital learning modality could enable to interact with others and practice self-regulated learning. One student remarked: "*With IDLE, I can study at my own pace, and choose the activities I like. I don't have to wait for my teacher or classmates.*" Another noted: "*Sometimes I learn without knowing it. Watching English videos or chatting online feels natural, not like studying in class*."

Second, the students adopted a problem-solving approach. They analyzed and understood their

own strengths and weaknesses and employed the informal digital learning activities that they needed to improve. The students' priorities reveal that they chose the actitivities because they were enjoyable and their met their needs. For instance, they utilized IDLE to expand their vocabulary, sharpen their productive skills and practice communicative tasks more frequently because a lack of exposure to conservational English and advanced English vocabulary in use in the Vietnamese EFL context. One participant shared: "*I knew my vocabulary was weak, so I used English games and apps to improve it. It was fun, and I didn't feel bored*." Another student explained: "*IDLE helps me learn what I really need. For example, if I want to practice speaking, I use YouTube or AI tools to simulate conversations*."

Finally, however, the shortage of artifacts and resources in the digital platforms provided by the institutions was the biggest challenge to their learning. As the students stated, most of the available digital tasks were relatively academic, but they found updated social trends were more enjoyable. They also expressed their needs for a diversity of activities and tasks. For example, video clips embedded for pleasure could ignite and drive their learning motivation. Their sense of success would come not only from formal test scores but also from accomplishments in informal authentic communication. One interviewee stated: *"The school's online platform has some good materials, but it's too academic. I want videos about daily life or current trends, not just new grammar or vocabulary."* Another added: "*If the content is fun or useful for the real life, like how to speak at work or while traveling, I think I can learn faster and enjoy it more*." In summary, data from the questionnaire and interviews unveil the students' IDLE priorities. They deployed IDLE to improve their knowledge and skills and personalized their informal digital learning. They generally expressed their needs and wants for IDLE.

Relationship between IDLE and English L2 WTC

The Pearson correlation analysis showed that IDLE engagement was significantly and positively correlated with WTC in all three contexts. The findings showed a moderate correlation between IDLE and WTC inside the classroom ($r = .490$, $p < .001$) and WTC outside the classroom ($r = .492$, $p < .001$) (see Table 5). The correlation between IDLE and WTC in digital settings was weaker ($r = .407$, $p < .001$), indicating a lower but still significant linear association.

Table 5.

Pearson correlation matrix

n=328	WTC Inside Class	WTC outside Class	WTC in Digital Settings
IDLE Engagement	.490**	.492**	.407**

***Note.* $p < .001$ (two-tailed).

Additionally, three separate regression analyses (see Table 6) further demonstrated IDLE's predictive power for WTC. Specifically, IDLE significantly predicted WTC in three contexts: WTC in class ($R^2 = .249$, $B = .537$, $SE = .052$, $\beta = .499$, $t = 10.407$, $p < .001$) with $F(1, 328) =$

108.309, WTC outside class (R^2 = .417, B = .650, SE = .043, β = .646, t = 15.275, p < .001) with $F(1, 328) = 233.336$, and WTC in digital settings (R^2 = .513, B = .682, SE = .037, β = .716, t = 18.525, p < .001) with $F(1, 328) = 343.173$. The results indicate that IDLE explains 24.9%, 41.7% and 51.3% of the variance in WTC in class, outside class, and in digital settings respectively. Thus, when learners engaged more in informal digital learning activities, their WTC in English tended to increase, with the strongest predictive effect was observed in digital settings, followed by outside-classroom contexts, while the weakest but still significant effect was found in classroom settings.

Table 6.

Regression analysis predicting WTC from IDLE

Model	B	SE	β	*t*	*p*	R^2	$F(1, 328)$
WTC in class	.537	.052	.499	10.407	<.001	.249	108.309
WTC outside class	.650	.043	.646	15.275	<.001	.417	233.336
WTC in digital settings	.682	.037	.716	18.525	<.001	.513	343.173

As this study used interviews to interpret the relationship between IDLE and WTC, we scrutinized the second part of the qualitative data to extract the underlying mechanisms in such association. The students in general confirmed the link between IDLE and WTC. In fact, they revealed that the characteristics of IDLE could gear up their WTC.

First, the students revealed that they were more willing to communicate in digital settings. This confirmed the quantitative finding about the relationship between IDLE and WTC in digital modality. They could anonymize their communication with peers and did not lose face when they scored low. Interesting, they prioritized communicating with ChatGPT as it was deemed more knowledgeable than peers. Unlike peers, ChatGPT could always give constructive expert feedback that enabled the students to set up their plan for success.

Second, their communication could be unfettered in digital platforms. Their communication was unobserved and unsupervised by their teachers or tutors. The students were more willing to communicate in digital settings and in the other contexts because their English was not often corrected by their teachers in informal digital platforms.

Finally, they could personalize their learning. Interestingly, they prioritized IDLE as their learning time was not usually restricted. They had plenty of time to think and rethink the applicability of input. Also, unlike the physical face-to-face classroom discourse, IDLE enabled them to choose who they liked to communicate with. Surprisingly, they took into account communication with artifacts and with technological tools as two types of communication. Accordingly, they assumed that these types of communication could help them progress.

In conclusion, the findings showed that IDLE was positively correlated with WTC across contexts, with the strongest effect in digital settings. Interviews revealed that students felt more confident communicating in digital spaces due to reduced anxiety, autonomy, and personalized learning. Learners also emphasized that unmonitored digital interactions enhance their WTC across different settings.

Discussion

Developed within the last decade, IDLE has sparked the interest of researchers and teachers alike who are interested in the way digital interactions can support L2 learners in language learning success. Deploying an explanatory mixed methods design, the present study investigated engagement of Vietnamese university students in IDLE in relation to their WTC in various contexts: in-class, out-of-class, and digitally. A total of 328 students (aged 19-22 years) studying six academic disciplines at four Vietnamese universities were recruited to take part in questionnaires and interviews.

The results indicate the active involvement of the students in IDLE because it provided them opportunities for self-directed learning. This result validates Rezai et al., (2024) study that IDLE encouraged students to engage in digital activities because of its autonomy. Accordingly, IDLE could be used to reinforce personalized learning as the students can create their own learning schedules and goals (Reinders & Benson, 2017). This allows students to keep track of course learning and individualize digital practices. The students further elaborated that the primary value of autonomy in IDLE is the way that they used either explicit or implicit learning to solve their own problems. Importantly, it was also through interview data that this autonomy could lead to different choices of digital tasks guided by their enjoyment and perceived usefulness; this was argued to be helpful by the students in fulfilling their gaps in terms of lexical resources and communicative confidence. Surprisingly, the students were aware of their weaknesses and held on to their learning alternatives. According to Skeriene & Juceviciene (2020) and Rezai (2024), when learners have various proficiency levels and learning objectives, problem-solving strategies can systematically provide a more efficient learning process. For this reason, it may be necessary for students to adopt the framework of when, how and why regarding the application of problem-solving strategies in their IDLE. This new finding can be a reference for language education in the immediate and distant context. However, the findings also contradict the traditional assumptions as to learners' reliance on formal instruction. Their engagement with IDLE would indicate that they are not nascent consumers but are active contributors to language learning. This raises very important questions about the extent to which learner profile is being reflected in this digital age and in the way we currently practice in the classroom. Third, to align education with this shift, educators can integrate metacognitive strategy training into the curricula by having students assess their own strengths, select effective tools and feedback on their own learning by using digital tools or AI chatbots. Educators can also conduct learner-driven or self-pacing progress checks that mimic IDLE's independent learning patterns.

The findings also reveal that the absence of artifacts and resources is one of the difficulties that the students encountered while participating in IDLE. This point was highlighted in interviews, where students said that the digital platforms of their institutions were based on academic activities and did not include up-to-date and attractive content. For instance, students wanted more types of tasks such as interactive videos or conversation simulations that were similar to communicative tasks in real life to make learning more fun and motivating. To better stimulate students' interest, it is necessary to incorporate a wide variety of activities in accordance with

learning needs and preferences of students (Rezai et al., 2024). Such improvement could provide students with more quality input and maximize the learning effect. In a context like Vietnam, where IDLE is still an emerging phenomenon, future research should have a thorough needs analysis to make sure the learning systems and strategies for IDLE are more sensitive to students' expectations and educational needs (Ghasemi & Azari Noughabi, 2024). In fact, there is still a current mismatch between the way institutional people make their product and what the learners want, which reveals a systemic problem in the top-down design of learning interactions. Whereas IDLE has been learner-centered, most digital learning platforms from educational institutions are still teacher-centered. This raises a concern about how effectively technologies have been employed in formal education. Indeed, without taking into consideration the interests and needs of students in designing the curriculum for digital learning, educational technologies will surely become outdated or under-utilized. As a result, IDLE platforms should be co-created by institutions in partnership with students. Task banks can be gamified vocabulary apps, AI chat tasks (e.g., ChatGPT roleplays) and multimedia that are related to trendy social topics. Policymakers also need to invest in developing more quality digital resources for language learners and integrate them into current LMSs of institutions and issue laws to encourage the collaboration between technology developers and language practitioners.

The results also show that in digital environments, IDLE was the biggest predictor of WTC with 51.3% variance ($R^2 = .513$). This large effect size indicated that over half of the variance in digital WTC engagement was accounted for by IDLE engagement. This close relationship shows the need for informal digital learning in the development of students' L2 WTC in online environments. This was also reinforced by the interviewed students who felt more confident communicating in digital contexts thanks to less social pressure, as well as greater control of interaction. In particular, students valued the anonymity and unmonitored courses of online communication, which reduced their fear of being judged. This result substantiates the previous studies on the facilitative effect of the digital platforms in diminishing anxiety and increasing learners' linguistic confidence (Reinders & Wattana, 2015). This is due to the fact that digital tools, especially AI-mediated tools, often offer a low-stakes environment for learners to engage in unplanned communication without concerns of being immediately corrected or socially judged (Liu et al., 2025). Interestingly, students' most common mention was ChatGPT, which they said they liked quite a lot because this AI was both expert and nonjudgmental in its feedback, a feature that just highlighted the power of facilitating strategic planning in language with IDLE tools. This heavy digital interaction, however, also calls for a re-examination of the place of the classroom. If learners are more supported and freer in the digital rather than in the formal environment, it raises the question whether conventional pedagogies are lagging behind. The preference for AI tools such as ChatGPT, perceived as nonjudgmental and constructive, may even indicate a shift in learners' expectations of feedback, from authoritative to collaborative. Based on this, teachers need to integrate AI-based tools in their classroom speaking activities or asynchronous assignments. For example, students can use ChatGPT to write or role-play arguments at home and then present their results in class. Also, anonymous tools (e.g., Padlet or Mentimeter) can be used to reduce the level of anxiety felt by the students to share their answers. One of the reasons for this is that digital, especially AI-powered learning

spaces, offer possibilities for self-directed learning and real-time interaction, thereby supporting students' L2 WTC in such spaces (Ghasemi & Azari Noughabi, 2024). In fact, frequent asynchronous, private and self-paced communication in such electronic communities can help leverage learners' willingness to experiment with the target language in their real-life communication. This is in contrast with the pressure and urgency required in person in traditional classrooms, where learners are afraid of making mistakes at the time. This finding reflects the pedagogical potential of IDLE in that learners are provided with exposure to authentic input, meaningful communication and freedom to experiment with language use without any external pressures.

Results also show that IDLE was a significant predictor of outside of class WTC with 41.7% variance ($R^2 = .417$). This middle-range effect is in line with past research on the significance of informal digital engagement in developing learners' communicative confidence outside formal learning environments (Lee & Hsieh, 2019). IDLE equips students with constant exposure to authentic uses of language and consequently building linguistic familiarity with which genuine communication in real-life might be possible. However, data obtained from interviews revealed that students mostly used English outside class in only required situations such as discussions in academic work, part-time jobs, and travel-related contexts. This implies that students' WTC was driven more by necessity rather than intrinsic motivation. Also, a number of students reported that they felt more at ease with communication out of class as they experienced working on similar tasks in IDLE. This finding is consistent with the theoretical model of MacIntyre et al (1998) which assumes that WTC is not only an individual characteristic but also subject to some influence by external factors. In reality, WTC may not be an incentive for students since communication in the natural environment is unpredictable, socially demanded and imposed by performance pressure. Unlike digital settings, communication beyond the classroom can be face-to-face and highly social with new unfamiliar interlocutors. Therefore, L2 WTC is still context-specific in the out-of-class situations and reactive since it is situational in its launching, with craving for narrativity rather than proactive language use. This validates previous research findings which suggest that L2 WTC in non-classroom settings is usually situationally motivated rather than, on the contrary, self-motivated (Ghasemi & Azari Noughabi, 2024). This represents an important tension, in that, while digital fluency can be seen on the part of the learners, everyday discourse is inhibited by socio-cultural expectations, pressure to perform and lack of support amongst interlocutors. In the Vietnamese context where spontaneous usage of English outside the class is not common, there can thus be a lack of worthwhile opportunities for students to make use of their digital confidence in spontaneous, face-to-face interaction. Thus, even though IDLE is able to contribute to communicative competence, it does not necessarily lead to proactive language use, except in acquired needs arise from contextual demand. In order to address the lack of opportunity for interaction, it is important to develop virtual experiential learning activities, in which some of the communication challenges in the real world can be simulated, such as role plays of workplace interactions, simulated travel scenarios, and unstructured conversations between peers. It can help students transition from digital fluency to more spontaneous spoken conversations which are beyond obligatory situations. In order to fill in such a gap, universities need to establish service-learning programs, volunteer exchanges, and virtual international

partnerships. For example, students can get involved in online language exchange groups or be paired with international partners to collaborate on intercultural projects. In addition to such simulations in the classroom, out-of-class simulations such as campus English areas can help the learner to relate digital fluency to real-word practice.

Results show that IDLE was the least influential for WTC in classroom situations with a variance of only 24.9% (R^2 = .249). The small effect size suggested that although IDLE had a positive effect on classroom WTC, its effect was less positive in comparison to other settings. In addition, some of the interviewees mentioned that although they participated in IDLE quite frequently, they still felt reluctant to speak in their classes for fear of making mistakes, teacher's high expectation and rigid discourse structures of the classroom.

This shares some similarities with Sato (2024) that has found the conventional classroom setting is characterized by high-stakes atmosphere that hinders spontaneous language behavior. Unlike online spaces where students can speak more freely without the threat of being assessed immediately, classroom communication is stunted by the structured format of the interactions, the peer pressure and the focus on accuracy (Lee & Hsieh, 2019). Some students also remarked that their learning habits from informal learning did not often intersect with in-class tasks which resulted in a disconnection in their communicative confidence. Although DLE provides security within a digital learning environment, this security is not easily transferred to classroom settings, probably because of the hierarchical dynamics in the classroom and the focus on linguistic accuracy (MacIntyre et al., 1998). This sharp contrast is perhaps one of the reasons why engaging in IDLE is not a great predictor of classroom WTC. In fact, the communicative situation of classrooms is still highly evaluative, time-constrained, and teacher-dominated. Many of these structural constraints affect students' willingness to take risks or engage in spontaneous conversations. This suggests some incompatibility between the affordances of IDLE and communicative constraints of the classroom instruction. Such formal instruction which takes the form of a rigid turn-taking structure, high-stakes assessment and emphasis on correcting students' errors may inhibit their WTC rather than supporting it. This disconnect underlines the need for a paradigm change in pedagogy from more controlled to more constructive. These limitations also raise the demand for pedagogical approaches that can effectively integrate informal digital learning into formal instruction. There are many ways to bridge the gap between digital fluency and classroom communication, such as via low-stakes speaking tasks, technology-empowered discussions, and student-centered practices. To combat this, teachers can implement a speaking routine such as "warm-up talk tickets" where students silently share their response to a prompt about themselves at the start of class. Flipped speaking models can also be used to enable learners to get prepared and practice speaking the target language online before they get into the classroom. Above all, professional development must be provided to help educators develop the role of a facilitator, and not a corrector or controller in students' oral communication. Such interactive and learner-centered environment with IDLE principles could better facilitate students' acquisition of the necessary communicative skills for the real world (Lee &Chiu, 2024). Policy makers may also have an important role in that too. Digital literacy must be provided in the national curriculum together with communication skills. Also, language assessment should cater for communicative competence and fluency rather than a heavy focus on form and accuracy.

Conclusion

This study illuminated the correlation between IDLE and students' L2 WTC in class, out of class, and online settings. The results supported the assertion that IDLE was a significant predictor of WTC, and its effect was probably stronger in digital environments because the students had more autonomy and less communication anxiety. However, it did not have a strong effect on in-class communication as a result of well-structured classroom nature and hierarchical discourse. The originality behind this research lies in the comparative perspective developed in three communicative contexts (formal-informal-digital) that provides a more complex picture of how IDLE engagement relates to situational variables of WTC. While previous research has tended to identify IDLE as a construct without specific context, this paper offers a contextual analysis that uncovers the variability in its efficacy based on the instructional and communicative context. Secondly, this study adds to the emerging literature on technology-enhanced language learning by reaffirming the importance of digital interaction when developing communicative confidence (Lee & Hsieh, 2019; Reinders & Benson, 2017) and complements the Social Cognitive Theory by demonstrating how IDLE facilitates language learning through observation and interaction (Guan et al., 2024). In line with previous studies, the results indicated that digital spaces offer low-anxiety communication opportunities, in particular, in AI-mediated interactions and gamified learning (Reinders & Wattana, 2015; Liu et al., 2024). Importantly, this study also highlights the emergent role of AI technologies like ChatGPT as language development partners. The students' preference for engagement with AI to human interaction suggests that feedback be reconceptualized as more facilitative rather than evaluative. This trend is a new aspect contributed by IDLE and makes it essential for us to re-evaluate the spheres of human and AI in communicative practice.

While IDLE has a positive impact on WTC in the digital and informal realm, it has a rather limited effect on the formal class environment. This finding indicates that spontaneous language use of students may be blocked as a result of the classroom environment, such as an authoritative style of teacher and a peer assessor. The study also underscores the importance of incorporating IDLE into formal instruction that would help bridge the digital informal learning and real-world communication gap. To this aim, technologically-supported, dialogic, virtual exchange, and online projects can be used to promote educational technology transfer of digital communication skills to classroom practices (Lee & Chiu, 2024). Teachers should also use low-stakes speaking activities to alleviate anxiety and promote students' L2 WTC (MacIntyre et al., 1998).

Despite its strengths, this study has potential drawbacks. First, it involved only Vietnamese university students, which means that the findings could not be generalized to other cultures and learning settings. This cultural distinctiveness might have affected how students related to digital learning and their willingness to communicate, in the light of Vietnam's exam-driven and teacher-centered culture. The convenience sampling method also further limits the transferability of the results to the larger populations. Future studies should sample participants using stratified or purposive sampling in varied types of institutional settings, locations and language proficiencies. Future research can use more varied and representative samples,

including cross-cultural intercultural exploits to understand how varying socio-cultural and educational contexts affect the interplay between IDLE and WTC to further develop informal digital learning practices for more varied learner groups. Second, self-report measures and cross-sectional data were used in the current study, potentially resulting in response issues. Self-report measures are subject to social desirability or recall bias, and cross-sectional cross-sections are unable to capture developmental change or any direction of causal effects. Thus, future research can use longitudinal or experimental study designs to better understand the temporal changes in the relationship between IDLE and WTC. Triangulated data sets between subjective reporting and daily logbooks, digital trace data, or ecological momentary assessment would be helpful to determine learner engagement. Third, although the study identified an array of IDLE activities leading to L2 WTC, further research is needed to explore the difference in the effect of distinct IDLE activities (e.g., social media activities or AI-assisted learning) on learners' communication behaviors. This difference is of particular significance given the rapid development of emerging technologies with distinct pedagogical affordances and psychological implications. Finally, the statistical analysis of this study examined the direct correlations and regression between IDLE and WTC across contexts. While being appropriate, it failed to include possible mediators or moderators such as anxiety, confidence, or self-efficacy. This reduces the power of the results fully explaining IDLE's impact on L2 WTC. Subsequent studies should include structural equation modeling or multilevel model to describe the interactions of individual characteristics and contextual affordances in the development of L2 WTC. In short, this study is one of the first to investigate IDLE's effect on L2 WTC within three settings. It found that the most conducive environment for WTC was digital settings while the least conducive environment was formal classrooms. The results not only enhance our knowledge of how IDLE facilitates L2 communication but also inform culturally responsive and digitally integrated language instruction in this digital age.

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