

Individual interest, self-regulation, and self-directed language learning with technology beyond the classroom

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Abstract: Individual interest and self-regulation are two pillars of self-directed learning. Despite empirical evidence on the interaction between the two with respect to academic achievement, few studies have explored how individual interest and self-regulation might interact and relate to self-directed informal learning. This study surveyed 322 university students on self-regulation and two interest constructs (interest in learning English and interest in pursuing personal interest in English), and tested how these factors related to their engagement in self-directed use of technology for English learning beyond the classroom. Structural equation modelling analysis revealed that despite both being significant determinants, interest factors, and self-regulation were associated differently with various types of self-directed technological activities (instruction-, information-, entertainment- and socialization-oriented activities). Self-regulation was predictive of instruction-, information- and socialization-oriented activities, which have high cognitive load and require effort management for second-language learners. Interest in English learning was consistently a significant predictor of all four types of technological activities. Interest in pursuing personal interest in English played a significant role in information- and entertainment-oriented technological activities. The findings recommend greater attention to individual interest when promoting self-directed informal learning. The findings further suggest adopting a differentiated approach to bolstering self-directed learning for different purposes.

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KEYWORDS

individual interest, out-of-class language learning, self-directed informal learning, self-directed language learning with technology, self-regulation

Practitioner notes

What is already known about this topic

- Self-regulation is important to self-directed learning.
- Subject-matter interest and self-regulation interplay to influence academic performance in formal learning contexts.

What this paper adds

- Interest and self-regulation interplayed to shape self-direction in informal learning contexts.
- Self-regulation was predictive of instruction-, information- and socialization-oriented activities.
- Interest factors added additional explanation power on self-directed technological activities.
- Both subject-matter interest and the integration of personal interest with subject learning were significant determinants.
- The integration of personal interest with subject learning mediated the influence of subject-matter interest.

Implications for practice and/or policy

- Educational interventions need to work simultaneously on both interest and self-regulation to bolster self-directed learning.
- Educators need to address different factors when boosting different types of technological activities.
- A relative stance needs to be taken since self-regulation might play a less significant role in less taxing technological activities.
- It is important to deliberately integrate students' personal interests into English learning and help students perceive and act on the integration.

INTRODUCTION

The widespread use of technology in daily life has increased access to resources and social interaction, making informal learning venues a significant source of learning (Bonk, 2010). Students use technology for learning outside of school more frequently than they do within it, which means that informal learning may be just as important as or even more important than formal learning for human development (Cox, 2013; Greenhow et al., 2009). At its core, informal learning is rooted in self-directed learning, where individuals take charge of their own learning processes and assume responsibility for them (Hall, 2009). While self-directed informal learning can occur with or without technology, technology offers access to enhanced information, social support, and spaces of action, which all contribute to enhancing learners' self-directed learning (Bonk & Lee, 2017; Rashid & Asghar, 2016).

Self-directed learning beyond the classroom is especially crucial for language learning because language learning requires diverse and ample language use experiences that cannot be fully provided in the classroom alone (Kormos & Csizer, 2014). Out-of-class language experience is indispensable (Reinders et al., 2022), contributing significantly and uniquely to language learning (Cole & Vanderplank, 2016; Peters, 2018). Learners' frequency and diversity of self-directed engagement with everyday technological resources, such as TV shows, YouTube videos, online gaming, and social media posts, are positively associated with the development of various language skills (Cole & Vanderplank, 2016; De Wilde et al., 2020; Lai et al., 2022). It even relates positively to learners' attitudes towards in-class learning (Lamb & Arisandy, 2020). Given the vital role that self-directed out-of-class language learning with technology plays in language development, it is crucial to conduct research on factors that drive and shape this type of learning.

Self-directed learning in technology-mediated informal contexts involves creating a personalized learning environment and trajectory, as well as managing the learning process through self-regulation (Morris, 2019; Saks & Leijen, 2014). The former is often driven by the fulfilment of personal needs and interests, and the latter involves the regulation of learning activities and task performance (Morris, 2019). Interest and self-regulation hence are critical to fuelling self-directed learning. However, while research efforts have shed light on the association between self-regulation and self-directed language learning with technology (eg, Bell, 2017; Luo, 2020), there is a limited understanding of how individual interest relates to this type of learning. Additionally, existing studies on the interplay of individual interest with self-regulation in relation to learning have primarily focused on subject-matter interest and have been conducted in formal learning contexts (eg, Bai et al., 2022; Grigg et al., 2018; Lee et al., 2014). However, it is important to note that individual interest that drives learning encompasses not only subject-matter interest but also the extent to which personal interests are integrated with the subject area. This study hence seeks to address the research gaps by investigating how individual interest and self-regulation interact to shape self-directed informal language learning with technology. The insights gained from this study on the interplay between individual interest and self-regulation in self-directed informal language learning with technology can inform the development of educational interventions that foster this desirable learning behaviour.

LITERATURE REVIEW

Self-directed language learning with technology

Self-directed learning is a learning process that emphasizes learners as autonomous and accountable managers of their own learning. This involves consciously planning and conducting life-long learning, monitoring the learning process, and managing learning resources to achieve learning goals (Knowles, 1975; Tough, 1971). Self-directed learning has both a humanistic foundation and a pragmatic foundation (Morris, 2019). The humanistic foundation is reflected in Knowles's (1975) conceptualization of self-directed learning as 'the process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes' (p. 18). This foundation regards self-regulation as an essential aspect of self-directed learning (Saks & Leijen, 2014). The pragmatic foundation is reflected in Tough's (1971) observation that self-directed learning is often driven by pragmatic reasons, namely, to fulfil personal needs and interests situated in one's personal context and to achieve personal growth. This foundation underscores the importance of individual interest in driving the intentional utilization of learning opportunities and distributed mentoring relationships in diverse settings to

establish personalized ecologies of connected learning across formal and informal contexts (Barron, 2006; Ito et al., 2020). Thus, the theoretical foundations of self-directed learning identify self-regulation and personal interest fulfilment as its two pillars.

The use of technology can facilitate and empower self-directed learning (Morris & Rohs, 2023). Learners' interaction with technology is agentic (Palmgreen, 1984). Learners may utilize the same technological resource for divergent purposes and to satisfy distinct needs (Hu & Yu, 2021; Lai et al., 2018). The appropriation of digital information for various purposes is linked to distinct cognitive strategies, appropriation behaviours, and learning outcomes (Lee & Wu, 2013; Vanderplank, 2019). Thus, a nuanced conceptualization of self-directed learning with technology is suggested by scholars when exploring its antecedents and consequences (Schmitt, 2019). Purpose provides a useful lens. Previous literature has indicated that language learners use technological resources for a range of purposes outside of formal language learning settings, such as self-study, relaxation, and entertainment, seeking information relevant to personal interests and needs, and developing and strengthening social connections with others (Lai et al., 2018; Lamb & Arisandy, 2020; Trinder, 2016). Moreover, these various orientations of technology use have been linked to distinct antecedents and outcomes (Henry & Cliffordson, 2017; Lai et al., 2018; Lamb & Arisandy, 2020). For instance, in their study, Lamb and Arisandy (2020) discovered that instruction- and socialization-oriented technology use was positively linked with students' attitudes towards in-class English learning, whereas entertainment-oriented use was minimally associated. Lai et al. (2018) found that perceived usefulness was the primary predictor of instruction-oriented experiences, while perceived ease of use directly predicted entertainment- and information-oriented experiences. Thus, examining how the two fundamental pillars of self-directed learning, individual interest, and self-regulation, interact to influence different types of self-directed out-of-class technological experience is worthy of exploration.

Self-regulation and self-directed language learning with technology

As defined by Zimmerman and Schunk (2011), self-regulation is 'the process by which learners personally activate and sustain cognitions, affects and behaviors that are systematically oriented towards the attainment of learning goals' (p. vii). It is an essential element of self-directed learning, involved in regulating the learning process (Loyens et al., 2008; Saks & Leijen, 2014) and particularly critical for self-directed learning in the free and challenging environment of informal learning contexts (Beishuizen & Steffens, 2011; Bell, 2017).

Self-regulation is a robust predictor of self-directed language learning with technology, exerting both direct and indirect effects through computer self-efficacy (Chen & Hsu, 2020; Lai, 2013; Lai et al., 2022). Lacking self-regulation hinders self-directed language learning. For instance, García Botero et al. (2019) discovered that university language learners' limited capacity to effectively self-monitor and manage their learning experience hindered their sustained use of the language learning mobile app, Duolingo, as a supplement to in-class Spanish instruction. Thus, we hypothesized that

H1. Self-regulation may directly and positively predict all types of self-directed technological activities.

Interest and self-directed language learning with technology

Interest is defined as an individual's enduring inclination and preferred involvement with a specific object or activity (Hidi & Renninger, 2006). Individual interest plays a critical role

in self-directed learning by enhancing attention and perseverance towards a learning task, promoting self-motivated and self-sustaining exploration across temporal and spatial boundaries, and fostering repeated and frequent engagement in activities relevant to a topic or domain (Barron & Martin, 2016; Renninger & Hidi, 2015). Individual interest is hence an essential booster of self-directed learning in informal contexts (Jeong et al., 2018).

In the context of informal English language learning, both a general interest in English and a desire to pursue personal interests through English can drive self-directed learning. Interest in English propels exploratory learning behaviours. For instance, Bonney et al. (2008) found that high school students' interest in language learning was the strongest predictor of their self-regulated extracurricular foreign language learning activities. Interest in a language positively and significantly predicts students' self-directed use of technology for language learning, even after efficacy and social influence factors are controlled for (An et al., 2021; Lai, 2013). In addition to interest in the language itself, personal interest in particular content can also serve as a powerful motivator for self-directed learning. For instance, interest in information of personal relevance or pop culture can drive learners to engage in self-directed learning by exploring relevant online resources in the target language (Kormos & Csizer, 2014; Lai et al., 2018). Thus, when learners consciously connect English learning with personal interest, the motivational strength of their personal interests may transfer to English learning and enhance engagement in self-directed learning activities. Thus, we hypothesized that

H2. Interest in English learning may positively and directly predict all types of self-directed technological activities.

H3. Interest in pursuing personal interest in English may positively and directly predict all types of self-directed technological activities.

Interest, self-regulation, and self-directed language learning with technology

Interest and self-regulation may interplay to shape activity (re)engagement (Renninger & Hidi, 2015; Sansone & Smith, 2000). Individual interest plays a significant role in facilitating and maintaining self-regulation, as noted by Renninger and Hidi (2015) and Lee et al. (2014). It impacts the direction, intensity, and persistence of action (Su, 2020) and can also interfere with goal-directed behaviours and strategy use (eg, Sorić & Palekčić, 2009). Schiefele (1991) explicitly proposes that the relationship between learner characteristics, such as individual interest, and learning outcomes is mediated by emotion and cognitive processes, including self-regulation.

The role of individual interest in shaping self-regulated English learning is well-established. Interest in English learning is a positive predictor of metacognitive self-regulation, such as effort regulation, goal setting, and planning, and a negative predictor of the tendency to avoid challenging learning tasks (Bai et al., 2022; Bai & Wang, 2020). Self-regulation also plays a crucial role in predicting the use of technology for personal interests in informal learning (Istencic & Lebenicnik, 2022). It also mediates the relationship between motivational factors and self-directed out-of-class use of technological resources for English learning (Kormos & Csizer, 2014). Research hence indicates that self-regulation has the potential to mediate the link between individual interest and self-directed language learning with technology. Thus, we hypothesized.

H4. Interest in English learning may positively and indirectly predict self-directed technological activities via self-regulation.

H5. Interest in pursuing personal interest in English may positively and indirectly predict self-directed technological activities via self-regulation.

The study

The study devised a conceptual framework of the relationships between self-regulation, the two interest factors, and self-directed language learning with technology beyond the classroom (see [Figure 1](#)), and empirically tested this framework to answer the following research question:

RQ: How do interest and self-regulation associate with self-directed language learning with technology beyond the classroom?

By examining the role of both interest and self-regulation in shaping self-directed learning, this study expands the current literature beyond its traditional emphasis on self-regulation.

RESEARCH METHOD

Research context and participants

A total of 348 undergraduate foreign language students from two universities in mainland China participated in this study. Both universities are located in socio-economically prosperous areas with advanced technological infrastructure, providing students with easy access to technological resources in English. The students were either English major or foreign language major (eg, Italian, Korean, Arabian) with a strong focus on English. This group of participants was selected because, as language majors, they are more likely to engage in self-directed use of technological resources for language learning in general. However, their

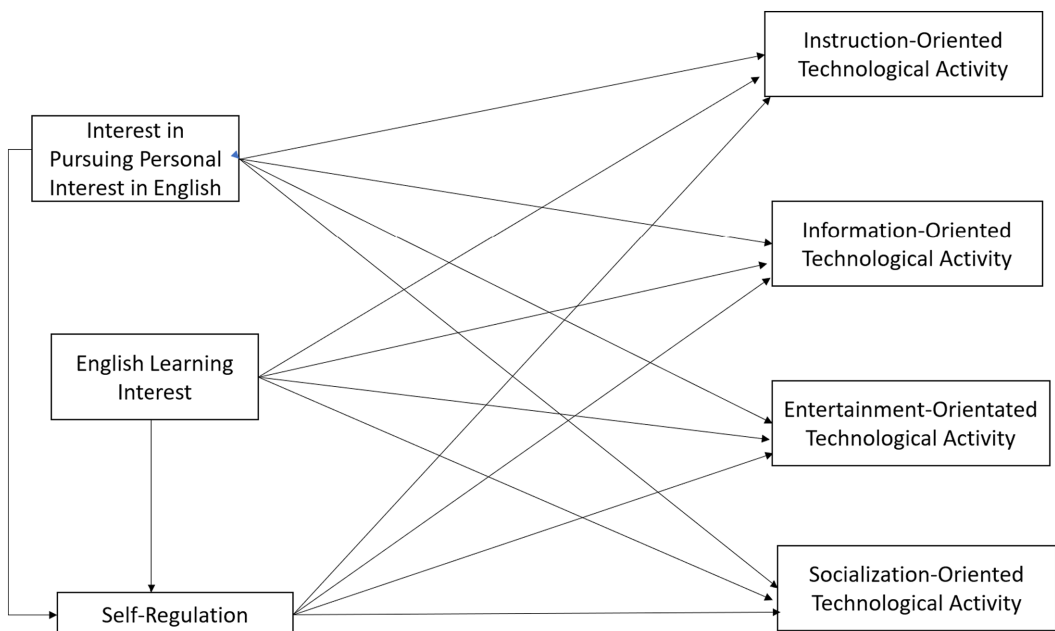


FIGURE 1 The conceptual framework.

interest in learning and using English may differ due to their various language specialisms. Students were recruited with the help of their English class instructors.

The majority of the participants in this study were female (83%), with an average age of 20. They were evenly distributed across the four undergraduate year groups, with approximately 25% of participants in each year group. Based on Nation's (2012) vocabulary size test, the participants had an average receptive vocabulary size of 6600-word families ($M=66.15$; $SD=13$), slightly below the 8000 needed to comprehend authentic spoken and written texts (Nation, 2012). The participants reported that they spent an average of 1–3 hours per week using English technological resources and tools for academic learning and daily life purposes.

The questionnaire

The questionnaire measured four major constructs with sub-dimensions. At the start of the questionnaire, we indicated that the aim of the research was to better understand how learners use technological resources to self-direct their English learning outside of formal instructional settings. A definition of technological resources was also provided: 'technological resources refer to any online and digital English resources that give you access to English or for English learning, including online communities, forums, public channels, digital games, audio-visual resources, chatting, blogging, podcasting, social media and mobile apps'.

Interest in English learning

Interest in English learning (*ELI*: $\alpha = 0.91$; $n = 6$) was operationalized as the perceived level of interest in learning and accessing English both inside and outside the classroom, as measured by adapted items from Rotgans (2015). Examples of items were 'I am very interested in English'; 'I always look forward to lessons in English'; and 'Outside of school I actively access English'.

Interest in pursuing personal interest in English

According to Schiefele (1991), individual interest consists of two components: feeling-related and value-related valences. The former pertains to positive feelings, such as enjoyment, that are associated with an object or activity, while the latter pertains to the personal significance and value that the individual attributes to it. As the measure of individual interest needs to relate directly to the topic (Schiefele, 1991), we developed a construct of six items (MDEPI: $\alpha = 0.90$; $n = 6$) to assess the participants' feeling- and value-related valences towards using digital English resources to pursue personal interest. Sample survey items were 'Learning and doing things of personal interest through using English online and digital resources is fun'; 'Pursuing personal interests through using English online and digital resources is beneficial'; and 'learning and doing things of personal interest through using English online and digital resources is worthwhile'.

Self-regulation

Self-regulation (*SR*: $\alpha = 0.85$; $n = 5$) measured goal commitment and metacognition regulation in relation to the use of English technological resources, using adapted items from Lai

and Gu (2011) and Barnard et al. (2009). This construct was measured using statements such as 'I set up subgoals at different stages of using online and digital resources to access or to study English', 'I persevere in achieving my goals in using online and digital resources to access or to study English against all sorts of difficulty', and 'I constantly monitor my progress towards using online and digital resources to access or to study English'.

Self-directed technological activities

To assess the frequency of various types of self-directed technological activities in English or for English learning outside the classroom in the preceding 6 months, we modified and extended the questionnaire items originally developed by Lai et al. (2018). Four types of activities were included: (1) *Instruction-Oriented Technological Activity* (ISO: $a=0.80$; $n=2$) measured self-initiated self-directed use of technological resources for self-study of English, using statement like 'I use online and digital resources to increase practice of English'; (2) *Information-Oriented Technological Activity* (IFO: $a=0.83$; $n=4$) measured self-initiated use of technological resources to seek information of interest, using statements like 'I use online and digital resources to obtain daily life information I need in English'; (3) *Entertainment-Oriented Technological Activity* (ENO: $a=0.87$; $n=3$) measured self-initiated use of technological resources for entertainment and relaxation, using statements like 'I use online and digital resources to access interesting entertainment resources in English'; and (4) *Socialization-Oriented Technological Activity* (SO: $a=0.91$; $n=4$) measured self-initiated use of technological resources to connect and socialize with others, using items like 'I use online and digital resources to communicate with others in English'.

Interest in English learning, interest in using English digital resources to pursue personal interest and self-regulation were measured using 1–6 Likert scale, 1 indicating 'Strongly Disagree' and 6 indicating 'Strongly Agree'. Self-directed technological activities were measured using 1–5 Likert scale, 1 indicating 'Almost Never' and 5 indicating 'Almost Always'. Prior to the main study, the questionnaire was pilot tested with five undergraduate students who were not part of the final sample to identify and address any potential wording issues.

Data collection and analysis

The questionnaire was written in both English and Chinese. To ensure that the meaning of the items was not lost or distorted in translation, two bilingual speakers of both English and Chinese conducted a backward translation of the questionnaire. A paper-and-pencil questionnaire was administered in class by the English teachers. After discarding incomplete questionnaires, 322 valid questionnaires were included in the analysis. The sample size was sufficient for the statistical analysis and structural equation modelling, as the observation–parameter ratio exceeded the recommended value of 10:1 (Schreiber et al., 2006).

Given that the factor structure of self-directed technological activities was not previously validated in Lai et al. (2018) and new questionnaire items were added to expand the original items, we utilized exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) to examine the factor structure. We randomly split the data in half and conducted EFA on half of the data ($N=168$) to examine the factor structure and CFA on the other half ($N=154$) to test and confirm the structure. Splitting the data in half to run EFA and CFA on separate subsets of data is a recommended practice that enables assessing the generalizability of the factor structure and avoids overfitting the model (Kline, 2015). Structural equation modelling (SEM) was then conducted on the whole dataset to model the data against the conceptual model, using different types of

self-directed technological activities as the endogenous variables and interest-related constructs and self-regulation as the exogenous variables. Since self-directed technological activities are related, principal axis factoring and promax rotation was adopted in the EFA analysis in SPSS. We used Barlett's test and Kaiser–Meyer–Olkin (KMO >0.60) to assess scale factorability, and relied on scree plot and parallel analysis to determine the number of factors (Kline, 2015; Worthington & Whittaker, 2006). In item screening, we used 0.32 as the cut-off value for item loadings and 0.15 difference for detecting cross-loadings (Worthington & Whittaker, 2006). CFA and SEM were conducted in AMOS 28.0 using maximum Likelihood Estimation as the estimation method and a bootstrap method with 5000 resamples and 95% confidence level in bias-corrected confidence interval. The model fit was assessed using the following criteria: RMSEA <0.06, CFL and TLI value >0.95, and CMIN/DF <3 (Hu & Bentler, 1999). To identify and address the potential presence of common method bias in the one-shot self-report questionnaire data, Harmon's single factor test and full collinearity variance inflation factors (VIFs) were conducted prior to performing SEM analysis (Kock & Lynn, 2012; Podsakoff et al., 2003). The Harman's single factor test result was satisfactory as the general construct accounted for 35.34% of the variance (<50%). The VIFs for all the constructs were below the commonly used threshold of 5, with the largest value being 2.27, indicating no significant multicollinearity. Thus, the dataset was free of common method bias.

FINDINGS

The measurement model

EFA analysis indicated satisfactory scale factorability (KMO = 0.86, $p < 0.000$). The communalities were all above the threshold value of 0.4 (Osborne et al., 2008). Both the scree plot and parallel analysis suggested four factors, and the four factors accounted for 76% of the variance in the construct. Subsequent CFA analysis generated acceptable fit indices: CMIN/DF = 1.38; CFI = 0.98; TLI = 0.97; RMSEA = 0.05 (0.017; 0.075). Thus, the factor analyses confirmed the conceptualized four-factor structure of self-directed technological activities (see Appendix 1).

The CFA of the overall measurement model revealed a satisfactory model fit (CMIN/DF = 1.76; CFI = 0.95; TLI = 0.94; RMSEA = 0.049 (90% confidence interval: 0.043; 0.055)), suggesting that the indicators were well represented by the constructs. The factor loadings of all the items were above 0.65. The AVEs of all the constructs were above 0.50, indicating good convergent validity. The square root of all AVEs was larger than the inter-construct correlations, indicating satisfactory discriminant validity (see Table 1). Thus, the construct validity was satisfactory. Construct reliability was evaluated using both Cronbach's alpha and composite reliability, both of which indicated satisfactory reliability for all constructs, with values above 0.80 (>0.70).

The participants reported a slightly positive interest in learning English ($M = 4.01$; $SD = 0.99$). They reported a higher level of interest in using English to pursue personal interests ($M = 4.68$; $SD = 0.77$). The level of self-reported self-regulation in technology use for English learning was low ($M = 3.74$; $SD = 0.85$). Participants reported engaging in entertainment-oriented activities most frequently ($M = 3.07$; $SD = 1.06$) for self-directed use of technological resources for English learning beyond the classroom, followed by information seeking ($M = 2.88$; $SD = 0.81$) and instructional purposes ($M = 2.87$; $SD = 0.92$), with all frequencies close to 'Sometimes'. They reported the least frequent use of English technological resources for socialization ($M = 2.00$; $SD = 0.77$), with frequencies close to 'Once in a While'.

TABLE 1 The measurement model.

	Mean (SD)	Composite reliability	α	AVE	PPI	ELI	SR	ISO	IFO	ENO	SO
PPI	4.68 (0.77)	0.89	0.88	0.54	(0.73)						
ELI	4.01 (0.99)	0.91	0.91	0.64	0.54	(0.80)					
SR	3.74 (0.94)	0.85	0.87	0.54	0.36	0.41	(0.73)				
ISO	2.87 (0.92)	0.80	0.80	0.67	0.36	0.48	0.41	(0.82)			
IFO	2.88 (0.81)	0.83	0.83	0.55	0.48	0.36	0.36	0.58	(0.74)		
ENO	3.07 (1.06)	0.87	0.86	0.69	0.48	0.47	0.29	0.45	0.58	(0.83)	
SO	2.00 (0.77)	0.91	0.90	0.72	0.24	0.34	0.28	0.38	0.49	0.43	(0.85)

Note: Diagonal in parentheses: square root for AVE from observed variables (items); off-diagonal numbers: correlations between constructs.

Abbreviations: ELI, interest in English learning; ENO, entertainment-oriented technological activity; IFO, information-oriented technological activity; ISO, instructional-oriented technological activity; PPI, interest in pursuing personal interest in English; SO, socialization-oriented technological activity; SR, self-regulation in self-directed technological activity.

The structural model

We first conducted an SEM analysis with self-regulation as the only exogenous variable (CMIN/DF = 1.97; CFI = 0.96; TLI = 0.96; RMSEA = 0.06 (90% confidence interval: 0.045; 0.065); SRMR = 0.05). The model accounted for 24% of the variance in instruction-oriented technological activity, 17% in information-oriented, 10% in entertainment-oriented, and 9% in socialization-oriented activities.

SEM analysis of the full conceptual model yielded unsatisfactory model fit indices: CMIN/DF = 1.94; CFI = 0.94; TLI = 0.93; RMSEA = 0.06 (90% confidence interval: 0.05; 0.06). The modification indices suggested adding a path from English learning interest to interest in pursuing personal interest in English (ELI → PPI). The suggested path is logical because interest in a subject domain can lead to a desire for continued engagement with the subject investment of effort in activities related to the domain (eg, Ainley & Ainley, 2011; Grigg et al., 2018). The more interested a learner is in English, the more likely they are to perceive a connection between English and their personal interests. This heightened awareness can lead to greater enjoyment and recognition of the value of using digital English resources to pursue their interests. After adding this path, the model fit indices were satisfactory: CMIN/DF = 1.65; CFI = 0.96; TLI = 0.95; RMSEA = 0.045 (90% confidence interval: 0.039; 0.051) (see Figure 2).

The structural model explained 36% of the variance in instruction-oriented technological activities, 37% in information-oriented activities, 33% in entertainment-oriented activities, and 15% in socialization-oriented activities. The inclusion of the two interest constructs significantly enhanced the model's explanatory power, particularly for information-oriented and entertainment-oriented technological activities, with a 20% and 23% increase in explanation power, respectively. Although the interest constructs and self-regulation accounted for a substantial amount of variance in most technological activities, they had limited explanatory power over technological activities for socialization purposes. The small explanatory power might be because socialization in a second language is influenced by a myriad of socio-cultural factors, such as social conventions, relationships, and identity, in addition to psychological factors, such as interest and self-regulation (Lai et al., 2018; Lamb & Arisandy, 2020).

Figure 2 revealed that the three constructs predicted various types of technological activities differently. English learning interest and self-regulation predicted three out of four types of technological activities directly, except for information-oriented technological activities

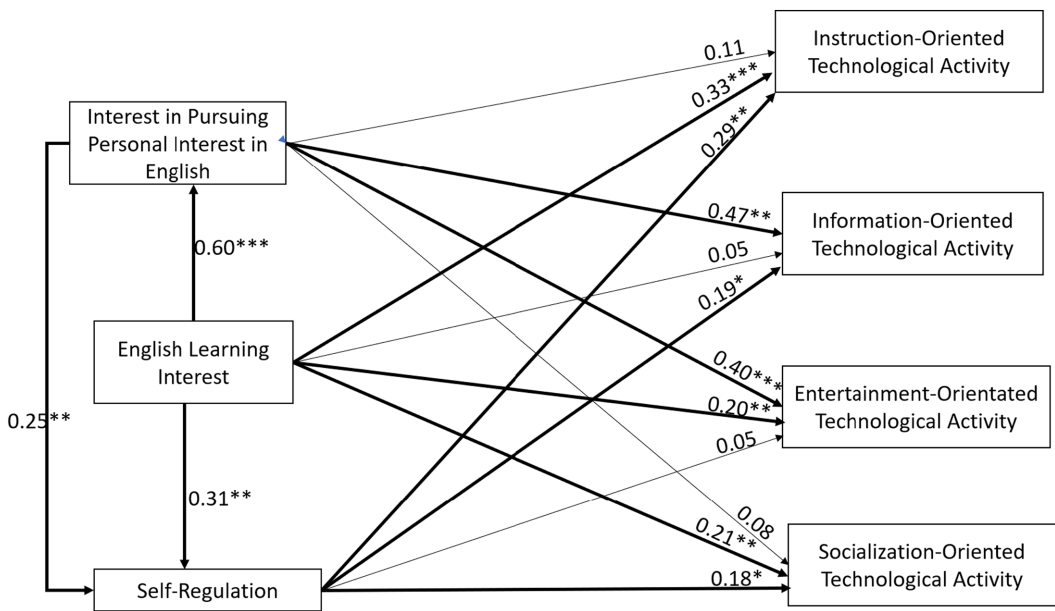


FIGURE 2 The structural model.

for English learning interest and entertainment-oriented technological activities for self-regulation. Interest in pursuing personal interest in English was a direct predictor of information- and entertainment-oriented activities only. Moreover, as hypothesized, the two interest constructs significantly predicted self-regulation.

Determinants of different types of technological activities

Instruction-oriented technological activities

Table 2 revealed that instruction-oriented technological activities were determined mostly by English learning interest and self-regulation, both being significant direct predictors ($\beta_{\text{English learning interest}} = 0.33$, $p < 0.001$; $\beta_{\text{self-regulation}} = 0.29$, $p < 0.01$). Interest in pursuing personal interest in English did not directly predict this type of technological activity ($\beta = 0.11$, $p > 0.05$), and its significant total effect came primarily from the mediation of self-regulation ($\beta = 0.08$, $p < 0.01$). Thus, the participants' overall interest in English learning and their effort regulation were dominant determinants of instruction-oriented technological activities.

Information-oriented technological activities

Information-oriented technological activities were determined primarily by interest in pursuing personal interest in English (see Table 3), with a large direct effect ($\beta = 0.47$, $p < 0.01$) and total effect ($\beta = 0.51$, $p < 0.001$). Self-regulation was also a significant direct predictor ($\beta = 0.19$, $p < 0.05$). Although English learning interest had a positive total effect on this type of activity ($\beta = 0.41$, $p < 0.001$), its effect was fully mediated by interest in pursuing personal interest in English ($\beta = 0.31$, $p < 0.001$) and self-regulation ($\beta = 0.06$, $p < 0.01$). Thus, information-oriented technological activities were determined primarily by learners' interest

TABLE 2 Effects of interests and self-regulation on instruction-oriented technological experience.

Instruction-oriented technological experience ($R^2 = 36\%$)					
	Direct effect	Indirect effect		Total effect	
		Mediator(s)	Indirect effects		
Interest in pursuing personal interest in English (PII)	0.11 (0.09)	SR	0.08** (0.03)		0.19* (0.08)
Interest in English learning (ELI)	0.33*** (0.08)	PII	0.11* (0.04)	0.20** (0.06)	0.53*** (0.05)
		SR	0.09** (0.03)		
Self-regulation (SR)	0.29** (0.09)	–	–		0.29** (0.09)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.00$.

TABLE 3 Effects of interests and self-regulation on information-oriented technological experience.

Information-oriented technological experience ($R^2 = 37\%$)					
	Direct effect	Indirect effect		Total effect	
		Mediator(s)	Indirect effects		
Interest in using digital English resources to pursue personal interest (PII)	0.47** (0.08)	SR	0.05** (0.03)		0.51*** (0.08)
Interest in English learning (ELI)	0.04 (0.08)	PII	0.31*** (0.05)	0.37*** (0.06)	0.41*** (0.06)
		SR	0.06** (0.02)		
Self-regulation (SR)	0.19* (0.08)	–	–		0.19* (0.08)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.00$.

in using digital English resources to pursue personal interest and their self-regulation of technological activities.

Entertainment-oriented technological activities

Table 4 showed that the two interest constructs were significant predictors of this type of technological activities, with significant total effects ($\beta_{\text{interest in pursuing personal interest}} = 0.42$, $p < 0.001$; $\beta_{\text{English learning interest}} = 0.46$, $p < 0.001$). Learners' interest in pursuing personal interest in English was the most prominent predictor, as it not only had a significant direct effect ($\beta = 0.40$, $p < 0.001$) but also mediated a large portion of the effect of English learning motivation ($\beta = 0.25$, $p < 0.001$). Thus, the greater feeling-related and value-related valences learners held with regard to integrating personal interest in English experiences, the more likely they would use English technological resources for entertainment and relaxation.

Socialization-oriented technological activities

Table 5 revealed that English learning interest and self-regulation were significant predictors of socialization-oriented technological activities, with significant total effects ($\beta_{\text{English learning interest}} = 0.34$, $p < 0.001$; $\beta_{\text{self-regulation}} = 0.18$, $p < 0.05$). English learning interest was the strongest predictor, having both significant direct and indirect effects. Learners'

TABLE 4 Effects of interests and self-regulation on entertainment-oriented technological experience.

Entertainment-oriented technological experience ($R^2 = 33\%$)					
	Direct effect	Indirect effect		Total effect	
		Mediator(s)	Indirect effects		
Interest in using digital English resources to pursue personal interest (PII)	0.40*** (0.08)	SR	0.01 (0.02)		0.42*** (0.07)
Interest in English learning (ELI)	0.20** (0.07)	PII	0.25*** (0.06)	0.26*** (0.06)	0.46*** (0.05)
		SR	0.01 (0.03)		
Self-regulation (SR)	0.05 (0.07)	–	–		0.05 (0.07)

** $p < 0.01$; *** $p < 0.00$.

TABLE 5 Effects of interests and self-regulation on socialization-oriented technological experience.

Socialization-oriented technological experience ($R^2 = 15\%$)					
	Direct effect	Indirect effect		Total effect	
		Mediator(s)	Indirect effects		
Interest in using digital English resources to pursue personal interest (PII)	0.08 (0.08)	SR	0.04* (0.03)		0.12 (0.08)
Interest in English learning (ELI)	0.21** (0.08)	PII	0.07 (0.04)	0.13* (0.05)	0.34*** (0.05)
		SR	0.06* (0.02)		
Self-regulation (SR)	0.18* (0.08)	–	–		0.18* (0.08)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.00$.

interest in pursuing personal interests in English did not predict this type of activity ($\beta = 0.12$, $p > 0.05$), which is not surprising given that socialization-oriented technological experiences for second-language learners often involve contrived language practices that lack authenticity in communication (Lai et al., 2018; Trinder, 2016). Self-regulation significantly mediated the effects of the two interest constructs. Thus, the participants' engagement in the self-directed use of English technological resources for socialization purposes was driven largely by learners' English learning interest and self-regulation.

In summary, the participants' engagement in technological activities for self-study and socialization was primarily predicted by both their English learning interest and self-regulation. Engagement in activities aimed at accessing information related to personal needs and interests was strongly influenced by self-regulation and interest in pursuing personal interests in English. Their engagement in activities for pure relaxation and entertainment was determined mainly by the two interest constructs.

DISCUSSION

Previous research on promoting self-directed technology-enhanced out-of-class learning has primarily concentrated on investigating the role of self-regulation (eg, Lai et al., 2022; Yabukoshi, 2021) and has developed interventions that focus exclusively on improving self-regulation skills (eg, García Botero et al., 2021; Li et al., 2021). However, this study found that self-regulation alone could only explain a small proportion of the variance in self-directed

out-of-class technological activities for language learning. Adding interest constructs into the model significantly increased the explanatory power, especially for information- and entertainment-oriented technological activities. The finding reinforces the argument that interest is a crucial factor in maintaining sustained informal learning (Barron, 2006; Jeong et al., 2018). Therefore, the study highlights the need for increased consideration of interest constructs in future research in this field. Although the findings confirm the importance of interest in self-directed informal learning behaviours, they cannot shed light on the underlying affective and cognitive mechanisms through which interest constructs promote self-directed informal learning with technological resources. Future research could explore the impact of both learning-related interests and the integration of subject matter with personal interests on various types of self-directed technological behaviours in informal learning settings.

The study also found that self-regulation and interests had varying contributions to different types of technological activities. The study found that self-regulation was a significant determinant of engagement in instruction-, information-, and socialization-oriented activities, all of which require greater cognitive effort and investment from second-language learners (De Wilde et al., 2022; Lai et al., 2018; Lee & Wu, 2013). However, it was not a predictor of entertainment-oriented activities, for which interest factors play a significant role. The observed difference is logical because self-regulation is related to concentrated efforts, whereas individual interest is associated with more exploratory behaviours (O'Keefe & Linnenbrink-Garcia, 2014; Sansone et al., 2012). Thus, interest and self-regulation are two equally important dimensions that relate differently to self-directed informal learning. The findings support the idea that both self-regulation and individual interest should be addressed simultaneously when promoting self-directed language learning outside the classroom (eg, McLoughlin & Mynard, 2015; Mynard & McLoughlin, 2020; Song & Bonk, 2016). The results, which indicate varying associations between self-regulation and interest constructs, suggest the need for a nuanced approach to understanding the roles of these two dimensions in learners' voluntary engagement in out-of-class technological activities. Moreover, self-directed language learning may require varying levels of effort investment among learners with different language proficiency levels, and learners at different proficiency levels may require specific support for various types of technological behaviours (Lai et al., 2018). Hence, the contribution of self-regulation and interests to different types of technological behaviours may vary for language learners with different language proficiency levels. Future research may tap deeper into the relative contribution of the two for different learners and for the same group of learners over time.

This study examined two interest constructs: interest in English learning (subject matter interest) and interest in using English to pursue personal interest (the integration of subject matter with personal interest). It revealed that both were significant determinants of self-directed technological activities in informal learning contexts. The link between subject matter interest and learning has been extensively researched and established (Briggs & Sherman, 2018; Grigg et al., 2018; Lee et al., 2014). The link between the integration of subject matter with personal interest and language learning, however, has received little attention in research, despite the existence of various arguments in favour of it (Benson, 2016; Trinder, 2016). This study found that this facet of interest not only directly predicted self-directed out-of-class technological activities but also mediated the influence of subject matter interest. The results suggest that using students' personal interests to establish connections across various elements and contexts relevant to learning and personal growth (Peters & Romero, 2019) is a promising approach, given that curiosity, interest, and the internal drive for self-improvement are essential motivational factors for self-directed learning (Bonk et al., 2015; Trinder, 2016). The results recommend incorporating students' personal and professional interests into English language learning through deliberate pedagogical strategies and supporting students in recognizing and utilizing these connections.

This study validated a taxonomy of four types of technological activities and showed that the influences of interests and self-regulation manifested differently for these four types of activities. The findings legitimize differentiating self-directed technological activities by purpose (Lai et al., 2018). The study revealed that self-directed technological activities designed for different purposes are not only linked to distinct cognitive processing and learning behaviours, as previously suggested in the literature (Knutson, 1998; Lee & Wu, 2013), but are also predicted by different antecedents. Consequently, educators should consider different factors when promoting various types of technological activities (Lai et al., 2018). This study further discovered that self-regulation was more critical to information-oriented technological activities than to entertainment-oriented technological activities. The differences can be attributed to the different nature of these two types of activities. Information-oriented activities may require more effortful cognitive processing, sustained attention, and goal-directed behaviour, which may necessitate greater self-regulation to maintain focus. In contrast, entertainment-oriented activities are more casual, immediately gratifying, and less cognitively demanding, and therefore may require less self-regulation. The finding, therefore, supports the idea of conceptualizing information- and entertainment-oriented technological experiences as two distinct types of activities in the informal learning context. It supports updating Lai et al.'s (2018) framework of self-directed language learning with technology to reflect these distinctions.

CONCLUSION

This study examined how individual interests and self-regulation interplayed to shape learners' engagement in self-directed language learning with technological resources beyond the classroom. It extends the investigation of the relationships of interests, self-regulation, and academic learning beyond the formal instructional contexts. It found that individual interest factors played an equally, if not more, important role as self-regulation in determining self-directed technological activities in English beyond the classroom. They related differently to different types of technological activities. The findings highlight the significance of addressing the individual interest when promoting self-directed language learning. The findings also underscore targeting different factors related to individual interest and self-regulation when promoting different types of technological activities.

This study has a few limitations. First of all, it tested a static model of how individual interests interact with self-regulation to shape self-directed learning. However, Nenniger (1999) proposed that the relationship between individual interests and self-regulation is dynamic, in which interests may influence self-regulation, but evaluation of the goal attainment may also further shape interests. Repeated engagement in related experiences may further generate interest (Grigg et al., 2018; Shanthi & Jaafar, 2020). Thus, a longitudinal design is needed to examine the interaction of individual interests, self-regulation, and self-directed out-of-class learning over time. Second, the research findings might be biased by the particularities of the participants. The participants were intermediate-level language learners, whose language proficiency makes pursuing personal interest in English possible. The strength of the predictive power of personal interest factors on self-directed technological activities might have been biased, since language proficiency may moderate the effects of antecedents on self-directed learning with technology (Lai et al., 2018). Moreover, the participants were predominantly female foreign language learners. Girls are found to exhibit greater self-regulation, and the correlation between individual interests and self-regulation is stronger for boys than for girls, especially in language learning (Lee et al., 2014; Schiefele et al., 1992). Thus, the influence of

individual interests might be stronger if the study was conducted with a population with a greater proportion of male participants or in different subject domains. Thus, future studies may explore the issues further in different subject domains and with different participants.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest declared.

DATA AVAILABILITY STATEMENT

Data can be accessed by contacting the author (saved in a personal repository).

ETHICS STATEMENT

Ethical approvals were gained from the hosting institution.

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APPENDIX 1

THE FACTOR STRUCTURE OF SELF-DIRECTED TECHNOLOGICAL ACTIVITIES

	1	2	3	4
ISO1	0.87			
ISO2	0.79			
IFO1		0.68		
IFO2		0.63		
IFO3		0.84		
IFO4		0.80		
SO1			0.77	
SO2			0.71	
SO3			0.88	
SO4			0.95	
ENO1				0.84
ENO2				0.40
ENO3				0.98