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Research Article

Predicting EFL Learners' Self-Regulated Learning in Online English Courses: Evidence from Foreign Language Enjoyment and L2 Grit in Sustainable Educational Practice

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Abstract

With the rapid expansion of digital learning, recognizing the factors that promote effective engagement in online English as a Foreign Language education has become crucial (Grammarly, n.d.). Elements, such as self-regulation, motivation, and emotional experiences, are central to persistence and achievement. Grit is essential in education; it is characterized by perseverance and a passion for long-term goals, enabling learners to sustain their efforts over time. Conversely, foreign language enjoyment (FLE) encourages motivation and enhances learning outcomes. Building on these insights, this study examined whether online self-regulated learning (OSRL) predicts EFL learners' e-learning acceptance (ELA) within the Technology Acceptance Model (TAM) and whether FLE and L2 grit serve as mediators in this relationship. The study selected a random sample of 300 participants using cluster sampling from various branches of Azad universities and private English-language institutes that offer online English courses. The study obtained its data using four validated measurement tools: the Foreign Language Enjoyment Scale (Dewaele & MacIntyre, 2014), the L2 Grit Scale (Teimouri et al., 2020), the Online Self-Regulated Learning Scale (Su et al., 2018), and the E-learning Acceptance Scale (Zhao et al., 2020). Using Structural Equation Modeling (SEM), the study assessed the proposed relationships. The results revealed that OSRL, whether mediated by FLE or L2 grit, did not improve.

Keywords: Consistency of interest; Foreign language enjoyment; L2 grit; Online self-regulated learning; Persistence of effort

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1. Introduction

Technological innovations have reshaped distance education by transforming delivery modes, expanding learning domains, and redefining the roles of instructors and learners (Harasim, 2000). Universities now rely on online platforms that enable flexible, anytime, anywhere learning. This transformation became especially prominent during the COVID-19 pandemic, when institutions adopted Emergency Remote Teaching (ERT), a temporary online instructional mode designed to ensure educational continuity during the crisis (Hodges et al.,

2020). Beyond emergency contexts, online education has long been regarded as a sustainable and practical approach, offering flexibility, reduced costs, and fewer time and place restrictions (Sadaghiani, 2011; Mayadas et al., 2009). According to research studies and distance learning theory, interaction is a key element in successful distance learning courses and increased interaction is linked to higher achievement and student satisfaction. Distance courses should employ more intensive methods than traditional courses to make instruction more meaningful and interactive (Isaee, H., & Fatehi Rad, N., 2024). Despite these advantages, research shows that learners' acceptance of online education remains uneven (Alhamami, 2018; Zhao et al., 2024). A well-established framework for explaining these adoption patterns is the Technology Acceptance Model, which suggests that perceived usefulness and ease of use shape technology acceptance. Although TAM was initially applied to measure users' intention to use technology, more recent studies have expanded its scope to capture actual acceptance and maintained engagement in online learning, particularly in the post-COVID era (Cheng et al., 2022; Jiang et al., 2023). Understanding e-learning acceptance requires recognizing students' dual roles as both learners and technology users (Saadé & Bahli, 2005). Nevertheless, much of the TAM literature has focused on external factors while overlooking learners' cognitive, motivational, and self-regulatory processes, which are crucial in self-directed online environments (Trenholm & Peschke, 2020; Sun & Chen, 2022).

Self-regulated learning (SRL) has therefore emerged as a critical factor in digital education. Empirical evidence demonstrates that SRL positively predicts academic achievement in online contexts (Ekici et al., 2014; Broadbent & Fuller-Tyszkiewicz, 2022). Beyond cognitive strategies, SRL encompasses emotional and social elements such as peer interaction, social presence, flow, and academic confidence (Farrell & Brunton, 2020; Martin & Bolliger, 2023). This viewpoint coincides with the rise of Positive Psychology (PP) in second language acquisition, which emphasizes affective variables—including resilience, flow, empathy, and engagement—in shaping learners' experiences (MacIntyre & Mercer, 2014). Recent studies extend this view: resilience and flow link psychological needs to engagement in digital English learning (Gao et al., 2025), perceived teacher support and empathy buffer against boredom (Liu et al., 2025a), and mindsets and anxiety predict language learning engagement patterns (Liu et al., 2025b). Together, these findings highlight the importance of integrating affective, motivational, and self-regulatory dimensions into models of online learning acceptance. Despite growing research on technology acceptance and language learning, several gaps remain. Few studies have examined how Foreign Language Enjoyment (FLE), grit, and self-regulated learning (SRL) jointly influence e-learning acceptance in English language education. Researchers have widely applied the Technology Acceptance Model (TAM). However, few have incorporated Positive Psychology (PP) and SRL constructs to explain actual acceptance of online learning rather than just intention to use it. Moreover, the Iranian EFL context remains underexplored, despite its unique educational challenges and the increasing reliance on digital platforms in higher education. Addressing these gaps is critical for contextualizing TAM and advancing understanding of learner-centered variables in online second language acquisition.

Two constructs at the intersection of PP and SLA are grit and FLE. Grit, defined as perseverance and sustained passion for long-term goals, predicts persistence and achievement across domains (Ovid+2PubMed+2), including SLA (Duckworth & Quinn, 2009; Keegan, 2017; Dewaele, et al., 2020). Similarly, FLE—positive emotions associated with language-learning experiences—enhances motivation, engagement, and performance (Dewaele & MacIntyre, 2014; Lee, 2020; Vainio & Daukantait, 2016; Jiang & Dewaele, 2019). Recent studies have also demonstrated that grit positively predicts learners' enjoyment in L2 contexts, highlighting their interdependence in shaping engagement (Zou, Noughabi, & Peng, 2025). However, little research has investigated how grit and FLE jointly predict SRL and e-learning acceptance in Iranian online EFL contexts, where digital learning environments demand high levels of self-regulation.

By integrating TAM, self-regulation theory, and PP, the present study develops a comprehensive model of how motivation, enjoyment, and strategy use interact to predict EFL students' acceptance of online learning. Specifically, it examines whether grit predicts SRL and FLE, and whether these, in turn, contribute to e-learning acceptance. This design extends TAM beyond its traditional focus on intention, emphasizing actual acceptance of online education—an outcome particularly relevant in post-pandemic contexts where online learning has become normalized. This research makes four key contributions. First, it extends TAM by integrating affective FLE, motivational grit, and self-regulatory constructs that are central to successful online language learning. Second, it foregrounds FLE as a mediator, an underexplored variable in TAM research. Third, it provides empirical evidence from the underrepresented Iranian EFL context, addressing an important area that current studies have not addressed. Fourth, it provides practical insights for designing online English courses that foster enjoyment, persistence, and self-regulation, thereby enhancing both acceptance and learning outcomes. By bridging TAM with PP and SRL, this study advances theoretical models of technology acceptance while offering concrete

pedagogical implications for learner-centered online SLA.

RQ1: Does online SRL among English as an EFL learners, with the mediating role of FLE, significantly affect students' acceptance of e-learning?

RQ2: Does FLE between EFL students significantly affect their acceptance of e-learning?

H1: Online self-regulated learning (SRL) positively influences EFL learners' acceptance of e-learning, and this relationship is mediated by Foreign Language Enjoyment (FLE).

H2: Foreign Language Enjoyment (FLE) positively predicts EFL learners' acceptance of e-learning.

2. Literature Review

2.1. Theoretical Background

The Technology Acceptance Model (TAM; Davis, 1989, 1993) has long been a foundational framework for understanding technology adoption in educational settings. The Technology Acceptance Model posits that perceived ease of use (PEOU) and perceived usefulness (PU) are the primary determinants of learners' attitudes toward technology use, which, in turn, shape behavioral intention and actual system use. Over time, researchers have expanded TAM to incorporate a broad range of external variables that influence PEOU and PU, thereby strengthening its explanatory power in complex learning environments (Abdullah & Ward, 2016). In educational settings, variables such as self-determination, interactivity, and social presence have been identified as important antecedents of learners' engagement in e-learning environments (Al-Adwan, 2020; Al-Adwan et al., 2018; Sung & Mayer, 2012). TAM thus provides a flexible framework for integrating cognitive, contextual, and psychological factors that shape learners' adoption of online learning technologies.

Within this framework, perceived ease of use concerns the effort required to use online or ERT platforms, and perceived usefulness concerns the extent to which they enhance learners' English proficiency. A growing body of research indicates that social and emotional experiences deeply influence these perceptions in online environments. For instance, social presence, defined as the sense of connectedness with peers and instructors, has been shown to reduce feelings of isolation, improve concentration, and promote engagement in online learning (Joo et al., 2014; Zhao et al., 2020). Furthermore, research links social presence to the experience of flow, a cognitive-affective state characterized by focused attention, enjoyment, and a seamless merging of action and awareness (Csikszentmihalyi, 1990). Flow experiences in e-learning have been found to improve satisfaction and academic performance by enhancing motivation and self-efficacy (Liao, 2006; Zhan & Mei, 2013; Hilliard et al., 2020; Li et al., 2021 b; Yen & Lin, 2020). These findings underscore that PEOU and PU are not isolated, purely cognitive constructs; instead, they are shaped by learners' emotional engagement and social interactions within digital learning environments.

Media richness theory further strengthens this account by emphasizing the importance of communication channels that provide multiple cues, interactivity, and immediacy (Otondo et al., 2008; Short et al., 1976). Richer media environments enhance social presence and improve message clarity, creating conditions that support both flow and meaningful engagement. In higher education, especially in online and blended learning, media richness is essential for sustaining learner involvement and promoting positive learning experiences (Mayadas et al., 2009). Taken together, these theoretical perspectives highlight how technological, social, and emotional factors converge to shape learners' perceptions of the ease and usefulness of digital learning tools.

Building on this foundation, foreign language enjoyment (FLE) and L2 grit serve as meaningful external antecedents within an extended TAM framework. FLE, grounded in positive psychology, captures learners' enjoyment, interest, and engagement in language learning. Research indicates that enjoyment reduces anxiety, facilitates concentration, and increases intrinsic motivation—conditions that enhance both PEOU and PU in online English learning environments. Learners who enjoy language learning are more likely to perceive e-learning systems as engaging, easy to use, and effective for developing their L2 skills. Similarly, L2 grit plays a motivational part in shaping learners' perceptions of digital learning tools. Gritty learners demonstrate greater resilience in navigating technological or linguistic challenges and are more likely to engage actively with e-learning environments as practical tools for achieving academic progress. Integrating FLE and L2 grit into TAM highlights the critical role of affective and motivational dispositions in fostering both technology acceptance and meaningful learner engagement, particularly in foreign language contexts. These constructs also directly connect to self-regulated learning (SRL), which serves as the conceptual basis for the mediational pathways proposed in this study. Self-regulated learning enables learners to structure, monitor, and review their learning activities, cultivating autonomy, proficiency, and intentional participation. Theoretically, SRL is expected to influence ELA in two complementary ways, each contributing to how learners engage with and accept e-learning environments. First, SRL enhances foreign language enjoyment (FLE) by promoting competence, focused engagement, and a sense of accomplishment—core drivers of positive emotional experiences in learning. A stronger FLE subsequently increases learners' perceptions

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of ease and usefulness within online platforms, thereby enhancing their acceptance of e-learning. Second, SRL supports the development of L2 grit by instilling behaviors associated with perseverance, sustained effort, and adaptive strategy use. Learners who actively manage their learning processes are better able to sustain interest and effort throughout the long-term journey of language acquisition. As L2 grit increases, learners perceive online learning technologies as more effective and manageable, supporting greater acceptance of e-learning. Motivational SRL serves as a foundational mechanism that influences both emotional engagement and motivational resilience, which, in turn, shape learners' adoption of online English learning platforms. The integrated framework—combining TAM, flow theory, media richness theory, and the constructs of FLE, L2 grit, and SRL—offers a comprehensive explanation of the cognitive, affective, and motivational processes that shape technology acceptance in digital language learning. This enriched model provides practical guidance for designing more effective and emotionally supportive online English learning environments. This enriched model offers valuable insights for designing and implementing more effective and emotionally supportive online English learning systems.

2.2. Self-Regulated Learning

The idea of self-regulated learning (SRL) derived in educational psychology and has been described as "the control students have over their cognition, behavior, emotions, and motivation through personal strategies to achieve their established goals" SRL is particularly significant in online learning environments, as it requires students to actively engage in language classes by reflecting on course content and interacting with peers (Dixson, 2015). The sudden, typically unexpected shift to e-learning during the epidemic posed numerous challenges for language educators (Derakhshan et al., 2021; Gao & Zhang, 2020). In addition to technological issues such as internet connectivity and anxiety about using new platforms, EFL and ESL students also faced psychological difficulties, including increased anxiety and boredom (Derakhshan et al., 2021), which in turn shaped their overall learning experiences (Côté & Gaffney, 2021). Self-regulation refers to the management of one's thoughts, emotions, behaviors, and physiological responses to achieve goals and maintain well-being. Affect influences choices; for instance, a negative mood may lead to impulsive or avoidant behavior. (Risdianto, E., Shirzad, S., Fatehi Rad, N., & Isaee, H., 2024).

Scholars have proposed several theoretical models of SRL. Zimmerman's social cognitive model describes SRL as a cyclical process encompassing forethought (task analysis, motivational beliefs, and aim setting), performance (strategy use, monitoring, and self-control), and self-reflection (self-evaluation and adaptation). Boekaerts' dual-pathway model emphasizes the part of context in shaping goal setting and highlights the interplay between learning-related goals and well-being-related goals. Winne's information-processing model highlights the recursive nature of SRL, emphasizing task definition, strategy selection, monitoring, and adaptation (Panadero & Tapia, 2014). A concise comparison appears in Table 1. Research identifies key cognitive and metacognitive SRL functions as crucial predictors of academic achievement. Prior research shows that SRL benefits multiple dimensions of online learning. In English language learning, for instance, writers often employ SRL strategies to regulate cognition, emotions, and behavior during writing tasks (Zimmerman & Schunk, 2011). Empirical evidence also suggests that students with stronger SRL skills tend to perform better when they have confidence in their writing abilities (Mitchell et al., 2019; Sun & Wang, 2020; Gloparvar & Khafi, 2021; Kärchner et al., 2021). Studies further indicate SRL is crucial for effective language acquisition in online education. One study examined the relationship between online SRL and learning among 303 university students enrolled in distance education, finding that learning methods significantly influence SRL habits.

Table 1. Summary of Major SRL Models

Model	Core focus	Key components	Implications for online EFL
Zimmerman — Cyclical (2001)	Social-cognitive regulation	Forethought → Performance → Self-reflection	The course emphasizes planning, monitoring, and reflection prompts in online courses.
Boekaerts — Dual-pathway (1999)	Interplay of learning vs. well-being goals	Appraisal → Choice of pathway → Strategy use	Stress balance between achievement and emotional well-being in digital contexts.
Winne — Information-processing (1996)	Cognitive and metacognitive micro-processes	Task comprehension → Goals/plans → Enactment/monitoring → Adaptation	Aligns with analytics-based scaffolding and feedback in online learning.

The researchers examined Chinese EFL university students and found that SRL components—such as goal setting, environment structuring, and self-evaluation—positively affected self-efficacy. Among these, learners emphasized the importance of structuring their environment.

Beyond cognitive and metacognitive processes, recent studies show that SRL in online language learning closely interacts with motivational and affective factors. Learners' beliefs, emotions, and dispositions strongly influence their capacity to regulate learning in digital contexts. For instance, Albelbisi and Yusop (2019) found that learners with stronger SRL abilities achieved greater success in MOOCs, where positive attitudes toward the learning environment enhanced self-regulation and outcomes. Similarly, Hood et al. (2015) and Li (2019) reported that contextual factors such as learning roles, prior online experience, and educational background influenced learners' capacity for self-regulation. Zheng and Zheng (2020) further demonstrated that while students' perceptions of online learning usefulness positively predicted SRL, perceived ease of use was unexpectedly negatively correlated with SRL. These findings underscore the importance of examining psychological and contextual influences when studying SRL in e-learning environments.

Importantly, scholarship has begun to explore how SRL interacts with other learner characteristics. L2 grit equips learners to persist in the face of technological and linguistic challenges, thereby reinforcing self-regulatory behaviors. FLE, in contrast, represents the positive affective experiences learners derive from language study (Dewaele & MacIntyre, 2014). While distinct from flow—a state of deep absorption and concentration (Csikszentmihalyi, 1990)—FLE has been shown to enhance motivation, engagement, and concentration, which in turn support SRL. Recent evidence suggests that grit can positively predict FLE, highlighting their interdependence in sustaining engagement in L2 contexts (Zou, Noughabi, & Peng, 2025).

Empirical work in Iranian and broader EFL settings supports these interconnections. Some scholars significantly predicted learners' online engagement, with self-efficacy mediating the link between L2 grit and engagement. Likewise, studies of EFL students in online assessment contexts reveal that self-assessment, self-efficacy, and grit tendencies are positively associated with resilience and reduced demotivation. During COVID-19 remote learning, learners with higher grit reported greater FLE, especially when emotional intelligence was also high. Together, these findings suggest that SRL is not limited to cognitive monitoring and strategy use, but is also profoundly shaped by learners' perseverance, affect, and self-beliefs. In conclusion, SRL in online EFL education reflects a multifaceted process that integrates cognition, motivation, and emotion. L2 grit and FLE act as critical antecedents that reinforce regulatory behaviors, thereby enhancing engagement and achievement in digital environments. Recognizing these interrelationships offers a stronger theoretical foundation for understanding how learners navigate online English courses and provides practical insights for designing interventions that foster persistence, enjoyment, and effective self-regulation.

2.3. Foreign Language Enjoyment

FLE is a meaningful positive emotion that learners often experience during language learning. It plays a key role in reducing negative emotions, fostering flexibility, and supporting long-term happiness (Li et al., 2018). FLE also contributes to the creation of "flow" experiences, which increase learners' involvement in educational tasks (Csikszentmihalyi, 2000). Unlike simple pleasure, enjoyment integrates intellectual engagement, concentration, and an appropriate level of challenge (Boudreau et al., 2018). It reflects excitement and achievement from overcoming obstacles and experiencing unexpected successes (Csikszentmihalyi, 2008).

Mierzwa (2019) emphasized that enjoyment involves students feeling competent and mastering material effectively. Similarly, Dewaele and Alfawzan (2018) underlined aspects such as focused concentration, attention, and the right level of challenge, which act as motivators in language learning. Hagenauer and Hascher (2014) distinguished enjoyment into cognitive, emotional, behavioral, expressive, and psychological components. Han and Wang (2021) noted that the emotional dimension relates to satisfaction and desire, while the mental aspect reflects favorable perceptions of the learning environment. The motivational dimension further supports students' engagement in foreign language tasks.

Traditionally, psychological research has emphasized reducing negative emotions among both learners and teachers (Derakhshan et al., 2021). This perspective led to increased documentation of negative affective sets in educational contexts (Derakhshan & Shakki, 2019a; King & Ng, 2018). However, more recent studies have shifted toward recognizing positive affective states. Enjoyment is now linked to Positive psychology frames FLE as a beneficial affective state (Wang et al., 2021), specifically the enjoyment derived from language learning (Lee, 2020). Research has shown that FLE encourages learners to take risks in new linguistic and cultural environments, thereby improving skills (Jiang & Dewaele, 2019). Boudreau et al. (2018) described FLE as "complex and stable emotion" distinct from superficial pleasure. Dewaele and MacIntyre (2016) also conceptualized it as a multidimensional experience balancing challenge with perceived ability. Later studies (Xie & Derakhshan, 2021) validated the impact of FLE throughout the learning

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journey. Classroom enjoyment, as an external factor, plays a central role in the broader SLA process. A positive classroom climate enhances multiple dimensions of EFL learning (Dewaele, 2019; Peng, 2019). Dewaele and Dewaele (2020) showed that learners reported higher enjoyment with teachers perceived as supportive and consistent in using the target language. While classroom enjoyment has proven benefits, its role in EFL learners' acceptance of E-learning remains underexplored.

Internal learner characteristics (e.g., age, education, proficiency) and external factors (e.g., teacher warmth, peer support) influence learners' enjoyment (Dewaele et al., 2019). At the same time, online environments present emotional challenges that require learners to manage and regulate their positive emotions to succeed. This study, therefore, examines how grit and self-regulated learning interact with FLE to shape EFL learners' acceptance of E-learning.

2.4. L2 Grit

As Duckworth (2016) highlights, grit plays a crucial role in both teaching and learning. It refers to the persistence in facing challenges while maintaining effort and passion for a long duration, even when progress is slow. In education, grit motivates learners to pursue their long-term goals with enthusiasm and dedication. It reflects one's ability to endure hardships while focusing on overarching objectives (Cross, 2014). For L2 learners, grit refers to the determination and passion required for achieving long-term language mastery (Sudina et al., 2020). In contrast to many psychological traits that vary across contexts, grit demonstrates relative stability. Duckworth (2016) highlighted grit as the capacity to persevere despite obstacles and connected it closely to conscientiousness. Research indicates that grit, which strongly predicts academic success, comprises two key components: persistence in effort and consistency of interest. Together, these facets highlight grit as a crucial element in academic achievement, particularly in second language learning. Studies consistently report positive associations between grit and educational success 2018 (Sudina et al., 2021; Zheng et al., 2022). Students' passion and dedication to long-term success shape their ability to acquire a second language (Datu et al., 2017). Grit has also been tied to overall happiness (Datu et al., 2016, 2018), life satisfaction, and mental health (Vainio & Daukantaite, 2016). Earlier findings indicated a link between grit and favorable emotional outcomes, such as optimism and a growth mindset, which support emotional well-being (Duckworth et al., 2009; Hill et al., 2016). In applied linguistics, researchers have demonstrated that grit strongly predicts outcomes such as motivation, willingness to communicate, persistence, achievement, and adaptability. Elahi Shirvan (2021b) confirmed that L2 grit is a stable construct, while Teimouri et al. (2020) found positive associations between grit and learners' grammar, speaking, and communication readiness. Further studies suggest grit correlates with self-efficacy (Alhadabi & Karpinski, 2019) and testing-related emotions (Datu & Fong, 2018). Recent findings show that teachers' optimism and trust can strengthen L2 learners' grit (Xu, 2022). Wu et al. (2022) also reported positive associations between grit and English performance. In online learning, grit has been linked to greater academic achievement and higher engagement levels (Kiatkeeree & Ruangjaroon, 2022). These findings underscore the crucial role of grit in supporting learning in both traditional and digital contexts.

3. Methodology

3.1. Participants

The research employed a cluster-random sampling technique to recruit participants from online English courses offered at different branches of Azad University and at private language institutes in Tehran. A total of 340 Iranian EFL learners were initially invited to take part. Of these, 300 completed all survey items and provided valid responses, resulting in a usable response rate of 88.2%. Forty learners withdrew during the process, either due to incomplete responses or attrition, and were excluded from the final analysis.

To be eligible, participants were required to have prior experience with online courses. This inclusion criterion, confirmed through demographic survey items, ensured that learners were familiar with online learning environments and could provide reliable data regarding their self-regulated learning, e-learning acceptance, and affective variables. The final sample size of 300 aligns with methodological guidelines recommending 10–20 observations per estimated parameter. While complex models may require larger samples, a minimum of 200 participants is typically considered sufficient; therefore, the final sample of 300 provided adequate statistical power for this paper. It should be noted that participants were drawn from two contexts—Azad Universities and private language institutes—where background knowledge, learning aims, and instructional materials may have differed. While this diversity strengthens the generalizability of findings across instructional settings, it may also introduce variability that could influence the reliability of outcomes.

3.2. Instruments

The tools for gathering data included FLES, the Online Self-Regulated Learning Scale (OSRL-S), the L2 Grit Scale, and the E-Learning Acceptance Scale (ELAS). The

following section will offer an in-depth description of these materials and tools.

3.2.1. *Foreign Language Enjoyment Scale*

The FLES used in the research was adapted from a 21-item scale. This scale encompasses three elements of Foreign Language Enjoyment: the social dimension, which includes nine pieces ("We form a tight group," "There is a good atmosphere"); the private dimension, featuring five items (e.g., "I enjoy the English class"); and the anxiety dimension, comprising seven items (e.g., "Start to panic," "Feel anxious"). These items were designed to measure participants' enjoyment of learning the English language. Responses were recorded using a standard 5-point scale; students could select each. It was validated, with a reported reliability of (α = 0.86) as calculated by Cronbach's alpha.

3.2.2. *The Online Self-Regulated Learning Scale*

To collect data on (SRL), the (OSRL-S) grown by Su (2018) was employed to evaluate behaviors in a virtual environment. The study utilized a seven-question format and a 5-point scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The scale features three main elements: metacognitive skills, help-seeking, and time management. OSRL-S includes psychological components, such as goal setting (3 items), task strategy (2 units), and self-evaluation (2 units), which may influence learners' e-learning experiences and acceptance. For instance, an item related to goal setting states, "I keep a high standard for my learning in my online English course." An example of a task strategy item is, "I read aloud the English instructional materials posted online to combat distractions," while a self-evaluation example is, "I communicate with my teachers to understand how I am progressing in my online English learning." The validity of the OSRL-S was established by Broadbent (2023), who reported a reliability score of 0.84.

3.2.3. *L2 Grit Scale*

The present paper comprises nine items and assesses two key components of L2 grit in second-language learning.: Perseverance of effort (POE) is evaluated through five items that gauge the extent to which learners remain dedicated to their L2 goals (for example, "I will not let anything hinder my progress in learning a foreign language").consistency of interest (COI) is measured with four items that reflect variations in learners' interest in L2 studies (such as, "My interest in learning a foreign language fluctuates from year to year"). While (POE) indicates learners' determination to achieve their L2 objectives, (COI) examines shifts in student enthusiasm during language learning. Responses to these units are figured on a five-point Likert scale, ranging from 1 (not like me at all) to 5 (very much like me). The scale was previously translated into Persian by Farahani and Iraji Noghondar (2014). Showing an internal consistency reliability of 0.81.

3.2.4. *E-Learning Acceptance Scale*

This scale, developed by Zhao et al. (2020), assesses learners' perceptions and engagement with online learning platforms through three key constructs: media richness, social presence, and flow. The media richness dimension (4 items) evaluates the platform's ability to provide timely feedback, support varied communication cues, enhance understanding through interactive content, and offer diverse course materials. Social presence (3 items) measures learners' comfort in interacting with teachers and peers, their feeling of being acknowledged, and their participation in discussions. Flow (3 items) examines the extent to which learners become absorbed, curious, and imaginative during online study. Although the scale's reliability has been established and the instrument has been previously validated in other contexts, evidence of factorial validity (e.g., CFA fit indices) in the Iranian context was not collected in the present study. This limitation should be addressed in future research to further confirm the instrument's structural validity among Iranian EFL learners.

3.3. Data Collection

This research employed a correlational, non-experimental design to investigate whether Online Self-Regulated Learning (SRL), Foreign Language Enjoyment (FLE), L2 Grit, and E-learning Acceptance (ELA) serve as indicators of e-learning outcomes among Iranian EFL learners. Specifically, the study investigated (a) the predictive role of L2 grit in learners' acceptance of e-learning, (b) the mediating role of foreign language enjoyment, and (c) the influence of Online SRL on e-learning acceptance. To ensure relevance, all participants had prior experience with online English courses. Data were collected between July 14 and July 22, 2023, via Google Forms. Electronic informed consent was obtained before participation. The final questionnaire package included four standardized instruments measuring ELA, FLE, SRL, and L2 Grit. Participants were given up to one week to complete the survey, though most responded within four consecutive days.

3.4. Data Analysis

This part was conducted in three ways, utilizing both descriptive and inferential statistics. Descriptive analyses

summarized demographic information and item-level responses. Normality was examined through the Kolmogorov-Smirnov test, which indicated that the data were normally distributed, supporting the use of parametric methods. (SEM) was conducted with AMOS 22 to test the hypothesized relationships among Online SRL, FLE, L2 Grit, and ELA.

4. Results

4.1. Research Question 1

The first research question explores the impact of EFL learners' Online Self-Regulation (OSR) on E-learning Acceptance (ELA), considering the mediating role of FLE. This section presents a summary of the statistical analysis results. Descriptive statistics for the subcategories of OSR, FLE, and ELA are shown in Table 2. As shown in Table 2, among the FLE subcomponents, Anxiety had the highest mean score (M = 3.99, SD = 0.44), followed by Social (M = 3.76, SD = 0.62) and Private (M = 3.15, SD = 0.70). For ELA, Media Richness had the highest mean (M = 3.90, SD = 0.57), followed by Social Presence (M = 3.80, SD = 0.68) and Flow (M = 3.66, SD = 0.64). Regarding OSR, Self-Evaluation showed the highest mean score (M = 3.85, SD = 0.81), followed by Goal Setting (M = 3.44, SD = 0.74) and Task Strategy (M = 2.67, SD = 0.90). As shown above, in Table 3, the *Asymp. Sig.* Values for all components exceeded the 0.05 threshold, indicating that the scores for all subcomponents were generally distributed. Given the data's normality, parametric statistical methods were deemed appropriate for subsequent analyses. The structural model examining the relationships among online self-regulation, foreign language enjoyment, and e-learning acceptance was then tested, focusing on FLE as a mediating variable in the effect of OSR on ELA. Before testing the model, factor loadings were examined, and all OSR items demonstrated satisfactory loadings above the recommended cut-off of 0.50. Table 4 presents the factor loadings for the three constructs.

Table 2. Descriptive Statistics for OSR, FLE, and ELA Subcomponents

Variable	N	Min	Max	M	SD
OSR1 (Goal Setting)	300	1.00	5.00	3.44	0.74
OSR2 (Task Strategy)	300	1.00	5.00	2.67	0.90
OSR3 (Self-Evaluation)	300	1.00	5.00	3.85	0.81
FLE1 (Anxiety)	300	3.00	5.00	3.99	0.44
FLE2 (Social)	300	2.00	5.00	3.76	0.62
FLE3 (Private)	300	2.00	5.00	3.15	0.70
ELA1 (Media Richness)	300	2.00	5.00	3.90	0.57
ELA2 (Flow)	300	2.00	5.00	3.66	0.64
ELA3 (Social Presence)	300	1.00	5.00	3.80	0.68

Note. OSRL = Online Self-Regulated Learning; FLE = Foreign Language Enjoyment; ELA = E-learning Acceptance

Table 3. One-Sample Kolmogorov-Smirnov Test for OSR, FLE, and ELA

Variable	N	M	SD	Absolute	Positive	Negative	K–S Z	P
OSR1 (Goal Setting)	300	3.44	0.74	0.28	0.28	–0.23	4.91	0.06
OSR2 (Task Strategy)	300	2.67	0.90	0.21	0.21	–0.21	3.60	0.09
OSR3 (Self-Evaluation)	300	3.85	0.81	0.39	0.29	–0.39	6.73	0.08
FLE1 (Anxiety)	300	3.99	0.44	0.41	0.40	–0.41	7.04	0.07
FLE2 (Social)	300	3.76	0.62	0.32	0.26	–0.32	5.56	0.06
FLE3 (Private)	300	3.15	0.70	0.30	0.30	–0.26	5.16	0.09
ELA1 (Media Richness)	300	3.90	0.57	0.42	0.35	–0.42	7.27	0.07
ELA2 (Flow)	300	3.66	0.64	0.35	0.25	–0.35	6.12	0.07
ELA3 (Social Presence)	300	3.80	0.68	0.41	0.31	–0.41	7.13	0.06

Note. K–S Z = Kolmogorov-Smirnov statistic. P = Asymp. Sig. (2-tailed)

Table 4. Reliability Statistics for All Variables

Variable	N of Items	Cronbach's α	CR
Online SRL	7	0.81	0.98
FLE	21	0.79	0.97
ELA	10	0.88	0.99

Note. Cronbach's α = Cronbach's alpha. CR = Composite Reliability. Reliability analysis showed strong internal consistency for all constructs, with Cronbach's α values ≥ 0.79

After establishing and finalizing the item reliability indices, the structural equation model (SEM) was applied. Fig. 1 presents the schematic representation of the path coefficient values. As shown in Table 5, the model's chi-square test was statistically significant, χ^2 (25) = 45.56, p = 0.01, indicating that the model did not achieve a good fit. For an acceptable model, the chi-square test should ideally yield a non-significant result.

The model fit indices (CFI, TLI) are presented in Table 6. For both SEM models, the χ^2 statistic was significant, suggesting a discrepancy between the model and the data, although χ^2 is known to be sensitive to sample size. Several incremental fit indices fell below acceptable thresholds. The CFI values ranged from 0.87 to 0.89, which is lower than the commonly recommended minimum of 0.90 for acceptable fit and 0.95 for good fit. Likewise, the NFI and RFI values were substantially below the acceptable range (typically ≥ 0.90). The RMSEA values ranged from 0.08 to 0.09, indicating borderline to poor fit, as values below 0.06–0.08 are generally preferred as shown in Table 7.

Taken together, these indices suggest that the model demonstrated only marginal fit and did not adequately meet standard SEM fit criteria. Despite these limitations, the model was further examined by interpreting the path coefficients, as presented in Table 8.

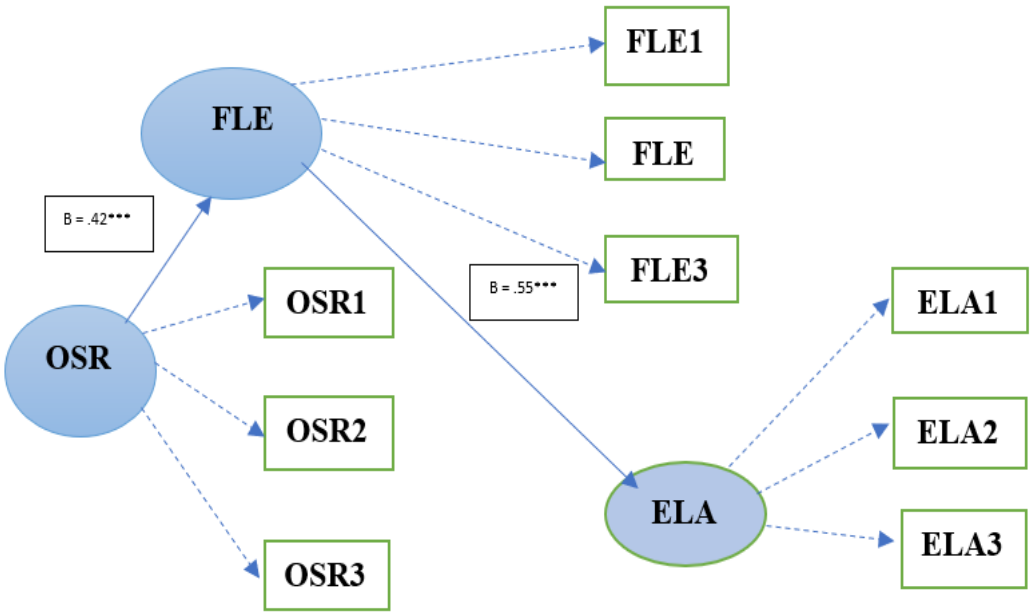

Figure 1. Schematic Representation of Path Coefficient Values for the Relationships between OSR, FLE, and ELA

Table 5. Chi-Square Results

Statistic	Value
Chi-square	45.56
Degrees of freedom	25.00
Probability level	0.01

Note. Probability level corresponds to the *p*-value

Table 6. Model Fit Indices

Model	NFI (Δ1)	RFI (ρ1)	IFI (Δ2)	TLI (ρ2)	CFI
Default model	0.79	0.70	0.83	0.91	0.89
Saturated model	1.00	–	1.00	–	1.00
Independence model	0.00	0.00	0.00	0.00	0.00

Note. NFI = Normed Fit Index; RFI = Relative Fit Index; IFI = Incremental Fit Index; TLI = Tucker–Lewis Index; CFI = Comparative Fit Index

Table 7. RMSEA and Confidence Interval Values for Model Fit

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.08	0.03	0.08	0.40
Independence model	0.13	0.11	0.15	0.00

Note. RMSEA = Root Mean Square Error of Approximation; LO 90/HI 90 = lower and upper limits of 90% confidence interval; PCLOSE = test of close fit

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Table 8. Regression Weights (Group 1 – Default Model)

Path	Estimate	S.E.	C.R.	p	Significance
FLE ← OSR	0.64	0.41	1.59	0.11	ns
ELA ← FLE	1.56	0.58	2.70	0.01	**
FLE1 ← FLE	1.00	–	–	–	–
FLE2 ← FLE	0.74	0.29	2.53	0.01	**
FLE3 ← FLE	0.27	0.30	0.90	0.37	ns
OSR3 ←OSR	1.00	–	–	–	–
OSR2 ←OSR	-8.19	6.35	-1.29	0.20	ns
OSR1 ←OSR	-2.30	1.26	-1.83	0.07	ns
ELA1 ← ELA	1.00	–	–	–	–
ELA2 ← ELA	1.27	0.22	5.82	< 0.001	***
ELA3 ← ELA	0.81	0.16	5.04	< 0.001	***

Note. OSR = Online self-regulation; FLE = Foreign language enjoyment; ELA = E-learning acceptance

Table 9. Descriptive Statistics for OSR, L2 Grit, and ELA

Variable	N	Mean	SD	Min	Max
OSR1	300	3.44	0.74	1.00	5.00
OSR2	300	2.67	0.90	1.00	5.00
OSR3	300	3.85	0.81	1.00	5.00
L2 Grit1	300	3.83	0.70	2.00	5.00
L2 Grit2	300	2.67	0.75	2.00	5.00
ELA1	300	3.90	0.57	2.00	5.00
ELA2	300	3.66	0.64	2.00	5.00
ELA3	300	3.80	0.68	1.00	5.00

Of 2.67. Subsequently, the normality of the data distributions was assessed

Note. OSR = Online self-regulation; FLE = Foreign language enjoyment; ELA = E-learning acceptance; OSR1 = Goal setting; OSR2 = Task strategy; OSR3 = Self-evaluation; L2Grit1 = Consistency of interest; L2Grit2 = Perseverance of effort; ELA1 = Media richness; ELA2 = Flow; ELA3 = Social presence

Table 10. One-Sample Kolmogorov-Smirnov Test for OSR, L2 Grit, and ELA

Variable	N	Mean	SD	K-S Z	p
OSR1	300	3.44	0.74	4.91	0.06
OSR2	300	2.67	0.90	3.60	0.09
OSR3	300	3.85	0.81	6.73	0.08
L2 Grit1	300	3.83	0.70	6.62	0.09
L2 Grit2	300	2.67	0.75	5.27	0.73
ELA1	300	3.90	0.57	7.27	0.07
ELA2	300	3.66	0.64	6.12	0.07
ELA3	300	3.80	0.68	7.13	0.06

Results indicate that OSR did not have a significant direct effect on FLE (p = 0.11) or ELA (p = 0.07). However, FLE had a significant positive effect on ELA (p = 0.01).

4.2. Research Question 2

Research Question 2 investigated whether EFL learners' enjoyment of foreign languages significantly affects their acceptance of e-learning. To answer this, descriptive statistics of the data are first presented in Table 9. The descriptive statistics of OSR and ELA were previously explained in Table 2. Here, the descriptive statistics regarding L2 Grit are presented. The first component, consistency of interest, had a mean score of 3.83, while the second component, perseverance of effort, had a mean score of 3.83. As shown in Table 10, all distributions were ok. Confirming that parametric statistics could be employed. The structural model of OSR, L2 Grit, and E-learning acceptance was then tested. Before running the SEM, factor loadings were examined, and all items exceeded the 0.50 threshold. The reliability results are presented in Table 11. As shown in Table 11, all scales demonstrated high reliability (α > 0.80; CR > 0.90), indicating strong internal consistency. The items enjoyed acceptable reliability, so the SEM was applied.

Table 11. Reliability for All Variables

Variable	Items	Cronbach's α	Composite Reliability
OSR	7	0.81	0.98
L2 Grit	9	0.83	0.97
ELA	10	0.88	0.99

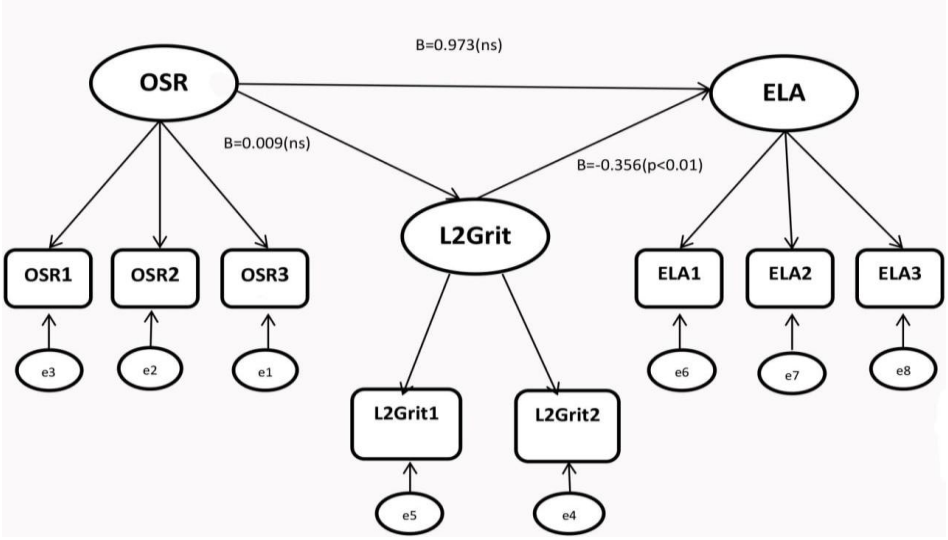

Figure 2. Schematic Representation of Path Coefficient Values for the Relationships between OSR, L2 Grit, and ELA. *Standardized path coefficients for the structural model (OSR, L2 Grit, and ELA).* χ^2 (17) = 43.66, p <0.001, CFI = 0.95, TLI = 0.92, RMSEA = 0.07, SRMR = 0.05

Table 12. Chi-Square Goodness-of-Fit Test for the Model

Test Statistic	Value
χ^2 (Chi-square)	43.66
DF (Degree)	17
P (Probability level)	< 0.001

Note. A non-significant χ^2 indicates good model fit; however, the χ^2 in this study was significant, suggesting poor fit

Table 13. Model Fit Indices

Model	NFI(Δ1)	RFI(ρ1)	IFI(Δ2)	TLI(ρ2)	CFI
Default model	0.81	0.69	0.87	0.94	0.87
Saturated model	1.00	—	1.00	—	1.00
Independence model	0.00	0.00	0.00	0.00	0.00
Model	RMSEA	LO 90	HI 90	PCLOSE	
Default model	0.09	0.05	0.10	0.076	
Independence model	0.16	0.14	0.17	0.000	

Table 14. Regression Weights (Default Model)

Path		Estimate	SE	CR	ρ
Grit	← OSR	-0.01	0.05	-0.17	0.869
ELA	← Grit	-0.36	0.12	-3.01	0.003
ELA	← OSR	0.97	0.58	1.69	0.091
OSR3	← OSR	1.00	—	—	—
OSR2	← OSR	-10.49	9.94	-1.06	0.291
OSR1	← OSR	-2.34	1.28	-1.82	0.069
L2Grit2	← Grit	1.00	—	—	—
L2Grit1	← Grit	-8.96	22.06	-0.41	0.684
ELA1	← ELA	1.00	—	—	—
ELA2	← ELA	1.33	0.25	5.42	<0.001
ELA3	← ELA	0.87	0.17	5.06	<0.001

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Fig. 2 presents the schematic representation of OSR, L2 Grit, and E-learning acceptance. As illustrated in Fig. 2, the standardized effect of OSR on L2 Grit was non-significant (β = −0.009, ns). L2 Grit negatively predicted ELA (β = −0.356, p < 0.01), while the direct path from OSR to ELA was non-significant (β = 0.973, ns). L2 Grit is the primary predictor of ELA in this model, but the negative coefficient indicates an inverse association in this sample.

Table 14 presents notable regression results, with (***) denoting a p-value less than 0.001. These pathways follow principles similar to those used in interpreting standard linear regression. The findings for the second research question indicate that online self-regulated learning (SRL) among EFL learners, with L2 grit as a mediator, did not significantly affect e-learning acceptance.

5. Discussion

This study examined Iranian students' acceptance of e-learning and their SLA strategies in online English courses. Two main sets of findings emerged. First, results confirmed that media richness, social presence, and flow are central to learners' acceptance of e-learning, supporting earlier TAM-based studies (Aloraini, 2012; Liaw, 2008; Liu et al., 2009). Flow was particularly influential in shaping perceived usefulness, aligning with Joo et al. (2014), suggesting that sustained engagement and concentration encourage learners to view online learning more positively. However, flow did not predict perceived ease of use, contrary to prior evidence (Yi & Hwang, 2003), possibly indicating that ease of use depends more on learners' prior technological experience rather than their moment-to-moment engagement in online activities. While a recent study (Carvajal Morales et al., 2024) has incorporated motivational constructs into TAM, the present study extends these insights to the Iranian EFL context.

A second and more unexpected pattern involved the psychological predictors. Contrary to earlier research (Su et al., 2019; Zhu et al., 2020), online self-regulated learning did not significantly predict either foreign language enjoyment or e-learning acceptance. Several contextual explanations may account for this. The sudden expansion of e-learning in Iran during and after the pandemic introduced substantial structural barriers—such as unstable connectivity, limited LMS functionality, and inconsistent instructional design—which may have undermined the usefulness of SRL strategies. In other words, even highly self-regulated learners may have found their strategies ineffective in navigating poorly supported or technologically constrained online environments. Additionally, SRL may be less relevant in contexts where the course structure is highly teacher-directed, thereby reducing learners' opportunities to meaningfully apply self-management strategies.

The negative path from grit to e-learning acceptance was also counterintuitive. One explanation is that highly gritty learners may prefer traditional, structured, face-to-face learning environments where perseverance and sustained effort are more aligned with established academic norms. For such learners, e-learning—often perceived as less rigorous, less structured, or less interactive—may be viewed as less valuable or practical. Alternatively, gritty learners may experience frustration when online systems fail to match their persistence or when technological challenges disrupt their goals. This aligns with recent critiques suggesting that grit can backfire when learners persist in environments that do not support their effort (Credé et al., 2017). Thus, grit may not universally promote acceptance of digital learning; its impact may depend on learners' perceptions of instructional quality and system reliability.

Interestingly, foreign language enjoyment significantly predicted e-learning acceptance, but OSRL did not. This pattern suggests that emotional engagement may play a more central role than strategic engagement in Iranian online language learning. Enjoyment may act as a motivational amplifier, making learners more receptive to digital platforms regardless of their strategic abilities. In fact, one recent study with Iranian EFL learners found that foreign language enjoyment (FLE) was a stronger predictor of student engagement than classroom social climate, suggesting that emotional engagement may outweigh even contextual or structural factors (Frontiers+1).In contrast, if contextual factors prevent learners from applying SRL strategies effectively, the strategies may have minimal visible impact on their learning attitudes (Zhao & Cao, 2023). This distinction highlights how emotional experiences shape learners' perceptions of online learning environments (Bianchi, 2022). Overall, these findings refine our understanding of e-learning acceptance by highlighting the primacy of social presence, media richness, and flow, while questioning the direct influence of SRL and the assumed positive role of grit in this context. Practically, designers should emphasize interactive, engaging media to strengthen perceived usefulness, cultivate enjoyment, and build positive emotional experiences. To achieve this, course designers should: (1) foster social presence through collaborative and interactive tasks; (2) design for flow using multimedia and gamified elements; and (3) embed reflective activities that encourage SRL, while also ensuring the technological infrastructure supports learners' efforts.

This study has several limitations. Because the findings rely on self-reported data from Iranian university students, their generalizability to other contexts is limited. Additionally, the cross-sectional design prevents causal

interpretation. Future research should adopt longitudinal or experimental designs to examine how grit, enjoyment, and SRL evolve and how system reliability, instructor support, and learners' prior digital experience may moderate these relationships.

6. Conclusion

This study investigated how Iranian students adopt e-learning and employ self-regulated learning (SRL) in online English courses. By extending the Technology Acceptance Model (TAM), the research showed media richness, social presence, and flow strongly influence system acceptance, while SRL had no direct effect. These results highlight the importance of contextual and motivational factors—particularly enjoyment and grit—in sustaining learners' engagement and persistence (SpringerLink+1). For Iranian EFL instructors and course designers, the findings suggest three priorities: creating interactive environments that strengthen social presence, designing multimedia-rich tasks that sustain flow (MDPI), and embedding structured opportunities for reflection and goal-setting to support SRL (MDPI). Administrators and developers should also prioritize user-friendly platforms that encourage learner autonomy and positive attitudes toward online learning. The study has several limitations. Data were self-reported, which may affect reliability, and the cross-sectional design restricts causal inference. The study examined only three components of self-regulated learning, leaving out other important variables such as self-determination, engagement, and learner characteristics. These factors should be considered and applied to broader contexts. Future studies should employ longitudinal or experimental designs to more rigorously examine causal relationships (Atan & Gelirli, 2025). Mixed-methods or quasi-experimental approaches could deepen understanding and improve validity. Adding constructs such as student engagement, self-determination, and learner characteristics would provide a more complete model (Tiwari et al., 2025). Qualitative insights into learners' experiences may also enhance understanding of L2 grit and self-regulation in online EFL settings.

Authors Contribution
All the authors have participated sufficiently in the intellectual content, conception, and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript.

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

Conflict of interest
The author states that there is no conflict of interest.

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