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Informal Digital Learning of English and Intercultural Competence among Iranian EFL Learners: A Mediation Model of EFL Grit and Classroom Boredom

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Abstract

Informal digital learning of English (IDLE) is now a routine part of many learners' everyday media use, yet it remains unclear how these out-of-class digital practices translate into competence for real-world intercultural communication. Building on work that conceptualizes IDLE as both receptive and productive engagement, this study tested a mediation model in which EFL grit and classroom boredom help explain the link between IDLE and intercultural communicative competence (ICC). A cross-sectional online survey was administered to 219 intermediate Iranian EFL learners (aged 15–20) studying in private language schools in Urmia. After screening, 218 valid cases were retained for analysis. Measures included receptive and productive IDLE, ICC (25 items), EFL grit (18 items), and boredom in practical English classes (27 items). The hypothesized model was examined using partial least squares structural equation modelling with bootstrapped confidence intervals. Results indicated that both receptive and productive IDLE were positively associated with ICC. In addition, higher grit and lower classroom boredom partially mediated these relationships. The findings suggest that learners' sustained effort (grit) and their classroom emotional experience (boredom) are key psychological routes through which everyday digital English engagement may contribute to intercultural development. Implications are discussed for connecting IDLE experiences to classroom reflection, reducing boredom, and supporting perseverance in EFL learning.

Key Words: Classroom Boredom; EFL Grit; Informal Digital Learning of English (IDLE); Intercultural Competence (ICC)

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1. Introduction

Digital technologies have expanded the ways English is encountered and practiced beyond formal lessons. For many EFL learners, English input and interaction are no longer confined to textbooks or teacher-led tasks; instead, they occur through everyday engagement with videos, games, social media, online communities, and mobile applications. This shift has made informal digital learning of English (IDLE) a salient feature of contemporary language learning, particularly because it is often self-directed, interest-driven, and embedded in authentic communicative purposes (Lee, 2022; Sundqvist, 2019). As learners move between classroom instruction and digital environments, a key question is not only whether IDLE supports language development, but also whether it helps learners participate more effectively and appropriately in intercultural communication.

Intercultural communicative competence (ICC) has become a central goal in language education as English is increasingly used among speakers with diverse linguistic and cultural backgrounds. In this study, ICC is understood as a combination of attitudes (e.g., openness), knowledge (e.g., cultural practices and perspectives), skills (e.g., interpreting and relating), and the ability to communicate effectively and respectfully across cultural contexts (Byram, 2020; Deardorff, 2006). Digital spaces can offer rich opportunities for intercultural contact—through exposure to diverse cultural representations, interaction with global peers, and participation in communities where cultural norms are negotiated in real time (Godwin-Jones, 2013; Liu & Darvin, 2024). At the same time, the benefits of these opportunities are not automatic. Learners may passively consume content without reflection, avoid demanding interactions, or disengage when experiences feel confusing or unproductive. For this reason, it is important to clarify the psychological processes that help some learners translate digital engagement into intercultural development.

Two affective factors are particularly relevant in this regard: L2 grit and classroom boredom. Grit, conceptualized in L2 settings as sustained effort and long-term commitment to language learning goals, has been linked to persistence, engagement, and achievement (Teimouri et al., 2020, 2021). Learners who maintain effort despite difficulties may be more likely to pursue challenging digital activities (e.g., interacting with unfamiliar interlocutors, following nuanced content) and to sustain intercultural exploration over time (Sundqvist & Wikström, 2015; Wu et al., 2024). In contrast, boredom in language learning – especially in practical English classes – can reduce attention, willingness to participate, and perceived value of tasks (Pawlak et al., 2020). When classroom activities feel repetitive or disconnected from learners' interests

and lived digital practices, boredom may undermine engagement and weaken the potential contribution of IDLE to intercultural learning (Liu et al., 2025; Yazdanmehr et al., 2021).

Although prior research has documented the benefits of IDLE for language learning and has begun to connect digital engagement with intercultural outcomes (Liu et al., 2023; Yu & Liu, 2023), the mechanisms explaining how IDLE relates to ICC remain under-specified. In particular, few studies have modelled grit and boredom simultaneously as mediators in a single framework while distinguishing between receptive and productive IDLE. Addressing this gap matters for two reasons. First, separating receptive and productive IDLE provides a more precise account of how different forms of digital engagement may relate to intercultural development. Second, identifying mediating affective factors can inform pedagogy by helping teachers design classroom experiences that connect with learners' digital practices, support persistence, and reduce disengagement.

Accordingly, the present study proposed and tested a mediation model linking receptive and productive IDLE to ICC through L2 grit and classroom boredom. By examining these interrelationships in an Iranian EFL context, the study aimed to contribute a clearer and more theoretically grounded account of when and why everyday digital English engagement may be associated with intercultural communicative competence.

2. Review of the Related Literature

2.1. Informal Digital Learning of English

Informal digital learning of English (IDLE) refers to language learning practices that learners engage in outside formal instruction using digital devices and online resources (Muharom et al., 2021). A widely used distinction is between **receptive** activities (e.g., watching videos, listening to podcasts, reading online texts) and **productive** activities (e.g., posting comments, participating in online discussions, creating digital content) (Lee & Drajati, 2019). Research suggests that IDLE can support vocabulary growth, motivation, and engagement by providing abundant input and personally meaningful purposes for use (Lee, 2022; Sundqvist, 2019). However, because IDLE is often self-managed, learners' sustained effort and emotional experiences may shape whether these experiences become developmentally productive.

2.2. Intercultural communicative competence in digital contexts

In digital environments, intercultural learning can occur through exposure to diverse cultural representations and interaction with speakers from different backgrounds. Such engagement can broaden learners' cultural knowledge and challenge assumptions, thereby supporting the development of intercultural communicative competence (ICC) (Byram, 2020; Deardorff, 2006). At the same time, ICC requires more than access to cultural content; it involves interpreting meanings, negotiating perspectives, and communicating appropriately in context (Byram, 1997). Digital platforms may facilitate these processes by enabling participation in transnational communities, but the developmental value of such participation depends on how learners engage with these spaces (Godwin-Jones, 2013; Liu & Darvin, 2024).

2.3. L2 grit and classroom boredom as mediators

L2 grit captures perseverance and sustained interest in language learning goals. In L2 settings, grit has been associated with motivated behavior and language achievement, and researchers have argued that domain-specific grit is particularly relevant for understanding sustained engagement in language learning (Teimouri et al., 2020, 2021). In the present model, grit is expected to serve as a mediating pathway between IDLE and ICC because learners who persist are more likely to invest effort in challenging digital engagement (e.g., sustained interaction, deeper processing of culturally loaded content), which may support intercultural development.

By contrast, boredom is a negative achievement-related emotion often linked to low perceived value, low challenge, or repetitive activities. Studies of foreign language learning boredom indicate that it can undermine engagement and participation (Liu et al., 2021; Wang et al., 2022; Zawodniak et al., 2021). In practical English classes, boredom may reduce learners' willingness to connect classroom learning with their digital experiences and may also reflect broader disengagement that limits intercultural exploration (Wu & Kang, 2023). Consequently, classroom boredom is theorized as a negative mediating pathway in the relationship between IDLE and ICC.

Drawing on this literature, the present study distinguished between receptive and productive IDLE and examined their direct and indirect associations with intercultural communicative competence (ICC) through L2 grit and classroom boredom. Accordingly, the following hypotheses were formulated to test the direct effects of receptive and productive IDLE on ICC, as well as the indirect effects through L2 grit and classroom boredom.

H1a: Receptive IDLE positively predicts ICC.

H1b: Productive IDLE positively predicts ICC.

H2a: L2 grit mediates the relationship between receptive IDLE and ICC.

H2b: L2 grit mediates the relationship between productive IDLE and ICC.

H3a: Classroom boredom mediates the relationship between receptive IDLE and ICC.

H3b: Classroom boredom mediates the relationship between productive IDLE and ICC.

Because the mediation hypotheses concern indirect pathways, they also imply the corresponding component paths from IDLE to the mediators and from the mediators to ICC. Accordingly, these component paths were specified and evaluated in the structural model alongside the direct and indirect effects. Consistent with the hypotheses and their implied component paths, Figure 1 illustrates the conceptual mediation model specified for structural model testing.

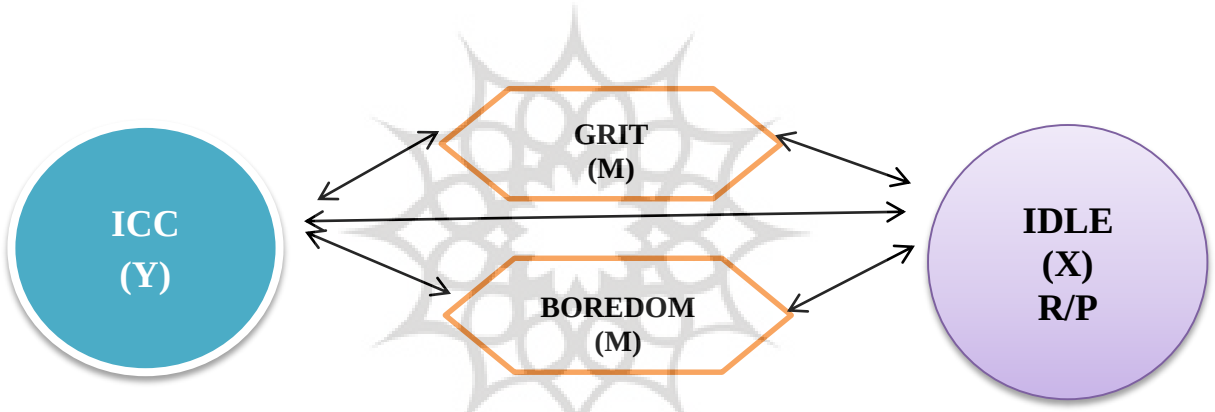

Figure 1. *A conceptual mediation model linking receptive and productive IDLE to ICC through L2 grit and classroom boredom*

3. Method

3.1. Design

The present study employed a quantitative, cross-sectional survey design with a hypothesis-driven mediation model. It was designed to examine the direct and indirect relationships between Iranian EFL learners' informal digital learning of English (IDLE) and one competence outcome – intercultural communicative competence (ICC) – through the mediating roles of EFL grit and classroom boredom. In line with current IDLE research, IDLE was operationalized as two related but distinct dimensions: receptive IDLE and productive IDLE.

Because the study aimed to test a model comprising multiple latent constructs and

simultaneous direct/indirect pathways, the analysis was conducted using partial least squares structural equation modelling (PLS-SEM) with bootstrapping. This design is non-experimental and correlational; therefore, the findings are interpreted as associational rather than causal. The model was specified a priori on the basis of the literature and the study hypotheses (H1a–H3b), and then evaluated through a two-stage PLS-SEM procedure involving (a) measurement model assessment and (b) structural model assessment.

Quantitative data were collected through closed-ended self-report questionnaires administered online to intermediate Iranian EFL learners in private language schools in Urmia. In the conceptual model tested in this study and presented earlier in Figure 1, the model of the hypothesized relationships among receptive and productive IDLE, and ICC, with EFL grit and classroom boredom as mediators is displayed. The study tested the conceptual mediation model using a cross-sectional survey design and PLS-SEM.

3.2. Participants

The initial sample comprised 219 Iranian EFL learners enrolled in private language schools in Urmia. After screening for completeness, one case with substantial missing data was removed, resulting in a final analytic sample of 218. Participants self-identified as intermediate-level learners and ranged in age from 15 to 20. Participation was voluntary, and responses were anonymous. Because the sample included participants under 18, consent procedures followed the language school guidelines, and consent was obtained from learners. Recruitment followed a convenience sampling approach typical of survey-based PLS-SEM studies, with inclusion criteria focusing on learners who reported regular engagement with digital media and sufficient English proficiency to complete the questionnaire.

3.3. Instruments

Self-report questionnaires

Four self-report questionnaires were used to operationalize the constructs in the model: (a) receptive and productive IDLE (b) the IDLE–ICC questionnaire, which yielded ICC indicators after validation, (c) boredom in practical English classes, and (d) EFL grit (Appendix). The survey began with demographic questions (e.g., age, gender, self-reported proficiency level).

All instruments were administered in Persian to minimize comprehension burden. The translation process followed standard adaptation steps: two bilingual experts translated the items into Persian; a third bilingual reviewer compared the translation against the original items; discrepancies were discussed and resolved to preserve conceptual equivalence. A small pilot (20

learners) was then conducted to check item clarity, response range, and completion time. Pilot data were used for wording refinement and preliminary reliability checks; construct validity was evaluated on the main sample within the measurement model assessment.

IDLE. Receptive and productive IDLE were measured using the scale adapted from Lee and Drajati (2019), comprising seven receptive and six productive items rated on a 5-point frequency scale (1 = never, 5 = most of the time).

Intercultural competence. ICC was assessed using the adapted IDLE–ICC questionnaire (Liu et al., 2023). The original instrument includes multiple components (33 items) rated on a 5-point agreement scale. Following pilot testing, item review, and factor-analytic validation on the main sample, the retained indicators formed an empirically distinguishable factor: intercultural communicative competence comprising 25 items.

EFL grit. EFL grit was measured using the scenario-based scale developed for Iranian EFL learners by Ebadi et al. (2018). The original pool included 26 items on a 5-point Likert scale; following pilot testing and validity checks, 18 items were retained in the present study.

Classroom boredom. Boredom in practical English language classes was measured using the Boredom in Practical English Language Classes Questionnaire (BPELC; Pawlak et al., 2020). The scale includes 27 items rated on a 7-point agreement scale (1 = strongly disagree, 7 = strongly agree).

3.4. Procedure

Following ethical clearance and permissions from the participating language schools, the researchers prepared an online survey package for data collection. All study instruments were first translated into Persian so that participants could respond in their preferred language. The translated versions were reviewed for clarity and equivalence, and then piloted with a small group of Iranian EFL learners (20 learners) who had similar characteristics to the target participants. Feedback from the pilot phase was used to refine wording, eliminate ambiguous items, and confirm that the survey length and response format were manageable for the intended age group and proficiency level.

After the instruments were finalized, English teachers in private language schools were contacted and asked to support recruitment by sharing the study invitation with their intermediate-level classes. The invitation message briefly introduced the study purpose (research on out-of-class digital English learning and related learner factors), emphasized that participation was voluntary, and explained that responses would be anonymous and used only for research. Before

accessing the questionnaire items, participants viewed an information sheet and provided informed consent electronically. Demographic questions (e.g., age, gender, self-reported proficiency/level, and basic background information) appeared first, followed by the scale items measuring receptive and productive informal digital learning of English, intercultural communicative competence, EFL grit, and classroom boredom.

Data collection was conducted fully online via a Google Forms survey link that could be opened on a smartphone or computer. To reduce fatigue and maintain response quality, the questionnaire battery was administered in time-separated blocks rather than as a single uninterrupted long session (e.g., two shorter parts completed on different days or with a substantial break in between), while using consistent instructions and a stable response format across blocks. To keep learners engaged, small incentives were offered in line with institute policies (e.g., participation recognition or small gifts) without creating pressure to participate. Participants were encouraged to answer honestly, reminded that there were no right or wrong answers, and told they could discontinue at any point.

After the survey period ended, responses were downloaded from Google Forms and prepared for analysis. The dataset was screened for duplicate entries, patterned responding, and missing data. Incomplete cases with substantial missing responses were removed, resulting in 218 usable cases for the final analysis. All variables were then coded and exported to statistical software for preliminary screening (e.g., descriptive statistics and assumption checks) and to SmartPLS for PLS-SEM modelling. The cleaned dataset was stored securely (password-protected) and contained no personally identifying information.

3.5. Data Analysis

Data analysis proceeded in two stages. First, descriptive statistics were computed to screen the data, check missing responses, and summarize central tendencies. Second, the hypothesized mediation model was tested using partial least squares structural equation modelling (PLS-SEM) in SmartPLS, with bootstrapping for inference. PLS-SEM was selected because the model included multiple latent variables and indirect effects and the analysis emphasized prediction and variance explanation for ICC.

In the measurement model, internal consistency was examined using Cronbach's alpha and composite reliability, and convergent validity was evaluated using average variance extracted (AVE). Discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT). Collinearity among predictor constructs was checked using variance inflation factors (VIF).

In the structural model, path coefficients were estimated and tested using bootstrapping with bias-corrected confidence intervals. Direct effects of receptive and productive IDLE on ICC (H1a–H1b) and indirect effects through EFL grit and classroom boredom (H2a–H3b) were evaluated based on the size and significance of the bootstrapped estimates. Model explanatory power was reported using R^2 for each endogenous construct, alongside effect sizes and predictive relevance where appropriate.

4. Findings

After data screening, one incomplete response was removed, yielding a final analytic sample of N=218. Because the study was specified and estimated using partial least squares structural equation modeling (PLS-SEM), multivariate normality was not treated as a strict prerequisite. The analysis followed the standard two-stage PLS-SEM workflow: (a) measurement model assessment and (b) structural model assessment with bootstrapped inference. As a preliminary screening step, however, univariate skewness and kurtosis values were within acceptable ranges (±2), and Mardia's multivariate skewness and kurtosis tests were non-significant, indicating no serious departure from normality.

Measurement Model Assessment

Table 1 presents the internal consistency reliability of the study constructs.

Table 1.

Internal consistency reliability of the study constructs

Construct	Cronbach's α	Items (n)
Receptive IDLE	.924	7
Productive IDLE	.901	6
Intercultural communicative competence (ICC)	.976	25
Classroom boredom	.976	27
L2 grit	.971	18

As shown in Table 1, internal consistency was satisfactory for all constructs (Cronbach's alpha ≥ .90). In addition to internal consistency, preliminary construct structure was examined using exploratory factor analysis (principal axis factoring with Varimax rotation). Sampling adequacy was satisfactory (KMO = .889), and the extracted six-factor solution accounted for 62.35% of the total variance, supporting the expected multidimensional structure of the measures. Table 2 reports composite reliability (CR) and average variance extracted (AVE), which were used to evaluate construct reliability and convergent validity within the PLS-SEM measurement model.

Table 2.

Composite reliability (CR) and convergent validity (AVE)

Construct	CR	AVE
Receptive IDLE	.917	.782
Productive IDLE	.894	.765
Intercultural communicative competence (ICC)	.975	.778
Classroom boredom	.976	.772
L2 grit	.970	.800

As shown in Table 2, all constructs demonstrated satisfactory composite reliability (CR = .894–.976) and convergent validity (AVE = .765–.800). All CR values exceeded the recommended threshold of .70, and all AVE values were above .50, indicating acceptable reliability and convergent validity.

Discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT). HTMT values for the reported construct pairs ranged from .615 to .679 (all below the conservative threshold of .85), supporting discriminant validity. Collinearity in the structural model was evaluated using inner VIF values from SmartPLS (separate from HTMT, which assesses discriminant validity). The inner VIF values for the predictor sets of the endogenous constructs were all below the recommended cutoffs (e.g., 3.3 / 5.0), indicating that multicollinearity was unlikely to bias the structural path estimates (see Table 5).

Structural Model Assessment

Structural model results are reported next. Path coefficients were estimated using bootstrapping (5,000 resamples) with bias-corrected 95% confidence intervals. Figure 2 presents the bootstrapped structural model with standardized path coefficients (β), and Table 3 reports the corresponding estimates, standard errors, confidence intervals, t values, and p values.

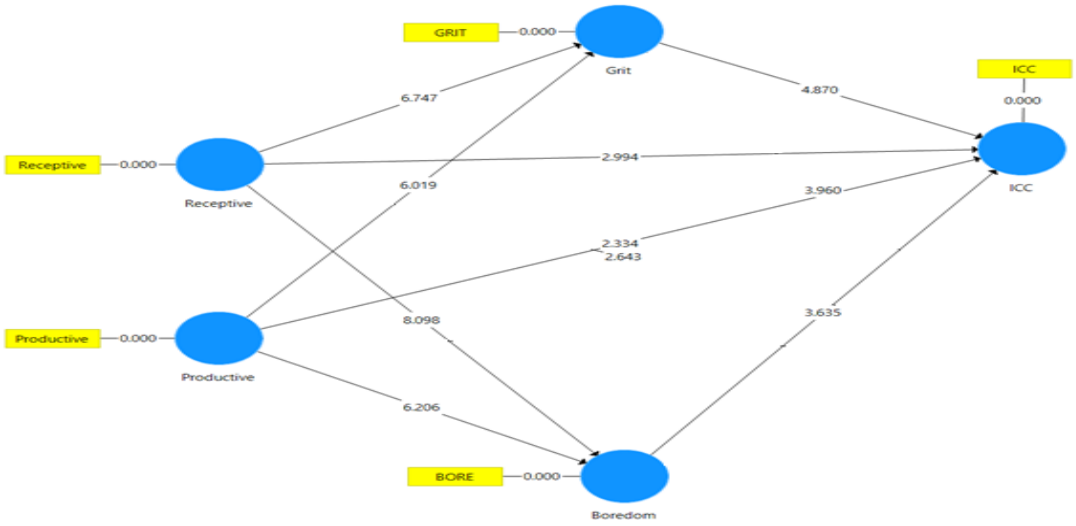

Figure 2. *Structural model with standardized path coefficients (β) for receptive and productive IDLE, L2 grit, classroom boredom, and ICC (t values)*

Table 3.

Structural model direct effects on intercultural communicative competence (ICC), and mediators (bootstrapped estimates)

Path	β	SE	95% CI (LL)	95% CI (UL)	t	p
Classroom boredom → ICC	-0.231	0.064	-0.365	-0.100	3.629	< .001
L2 grit → ICC	0.294	0.065	0.160	0.418	4.535	< .001
Productive IDLE → Classroom boredom	-0.335	0.054	-0.429	-0.225	6.197	< .001
Productive IDLE → L2 grit	0.368	0.063	0.221	0.480	5.835	< .001
Productive IDLE → ICC	0.152	0.066	0.022	0.277	2.289	.022
Receptive IDLE → Classroom boredom	-0.466	0.053	-0.568	-0.364	8.761	< .001
Receptive IDLE → L2 grit	0.400	0.058	0.285	0.524	6.867	< .001
Receptive IDLE → ICC	0.213	0.074	0.072	0.368	2.889	.004

As shown in Table 3, both receptive IDLE and productive IDLE had significant positive direct effects on ICC. In addition, both IDLE dimensions significantly predicted the two mediators in the expected directions: higher IDLE was associated with higher L2 grit and lower classroom boredom. In turn, L2 grit positively predicted ICC, whereas classroom boredom negatively predicted the outcome. These results provide initial support for the hypothesized direct paths and justify the subsequent mediation analysis.

Table 4 presents the structural model's explanatory power and predictive relevance for the endogenous constructs, reporting R^2 values (and Q^2 indices) for classroom boredom, L2 grit,

and intercultural communicative competence (ICC).

Table 4.

Structural model explanatory power and predictive relevance

Endogenous construct	R^2	Q^{2*}
Classroom boredom	.040	.014
L2 grit	.028	-.001
Intercultural communicative competence (ICC)	.068	.023

Note. R^2 values indicate explained variance in each endogenous construct.

As shown in Table 4, the model explained a modest proportion of variance in the endogenous constructs. Q^2 values were positive for classroom boredom and ICC, indicating acceptable predictive relevance for these constructs, whereas L2 grit showed a near-zero/slightly negative Q^2 (-.001), suggesting limited predictive relevance for that construct in the present model. Table 5 further presents collinearity diagnostics for the predictor sets and f^2 effect sizes for the key structural paths.

Table 5.

Structural model collinearity diagnostics (inner VIF) and effect sizes (f^2) for key paths

Structural path	Inner VIF	f^2
Receptive IDLE → Classroom boredom	1.017	.023
Productive IDLE → Classroom boredom	1.017	.013
Receptive IDLE → L2 grit	1.017	.014
Productive IDLE → L2 grit	1.017	.012
Receptive IDLE → ICC	1.052	.015
Productive IDLE → ICC	1.040	.006
L2 grit → ICC	1.039	.010
Classroom boredom → ICC	1.052	.018

Note. Inner VIF values are well below common thresholds (e.g., 3.3 or 5.0), suggesting no serious multicollinearity concern in the structural model.

As shown in Table 5, all inner VIF values were low and well below common cutoff values (e.g., 3.3 or 5.0), indicating that multicollinearity was unlikely to bias the structural path estimates. The f^2 values suggest mostly small effect sizes for the key predictors, which is consistent with the pattern of statistically significant but modest path coefficients observed in Table 3.

To test the hypothesized mediating roles of L2 grit and classroom boredom (H2a–H3b), the specific indirect effects of receptive and productive IDLE on ICC were examined using bootstrapping (5,000 resamples) with bias-corrected 95% confidence intervals. With the direct effects and structural model diagnostics established, the mediation hypotheses were tested by estimating bootstrapped specific indirect effects from receptive and productive IDLE to ICC through L2 grit and classroom boredom. Table 6 reports the indirect path coefficients, standard

errors, bias-corrected 95% confidence intervals, t values, and p values.

Table 6.

Mediation (indirect effects) via L2 grit and classroom boredom for intercultural communicative competence (ICC): bootstrapped estimates

Indirect path	β	SE	95% CI (LL)	95% CI (UL)	t	p
Productive IDLE → Classroom boredom → ICC	0.077	0.025	0.034	0.131	3.038	.003
Receptive IDLE → Classroom boredom → ICC	0.108	0.032	0.050	0.176	3.335	.001
Productive IDLE → L2 grit → ICC	0.108	0.030	0.054	0.169	3.632	< .001
Receptive IDLE → L2 grit → ICC	0.118	0.032	0.060	0.185	3.670	< .001

As shown in Table 6, all four indirect effects were statistically significant, as none of the bootstrapped 95% confidence intervals included zero. These findings support the mediating roles of L2 grit and classroom boredom in the relationships between both IDLE dimensions (receptive and productive) and the competence outcome (ICC). Indirect effects through classroom boredom were positive because IDLE negatively predicted boredom, and boredom negatively predicted ICC (i.e., a double-negative pathway). Indirect effects through L2 grit were also positive because IDLE positively predicted grit, and grit positively predicted ICC. Taken together, the results indicate partial mediation, as both the direct effects (Table 3) and indirect effects (Table 6) were significant.

To complete the evaluation of the structural model, the R^2 and Q^2 indices suggested generally acceptable explanatory power and predictive relevance for the endogenous constructs. The model explained .068 of the variance in intercultural communicative competence (ICC), .028 in L2 grit, and .040 in classroom boredom. Inner VIF values for structural predictors were all below the recommended thresholds, indicating no problematic collinearity. The f^2 values further showed the relative contribution of individual predictors to the endogenous constructs, with the strongest effects observed for Receptive IDLE → Classroom boredom (f^2 = .023), Classroom boredom → ICC (f^2 = .018), and Receptive IDLE → ICC (f^2 = .015). In addition, Q^2 values were above zero for classroom boredom, and ICC (but not for L2 grit), suggesting generally acceptable predictive relevance at the construct level.

Overall, the results supported all hypothesized direct and indirect relationships. H1a and H1b were supported, as both receptive and productive IDLE significantly and positively predicted ICC. H2a and H2b were also supported, as the indirect effects of receptive and productive IDLE on ICC through L2 grit were statistically significant. Likewise, H3a and H3b were supported, as

the indirect effects of receptive and productive IDLE on ICC through classroom boredom were significant. Because both direct effects (Table 3) and indirect effects (Table 4) were significant, the findings indicate partial mediation rather than full mediation for both mediators in relation to ICC.

5. Discussion

This study examined the direct and indirect relationships between Iranian EFL learners' informal digital learning of English (IDLE) and the competence outcome, namely intercultural communicative competence (ICC), with L2 grit and classroom boredom as mediators. Overall, the findings supported a coherent pattern in the hypothesized model: both receptive and productive IDLE were positively associated with ICC; both IDLE dimensions were positively associated with L2 grit and negatively associated with classroom boredom; and both grit and boredom significantly mediated the relationships between IDLE and ICC. Because both the direct and indirect paths were significant, the results are consistent with a partial mediation interpretation. This means that IDLE appears to contribute to ICC not only directly, through exposure to and participation in digital English environments, but also indirectly through motivational and affective mechanisms.

The direct associations between IDLE and ICC can be understood in light of the affordances of out-of-class digital engagement. Receptive IDLE, such as viewing, listening to, and reading online content, may increase learners' exposure to culturally embedded meanings, discourse conventions, pragmatic norms, and diverse representations of English use. Productive IDLE, such as posting, commenting, messaging, and interacting online, may provide opportunities for active meaning negotiation, perspective-taking, and context-sensitive language production (Lee & Drajati, 2019; Lee, 2022; Reinders et al., 2022). In this sense, receptive and productive IDLE appear to function in complementary ways: receptive engagement expands learners' interpretive resources, whereas productive engagement enables them to enact those resources in communication. Such digital practices may also make intercultural contact more accessible and less restricted to formal classroom boundaries. This interpretation is compatible with work emphasizing the role of technology-mediated environments in supporting intercultural learning opportunities (Byram, 2020; Godwin-Jones, 2013).

The mediation results add an important explanatory layer. The positive indirect effects through L2 grit suggest that learners who engage more frequently in IDLE may develop or sustain greater perseverance and long-term commitment to language learning, which in turn is associated with stronger ICC. This is theoretically plausible because IDLE often provides frequent, self-

directed, and personally meaningful opportunities for practice, exploration, feedback, and incremental success, all of which may reinforce sustained effort (Teimouri et al., 2020, 2021). Learners who maintain effort despite difficulties may be more willing to pursue challenging digital activities, such as interacting with unfamiliar interlocutors, following nuanced online content, or exploring culturally different viewpoints. These experiences can gradually support the development of intercultural awareness and communicative flexibility.

By contrast, the boredom pathway operated as a double-negative mechanism: greater IDLE was associated with lower classroom boredom, and lower boredom was associated with higher ICC. This pattern suggests that learners who are more engaged with English beyond the classroom may perceive English as more personally meaningful, useful, and connected to their lived digital experiences. As a result, they may be less likely to experience classroom English learning as repetitive or detached from real communication. Conversely, when boredom is high, learners' attentional investment, curiosity, and willingness to explore intercultural meanings may be reduced. This interpretation is consistent with research showing that boredom undermines engagement and learning in EFL contexts and that affective classroom conditions can shape learners' participation, persistence, and developmental outcomes (Derakhshan et al., 2022; Li, 2022; Pawlak et al., 2020; Wang & Liu, 2022).

These findings are broadly consistent with previous studies linking IDLE to intercultural outcomes and broader language development, particularly research showing positive associations between digital English engagement and intercultural competence (Liu et al., 2023; Yu & Liu, 2023). They are also in line with studies highlighting the role of grit and affective variables in language learning processes (Liu & Wang, 2021; Wu et al., 2024; Xiong & Wang, 2023). At the same time, the present study extends prior work by distinguishing receptive and productive IDLE, examining ICC as the target competence outcome, and testing L2 grit and classroom boredom together in one mediation framework. In doing so, the study suggests that the contribution of IDLE to intercultural learning is not merely a matter of digital exposure, but is also shaped by learners' motivational endurance and emotional classroom experiences. Any differences from earlier studies in the size of effects should be interpreted cautiously, as such variation may reflect differences in sampling, context, learner age, educational setting, and measurement instruments (Lee, 2022; Reinders & Benson, 2017).

6. Conclusion

The present study set out to examine the direct and indirect relationships between Iranian EFL learners' informal digital learning of English (IDLE) and intercultural communicative competence (ICC), with L2 grit and classroom boredom functioning as mediating variables. The findings showed that both receptive and productive IDLE were positively associated with ICC and that these relationships were partly explained by learners' motivational and affective characteristics. Specifically, higher engagement in IDLE was linked to stronger L2 grit and lower classroom boredom, both of which contributed to learners' intercultural communicative development. These results suggest that IDLE is not merely an informal or peripheral language-learning activity, but a meaningful ecology of learning that can support intercultural growth when accompanied by persistence, engagement, and emotionally supportive classroom experiences.

The findings of the present offer some implications. Pedagogically, the results support treating IDLE as a resource that can be purposefully connected to classroom learning rather than as an unrelated extracurricular activity. Teachers may strengthen this connection through guided reflection on digital encounters, structured sharing of online content, and tasks that foreground intercultural meanings. For example, learners can be encouraged to bring examples from online videos, social media posts, podcasts, games, forums, or intercultural interactions into the classroom and analyze how language, identity, values, politeness, humor, and cultural assumptions are represented. Such activities can help transform learners' everyday digital practices into pedagogically meaningful opportunities for intercultural awareness and language development.

The findings also imply that teachers may attend to learners' motivational endurance and emotional engagement. Since L2 grit mediated the relationship between IDLE and ICC, classroom practices that promote sustained effort, goal setting, self-reflection, and tolerance of difficulty may help learners benefit more fully from digital English engagement. Similarly, the boredom-related findings suggest the importance of maintaining classroom relevance, autonomy, and interactional authenticity so that learners' out-of-class engagement can be more effectively leveraged in class (Li, 2022; Pawlak et al., 2020). In practical terms, this means that English classes should not remain detached from learners' real digital lives; rather, they should create bridges between formal instruction and the online spaces where learners already encounter English.

Several limitations should temper the interpretation of the findings. First, the study used a cross-sectional, self-report design, which limits causal inference and may inflate associations due to shared-method variance (Dörnyei & Taguchi, 2009). Therefore, although the proposed

mediation model is theoretically meaningful, the direction of the relationships cannot be established with certainty. Second, the sample was drawn from private language schools in the Iranian city of Urmia which may limit the generalizability of the findings to other learner populations, such as public-school students, university learners, rural learners, or EFL learners in different sociocultural contexts. Third, the study relied on questionnaire-based measures of IDLE, L2 grit, boredom, and ICC; therefore, the findings may not fully capture learners' actual digital practices or their observable intercultural performance.

Future research would benefit from longitudinal and multi-method designs to test the robustness and temporal ordering of the proposed pathways. Longitudinal studies could examine whether sustained engagement in receptive and productive IDLE gradually enhances ICC over time and whether changes in grit and boredom precede or follow changes in digital engagement. In addition, future studies should include performance-based measures of intercultural competence, such as discourse-completion tasks, scenario-based intercultural judgment tasks, reflective portfolios, interviews, classroom observations, or analysis of learners' actual online interactions (Deardorff, 2006; Taguchi et al., 2016). Such methods would provide a richer understanding of how learners interpret, negotiate, and communicate intercultural meanings in real or simulated contexts.

Further research could also compare different types of IDLE activities more precisely. For instance, future studies may examine whether social media interaction, online gaming, video streaming, digital reading, podcast listening, or participation in online communities contribute differently to ICC. Another useful direction would be to investigate whether learner variables such as proficiency level, gender, age, socioeconomic background, digital literacy, and previous intercultural contact moderate the relationship between IDLE and intercultural development. Finally, intervention-based studies could explore how teachers can systematically integrate learners' informal digital experiences into classroom tasks and whether such integration reduces boredom, strengthens grit, and improves intercultural communicative competence. These lines of inquiry would help clarify not only whether IDLE contributes to ICC, but also under what conditions, for whom, and through which pedagogical mechanisms.

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Appendix

Questionnaire

Part 1. Informal digital learning of English Activities

1. How often do you engage in the following receptive IDLE activities?

1 - *Never*; 2 - *Rarely (once a week)*; 3 - *Sometimes (2 or 3 times per week)*; 4 - *Fairly often (once a day)*; 5 - *Very often (many times per day)*

1. I play games in English.
2. I listen to English language news programs online or TV.
3. I listen to songs in English.
4. I listen to English podcasts.
5. I watch English comics online or TV.
6. I watch sports events in English online or TV.
7. I watch English language movies or dramas with subtitles in English.

2. How often do you engage in the following productive IDLE activities?

1 - *never*; 2 - *rarely (once a week)*; 3 - *sometimes (2 or 3 times per week)*; 4 - *fairly often (once a day)*; 5 - *very often (many times per day)*

1. I chat with others in English via social media (e.g., Facebook, KaKaoTalk, Line, WeChat, WhatsApp).
2. I Skype with others in English.
3. I send an email to others in English.
4. I share English contents online.
5. I use technology to connect with native speakers of the language (e.g., American, British).
6. I use technology to connect with non-native speakers of English all over the world (e.g., Japanese, Chinese).

Part 2. Intercultural competence

Knowledge of self: Knowledge regarding one's own language, culture, and country

1 I Know about the history, geography, and socio-political context of China
2 I Know about the lifestyle and values of China
3 I Know about the social etiquette and religious culture of China

Knowledge of others: Knowledge regarding the foreign language, culture, and country

4 I Know about cultural taboos of foreign countries
5 I Know about the history, geography, and socio-political context of foreign countries
6 I Know about some strategies and skills for successful intercultural communication
7 I Know about the social etiquette and religious cultures of foreign countries
8 I Know about and be able to compare basic norms and behavior of different cultures
9 I Know about the lifestyles and values of foreign countries

Awareness: The cognitive and critical ability to understand and evaluate cultural differences

10 I am aware of the differences between cultural identities when interacting with foreigners
11 I am aware of personal habits and preferences of certain cultural conditioning
12 I am aware of the cultural similarities and differences when interacting with foreigners
13 I am aware of the danger of generalizing an individual foreigner's behavior to the entire culture
14 I am aware of the differences in cultural styles and language use, and the impact they have on social and work situations

Intercultural communication skills: The integrative ability to mobilize and optimize knowledge, attitudes, and awareness to engage in intercultural communication successful

15 I have the ability to conduct successful conversations with people from different socio-cultural backgrounds and fields
16 I have the ability to sense intercultural differences
17 I have the ability to see political, economic, religious and other events of other countries from different cultures and multiple perspectives

18 I have the ability to negotiate and explain my own culture in case of intercultural communication misunderstandings, so as to satisfy both parties
19 I have the ability to avoid prejudice and stereotyping against foreigners when interacting with them
20 I have the ability to reflect, learn, and find solutions when intercultural conflicts and misunderstandings arise

Attitude: The integrative ability to mobilize and optimize knowledge, attitudes, and awareness to engage in intercultural communication successfully

21 I am willing to evaluate foreigners' behavior as objectively as possible
22 I am willing to try to accept foreigners' different values, eating habits, taboos, etc.
23 I am willing to try to avoid offending foreigners in terms of language, dress and behavior when interacting with them
24 I am willing to interact with and learn from foreigners from different cultures
25 I am willing to learn foreign languages and know about foreigners

Part 3. Boredom (Strongly disagree, Disagree, Neutral, Agree, Strongly agree**)**

1. Time always seems to be passing slowly in my language classes.
2. I often find myself at loose ends in a language class.
3. I often have to do meaningless things in my language classes.
4. I always feel entertained in my English language classes.
5. I often have to do repetitive or monotonous things in my language classes.
6. It takes more stimulation to get me going in English classes than most students from my group.
7. I get a kick out of most things I do in a language class.
8. I am seldom excited about my English language classes
9. I can usually find something interesting to do in my language classes.
10. I can patiently wait for EFL learning results including, for example, tests, exams and written tasks.
11. I often do not feel like doing anything in practical English classes.
12. It would be very hard for me to find an exciting task in language classes.
13. I would like to have more challenging things to do in my English classes.
14. I feel that I am working below my abilities most of the time in my language classes.
15. Teachers would say that I am a creative or imaginative person in language classes.
16. I am more interested in other subjects than practical English classes.
17. If I am not doing something interesting/exciting during practical English classes, I feel tired and bored.
18. It takes a lot of change and variety to keep me really satisfied during my English classes.
19. It seems that English classes are the same all the time; it is getting boring.
20. When I was younger (e.g., in junior or senior high school), I used to find my foreign language classes monotonous and tiresome.
21. It is easy for me to concentrate on the activities in my English language classes
22. During language classes, I often think about unrelated things.
23. Having to listen to my practical English language teachers present material bores me tremendously.
24. I actively participate in practical English classes.
25. Much of the time I just sit around doing nothing in my English language classes.

Part 4. EFL Grit

Items	Never true about me	Rarely true about me	Sometimes true about me	Often true about me	Always true about me
1. Maria loves to know a lot about the new inventions in the world in order to show off her information about them in family and friendly gatherings, but she's found that there are many new vocabularies in the related news, so she's decided to follow the news in her native language.					
2. Hassan likes Robotic football very much and wants to join the London Robotic team, so he regularly takes part in different English classes to get the necessary proficiency in learning English.					
3. Rose loves English cartoons very much and it has been several months since she has watched the English cartoons several hours a day, but she hasn't felt the passing of time.					
4. When Rex realized that Sheila can fluently help one tourist to get to his destination, he liked it very much and tried to help another tourist but the accent of that tourist was very hard to understand and he became disappointed and from that time he prefers to just watch the tourists from afar.					
5. Susan liked to be a great International cook and she watched cooking programs in different English channels, but it was hard for her to completely understand the recipes, so she tried to use the International cook books in her mother tongue instead.					
6. Rihanna likes Hollywood star, Nicole Kidman, very much and in order to follow her new films in different channels and social networks, she tries to make her English better day by day.					
7. Reza's English teacher had strong American accent and he couldn't understand him, so he went to the English institute's manager and asked to change his class.					
8. Sonia is a student in medical university and after registration, she understood that all her professors are going to teach in English, so she recorded all the voices of her classes and listened to them several times at home in order to understand all parts of the lessons.					
9. Mina can't pronounce the English words well and her classmates usually starts laughing when she reads English texts, so she asked the teacher to let her not read aloud in the English class.					

10. It was very hard for Parham to do his English class homework after a hard and long day that he had at school/ university; but he tried to wake up sooner and do his English class homework before going to school/ university.					
11. When Kamran understood that in order to study IT in his favorite university, he must have IELTS score of 7-8, he decided to choose another university.					
12. Although learning how to use Passive Tense is very difficult for Shana, but she has used several books and has asked her teachers and classmates for more explanations.					
13. Karla's language institute is far from her home and she often becomes awfully tired because of pollution and traffic so she decides to improve her English later.					
14. Sara works in an International company and because she wants to be the best employee, she regularly takes part in English classes during all her free time.					
15. Rosa's professor just introduces the original articles in English and it's very hard for her to understand the main points of them, so she gave all the articles to a translator to translate it for her.					
16. Helen wants to be accepted in MA. /MS. Entrance exam and her consultant has told her that having higher percentage in the language test will increase the probability of her acceptance in her favorite university, so she decides to take part in an English preparation class.					
17. When Nima understood that in order to find a job in a company, he needs to know how to write different kinds of letter in English, he has participated in intensive letter writing class to make himself ready to take part in the job interview.					
18. Samir loves to apply for Ph.D. in Mechanics at Oxford University, but these days he is busy with his new job and he is thinking that progress in this job is more important than taking part in English classes to have a higher score in IELTS exam in order to apply for that university.					