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Exploring Predictors of Academic Success Among ESL Students in Online Learning Contexts

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Abstract

This study explores the predictive roles of digital literacy, learner autonomy, and language proficiency in determining academic success among ESL students in online learning environments. Employing a quantitative, correlational research design, data were collected from 180 undergraduate students enrolled in online English courses across multiple campuses of a private university in Sindh, Pakistan. Standardized and adapted survey instruments measured the three predictor variables, while final course grades served as the indicator of academic performance. Data were analyzed using SPSS Version 27, incorporating reliability analysis, correlation coefficients, and multiple regression modeling. The regression results demonstrated that all three variables significantly contributed to academic outcomes ($p < .001$), with learner autonomy emerging as the strongest predictor ($\beta = 0.334$), followed by language proficiency ($\beta = 0.278$), and digital literacy ($\beta = 0.228$). The model accounted for 24.1% of the variance in final course grades ($R^2 = .241$), and correlation analysis supported the independence of predictors, suggesting minimal multicollinearity. These findings underscore the central role of learner autonomy in promoting academic success in online ESL contexts, while also affirming the importance of language competence and digital skills. The study offers practical implications for online pedagogy, advocating for the integration of self-regulated learning strategies, language development, and digital literacy training into ESL curricula. Limitations related to self-reported data, sample size, and contextual generalizability are acknowledged, and recommendations for future research include longitudinal and mixed-method studies to further explore these interrelated constructs.

Keywords: Digital Literacy, Learner Autonomy, Language Proficiency, ESL, Online Learning, Academic Success, Multiple Regression, Virtual Classrooms.

Introduction

The global shift toward online education accelerated by the COVID-19 pandemic. This shift has significantly transformed the way English as a Second Language (ESL) instruction is delivered and experienced. With the rise of digital platforms that demand a range of new skills and competencies, ESL learners are increasingly

required to adapt to online environments. Among these, digital literacy, learner autonomy, and language proficiency have emerged as crucial predictors of students' success in virtual classrooms (Al-Fraihat et al., 2020; Pham & Nguyen, 2022). Success in this context can be understood through academic outcomes such as final course grades.

Despite the proliferation of online ESL programs, not all students thrive in this mode of learning because many struggle with navigating digital tools, managing their own learning schedules, or applying their language skills effectively in virtual interactions. These disparities suggest a need to identify the factors in online ESL settings that most strongly predict successful outcomes. This study focuses on key learner characteristics i.e., digital literacy, learner autonomy, and language proficiency and seeks to provide empirical insights that can guide educators and policymakers in supporting ESL students more effectively in the digital learning landscape.

Online education offers flexibility and accessibility to ESL students despite it they often face unique challenges that can hinder their academic success in such environments. Current research, in online learning has acknowledged the importance of student-centered factors yet there is limited empirical evidence specifically examining how digital literacy, learner autonomy, and language proficiency interact to influence ESL students' outcomes (Yeşilyurt & Vezne, 2023). In the lack of clear understanding of these predictors, educators may struggle to design interventions or instructional strategies that enhance student performance and engagement. This study addresses the gap by exploring how these three variables contribute to ESL learners' success, measured by final course grades in fully online learning environments.

Objectives of the Study

1. To examine the extent to which digital literacy predicts ESL students' success in online learning environments.
2. To investigate the role of learner autonomy in influencing ESL students' academic performance and engagement online.
3. To assess the impact of language proficiency on ESL learners' outcomes in virtual classrooms.
4. To develop a regression model identifying the most significant predictors of online learning success among ESL students.

Research Questions

1. To what extent do digital literacy, learner autonomy, and language proficiency predict ESL students' final course grades in online learning environments?
2. Which of the three variables digital literacy, learner autonomy, or language proficiency, emerges as the strongest predictor of ESL students' success in online learning?

Significance of Study

This study holds both theoretical and practical significance in the field of ESL education, particularly within the context of increasing digital learning environments. As online education becomes a permanent fixture in higher education and language learning programs, understanding what enables ESL students to succeed in these settings is more critical than ever. By investigating the predictive power of digital literacy, learner autonomy, and language proficiency, this research contributes valuable insights into the learner-centered variables that impact academic outcomes and engagement in virtual classrooms.

Theoretically, the study enriches the growing body of literature on online language learning by offering an empirical model that links individual learner characteristics to performance indicators such as final course grades and engagement levels. This model can serve as a foundation for future research in digital ESL contexts that seek to optimize instructional design and learner support.

Practically, the findings of this study can guide educators, instructional designers, and policymakers in creating more targeted interventions for ESL learners. For instance, if digital literacy emerges as a significant predictor, it needs to be prioritized at the beginning of online courses. Similarly, if learner autonomy proves critical, educators can design courses by incorporating self-regulation strategies and flexible learning pathways. This targeted approach, in online ESL programs, can help reduce dropout rates, improve learner satisfaction, and enhance overall learning outcomes.

Literature Review

1. Online Learning and ESL Education

Online learning has become a core component of ESL instruction globally over the past decade and especially since the COVID-19 pandemic. Though virtual classrooms

offer flexibility and broader access to language education, they also introduce unique challenges for ESL learners, such as limited face-to-face interaction, increased technological demands, and the need for self-regulation (Stickler, 2022). As a result, researchers and educators have begun to explore which factors best predict ESL students' success in these environments.

Success in online learning is often measured through academic outcomes such as final course grades or behavioral metrics like engagement, participation, or completion rates (Martin et al., 2018). However, the factors influencing these outcomes are multidimensional, particularly in the case of language learners who are navigating not only course content but also linguistic and digital challenges.

2. Digital Literacy as a Predictor of Online Learning Success

Digital literacy is defined as the ability to effectively use digital tools, platforms, and technologies, and has become a fundamental skill in online education. It is not just about using a computer for ESL learners, it also includes the ability to navigate learning management systems (LMS), participate in virtual discussions, and access online resources in a second language (Ng, 2022). Studies show that students with higher digital literacy are more confident, motivated, and better equipped to manage their learning in online environments (Tang & Chaw, 2013).

Research by Yeşilyurt and Vezne (2023) found a significant positive correlation between students' digital skills and their engagement in online ESL courses. Similarly, Pham and Nguyen (2022) highlighted that digital literacy enables ESL learners to access learning materials independently and interact more meaningfully with peers and instructors in virtual spaces. Students may experience technical frustration, disengagement, and ultimately, lower performance without adequate digital literacy.

3. Learner Autonomy in Online ESL Classrooms

Learner autonomy, the ability of students to take control of their own learning, is another critical predictor of success in online learning (Lai, 2022). In traditional classrooms, teachers often guide learning, but online environments demand greater responsibility from students to plan, monitor, and evaluate their own progress. Autonomy becomes even more important in the absence of constant teacher presence for ESL students, who may already face anxiety or uncertainty about their language

abilities.

Autonomous learners in ESL online programs show higher persistence, better time management, and stronger academic outcomes (Hunutlu, 2023). A study by Bai and Wang (2021) also found that learner autonomy was significantly related to online course completion and language development. Promoting strategies such as goal setting, self-monitoring, and reflection can foster autonomy and lead to better academic results.

4. Language Proficiency and Academic Success

Language proficiency is, unsurprisingly, a foundational predictor of ESL students' academic success, both online and offline. However, language proficiency in online learning affects not only comprehension of course content but also students' ability to navigate digital platforms, communicate with instructors and peers, and participate in written or spoken online discussions (Zhang & Lin, 2021).

Low language proficiency can hinder students from fully engaging with the material or expressing their thoughts clearly, which negatively impacts both grades and engagement (Meylani, 2024). Conversely, students with higher proficiency levels are more likely to contribute actively to online discussions, seek help when needed, and perform well on assessments.

5. Interplay of Predictors and Use of Regression Models

While each predictor such as digital literacy, learner autonomy, and language proficiency, has been studied individually, there is a growing interest in understanding how these variables interact. Multiple regression analysis allows researchers to examine the relative contribution of each factor to academic outcomes and to identify which predictors are most influential.

Studies using such models (e.g., Martin et al., 2018; Al-Fraihat et al., 2020) suggest that no single factor operates in isolation. For example, a student with high digital skills may still struggle without sufficient language proficiency or self-regulation. Therefore, exploring these predictors together can offer a more holistic understanding of what drives ESL students' success in online learning environments.

Overall, in online settings the literature highlights that digital literacy, learner autonomy, and language proficiency are vital for ESL learners' academic success. However, more research is needed to determine which factors are most predictive of

success, and to clarify their combined effects. This study addresses that gap by using multiple regression to assess the impact of these three learner characteristics on ESL students' final grades in fully online courses.

Methodology

1. Research Design

This study employed quantitative, correlational research design using multiple linear regression analysis. The aim was to examine the extent to which digital literacy, learner autonomy, and language proficiency predict ESL students' success in online learning environments. This design was appropriate because the goal was not to manipulate variables but to explore relationships among them based on naturally occurring data.

2. Population and Sample

The target population consists of undergraduate ESL students enrolled in online English courses at universities in Pakistan. A sample of 180 students was selected using convenience sampling, as the participants were those who already had been taking online ESL courses and were accessible during the semester.

This sample size is considered adequate for multiple regression analysis, which generally requires 15–20 cases per predictor variable. With three independent variables, the sample of 180 ensures sufficient statistical power (Tabachnick & Fidell, 2013).

3. Variables of the Study

- **Dependent Variable**:
  - *Final course grade* (measured as a percentage)
- **Independent Variables**:
  - *Digital Literacy*
  - *Learner Autonomy*
  - *Language Proficiency*

4. Instrumentation

The study used standardized and adapted survey instruments to measure the independent variables. All items were presented in English and rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

I. **Digital Literacy Scale**: Adapted from Ng (2012) and Tang & Chaw (2013),

assessing students' ability to use digital tools for communication, learning, and problem-solving. The scale consists of 25 items.

II. **Learner Autonomy Scale**: Based on Lai's (2023) framework, it comprised of 25 items, measuring students' self-directed learning behaviors, including goal setting, planning, and self-monitoring.

III. **Language Proficiency Self-Assessment**: Students will rate their reading, writing, listening, and speaking skills using the questionnaire, based on CEFR self-assessment grid, adapted from Piamsai (2023). The instrument consists of 40 items to assess four basic skills of language.

IV. **Academic Success Measures** – Final course grades were collected from instructors (with consent).

5. Data Collection Procedure

Ethical approval for the study was granted by the university's research ethics committee. Participants were recruited through course instructors and online announcements. Informed consent was obtained digitally, ensuring that all responses remained anonymous to protect participants' privacy. Students completed the online questionnaire using Google Forms. Additionally, with participants' consent, their final course grades were collected at the end of the semester for research purposes.

6. Data Analysis

Data analysis was conducted using SPSS Version 27. The following procedures were applied:

First, reliability analysis using Cronbach's alpha was performed to assess the internal consistency of each scale. The results indicated acceptable reliability for all three instruments:

- Digital Literacy Scale ($\alpha = 0.87$),
- Learner Autonomy Scale ($\alpha = 0.89$), and
- Language Proficiency Self-Assessment ($\alpha = 0.82$).

Following this, multiple regression analysis was conducted to examine the predictive power of digital literacy, learner autonomy, and language proficiency on students' final course grades or engagement scores.

7. Ethical Considerations

- Participation was voluntary, and they (students) might withdraw at any point.

- No identifiable information was collected, and all responses remained confidential.
- Data was stored securely and used only for academic purposes.

Findings of Study

Collected data were loaded on the SPSS Version-27 and multiple regression analysis was run. Initially, findings of first research question were found. The question enquired, to what extent do digital literacy, learner autonomy, and language proficiency predict ESL students' final course grades in online learning environments? The findings are presented below:

Table 1: Model Summary

Model Metric	R^2	Adjusted R^2	F-Statistic	p-value (Model)
Value	.241	.228	18.66	< 0.001

Approximately 24.1% of the variance in final course grades is explained by digital literacy, learner autonomy, and language proficiency.

Table 2: Showing Regression Coefficients

Predictor	Unstandardized Coef. (B)	Std. Error	t-value	p-value	95% CI
(Constant)	84.55	1.999	42.31	0.000	[80.61, 88.50]
Digital Literacy	1.21	0.35	3.47	0.001	[0.52, 1.90]
Learner Autonomy	1.77	0.35	5.07	0.000	[1.08, 2.46]
Language Proficiency	1.14	0.27	4.22	0.000	[0.61, 1.68]

All predictors significantly contributed to predicting final course grades ($p < .01$).

The above table presents the results of a multiple linear regression analysis examining how well Digital Literacy, Learner Autonomy, and Language Proficiency predict ESL students' final course grades in online learning environments. The following points are worth important according to the above table.

1. Constant (Intercept)

Unstandardized Coefficient (B) = 84.55, $p < 0.001$ predict when the scores of Digital Literacy, Learner Autonomy, and Language Proficiency are all zero (a hypothetical

baseline), the model predicts a final course grade of 84.55%. While not directly meaningful in practical terms (since predictor scores rarely equal zero), it anchors the regression line.

2. Digital Literacy

For the above predictor B = 1.21, and p = 0.001 therefore, for every one-point increase in a student's digital literacy score, their final course grade increases by 1.21 percentage points, holding all other variables constant. Moreover, the result is statistically significant (p = 0.001), indicating that digital literacy has a positive and meaningful effect on academic success.

3. Learner Autonomy

The above predictor shows B = 1.77, and p < 0.001which suggest that each one-point increase in learner autonomy, a student's final grade increases by 1.77 percentage points, assuming digital literacy and language proficiency remain constant. This is the strongest predictor among the three. It is highly statistically significant (p < 0.001), suggesting that students who are more self-directed in their learning tend to achieve higher grades in online ESL courses.

4. Language Proficiency

For the above predictor B = 1.14, and p < 0.001 show that a one-point increase in language proficiency corresponds to an increase of 1.14 percentage points in the final course grade, controlling for the other two variables. This result is also statistically significant, meaning students with higher self-rated language skills perform better academically in online learning environments.

All three predictors, i.e., Digital Literacy, Learner Autonomy, and Language Proficiency, make significant, positive contributions to students' final course grades. Among them, Learner Autonomy has the largest effect, emphasizing the importance of self-regulated learning in online education.

Answer to the second research question which enquired which of the three variables, digital literacy, learner autonomy, or language proficiency, emerges as the strongest predictor of ESL students' success in online learning?

Table 3: Standardized Beta Coefficients

Predictor	Standardized Beta (β)
Learner Autonomy	**0.334**
Language Proficiency	0.278
Digital Literacy	0.228

Standardized beta coefficients (β) allow us to compare the relative strength of each predictor variable in the regression model, because they are measured on the same standardized scale (mean = 0, standard deviation = 1). This is particularly useful when the predictors are measured in different units or scales. The following standardized beta values represent the unique contribution of each variable to predicting ESL students' final course grades in online learning environments, controlling for the influence of the other variables.

1. Learner Autonomy (β = 0.334)

Learner autonomy has the strongest positive influence on final course grades among the three predictors. A one standard deviation increase in learner autonomy is associated with a 0.334 standard deviation increase in final course grades, holding digital literacy and language proficiency constant. This suggests that self-directed learning behaviors (such as goal setting, planning, and self-monitoring) play a critical role in academic success in online ESL settings.

2. Language Proficiency (β = 0.278)

Language proficiency is the **second strongest predictor** of academic success. A **one standard deviation increase** in language proficiency is associated with a **0.278 standard deviation increase** in final grades. This indicates that students who perceive themselves as more competent in reading, writing, listening, and speaking English tend to perform **better academically** in online courses.

3. Digital Literacy (β = 0.228)

Digital literacy also has a positive and meaningful influence, though it is the least strong among the three predictors. A one standard deviation increase in digital literacy predicts a 0.228 standard deviation increase in final course grades. This reflects the importance of students' ability to use digital tools effectively in the context of online learning, though its impact is slightly less pronounced than learner autonomy and

language proficiency.

Concludingly, among the three predictors, Learner Autonomy has the most substantial impact on students' academic performance, it is followed by Language Proficiency, then Digital Literacy. All three factors contribute positively, suggesting that fostering autonomy, improving language skills, and enhancing digital competence can collectively support ESL students' success in online learning environments.

Table 4: Showing Correlation Matrix

	Digital Literacy	**Learner Autonomy**	**Language Proficiency**	**Final Grades**
Digital Literacy	1.00	-0.04	-0.04	0.21
Learner Autonomy	-0.04	1.00	0.06	**0.34**
Language Proficiency	-0.04	0.06	1.00	0.29
Final Grades	0.21	**0.34**	0.29	1.00

1. Final Grades and Independent Variables

Learner Autonomy and Final Grades (r = 0.34)

A moderate positive correlation, indicating that students who exhibit higher levels of learner autonomy (e.g., self-regulation, planning, goal setting) tend to achieve better final grades. This is the strongest correlation with final grades among the three predictors.

Language Proficiency and Final Grades (r = 0.29)

A moderate positive correlation, suggesting that students who rate themselves higher in reading, writing, listening, and speaking skills tend to perform better academically.

Digital Literacy and Final Grades (r = 0.21)

A weak-to-moderate positive correlation, indicating that students with better digital skills (e.g., using online tools, accessing digital resources) are somewhat more likely to succeed in online courses.

2. Intercorrelations Among Independent Variables

All intercorrelations among the three predictors (Digital Literacy, Learner Autonomy, and Language Proficiency) are **very weak or near zero**:

- Digital Literacy & Learner Autonomy (r = -0.04)
- Digital Literacy & Language Proficiency (r = -0.04)
- Learner Autonomy & Language Proficiency (r = 0.06)

These low correlations suggest that each predictor captures a distinct dimension of student ability or behavior. This is ideal for multiple regression, as it minimizes multicollinearity and indicates that each variable is contributing unique information to the model.

In conclusion, the correlation matrix supports the findings of the regression analysis. Learner Autonomy is the most strongly associated with academic success. Language Proficiency and Digital Literacy are also positively related to performance, though to a lesser extent. The predictors are not strongly correlated with each other, which confirms their independent contributions in explaining students' final grades.

Discussion

The present study investigated the predictive roles of Digital Literacy, Learner Autonomy, and Language Proficiency in determining ESL students' final course grades within online learning environments. The regression analysis revealed that all three variables made statistically significant and positive contributions to students' academic performance, with Learner Autonomy emerging as the strongest predictor, followed by Language Proficiency, and Digital Literacy. These findings align with and extend prior research in the domain of technology-enhanced language learning and learner-centered pedagogy.

The dominant role of learner autonomy ($\beta = 0.334$, $r = 0.34$) in predicting final course grades resonates with the theoretical underpinnings of Self-Determination Theory (Deci & Ryan, 1985), which posits autonomy as a fundamental psychological need that enhances motivation and learning outcomes. In the context of online learning, where teacher presence is often reduced, students' ability to self-regulate becomes even more crucial.

Recent empirical evidence supports this. For instance, Benson (2021) underscores the increasing importance of autonomy in digital and remote language learning contexts, arguing that students who can manage their own learning paths tend to adapt more successfully to asynchronous and technology-mediated environments. Similarly, Yıldız (2023), in a study on Turkish EFL learners during emergency remote

teaching, found that autonomous learners demonstrated significantly better academic outcomes and engagement levels than their less autonomous peers.

The study found that language proficiency (β = 0.278, r = 0.29) was the second most significant predictor of final grades. This is consistent with existing literature highlighting language proficiency as a key determinant of success in content-based online instruction (Glick et al., 2019). Students who perceive themselves as more proficient in English are more likely to comprehend instructional materials, communicate effectively in class discussions, and complete assignments with confidence.

Moreover, in online ESL learning, linguistic self-efficacy plays a critical role. According to Lee & Drajati (2019), self-perceived language ability not only predicts performance outcomes but also influences learners' willingness to participate in virtual interactions, which are essential for active learning.

Although digital literacy had the smallest standardized beta (β = 0.228, r = 0.21), it was nonetheless a significant predictor, affirming that students' capacity to navigate digital platforms, manage information, and troubleshoot technological problems contributes meaningfully to their academic success in online learning settings.

This supports the findings of Ng (2012) and more recently Godwin-Jones (2023), who argue that digital literacy is a foundational competence in modern language learning, particularly as courses increasingly integrate Learning Management Systems (LMS), multimedia materials, and collaborative tools. In a study by Park & Son (2022), Korean university students' digital literacy levels significantly predicted their academic engagement and satisfaction in online English courses, albeit with a smaller effect size compared to learner autonomy and motivation like the current study.

Notably, the low intercorrelations among the three predictors (ranging from -0.04 to 0.06) suggest that each contributes unique variance to students' final course grades. This indicates a lack of multicollinearity, enhancing the robustness of the regression model. It also highlights that fostering student autonomy, digital skills, and language proficiency should be treated as complementary but distinct pedagogical goals in online ESL instruction. From a practical standpoint, this finding aligns with

constructivist approaches to online education, where learners are expected to simultaneously develop multiple competencies technical, cognitive, and metacognitive to thrive in self-paced, digital environments.

Collectively, these findings suggest that successful online ESL learning is not contingent upon any single factor but emerges from a dynamic interplay between cognitive skills (language proficiency), technical competencies (digital literacy), and personal attributes (learner autonomy). This holistic view is echoed in recent models such as Anderson's Interaction Equivalency Theorem (2020), which posits that meaningful learning in online settings can occur through various combinations of student-content, student-teacher, and student-student interactions, each influenced by the learner's autonomy and preparedness.

Future studies should explore longitudinal trajectories of these variables and consider additional mediating factors such as learning motivation, engagement, and self-efficacy. Moreover, qualitative insights into learners' perceptions of autonomy and digital readiness can deepen our understanding of how these constructs interact in different cultural and institutional contexts.

Conclusion

This study set out to examine how digital literacy, learner autonomy, and language proficiency predict ESL students' academic success in online learning environments. The findings clearly show that all three variables make statistically significant and positive contributions to students' final course grades. Learner autonomy emerged as the strongest predictor, followed by language proficiency and then digital literacy.

These results highlight the increasingly critical role of self-directed learning in digital education. In an online setting where traditional classroom structures are less visible, students who can manage their learning set goals, monitor progress, and stay motivated, are more likely to succeed. Additionally, a student's confidence and competence in the English language remains a strong foundation for academic achievement, particularly in ESL contexts. Meanwhile, digital literacy, though slightly less influential, still plays an essential role by enabling learners to navigate platforms, access resources, and engage with content effectively.

The low correlations among the three predictors further suggest that these are distinct but complementary domains of student readiness. This provides educators and

curriculum designers with a valuable insight: to support ESL learners in online environments, we must not focus on just one area but develop all three language skills, digital competence, and learner independence in tandem.

Ultimately, this study contributes to the growing understanding of how multiple learner characteristics interact to shape educational outcomes in the digital age. It calls for holistic instructional practices that empower students not just to consume content, but to take ownership of their learning in technologically rich, linguistically demanding environments.

Limitations

While the findings offer meaningful insights, several limitations should be acknowledged:

- Digital literacy, learner autonomy, and language proficiency were assessed through self-reported data, which may be subject to social desirability bias or inaccurate self-perceptions.
- The study was conducted with 180 students from various campuses of a single institution in Sindh, Pakistan, limiting the generalizability of results to other regions, academic levels, or cultural contexts.
- The data were collected at a single point in time, which restricts the ability to draw conclusions about causality or changes over time.
- Other relevant factors such as internet access, socioeconomic background, instructor quality, or motivation were not considered in this model.

Implications

The study has several practical implications for educators, curriculum designers, and policymakers:

- Incorporate digital literacy and language development as integrated components of ESL curricula, especially in online or hybrid formats.
- Educators should be trained to recognize and support varying levels of student autonomy and digital competence in online settings.
- Language labs, tech support, and self-regulated learning workshops can empower students to navigate digital learning more successfully.
- Institutions should consider digital readiness and language proficiency as core competencies in online education frameworks and assessments.

Suggestions for Future Research

To build on the current findings, future research could:

- Use Longitudinal Designs to track changes in students' digital skills, language proficiency, and academic outcomes over multiple semesters.
- Include Objective Measures, such as standardized language test scores, LMS activity logs, or instructor evaluations, to validate self-reported data.
- Expand the Model to include other relevant predictors like motivation, internet access, teacher presence, or socio-emotional factors.
- Explore Moderation or Mediation Effects for example, examining whether learner autonomy mediates the relationship between digital literacy and academic success.
- Replicate the Study in Diverse Contexts across different institutions, or educational levels to enhance generalizability and cultural relevance.

References

Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. *Computers in Human Behavior*, 102, 67–86. https://doi.org/10.1016/j.chb.2019.08.004

Bai, B., & Wang, J. (2021). Hong Kong secondary students' self-regulated learning strategy use and English writing: Influences of motivational beliefs. *System*, *96*, 102404.

Benson, P. (2021). *Language learning environments: Spatial perspectives on SLA* (Vol. 147). Multilingual Matters.

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality*, *19*(2), 109-134.

Glick, D., Cohen, A., Festinger, E., Xu, D., Li, Q., & Warschauer, M. (2019). Predicting Success, Preventing Failure: Using Learning Analytics to Examine the Strongest Predictors of Persistence and Performance in an Online English Language Course. In *Utilizing learning analytics to support study success* (pp. 249-273). Cham: Springer International Publishing.

Godwin-Jones, R. (2023). Presence and agency in real and virtual spaces: The

promise of extended reality for language learning.

Hunutlu, S. (2023). Self-regulation strategies in online EFL/ESL learning: A systematic review. *Studies in Self-Access Learning Journal*, *14*(2).

Lai, C. (2023). *Insights into autonomy and technology in language teaching*. Castledown Publishers.

Lee, J. S., & Drajati, N. A. (2019). English as an international language beyond the ELT classroom. *ELT Journal*, *73*(4), 419-427.

Martin, F., Wang, C., & Sadaf, A. (2018). Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. *The Internet and Higher Education*, *37*, 52-65.

Meylani, R. (2024). Blueprint for the 21st century online learning environment in stem education through a systematic review and qualitative synthesis. *Edelweiss Applied Science and Technology*, *8*(6), 8196-8226.

Ng, D. T. K. (2022). Online aviation learning experience during the COVID-19 pandemic in Hong Kong and Mainland China. *British journal of educational technology*, *53*(3), 443-474.

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & education*, *59*(3), 1065-1078.

Park, M., & Son, J. B. (2022). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, *42*(2), 320-334.

Pham, N. T., & Van Nghiem, H. (2022). Online teaching satisfaction amid the covid-19 pandemic: evidence from a Vietnamese higher education context. *International Journal of TESOL & Education*, *2*(1), 310-326.

Piamsai, C. (2023). Development and use of CEFR based self-assessment in a Thai tertiary context. *Pasaa*, *66*(1), 81-126.

Stickler, U. (2022). *Technology and language teaching*. Cambridge University Press.

Tabachnick, B. G., & Fidell, L. S. (2013). Using Multivariate Statistics (6th ed.). Boston, MA: Pearson.

Tang, C., & Chaw, L. (2013). Readiness for blended learning: Understanding the attitude of university students. *International journal of cyber society and*

education, *6*(2), 79-100.

Yeşilyurt, E., & Vezne, R. (2023). Digital literacy, technological literacy, and internet literacy as predictors of attitude toward applying computer-supported education. *Education and information technologies*, *28*(8), 9885-9911.

Yıldız, T. A. (2023). The impact of ChatGPT on language learners' motivation. *Journal of Teacher Education and Lifelong Learning*, *5*(2), 582-597.

Zhang, H., & Lin, J. (2021). Morphological knowledge in second language reading comprehension: Examining mediation through vocabulary knowledge and lexical inference. *Educational Psychology*, *41*(5), 563-581.