

Digital Literacy in EFL Education: Exploring Self-Efficacy, Engagement, and Gender Dynamics

Littératie Numérique dans l'Enseignement de l'Anglais Langue Etrangère (EFL) : Exploration des Dynamiques entre Auto-Efficacité, Engagement et Genre

Keltoum Mansouri,*

University of Oum El Bouaghi(Algeria)

mansouri.keltoum@univ-oeb.dz

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Abstract

Digital learning has gained increasing global attention, with Algeria being no exception, particularly following the COVID-19 pandemic, which advanced the integration of technology into education. Within this evolving field, the need to equip students with effective digital knowledge and skills has become increasingly evident. In this context, this study investigates the relationship between self-efficacy, engagement, and gender among English as a Foreign Language (EFL) students in digitally mediated learning environments. It employed a quantitative approach, using an online survey with 61 postgraduate students at an Algerian university to assess their confidence and engagement in using digital tools for language learning. Data were analysed using descriptive statistics, correlation analysis, t-tests, and standard multiple regression analysis. The findings revealed moderately high levels of both digital self-efficacy and engagement among participants. Notably, proactive digital engagement was a significant predictor of students' self-efficacy. Additionally, although male and female students reported similar engagement levels, male students indicated significantly higher levels of digital self-efficacy. Interestingly, gender emerged as the strongest predictor of self-efficacy, revealing substantial confidence disparities between male and female students. These findings emphasise the importance of fostering self-directed digital engagement and addressing gender-related confidence gaps. The study provides insights for curriculum development, particularly in supporting inclusive pedagogical strategies that leverage digital literacy and equitable participation in technology-enhanced EFL settings.

Keywords:

Digital literacy; Self-efficacy; Engagement; Gender; English as a foreign language.

Resumé

L'apprentissage numérique a attiré une attention croissante à l'échelle mondiale, l'Algérie ne faisant pas exception, particulièrement après la pandémie de COVID-19, qui a accéléré l'intégration de la technologie dans l'éducation. Dans ce domaine en évolution, le besoin d'équiper les étudiants de connaissances et de compétences numériques efficaces est devenu de plus en plus évident. Dans ce contexte, cette étude examine la relation entre l'auto-efficacité, l'engagement et le genre chez les étudiants en anglais langue étrangère (ALE) dans des environnements d'apprentissage médiatisés numériquement. Elle a adopté une approche quantitative, en utilisant une enquête en ligne auprès de 61 étudiants de master dans une université algérienne pour évaluer leur confiance et leur engagement dans l'utilisation des outils numériques pour l'apprentissage des langues. Les données ont été analysées à l'aide de statistiques descriptives, d'analyses de corrélation, de tests t et d'analyses de régression multiple standards. Les résultats ont révélé des niveaux modérément élevés d'auto-efficacité numérique et d'engagement chez les participants. Notamment, un engagement numérique proactif s'est avéré un prédicteur significatif de l'auto-efficacité des étudiants. De plus, bien que les étudiants masculins et féminins aient rapporté des niveaux d'engagement similaires, les étudiants masculins ont indiqué des niveaux d'auto-efficacité numérique significativement plus élevés. Fait intéressant, le genre est apparu comme le prédicteur le plus fort de l'auto-efficacité, révélant des disparités substantielles de confiance entre les étudiants masculins et féminins. Ces résultats soulignent l'importance de promouvoir l'engagement numérique autodirigé et de traiter les écarts de confiance liés au genre. L'étude offre des perspectives pour le développement des programmes, notamment en soutenant des stratégies pédagogiques inclusives qui favorisent la littératie numérique et la participation équitable dans des environnements d'ALE enrichis par la technologie.

Mots clés

littératie numérique ; auto-efficacité ; engagement ; genre ; Anglais langue étrangère

*Corresponding Author:

1. INTRODUCTION

In this digital era, the integration of technology into education has changed the way knowledge is accessed, produced, and shared. Digital literacy, defined as the ability to navigate digital platforms, critically evaluate online content, and create meaningful outputs, has emerged as an essential skill for both teachers and learners (Gilster, 1997). In the EFL context, digital literacy is deemed crucial, as it supports learners to engage with authentic language materials and interact virtually to develop communicative competence in real-world digital settings (Chapelle, 2003). In Algeria, besides other contexts, the shift to online and blended learning has grown since the COVID-19

pandemic, highlighting the need for digital competence among students and teachers more than ever (Dzekoe, 2020). Despite the growing access to technology, many EFL learners remain limited to basic digital skills, such as performing online searches, while lacking the critical abilities required to evaluate, produce, and communicate information effectively and safely in online environments.

Two main factors identified to support students' effective use of digital tools for learning are self-efficacy and engagement. The former refers to learners' beliefs in their capacity to perform specific learning tasks successfully (Bandura, 1997). In this context, it relates to digital learning tasks, such as navigating online platforms and participating in virtual discussions. The latter, on the other hand, reflects the behavioural, emotional, and cognitive involvement of learners (Fredricks et al., 2004). In this study, it refers to learners' involvement in digital environments. Typically, students who exhibit strong confidence and active participation are better positioned to leverage technology for learning. However, in the existing literature, while self-efficacy and engagement have been widely studied, few studies have examined these constructs within the specific context of digital EFL learning, particularly in under-researched regions such as Algeria. Moreover, studies have investigated how self-efficacy influences engagement, yet few have explored whether engagement fosters self-efficacy. Lastly, although gender differences in digital self-efficacy exist, their interaction with engagement types in predicting learners' digital sense of efficacy is scarce. Thus, this study seeks to address the following research questions:

- 1.What is the level of student self-efficacy in digital learning?
- 2.What is the level of student engagement in digital learning?
- 3.What is the relationship between engagement and self-efficacy in digital language learning?

4.Are there significant differences in the mean levels of self-efficacy and engagement based on gender?

5.To what extent do gender and forms of digital engagement contribute to students' perceived ability in digital learning?

2. Literature Review

2.1 Digital Literacy: Definitions and Core Competencies

Digital literacy is increasingly recognised as a foundational competency in today's knowledge-based society. Gilster (1997, p.6) defines digital literacy as “the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers”. This emphasises not only comprehension but also the practical application of digital content. Expanding on this definition, Carretero et al. (2017) outline five main areas of digital competence. First, information and data literacy involve the ability to find, assess, and organise digital information effectively, such as searching, filtering content, and critically evaluating its reliability and relevance. Second, communication and collaboration refer to the use of digital technologies to communicate with others responsibly, such as interacting and sharing online and participating in digital citizenship. Third, digital content creation involves producing and adapting digital materials while respecting ethical standards, such as creating new content and understanding copyright and licensing. Fourth, safety focuses on protecting oneself and others when using digital technologies, such as devices, personal data and privacy and promoting digital well-being. Lastly, problem-solving competence involves using digital technologies to address challenges and improve skills, such as fixing technical issues, identifying needs and choosing suitable digital solutions and applying technology creatively.

2.1.1 Digital Literacy in Education and Language Learning

Digital literacy plays a vital role in today's evolving educational landscape, where an increasing emphasis is placed on digital inclusion. Yet, existing research reveals wide variations in students' digital abilities, showing that access and engagement alone are not enough. For instance, Gui and Argentin (2011) noted that Italian high school students excelled at basic digital tasks; yet, their ability to judge content critically was limited, shaped by factors like family background and gender. Similarly, Ng (2012) found that Australian undergraduates reported being comfortable using new technologies but struggled to apply them effectively in academic settings. In Japan, Gobel and Kano (2014) observed that although students had access to mobile technologies, they rarely used them for educational purposes and often lacked confidence in their digital skills. Together, these findings point to a critical issue: having digital tools does not ensure literacy.

In second and foreign language education, digital literacy is increasingly recognised as an essential skill. Technology-enhanced language learning environments require that students not only interact with digital platforms but also critically evaluate information, manage online resources, and communicate in multimodal formats. Hafner et al. (2015) argue that simply understanding and creating straightforward text is no longer enough; students must now manage complex digital material, blending words, images, and links. This shift necessitates a reconsideration of language pedagogy, emphasising the integration of digital literacy into meaningful classroom practices. In this sense, real-world digital activities, like connecting students' casual online habits to classwork, can improve engagement and develop literacy skills. In their study, Son et al. (2017) found that EFL students outperformed EAP students on digital literacy tests, despite rating themselves lower in digital self-efficacy. Although most

learners reported frequent use of computers and social media, few took full advantage of language-learning apps, suggesting a gap between digital engagement and purposeful academic use. Interestingly, self-efficacy and digital engagement emerged as key factors influencing students' digital literacy performance. Overall, the literature highlights that the successful integration of digital tools in language education depends not only on access and infrastructure but also on learners' psychological readiness and teaching strategies.

2.2Engagement in Digital Learning

In technology-enhanced learning contexts, engagement is considered a key predictor of academic achievement and learning success (Kuo et al., 2021). It involves not only behavioural participation but also emotional experiences and cognitive investment throughout the learning process (Jie, 2020). Redmond et al. (2018) further expand the traditional Fredricks et al.'s (2004) tripartite engagement model by proposing five interconnected dimensions: social, cognitive, behavioural, collaborative, and emotional, specific to online higher education. They suggest that fostering these areas can improve students' persistence, satisfaction, and academic performance.

In second and foreign language learning contexts, engagement is similarly viewed as a multifaceted and context-related construct. Hiver et al. (2021) define engagement as the quality and quantity of learners' active participation in language learning tasks, emphasising its dynamic nature. They outline four core aspects of L2 engagement in their framework: behavioural, cognitive, emotional, and social. Among these, behavioural engagement has received the most attention in language learning research, whereas social engagement remains relatively understudied, despite its vital role in technology-supported and collaborative-focused online settings (Hiver et al., 2021; Redmond et al., 2018). They urge more investigation into how engagement

differs among learners and across various contexts. Another way to view engagement in digital language learning is through self-determination theory (Deci & Ryan, 1985), which ties autonomy, a central part of engagement, to competence, closely related to self-efficacy. Zheng and Xiao (2024) adopt this perspective to show how fostering students' independence and skill confidence can improve technology-enhanced language education outcomes.

2.3 Self-efficacy in Digital Learning

Self-efficacy, a central concept in Bandura's (1997) social cognitive theory, refers to individuals' beliefs in their ability to plan and execute actions to achieve specific goals. In education, this belief influences students' motivation, effort, persistence, and ultimately their academic achievement. For digital language learning, self-efficacy is particularly important, as it shapes learners' confidence in using digital tools, completing tasks, and engaging with online materials (Kim & Glassman, 2013). In language learning, Oriol-Granadoa et al. (2017) expand the definition, arguing that academic self-efficacy is not only about believing in one's abilities but also about effectively managing challenges and opportunities in the learning environment, while staying motivated and engaged. This perspective aligns with the increasing complexity of digital learning, where learners must navigate both technological and cognitive demands.

Zheng and Xiao (2024), building on the self-determination theory (Deci & Ryan, 1985), stress how self-efficacy (related to competence) works alongside engagement (linked to autonomy) in a digital language setting. Their study demonstrates that online learning self-efficacy strongly predicts EFL learners' satisfaction with their courses, meaning that those who believe in their digital skills tend to feel more accomplished. Similarly, Getenet et al. (2024) found that self-efficacy with

digital technologies strongly predicts all five aspects of student online engagement. This finding supports the integrative role of self-efficacy in fostering active engagement and persistence in digital learning contexts. Thus, self-efficacy is a dynamic construct that directly influences learners' digital practices. It enables students to approach tasks with confidence, embrace challenges, and remain committed to achieving their goals, especially in technology-mediated environments where autonomy is essential.

2.4 Gender Differences in Digital Engagement and Self-efficacy

Understanding how gender shapes digital engagement and self-efficacy is crucial for digital learning, especially in EFL settings. Harputlu and Güryay's (2024) study in Turkey showed that males typically excel in broad digital knowledge, content creation, and privacy awareness, while females excel in ethical digital behaviour and routine digital tasks. Likewise, Huatay et al. (2023) noted that Peruvian female students rated themselves higher in online safety and problem-solving skills, whereas males displayed more confidence in navigating and using educational technology.

Self-efficacy plays a critical role in how students engage with learning activities. For instance, Borgonovi (2016) linked boys' frequent video gaming to better digital reading skills, thanks to enhanced navigation and visual-spatial abilities. Cheung et al. (2013) also found that frequent online reading reduces the digital literacy gap between genders. However, gender stereotypes and lower information and communication technology (ICT) self-efficacy among girls continue to limit their confidence and reduce their active engagement with digital tools (Cheryan et al. 2013). Moreover, Yu and Hu (2022) note that girls' lower interest in ICT often stems from lower self-efficacy rather than genuine disinterest. In EFL contexts, enhancing digital self-efficacy, especially for female learners, can foster stronger engagement, encourage autonomous learning, and create more equitable opportunities in digitally mediated language education.

3. Methodology

This study employed a quantitative, cross-sectional design to investigate self-efficacy and engagement among students in digital language learning environments, focusing on their confidence and participation in using digital tools for learning. Data were collected from a sample of language learners using a survey that measured self-efficacy and engagement, and analysed using a combination of descriptive and inferential statistical methods. This section outlines the participants, data collection procedures, and data analysis methods used to address the research questions.

3.1 Participants

The study involved 61 postgraduate Master's students (28 males, 33 females) enrolled in an English language programme at an Algerian university. Participants were aged between 22 and 27 years ($M= 24.5$) and were recruited through convenience sampling. Inclusion criteria required participants to be familiar with the digital learning context. Students who did not meet this criterion or who did not provide informed consent were excluded. The sample size was deemed sufficient for the planned statistical analyses.

3.2 Data collection

Data were collected through an online survey administered via Google Forms. Participants were recruited during their English language classes. Informed consent was obtained, ensuring that participants understood the purpose of the study, their right to withdraw at any time, and the anonymity of their responses. The survey included two main scales in addition to demographic questions: the Self-Efficacy in Digital Language Learning Scale and the Engagement in Digital Language Learning Scale. The items of both scales were developed based on Carretero et al.'s (2017) digital competence framework. The self-efficacy scale, specifically, was grounded in Bandura's (1997) concept of self-efficacy. The engagement scale drew on existing literature (e.g., Redmond et al. 2018). Both scales were rated on a 6-point Likert scale.

3.2.1 Self-Efficacy in Digital Language Learning Scale

This scale measured students’ confidence about digital learning across three dimensions, identified through principal component analysis (PCA): Digital Language Learning Efficacy (4 items, e.g., “I can independently learn and understand new English concepts using digital tools”), Digital Navigation and Critical Evaluation Efficacy (5 items, e.g., “I can identify misleading or biased digital content, including AI-generated information”), and Digital Safety and Self-Regulation (3 items, e.g., “. I can protect my digital learning environment by using strong passwords and other security measures”). The overall scale consisted of 12 items, with a Cronbach’s alpha of .85, indicating good reliability. Subscale reliabilities are presented in Table 1.

3.2.2 Engagement in Digital Language Learning Scale

This scale assessed students’ engagement in digital learning environments across two dimensions, also identified through PCA: Proactive Engagement (4 items, e.g., “I use digital resources to practise outside of class regularly, like language apps or online quizzes”) and Collaborative Engagement (5 items, e.g., “I share useful digital resources and tips with my classmates to support each other’s learning”). proactive digital engagement (e.g., self-directed tool use, aligning with behavioural and cognitive dimensions) and collaborative digital engagement (e.g., peer interaction, reflecting the social dimension) of Hiver et al. (2021). The overall scale included 9 items, with a Cronbach’s alpha of .78, indicating good reliability. Subscale reliabilities are presented in Table 1.

Table 1. Cronbach’s Alpha for the Research Instruments

Scale	Section	Cronbach alpha
Self-efficacy	Digital Navigation and Critical Evaluation Efficacy	.84
	Digital Language Learning Efficacy	.84
	Digital Safety and Self-Regulation	.69

	Overall	.85
Engagement	Collaborative Engagement	.79
	Proactive Digital Engagement	.71
	Overall	.78

3.3 Data Analysis

Several statistical methods were employed to address the research questions, using SPSS version 27. First, principal component analysis (PCA) with Direct Oblimin rotation was conducted to confirm the factor structure of the self-efficacy and engagement scales, resulting in the three self-efficacy subscales and two engagement subscales described above. To address Research Questions 1 and 2, descriptive statistics were calculated. For Research Question 3, Pearson correlations were computed. To address Research Question 4, independent samples t-tests were conducted. Finally, for Research Question 5, multiple regression analysis was performed. Assumptions of regression (e.g., linearity, normality of residuals, homoscedasticity, multicollinearity) were checked and met, ensuring the validity of the analysis.

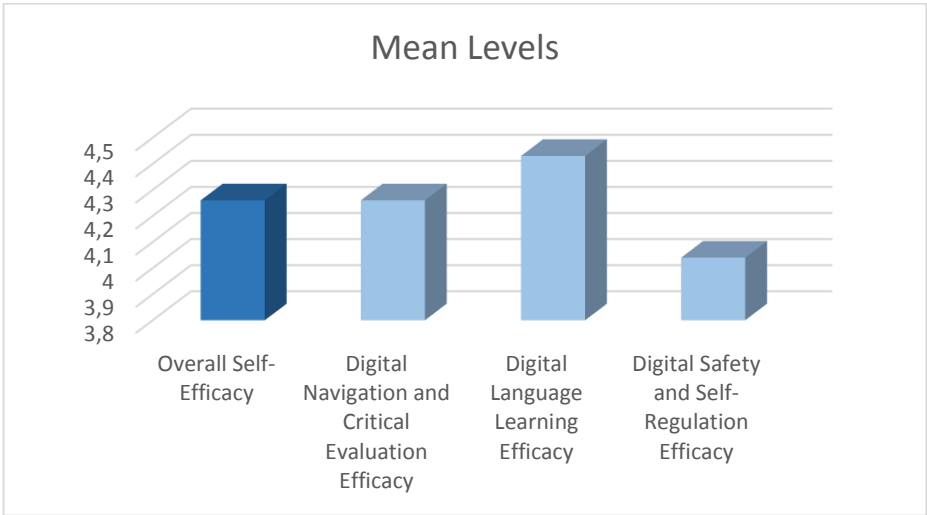
4. Findings

Research Question 1: What is the level of student self-efficacy in digital learning?

Figure 1 presents the mean levels for individual aspects of student self-efficacy, measured on a 6-point Likert scale from not confident at all (1) to completely confident (6). The findings reveal distinct patterns across the three subscales. Overall, students reported a moderately high level of confidence in their experience with digital learning. The Digital Navigation and Critical Evaluation Efficacy subscale shows mean scores ranging from 4.04 to 4.8, with students reporting the highest confidence in checking if digital content aligns with their learning goals and the lowest in navigating and troubleshooting digital tools, indicating generally strong confidence in this aspect. The Digital Language Learning Efficacy subscale has mean scores between 4.18 and 4.85,

with the greatest confidence in independently learning new English concepts using digital tools and the least in creating content for language learning, reflecting high confidence in language learning applications. The Digital Safety and Self-Regulation subscale exhibits mean scores from 3.52 to 4.55, with students feeling most confident in protecting their digital learning environment and least confident in maintaining focus amidst distractions, suggesting more variability in this area. Overall, students demonstrate the highest confidence in digital language learning ($M = 4.43$), followed by navigation and critical evaluation ($M = 4.26$), and the lowest in safety and self-regulation ($M = 4.04$), with moderate variability across all subscales.

Figure 1. Mean Levels, Individual Aspects of Student Self-Efficacy

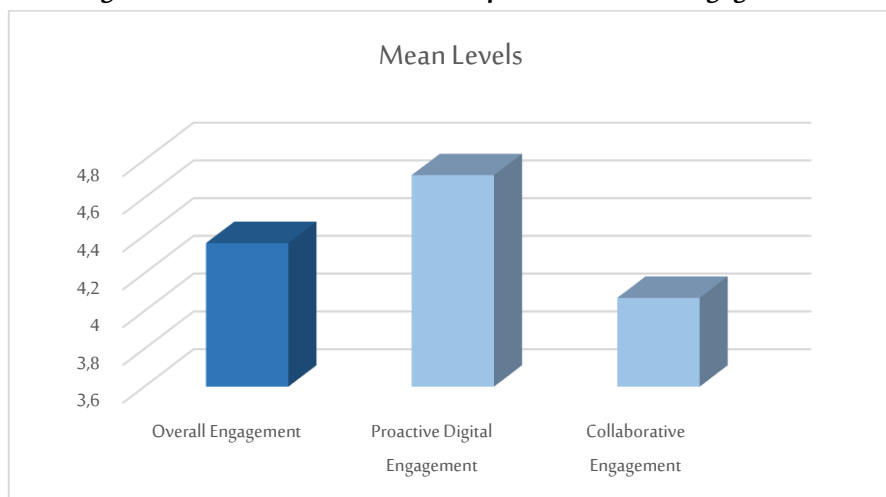


Research Question 2: What is the level of student engagement in digital learning?

Figure 2 presents the mean levels for individual aspects of student engagement in digital learning, measured on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). Overall, students reported a moderately high level of engagement with digital learning. The Collaborative Engagement subscale shows mean scores between 3.8 and 4.27, indicating moderate to slightly above-average agreement, with the highest agreement for feeling connected to peers during digital projects and the

lowest for engaging in online discussions to practise English skills. The Proactive Engagement subscale reports higher mean scores, ranging from 4.42 to 5.11, reflecting stronger agreement, particularly for the use of interactive AI tools, while the lowest agreement is for using digital resources for regular out-of-class practice. Overall, students exhibit greater agreement with proactive engagement ($M = 4.72$) compared to collaborative engagement ($M = 4.07$), with moderate variability in responses across both subscales.

Figure 2. Mean Levels, Individual Aspects of Student Engagement



Research Question 3: What is the relationship between engagement and self-efficacy in digital language learning?

Table 2 presents the correlation matrix examining the relationships between digital self-efficacy and digital engagement, including their respective subscales. Overall, self-efficacy demonstrates a weak but significant positive correlation with overall engagement ($r = .29, p = .02$), indicating that learners who are more confident in their digital learning abilities tend to report slightly higher levels of engagement and vice versa.

When breaking down the subscales, digital language learning efficacy shows a moderate and significant correlation with proactive digital engagement ($r = .51, p$

< .001), suggesting that learners who feel confident are more likely to engage actively and independently. Similarly, overall self-efficacy is weakly to moderately correlated with proactive digital engagement ($r = .37, p = .003$), reinforcing the link between confidence and self-regulated engagement behaviours. In contrast, collaborative engagement appears less closely related to self-efficacy ($r = .15, p = .25$), suggesting that confidence in one's digital skills may not be strongly linked to participation in socially oriented digital activities.

Additionally, a weak but significant correlation was found between collaborative engagement and digital safety and self-regulation efficacy ($r = .33, p = .01$), implying that learners with stronger self-regulatory skills may be more inclined to participate in socially interactive digital learning. However, other associations, such as between digital navigation and critical evaluation efficacy and collaborative engagement, were non-significant ($r = .05, p = .73$), indicating the distinct roles these constructs play within digital learning environments.

Table 2. Correlation Matrix between Digital Self-Efficacy and Digital Engagement

Variables	Correlation						
	1	2	3	4	5	6	7
1. Overall Self-efficacy	1	.29*	.82**	.78**	.68**	.15	.37**
2. Overall Engagement		1	.15	.28*	.27*	.89**	.72**
3. Digital Navigation and Critical Evaluation Efficacy			1	.39**	.38**	.05	.24
4. Digital Language Learning Efficacy				1	.36**	.04	.51**
5. Digital Safety and Self-Regulation					1	.33**	.04
6. Collaborative Engagement						1	.33*
7. Proactive Digital Engagement							1

Note. $N = 61$. * $p < 0.05$. ** $p < 0.01$.

Research Question 4: Are there significant differences in the mean levels of self-efficacy and engagement based on gender?

The Independent Samples Test indicates a significant gender difference in overall self-efficacy ($M = .84$, 95% CI [.52, 1.15], $p < .001$, $d = 1.37$), with male students reporting higher confidence in digital learning than female students. The large effect size suggests this difference is not only statistically significant but also practically meaningful. In contrast, no significant gender difference was found in overall engagement ($M = .28$, 95% CI [−.14, .69], $p = .19$), indicating that male and female students are similarly engaged in digital learning despite the observed gap in self-efficacy.

Table 3. Independent Samples Test

Variables	<i>t</i>	<i>df</i>	<i>p</i>	Mean Difference
Overall self-efficacy	5.3	59	< .001	.84
Overall engagement	1.34	42	.19	.28

Research Question 5: To what extent do gender and forms of digital engagement contribute to students' perceived ability in digital learning?

The regression model accounts for 41% of the variance in overall self-efficacy ($R^2 = .41$), indicating a moderate effect, and it is statistically significant, $F(3, 60) = 12.94$, $p < .001$. This indicates that gender, collaborative engagement, and proactive engagement together are meaningful predictors of digital self-efficacy.

The model reveals a significant negative effect of gender ($B = -.77$, $p < .001$), confirming that female students report significantly lower self-efficacy than male students. The standardised beta coefficient ($\beta = -.53$) further shows that gender is the strongest predictor in the model, highlighting a substantial gender disparity in self-efficacy within the digital learning context. In addition, Proactive Digital Engagement significantly predicts higher self-efficacy ($B = .26$, $p = .01$), suggesting that students who actively engage with digital tools tend to feel more confident in their digital learning abilities. By contrast, Collaborative Engagement has no significant effect on self-efficacy ($B = -.02$, $p = .83$), aligning with earlier correlation findings and indicating that social

forms of digital engagement do not significantly contribute to self-perceived digital competence in this sample.

Table 4. Multiple Regression Analysis for Variables Predicting Student Digital Self-Efficacy

Model		<i>R</i> ²	<i>B</i>	<i>SE</i> β	β	<i>t</i>	<i>Sig</i>
1	Constant	.41	4.29	.56		7.61	<.001
	Collaborative Engagement		-.02	.08	-.02	-.21	.83
	Proactive Engagement		.26	.1	.3	2.74	.01
	Gender		-.77	.15	-.53	-5.05	<.001

5. Discussion

The present study investigated the interplay of digital self-efficacy, engagement, and gender among Algerian EFL postgraduate students engaged in digital language learning. First, students reported moderately high levels of digital self-efficacy and engagement, reflecting a positive attitude toward digital language learning. This finding aligns with Ng’s (2012) observation that modern learners are increasingly comfortable with technology; however, Gui and Argentin’s (2011) note that this comfort does not always reflect comprehensive digital competence. Specifically, self-efficacy was highest in digital language learning (*M*= 4.43) but lowest in safety and self-regulation (*M*= 4.04). This indicates gaps in critical competencies such as managing digital distractions or ensuring online security. These findings support Gobel and Kano’s (2014) conclusion that access to technology alone does not guarantee meaningful use, as well as Carretero et al.’s (2017) emphasis on the importance of cybersecurity literacy. Similarly, Son et al. (2017) noted that EFL learners often fail to utilise digital tools for academic purposes despite frequent exposure, highlighting the need for targeted training to enhance evaluative and self-regulatory skills.

Second, the findings demonstrated differences in students' proactive and collaborative engagement. Proactive engagement, involving self-directed use of digital tools like language apps and AI resources, was moderately correlated with self-efficacy ($r = .37, p = .003$) and found to be a significant predictor in the regression model ($B = .26, p = .01$). This finding aligns with self-determination theory (Deci and Ryan, 1985), which posits that autonomy fosters competence. It also corroborates Zheng and Xiao's (2024) evidence that autonomy-driven digital engagement enhances EFL learners' satisfaction and confidence. Furthermore, it resonates with Hiver *et al.*'s (2021) model of L2 engagement, where behavioural and cognitive dimensions, reflected in proactive tool use, drive learning outcomes. In contrast, collaborative engagement showed no significant association with self-efficacy ($r = .15, p = .25$), a result that contradicts Redmond *et al.*'s (2018) emphasis on social engagement in online settings. This discrepancy may stem from contextual factors in Algerian higher education, where collaborative digital practices may be less emphasised or constrained by cultural preferences for individual study, as noted in broader EFL contexts (Hafner *et al.*, 2015). Such practices may be perceived as less valuable compared to individual study, limiting their integration in the Algerian context.

Third, the findings revealed significant gender differences, with male students reporting higher digital self-efficacy ($M = .84, p < .001, d = 1.37$) despite similar engagement levels across genders. This aligns with Chen and Hu's (2020) observation of greater ICT confidence among males and Harputlu and Güryay's (2024) findings of male advantages in digital knowledge and navigation. However, the large effect size in this study indicates a wider gap than found in other contexts, such as Huatay *et al.*'s (2023) study of Peruvian students, where females reported higher competence in safety and problem-solving. Drawing on Yu and Hu (2022), this disparity may reflect lower ICT self-efficacy among female students, potentially influenced by sociocultural norms or gendered stereotypes, rather than differences in actual digital skills. Bandura's (1997) self-efficacy theory suggests that females' lower confidence may result from fewer

mastery experiences or social reinforcements in digital settings, creating a cycle of diminished engagement and self-perception. The regression model's identification of gender as the strongest predictor of self-efficacy ($\beta = -.53, p < .001$) highlights the need to address gender disparities to ensure equitable development of digital literacy.

6. Conclusion

This study highlights the importance of digital self-efficacy and engagement in digital learning among EFL postgraduate students in Algeria. It contributes to digital literacy and EFL education by extending theories of self-efficacy and engagement, demonstrating that autonomy fosters digital confidence. The findings provide empirical evidence that proactive digital engagement and gender significantly influence digital self-efficacy. Moreover, by focusing on the under-researched Algerian context, the study fills a notable gap.

The study's findings suggest important implications for EFL education. To enhance students' digital self-efficacy, encouraging proactive digital engagement through individual tasks is needed. Additionally, to address gender disparities, practices that can enhance female students' digital confidence should be implemented, such as practical sessions, peer support, and positive feedback. Additionally, redesigning collaborative activities to be more structured and effective can enhance their impact. Teaching digital safety and self-regulation is crucial for students' well-being. Overall, in Algerian institutions, well-resourced digital literacy programmes, supported by teacher training, are necessary to promote autonomous learning.

While this study provides valuable insights, it is not without limitations; therefore, future research should aim to address these limitations by employing a larger sample and mixed-methods approaches. Conducting in-depth interviews could uncover valuable insights into the sociocultural factors affecting gender differences, especially female students' perceptions of digital challenges. Additionally, longitudinal studies are needed to explore the long-term effects of digital engagement on literacy

development. Cross-context comparisons could also clarify how institutional settings shape learners' experiences. By addressing these gaps, educators and policymakers can develop more inclusive, autonomy-supportive pedagogies that fully utilise technology in language learning, ensuring equitable opportunities for all students in digital EFL environments

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