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Research Article

Iranian Undergraduate EFL Learners' Digital Literacy: Challenges and Suggestions for Remedy

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ABSTRACT

This study theoretically reconceptualizes digital literacy as a multidimensional construct (digital competencies, digital literacy, and technology perception) to examine Iranian undergraduate EFL learners' proficiency levels, gender differences, academic variations, and implementation challenges. Using a mixed-methods approach with stratified purposeful sampling, 48 participants (24 freshmen, 24 seniors; balanced by gender) were recruited from Islamic Azad University, Najafabad Branch. Data were collected via a culturally adapted Digital Literacy Questionnaire and semi-structured interviews, analyzed through descriptive statistics, t-tests, and thematic analysis. Results revealed above-average proficiency in typing, web search, and digital literacy ($M = 3.31–4.00$), with female learners significantly outperforming males in web search ($t = 2.589$, $p = .013$), computer literacy ($t = 2.176$, $p = .035$), and internet literacy ($t = 3.077$, $p = .004$). No significant differences emerged between freshmen and seniors. Qualitative analysis identified four core challenges: inconsistent resource quality, insufficient training, platform complexity, and information overload. Critically, the study highlights socioeconomic inequities underlying digital divides, including resource distribution disparities and teacher training gaps, advocating for institutional policy reforms beyond technical solutions. The study recommends integrated digital literacy curricula, gender-responsive pedagogies, and infrastructure investments to enhance technology integration in Iranian EFL contexts.

Introduction

In the contemporary educational landscape, English as a Foreign Language (EFL) instruction has undergone significant transformations, primarily driven by rapid advancements in digital technologies and the accelerated integration of Information and Communication Technology (ICT) across educational contexts worldwide (Nguyen & Habók, 2022). Traditional teaching methodologies that once relied on physical aids such as blackboards and tape recorders have been largely replaced by sophisticated digital tools, including interactive smartboards, adaptive e-books, and sophisticated online learning platforms (Nurhidayat et al., 2024). The COVID-19 pandemic further catalyzed this digital transformation, forcing educational institutions worldwide to rapidly adopt remote and hybrid learning models, thereby highlighting both the opportunities and challenges of technology-mediated language instruction (Rubach & Lazarides, 2021).

Digital literacy, as a critical competency in the 21st century, extends far beyond basic technical proficiency to encompass a complex constellation of cognitive, social, and emotional skills required for effective participation in digital environments (Aviram & Eshet-Alkalai, 2006; Pegrum et al., 2022). In EFL contexts, digital literacy is fundamentally intertwined with language acquisition and communicative competence, enabling learners to access vast online linguistic resources, engage in computer-mediated communication with global communities, and utilize collaborative digital tools for language production (Pratolo & Solikhati, 2021). Recent research emphasizes the dynamic and collaborative nature of these "new literacies" (Leu et al., 2018), highlighting how digital environments have transformed reading, writing, and communication practices in ways that are central to developing both linguistic proficiency and 21st-century skills in EFL settings.

The concept of critical digital literacy has gained renewed importance in an era of information proliferation and artificial intelligence advancement. Buckingham's (2013) framework, emphasizing the ability to analyze ideological underpinnings, power structures, and biases embedded within digital content, takes on particular significance when considering the challenges of navigating information in a second language. Recent studies further underscore the importance of developing learners' critical evaluation skills in the context of AI-generated content and algorithmically curated information environments (Yaseen et al., 2025). As generative AI tools increasingly influence language learning materials and assessment practices, the need for critical digital literacy has become even more pronounced, requiring learners to develop sophisticated metacognitive strategies for evaluating digital content and tools (Ng, 2023).

A critical examination of prior Iranian research reveals significant gaps in our understanding of digital literacy among EFL learners in this context. At the same time, Dashtestani's (2014) seminal study identified substantial gaps in computer literacy among Iranian EFL teachers, which subsequently impacted student learning experiences. More recent work by Heidari and Tabatabaee-Yazdi (2021) confirms these findings while extending them to demonstrate disparities in digital literacy skills among both teachers and students, particularly in areas requiring higher-order cognitive skills. However, these studies collectively focus primarily on teacher perspectives or specific technological tools

rather than providing a comprehensive assessment of student digital competencies across different academic levels. Jahanban-Isfahlan et al. (2017) further contribute to our understanding by identifying factors contributing to the reluctance of students and instructors to embrace digital learning tools fully, including insufficient training, inadequate access to reliable digital resources, and resistance to shifting away from traditional pedagogical practices.

Notably, these Iranian studies collectively highlight that while digital literacy is increasingly recognized as a prerequisite for academic and professional success, many Iranian students lack the necessary skills to effectively navigate digital environments, leaving them unprepared to assess online information, utilize digital resources efficiently, and engage in responsible digital communication (Heidari & Tabatabaee-Yazdi, 2021). The Iranian educational context presents unique challenges, including disparities in access to digital resources, varying levels of pedagogical support, and inconsistent integration of technology across institutions (Dashtestani, 2014). Despite these important findings, a significant gap remains in understanding how demographic factors such as gender and academic level interact with digital literacy development in this specific context, and how these factors might inform targeted interventions to improve technology integration in language learning.

The emergence of artificial intelligence presents both unprecedented opportunities and significant challenges in digital EFL education. AI-powered tools such as intelligent tutoring systems, automated feedback mechanisms, and language learning chatbots have the potential to personalize learning experiences and enhance student engagement in ways previously unimaginable (AlizadehMahmoudAlilo, 2025; Yaseen et al., 2025). However, concerns regarding AI integration persist, particularly regarding algorithmic bias, data privacy, and the potential dehumanization of language learning. In Iran, effective AI implementation in EFL education requires significant investment in infrastructure, teacher training, and policy development to ensure equitable access and ethical use of these emerging technologies (Alhammad & Alzahrani, 2023).

One of the major challenges in the Iranian EFL education system is the reluctance of students and instructors to embrace digital learning tools fully. Several factors contribute to this hesitancy, including insufficient training, inadequate access to reliable digital resources, and resistance to shifting away from traditional pedagogical practices (Jahanban-Isfahlan et al., 2017). Additionally, many educators remain unaware of the pedagogical benefits of digital integration, leading to ineffective or superficial use of technology in language instruction (Pozas, 2009). The digital divide, manifesting as disparities in access and proficiency, further exacerbates these challenges, limiting students' ability to develop essential digital skills necessary for academic and professional success (van Dijk, 2005).

Recent studies have highlighted the importance of addressing these challenges through comprehensive digital literacy frameworks that go beyond technical skills to include critical evaluation, creative expression, and ethical engagement with digital technologies (Vuorikari et al., 2022). The European Digital Competence Framework for Citizens (DigComp) and UNESCO's Digital Literacy Global Framework provide structured models for understanding and assessing these competencies, emphasizing the

knowledge, skills, and attitudes required for confident, critical, and responsible engagement with digital technologies (Law et al., 2018). Applying such frameworks to EFL contexts helps delineate the specific digital competencies learners need to effectively leverage technology for language acquisition, intercultural communication, and autonomous learning (Pegrum et al., 2022).

Understanding the digital literacy levels of Iranian undergraduate EFL learners is crucial for several reasons. First, as Iran continues to develop its digital infrastructure and integrate technology into education, there is a pressing need for empirical data to inform policy decisions and curriculum development. Second, in an increasingly globalized world, digital literacy has become essential for accessing international academic resources and participating in global discourse. Third, the rapid development of AI and other emerging technologies necessitates a proactive approach to digital literacy education to ensure learners are prepared for future technological advancements. This study directly addresses the identified research gap by systematically assessing digital literacy levels among Iranian undergraduate EFL learners, examining how gender and academic level interact with digital literacy competencies, and identifying practical solutions to enhance technology integration in language learning environments. It aims to fill the void left by previous Iranian studies by providing a comprehensive assessment of student digital competencies across different academic levels and genders, thereby offering valuable insights for curriculum development and instructional practices in the Iranian EFL context.

Literature Review

Digital literacy has undergone significant conceptual evolution since its initial definition by Gilster (1997) as the ability to comprehend and utilize digital information. Contemporary scholarship reconceptualizes digital literacy as a dynamic, multidimensional construct encompassing cognitive, social, emotional, and metacognitive skills necessary for effective participation in digital environments (Aviram & Eshet-Alkalai, 2006; Vuorikari et al., 2022). However, this reconceptualization remains contested, with scholars debating whether digital literacy should be viewed as a set of discrete skills or an integrated competency. This theoretical tension has significant implications for how we approach measurement and instruction in educational contexts.

The European Digital Competence Framework for Citizens (DigComp 2.2) and UNESCO's Digital Literacy Global Framework represent two dominant but distinct approaches to conceptualizing digital literacy. While both frameworks organize competencies into key areas, DigComp emphasizes practical skills organized into five domains (Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety, and Problem Solving), whereas UNESCO's framework more explicitly integrates knowledge, skills, and attitudes required for responsible engagement across personal, social, and professional domains (Law et al., 2018). Critically, both frameworks have been criticized for their Western-centric bias and limited applicability to non-Western educational contexts, particularly in EFL settings where language and cultural factors intersect with digital competencies (Ng, 2023). This limitation is particularly relevant in the

Iranian context, where cultural attitudes toward technology, infrastructure limitations, and pedagogical traditions shape digital literacy development in unique ways (Dashtestani, 2014; van Dijk, 2005).

For the purpose of this study, we operationalize digital literacy as a multidimensional construct comprising three core dimensions: digital competencies (technical proficiency with tools and platforms), digital literacy (ability to find, evaluate, and utilize digital information effectively), and technology perception (attitudes toward and engagement with digital technologies). This operationalization builds upon but critically adapts the DigComp framework by: (1) reducing the five domains to three more focused dimensions relevant to EFL contexts; (2) emphasizing critical evaluation skills given the proliferation of AI-generated content; and (3) incorporating technology perception as a separate dimension to address affective factors influencing digital engagement. This theoretical delimitation allows for a more nuanced assessment of Iranian EFL learners' digital capabilities while acknowledging the complex interplay between technical skills, critical thinking, and attitudinal factors that shape effective digital participation in language learning contexts.

Within EFL contexts, digital literacy has become transformative, fundamentally reshaping language pedagogy and learning outcomes. Recent studies demonstrate that technology integration shifts language learning from discrete skill practice toward authentic communication and meaning-making in digitally mediated contexts (Nurhidayat et al., 2024). However, this transformation is not uniform across contexts, with implementation varying significantly based on institutional support, teacher readiness, and student preparedness (Heidari & Tabatabaee-Yazdi, 2021). Digital platforms enable EFL learners to access vast repositories of authentic linguistic resources, including multimedia texts, interactive corpora, and global communication networks, facilitating exposure to authentic language use in culturally rich contexts (Pratolo & Solikhati, 2021). The COVID-19 pandemic accelerated this transformation, highlighting both the affordances and limitations of digital EFL education, particularly in contexts with varying levels of digital infrastructure (Rubach & Lazarides, 2021). Research indicates that well-designed digital interventions can enhance linguistic proficiency, develop intercultural competence, and foster autonomous learning behaviors when appropriately integrated into curricula (Mudra, 2020; Nguyen & Habók, 2022).

Leu et al.'s (2018) concept of new literacies remains particularly relevant, emphasizing the dynamic, collaborative nature of digital reading, writing, and communication. However, this framework has been criticized for underemphasizing the power dynamics and ideological dimensions of digital environments, particularly in second language acquisition, where cultural and linguistic factors intersect with technological affordances (Buckingham, 2013). Recent empirical studies validate aspects of this framework, demonstrating how digital environments transform literacy practices in ways that simultaneously develop linguistic proficiency and 21st-century skills (Pegrum et al., 2022). For instance, computer-mediated communication with global communities provides authentic contexts for practicing pragmatic competencies and developing intercultural awareness, while collaborative

digital tools like wikis and blogs promote negotiated meaning-making and co-constructed knowledge (Pratolo & Solikhati, 2021). Yet these benefits are unevenly distributed, with access to such opportunities often constrained by socioeconomic factors and institutional policies.

The proliferation of misinformation, algorithmic bias, and AI-generated content has elevated the importance of critical digital literacy in educational contexts. Buckingham's (2013) framework, emphasizing the ability to analyze ideological underpinnings and power structures embedded within digital content, has gained renewed significance in the current information ecosystem. Recent research underscores the necessity for EFL learners to develop sophisticated critical evaluation skills when navigating information in a second language, where cultural nuances and potential misinformation require heightened awareness (Ng, 2023). The emergence of generative AI presents additional challenges, as learners must develop metacognitive strategies to evaluate algorithmically curated content and distinguish between human-generated and AI-produced language (Yaseen et al., 2025). Critically, these skills are not universally developed, with significant variations in critical digital literacy across different educational contexts and demographic groups (Heidari & Tabatabaee-Yazdi, 2021).

Digital literacy development is deeply situated within sociocultural contexts, shaped by access to technology, infrastructure, cultural attitudes toward technology, and pedagogical traditions (van Dijk, 2005). The digital divide, manifesting as disparities in access, quality, and usage, continues to pose significant challenges in educational contexts worldwide, with research indicating that these gaps often exacerbate existing educational inequalities (Dashtestani, 2014). In Iran, these challenges are particularly pronounced, characterized by uneven distribution of digital resources, varying levels of institutional support, and inconsistent integration of technology across educational settings (Dashtestani, 2014). Recent studies highlight how sociocultural factors influence digital literacy development, including cultural attitudes toward technology, family digital practices, and prior educational experiences (Heidari & Tabatabaee-Yazdi, 2021). These factors create complex digital ecologies that either facilitate or hinder the development of digital competencies among EFL learners.

A critical examination of the literature reveals several significant gaps that this study addresses. First, most existing research on digital literacy in EFL contexts focuses on teacher perspectives or specific technological tools rather than a comprehensive assessment of student digital competencies. Second, limited research explores how demographic factors such as gender and academic level interact with digital literacy development in non-Western contexts. Third, the rapid emergence of AI technologies has created both opportunities and challenges that require empirical investigation, particularly in terms of how these technologies reshape digital literacy requirements for language learners (Yaseen et al., 2025). This study addresses these gaps by systematically assessing digital literacy levels among Iranian undergraduate EFL learners, examining gender and academic level differences, and identifying practical solutions to enhance technology integration in language learning environments. To guide the investigation, the study poses the following research questions:

RQ1: To what extent do Iranian undergraduate EFL learners possess digital literacy and competency?

RQ2: Are there gender-based differences in digital literacy among male and female learners?

RQ3: Do digital literacy competencies differ between freshman and senior undergraduate students?

RQ4: What challenges do Iranian undergraduate EFL learners face in using digital tools for education, and what remedies can be proposed?

Method

This study adopted a descriptive survey design enhanced by methodological triangulation, combining quantitative and qualitative approaches to gain a comprehensive understanding of Iranian EFL learners' digital literacy. The quantitative phase involved a structured questionnaire to gather measurable data, which was analyzed using statistical methods. Complementing this, the qualitative phase employed interpretive phenomenological analysis (IPA) through semi-structured interviews, allowing participants to share in-depth insights into their experiences with digital tools. The integration of both methods enabled validation and richer interpretation of findings.

Participants

The study employed a stratified purposeful sampling strategy to recruit 48 undergraduate EFL learners from the Islamic Azad University, Najafabad Branch, Iran. This sampling approach was selected specifically to ensure proportional representation across key demographic variables (academic level and gender) while acknowledging practical constraints inherent in educational research. The sample size was determined through a power analysis (Faul et al., 2009), which indicated that 48 participants would provide sufficient statistical power (0.80) to detect medium effect sizes (d = 0.50) with an alpha level of 0.05 in a mixed-methods design. Participants were stratified into two academic level groups: 24 freshmen (first-year students) and 24 senior students (fourth-year students), with each subgroup containing an equal gender distribution (12 female and 12 male participants). This balanced design enabled the examination of potential interactions between academic progression and gender differences in digital literacy development, which were central to the study's research questions. Recruitment occurred through a multi-channel approach that began with purposeful selection through the university's Department of English, which distributed electronic recruitment materials through course management systems and departmental noticeboards. To enhance participant diversity while maintaining the stratified design, snowball sampling was employed as a supplementary technique, where initial participants were encouraged to refer peers who met the inclusion criteria. This combined approach allowed for both systematic representation and organic expansion of the sample within the constraints of the institutional context. Inclusion criteria required participants to be: (1) enrolled in an undergraduate EFL program at the university, (2) between 18 and 25 years of age, and (3) having completed at least one semester of coursework. Exclusion criteria included students with documented learning disabilities that significantly affected digital tool usage or those who had not used digital learning resources in their coursework during the past academic year. All participants provided

informed consent after receiving detailed information about the study's purpose, procedures, potential risks and benefits, and their rights to withdraw at any time without academic penalty. To ensure confidentiality, all data were anonymized using participant identification codes, and digital records were stored on a password-protected university server with restricted access. While acknowledging that the sampling approach contains elements of convenience sampling due to the single-institution focus, the stratified design ensures methodological coherence by guaranteeing proportional representation across academic levels and genders. This systematic stratification addresses the primary concern of representativeness for the variables most relevant to the research questions, thereby strengthening the internal validity of the study despite the non-random selection process. Nevertheless, we acknowledge that this institutional sampling limits the generalizability of findings beyond the specific context of Islamic Azad University, Najafabad Branch.

Instrumentation

The study employed a mixed-methods approach to comprehensively assess Iranian EFL learners' digital literacy, integrating a modified questionnaire and semi-structured interviews to capture both quantitative patterns and qualitative contextual insights. The quantitative instrument was a culturally adapted version of the Digital Literacy Questionnaire developed by Son et al. (2017), selected for its established validity in educational contexts and alignment with the study's focus on EFL learners. The original instrument demonstrated strong psychometric properties (Cronbach's $\alpha = .92$) and construct validity across diverse populations, making it suitable for this investigation (Son et al., 2017). For the Iranian context, the questionnaire underwent rigorous adaptation: it was translated into Persian via a forward-backward translation process with bilingual experts, and culturally specific digital tools (e.g., replacing Google Classroom with Moraqeb) were incorporated to enhance ecological validity. The final version comprised 31 items across four dimensions: demographic information, digital competencies, digital literacy, and technology perception, with a 5-point Likert scale. Psychometric evaluation confirmed excellent internal consistency (Cronbach's $\alpha = .91$ for digital competencies; $\alpha = .89$ for digital literacy) and construct validity through confirmatory factor analysis (CFI = .94, RMSEA = .05), ensuring reliable measurement of digital literacy proficiency.

Complementing the quantitative data, semi-structured interviews provided depth on contextual challenges and solutions. A purposeful subsample of 12 participants (balanced by academic level and gender) was selected through random sampling to explore lived experiences with digital tools in EFL classrooms. The interview protocol, informed by frameworks like Leu et al.'s (2018) "new literacies" and Pegrum et al.'s (2022) digital literacies model, comprised four open-ended questions probing digital literacy's role in language learning, perceived challenges, and improvement strategies. Trustworthiness was enhanced through member checking (transcripts verified by participants), triangulation with quantitative results, and reflexive journaling to document researcher biases. This dual-instrument approach, quantitative measurement of skills and qualitative exploration of contextual barriers, enabled a holistic understanding of digital literacy challenges, aligning with the study's

mixed-methods design and addressing both competency levels and challenges and remedies (Creswell & Plano Clark, 2017). The protocol included four open-ended questions designed to elicit rich, contextual data:

1. How has digital technology influenced your English language learning experiences?
2. What aspects of digital literacy do you consider most valuable for your academic and professional future?
3. What challenges have you encountered when using digital tools for language learning?
4. What suggestions do you have for improving digital literacy education in EFL contexts?

Interview questions underwent expert review for clarity and relevance, and were pilot-tested with two students to refine wording. Interviews were conducted in Persian, participants' native language, by one of the researchers, who has extensive experience in qualitative research and EFL education. Each session lasted 30-45 minutes and was audio-recorded with participant consent. Field notes were taken during interviews to capture nonverbal cues and contextual observations.

Data Collection Procedure

The study employed a systematic and rigorous data collection process designed to ensure methodological rigor while respecting ethical and cultural considerations. Prior to data collection, ethical approval was obtained from the Institutional Review Board (IRB) of Islamic Azad University, Najafabad Branch. The study adhered to the American Educational Research Association's (2011) ethical guidelines, ensuring participants' rights were protected throughout the research process. Informed consent was obtained from all participants after they received detailed information about the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any time without academic penalty. To address cultural sensitivities, all materials were reviewed by three bilingual experts to ensure appropriate language and content for the Iranian EFL context, with particular attention to religious and educational norms.

Participants were recruited through a multi-stage stratified sampling process to ensure representativeness across academic levels (freshman and senior) and gender. The Department of English distributed electronic recruitment materials through course management systems and departmental noticeboards, followed by stratified purposeful sampling where initial participants referred peers meeting the inclusion criteria. Inclusion criteria required participants to be: (1) enrolled in an undergraduate EFL program, (2) between 18 and 25 years of age, and (3) having completed at least one semester of coursework. Exclusion criteria included students with documented learning disabilities affecting digital tool usage or those who had not used digital learning resources in the past academic year. This process yielded a final sample of 48 participants (24 freshmen, 24 seniors; 24 females, 24 males), closely mirroring the department's demographic distribution.

Quantitative data collection occurred during three weeks in the fall semester of 2023. Participants completed the modified Digital Literacy Questionnaire via the university's encrypted learning management system to ensure accessibility and reduce response bias. The questionnaire was administered in Persian (participants' native

language) and took approximately 20-30 minutes to complete. To minimize social desirability bias, participants were assured of anonymity and informed that their responses would not affect their academic standing. Reminder emails were sent to non-respondents after one week, with a 92% completion rate achieved. Data were automatically stored in a password-protected university server with restricted access, maintaining confidentiality throughout the process.

Complementing the quantitative approach, semi-structured interviews were conducted with a purposeful subsample of 12 participants (6 freshmen, 6 seniors; 6 females, 6 males) selected through random sampling from the questionnaire respondents. Interviews took place in private university meeting rooms to ensure privacy and minimize external distractions. Each session, conducted in Persian by the researcher (who has extensive experience in EFL education and qualitative research), lasted 30-45 minutes and followed a predetermined protocol with four open-ended questions. Interviews were audio-recorded with participant consent, and field notes were taken to capture nonverbal cues and contextual observations. To enhance trustworthiness, member checking was employed, where interview transcripts were sent to participants for verification and clarification. Transcription was performed verbatim by a professional transcriber unfamiliar with the research hypotheses, with the researcher subsequently reviewing all transcripts for accuracy.

The entire data collection process was meticulously documented in an audit trail, maintaining detailed records of recruitment, consent procedures, data collection schedules, and decision-making processes. This systematic approach ensured methodological rigor while respecting the cultural and educational context of Iranian EFL learners, providing a robust foundation for both quantitative and qualitative data analysis.

At the end, quantitative data from the questionnaire were analyzed using SPSS version 26, employing descriptive statistics (mean and standard deviation) to assess learners' digital competencies, and inferential statistics, including one-sample and independent samples t-tests, to identify differences based on gender and academic level. For qualitative data, an IPA was employed. This involved five systematic steps, including data preparation, familiarization, open coding, axial coding, and selective coding. Interview responses were transcribed, coded, and thematically categorized to uncover common patterns and challenges related to digital tool usage in education. The integration of both analytical approaches ensured a well-rounded understanding of participants' digital literacy levels and the contextual factors influencing their experiences.

Results

This section presents the findings of the mixed-methods investigation into Iranian undergraduate EFL learners' digital literacy, addressing the four research questions through quantitative and qualitative data. The results are organized first to establish the demographic context, followed by an analysis of digital literacy proficiency levels and group differences, and finally an exploration of challenges and proposed solutions through interview themes. Quantitative data were analyzed using descriptive statistics and inferential tests (t-tests), while qualitative responses underwent thematic analysis to

contextualize numerical patterns. All statistical tests employed a significance threshold of $p < .05$, and qualitative themes were validated through member checking and triangulation with quantitative results. The following subsections systematically address each research question, providing a comprehensive understanding of learners' digital competencies, demographic variations, and implementation barriers in the Iranian EFL context. The demographic data about the participants are provided in Table 1.

Table 1.

Descriptive Statistics

		Frequency	Percent
gender	Female	23	
	Male	25	
Age	freshman	24	50
	senior	24	50
Q5	<5	9	20
	5-10	30	66.7
	>10	6	13.3

Table 1 presents the demographic characteristics of the 48 participants, comprising 23 females (47.9%) and 25 males (52.1%) learners. The sample was equally divided by academic level, with 24 freshmen (50%) and 24 seniors (50%). Regarding digital experience duration (Q5), 9 participants (20%) reported less than 5 years of device usage, 30 participants (62.7%) reported 5–10 years, and 6 participants (12.5%) reported over 10 years.

To answer the first research question, one sample t-test was run. The results have been provided in Table 2.

Table 2

One Sample T-test to Measure Digital Literacy

	descriptive		One sample test		
	Mean	Std. Deviation	t	df	Sig.
Q6	3.55	1.00	3.808	46	.0001*
Q7	4.00	.95	7.329	47	.0001*
Q8	3.63	.91	4.738	47	.0001*
Q9	3.90	.86	7.246	47	.0001*
Q10	3.58	.87	4.639	47	.0001*
Q11	3.54	.54	6.999	47	.0001*
Q12	3.40	.69	4.014	47	.0001*
Q13	3.33	.65	3.561	47	.0001*
Q14	3.31	.78	2.737	47	.0001*
Section 2	3.73	.76	6.705	47	.0001*
Section 3	3.38	.60	4.321	47	.0001*

Table 2 presents the results of one-sample t-tests assessing Iranian EFL learners' digital literacy proficiency across 14 items and two section totals. All items demonstrated statistically significant proficiency levels ($p < .0001$), with means ranging from 3.31 (Q14) to 4.00 (Q7). Web search (Q7; $M = 4.00$) and internet literacy (Q9; $M = 3.90$) yielded the highest scores, followed by computer literacy (Q8; $M = 3.63$), digital literacy (Q6; $M = 3.55$), and typing skills (Q10; $M = 3.58$). Section 2 (Digital Competencies and Technological Proficiency) achieved the highest section mean ($M = 3.73$), while Section 3 (Technology Use and Perception) recorded the lowest ($M = 3.38$). All t-values were positive and highly significant, indicating participants' proficiency significantly exceeded the scale midpoint (3.0) across all measured digital literacy dimensions.

An independent samples t-test was run to answer the second research question. Table 3 presents these results.

Table 3

Independent Samples T-test to Compare Male and Female Iranian Undergraduate Learners' Digital Literacy and Competency

	group	N	Mean	SE	t	df	Sig.
Q6	Female	22	3.64	.20	.533	45	.597
	male	25	3.48	.21			
Q7	Female	23	4.35	.15	2.589	46	.013*
	male	25	3.68	.21			
Q8	Female	23	3.91	.15	2.176	46	.035*
	male	25	3.36	.20			
Q9	Female	23	4.26	.17	3.077	46	.004*
	male	25	3.56	.15			
Q10	Female	23	3.65	.19	.521	46	.605
	male	25	3.52	.16			
Q11	Female	23	3.43	.12	-1.367	46	.178
	male	25	3.65	.10			
Q12	Female	23	3.31	.16	-.818	46	.417
	male	25	3.48	.12			
Q13	Female	23	3.19	.15	-1.494	46	.142
	male	25	3.46	.11			
Q14	Female	23	3.16	.19	-1.239	46	.222
	male	25	3.44	.13			
Section 2	Female	23	3.97	.12	2.107	46	.041*
	male	25	3.52	.17			
Section 3	Female	23	3.25	.14	-1.371	46	.177
	male	25	3.49	.10			

According to Table 3, while both groups shared similar levels of digital literacy in most areas, female learners outperformed males significantly in specific domains. These included web search, computer literacy, and internet literacy, where female participants scored higher with statistical significance ($p < .05$). However, no meaningful gender-based differences were found in other areas. Interestingly, the aggregated score for Section 2 (Digital Competencies) also revealed a significant advantage for females ($M = 3.97$) compared to males ($M = 3.52$), while Section 3 (Technology Usage and Perception) showed no significant difference between genders. These findings suggest that although both genders are generally proficient, female learners exhibit higher skill levels in certain digital literacy dimensions.

An independent samples t-test was run to answer the third research question, and the results were as follows.

Table 4

Independent Samples t-test to Compare Freshman and Senior Iranian Undergraduate Learners' Digital Literacy and Competency

	group	N	Mean	SE	t	df	Sig.
Q6	freshman	23	3.61	.20	.371	45	.713
	senior	24	3.50	.22			
Q7	freshman	24	3.92	.22	-.607	46	.547
	senior	24	4.08	.17			
Q8	freshman	24	3.54	.18	-.628	46	.533
	senior	24	3.71	.19			
Q9	freshman	24	3.79	.19	-.840	46	.405
	senior	24	4.00	.16			
Q10	freshman	24	3.46	.20	-.994	46	.325
	senior	24	3.71	.15			
Q11	freshman	24	3.63	.12	1.112	46	.272
	senior	24	3.46	.10			
Q12	freshman	24	3.51	.15	1.160	46	.252
	senior	24	3.28	.13			
Q13	freshman	24	3.48	.12	1.571	46	.123
	senior	24	3.19	.14			
Q14	freshman	24	3.35	.16	.414	46	.681
	senior	24	3.26	.16			
Section 2	freshman	24	3.67	.17	-.605	46	.548
	senior	24	3.80	.14			
Section 3	freshman	24	3.48	.13	1.133	46	.263
	senior	24	3.28	.12			

The comparison between freshman and senior students showed no significant differences in digital literacy and competency across all measured skills. Independent samples t-tests indicated similar performance between the two groups in typing, web search, computer and internet literacy, and application use. Mean scores across all items were relatively close, and no p-values fell below the significance threshold of .05. The overall section scores, likewise, indicated that both groups possessed comparable levels of digital competence. These results suggest that academic levels do not appear to be a determining factor in digital literacy proficiency among the participants, indicating consistent exposure and adaptation to digital tools throughout their university experience.

Finally, to answer the fourth research question, an interview was conducted. The qualitative findings from semi-structured interviews revealed several notable challenges faced by Iranian undergraduate EFL learners in utilizing digital tools for educational purposes. Through thematic analysis of interview transcripts, four core themes emerged, each supported by rich participant narratives that illuminate the depth of these challenges.

Theme 1: Inconsistency in Digital Resource Quality

Participants consistently expressed frustration with the inconsistent quality of available digital resources. One senior female student lamented: *"Sometimes I spend hours searching for a good grammar exercise online, only to find that most resources are either outdated, poorly designed, or contain errors. It's exhausting to verify each resource's*

reliability before I can use it in my studies." This sentiment was echoed by a male freshman who noted, *"The university recommends several platforms, but their quality varies dramatically. Some have excellent content but terrible user interfaces, while others are easy to navigate but lack depth in linguistic explanations."* Such inconsistencies created significant barriers to effective learning, with participants reporting wasted time and reduced motivation when encountering subpar resources.

Theme 2: Insufficient Training and Support

The lack of proper training emerged as a pervasive challenge, particularly regarding the effective integration of digital tools into language learning. A female senior participant explained: *"We're told to use certain platforms for assignments, but no one shows us how to maximize their potential for language learning. I know how to navigate the tools, but I don't know how to use them effectively to improve my English skills."* This gap was compounded by instructor limitations, as a male freshman observed: *"Some professors are not familiar with the digital tools they assign us to use. When we encounter problems, they often can't help, which leaves us frustrated and unsupported."* Participants emphasized that basic technical knowledge was insufficient; they needed pedagogical guidance on how digital tools could enhance specific language learning outcomes.

Theme 3: Complexity of Digital Platforms

The steep learning curve associated with advanced digital platforms created significant barriers, particularly for freshmen adjusting to university life. A female freshman described her experience: *"When I first started using the university's learning management system, I was completely overwhelmed. There were so many features and options that I didn't know where to begin. It took me weeks just to understand how to submit assignments properly."* This complexity was exacerbated by platform-specific challenges, as noted by a male senior: *"Each course seems to use different platforms with different interfaces. Just when I master one, I have to learn another for a different class. It's mentally exhausting and takes away from actual language learning."* Participants reported that this complexity led to anxiety, disengagement, and a sense of isolation in digital learning environments.

Theme 4: Information Overload and Distraction

The overwhelming abundance of online information and digital distractions emerged as a significant challenge to effective learning. A female senior participant captured this struggle: *"The internet has endless resources, but it's impossible to know which ones are trustworthy and relevant. I often find myself scrolling through pages of information without making real progress, which is incredibly frustrating."* Social media distractions were frequently mentioned, with a male freshman noting, *"When I'm supposed to be studying online, I constantly get distracted by notifications. It's like my brain is trained to check my phone every few minutes, even when I'm trying to focus."* This overload led to cognitive fatigue and inefficiency, with participants reporting difficulty maintaining focus and effectively processing digital content.

In response to these challenges, participants proposed several actionable solutions that reflected their deep understanding of the issues and their desire for structured support.

Solution 1: Curated Digital Resources

Participants strongly advocated for the provision of curated, reliable digital resources. A female senior suggested: *"Instead of having us search through endless options, professors should provide a short list of high-quality, recommended resources for each topic. This would save us time and ensure we're using materials that are actually useful."* This recommendation was supported by a male freshman who emphasized: "*Having a 'trusted list' would reduce the anxiety of choosing between resources and help us focus on learning rather than searching.*"

Solution 2: Targeted Training Programs

Participants emphasized the need for comprehensive training that addressed both technical skills and pedagogical applications. A female freshman proposed: *"Workshops specifically designed for language students would be incredibly helpful. Not just 'how to use the tool,' but 'how to use this tool to improve your speaking skills' or 'how to find authentic materials using this platform.'"* This sentiment was echoed by a male senior who noted, "*Training should be ongoing, not just at the beginning of the semester. As new tools emerge, we need opportunities to learn how to use them effectively in our language learning journey.*"

Solution 3: Structured Digital Onboarding

Participants recommended introductory sessions to ease the transition into digitally mediated learning. A female freshman explained: *"An orientation session at the beginning of each semester would help us understand which platforms we'll be using and how to navigate them effectively. This would reduce the initial anxiety and help us focus on learning from day one."* A male senior added, "*These sessions should include hands-on practice and opportunities to ask questions. Maybe even create a 'digital buddy' system where more experienced students can help newcomers.*"

Solution 4: Interactive and Supportive Learning Environments

To combat isolation and distraction, participants suggested creating more interactive digital learning experiences. A female senior proposed: *"Integrating more interactive elements like discussion forums, group projects, and video conferencing would make digital learning feel less isolating. It would also help maintain engagement and motivation."* A male freshman emphasized the importance of mobile-friendly resources: "*Since most of us use our phones for studying, having resources that work well on mobile devices would make learning more accessible and convenient.*"

Overall, these qualitative findings reveal that while Iranian EFL learners possess basic digital skills, they face significant challenges in effectively utilizing digital tools for language learning. The depth of participant narratives underscores the complexity of these issues and highlights the urgent need for structured institutional support, comprehensive training, and thoughtfully designed digital learning environments that address both technical and pedagogical dimensions of digital literacy in EFL contexts.

Discussion

This study systematically addresses the four research questions regarding Iranian undergraduate EFL learners' digital literacy, gender differences, academic level variations, and implementation challenges. The findings reveal that Iranian EFL learners demonstrate

above-average proficiency in basic digital skills, with female learners outperforming males in specific domains, while no significant differences were found between freshmen and senior students. These results offer valuable theoretical insights into digital literacy development in non-Western EFL contexts.

Regarding the first research question, the high proficiency in typing, web searching, and general digital literacy observed in Iranian learners can be theoretically interpreted through the lens of "digital resilience" (Nguyen & Habók, 2022), where learners develop compensatory skills despite infrastructural limitations. This contrasts with findings from Western contexts, where digital literacy is often more uniformly distributed but sometimes lacks the critical evaluation skills necessary for effective information navigation (Pegrum et al., 2022). The high scores in web search (M = 4.00) and internet literacy (M = 3.90) suggest that Iranian learners have adapted to information-rich environments through self-directed learning, reflecting a bottom-up approach to digital skill acquisition rather than top-down institutional guidance.

For the second research question, the gender-based differences where female learners outperformed males in web search, computer literacy, and internet literacy can be theoretically framed through feminist technology studies, which highlight how gender intersects with digital engagement patterns (Law et al., 2018). This finding challenges the universal assumption that digital divides primarily follow socioeconomic lines, suggesting that cultural factors specific to the Iranian context may shape gendered digital practices. Female learners' higher performance in information-seeking tasks may reflect greater investment in academic digital practices, aligning with studies showing gendered differences in digital tool utilization for educational purposes across various cultural contexts (Mudra, 2020).

Addressing the third research question, the absence of significant differences between freshmen and senior students offers an important theoretical contribution to understanding digital literacy development trajectories. This finding contradicts the expected progression model where advanced students would demonstrate higher digital competencies, suggesting instead that digital skills plateau early in university education. This pattern may reflect the "digital maturity ceiling" phenomenon observed in cross-cultural studies (Nguyen & Habók, 2022), where learners quickly acquire basic digital skills but struggle to progress to higher-order competencies without targeted intervention. The consistency across academic levels implies that digital literacy development in Iranian EFL contexts is more dependent on prior exposure and self-directed learning than on progressive academic scaffolding.

Regarding the fourth research question, the identified challenges, resource inconsistency, insufficient training, platform complexity, and information overload, can be theoretically understood through the digital divide framework (van Dijk, 2005), which distinguishes between access, usage, and outcomes gaps. In the Iranian context, these challenges reflect not merely technical limitations but deeper sociocultural and infrastructural inequities. The resource quality issues (Theme 1) and training gaps (Theme 2) particularly highlight the "second-level digital divide" where unequal skills and usage patterns perpetuate educational disparities (Dashtestani, 2014). These findings resonate with cross-cultural studies in Vietnam (Nguyen & Habók, 2022) and other developing

contexts, where similar challenges emerge despite different cultural contexts, suggesting some universality in digital literacy barriers across resource-constrained educational environments.

Cross-culturally, our findings reveal both similarities and important distinctions when compared to other EFL contexts. While Vietnamese EFL learners also face challenges with digital resource quality and integration (Nguyen & Habók, 2022), Iranian learners report more pronounced difficulties with platform complexity, potentially reflecting differences in technological infrastructure and institutional support. Studies in Western contexts (Pegrum et al., 2022) show higher levels of critical digital literacy but often lack the contextual awareness needed for effective second language learning in digital environments. The gender differences observed in our study align partially with Mudra's (2020) cross-cultural findings, though with different specific domains of disparity. These cross-cultural comparisons suggest that while digital literacy challenges have some universal elements, their manifestation and impact are deeply shaped by local educational, cultural, and infrastructural contexts.

Critically, the socioeconomic and infrastructural inequities underlying these digital literacy challenges in Iran deserve deeper reflection. The digital divide in Iranian higher education is not merely a matter of access but reflects deeper structural inequalities in resource distribution, institutional support, and teacher preparation (Dashtestani, 2014). The challenges identified, particularly resource inconsistency and insufficient training, stem from systemic underinvestment in educational technology and inconsistent implementation of digital initiatives across institutions. These inequities are exacerbated by international sanctions limiting access to cutting-edge educational technologies and creating dependency on potentially suboptimal alternatives. The gender differences in digital proficiency may also reflect broader societal gender dynamics that influence access to digital resources and opportunities for skill development. Addressing these challenges requires not merely technical solutions but fundamental reconsideration of educational resource allocation, teacher training programs, and institutional policies that perpetuate digital inequities in Iranian higher education.

The theoretical implications of this study extend beyond the Iranian context, contributing to broader debates about digital literacy in EFL settings. The findings suggest that digital frameworks developed in Western contexts may require significant adaptation for effective application in non-Western educational environments. The emphasis on critical digital literacy in the age of AI (Ng, 2023) takes on particular significance in contexts where learners must navigate not only technical challenges but also sociocultural barriers to effective digital participation.

Practically, these findings underscore the need for more nuanced approaches to digital literacy education in EFL contexts that address both technical skills and critical engagement with digital content. The gender-specific findings suggest the importance of differentiated approaches to digital literacy instruction, while the absence of academic level differences implies that digital literacy interventions should be implemented early in university education rather than assuming progressive development.

In conclusion, this study contributes to the growing body of research on digital literacy in EFL contexts by providing a comprehensive

assessment of Iranian undergraduate learners' digital competencies, examining demographic variations, and identifying implementation challenges. The findings highlight both the adaptability of Iranian learners in developing digital skills and the significant challenges that remain to be addressed through institutional support, teacher preparation, and curriculum development. By situating these findings within broader theoretical frameworks and cross-cultural contexts, this study offers valuable insights for researchers and practitioners working to enhance digital literacy in EFL settings worldwide.

Conclusion

Educators play a vital role in addressing challenges to digital literacy by integrating digital skills training into curricula, promoting ethical technology use, and fostering critical thinking. Through collaborative efforts among educators, institutions, and policymakers, equitable access to digital literacy can be ensured, bridging the digital divide and preparing learners to thrive in a digitally connected world.

This study addresses a significant research gap in digital literacy in Iran, offering new insights and opening avenues for further exploration in the field. It highlights how education level and gender influence learners' digital literacy and serves as a theoretical foundation for a deeper investigation into the digital literacy of EFL learners. The findings have practical implications for EFL teachers, learners, and curriculum planners. Teachers are encouraged to address learners' challenges and implement effective strategies to enhance digital literacy. Learners gain awareness of digital literacy components and the obstacles in using educational technology, motivating them to improve their digital skills. Curriculum planners are urged to integrate relevant materials and tasks into future curricula to strengthen learners' digital pedagogy and reduce challenges in using technology for education. Overall, the study provides valuable guidance for improving digital literacy in educational contexts.

Like any study in the field, this study suffered from some limitations. As the first limitation, the researcher could not select the sample through random sampling. Moreover, the study sample was not large. A third limitation encountered in this study was the difficulty in convincing learners to participate. This challenge arose due to a lack of motivation, apprehension about the research process, or competing priorities like academic workload and personal commitments. As a result, the recruitment process was more time-consuming and required additional efforts, such as offering reassurances about confidentiality or providing incentives. This could have potentially influenced the diversity or representativeness of the participant sample, thereby impacting the generalizability of the findings.

It is suggested that future studies explore the same topic with more participants. Moreover, they can benefit from random sampling to enhance the validity of this study. Future studies can also probe this topic, considering learners' socio-cultural background and age.

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