



Profiling Prospective EFL Teachers' Digital Literacies: Insights from Hague & Payton's Framework and Martin's Levels

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Abstract

As digital technologies become increasingly embedded in language education, digital literacy is now considered a fundamental competence for teachers. Nevertheless, evidence suggests that many prospective EFL teachers remain limited to functional uses of digital tools, highlighting concerns about their preparedness for transformative technology integration in the classroom. This study profiles the digital literacy of prospective EFL teachers by applying Hague and Payton's eight dimensions alongside Martin's three levels of digital competence. The participants were 26 sixth-semester students enrolled in the English Education Department of a private university in West Java, Indonesia. Data were collected through a structured questionnaire, a digital literacy test, and semi-structured interviews, enabling triangulation of self-reported practices, demonstrated skills, and lived experiences. The findings reveal that most participants were situated at Level 2 (Digital Usage), demonstrating confidence in functional applications such as Microsoft Word, Canva, and PowerPoint. Evidence of Level 3 (Digital Transformation) emerged most clearly in creativity and information search, where some students used Canva and CapCut for entrepreneurial projects or applied academic databases systematically. However, collaboration, communication, cultural awareness, and e-safety remained largely functional, reflecting transactional rather than transformative practices. These results highlight the uneven development of digital literacy, with student's adept at using digital tools but less prepared to employ them critically and innovatively in pedagogical contexts. The study underscores the need for teacher education programmes to integrate reflective pedagogy, project-based tasks, and explicit training in evaluation, intercultural engagement, and online safety. Such interventions would support pre-service teachers in progressing from functional usage to transformative practice. Future research should expand the scope to larger and more diverse cohorts, as well as adopt longitudinal approaches to examine how digital literacy evolves as pre-service teachers transition into professional practice.

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INTRODUCTION

Digital literacy has become indispensable in the 21st century, especially for English as a Foreign Language (EFL) educators and prospective teachers who must navigate, evaluate, and create digital content in their professional and academic contexts. According to Hague & Payton (2010), digital literacy encompasses the broad set of capabilities that prepare individuals for living, learning, and working in a digital society (Son Jeon-Bae et al., 2017). Extending this idea, (Martin, 2006, 2009) describes digital literacy as the awareness, attitude, and ability to use digital tools appropriately for information retrieval and communication. More recently, (Charisma et al., 2025) argue that in the Indonesian EFL context, digital literacy must also be understood as a transformative competence, enabling pre-service teachers to engage not only functionally with digital tools but also pedagogically, ethically, and creatively in ways that promote collaboration, critical thinking, and learner autonomy. Taken together, these perspectives highlight that digital literacy is not merely a set of technical skills but a dynamic and multifaceted competence that is central to preparing future EFL teachers for the demands of 21st-century classrooms.

Despite growing attention to digital literacy in education, research focusing specifically on EFL teacher candidates and their digital literacies, particularly through the lens of dual frameworks is still scarce. Using only one framework risks producing an incomplete profile. Hague & Payton identify what digital practices appear across eight dimensions, but they do not explain how deeply those practices are engaged. Conversely, Martin's levels show the depth of engagement but overlook the breadth and diversity of competencies. Therefore, a dual-framework approach is required to generate a more comprehensive, multi-layered understanding of pre-service teachers' digital literacy. Without such an approach, research may misinterpret functional digital usage as advanced competence, overlook subtle but important differences between usage and transformation, and fail to identify targeted pedagogical interventions. This scarcity of dual-framework studies underscores the need for research that systematically integrates both models to provide a fuller picture of prospective EFL teachers' digital readiness (; Pradas-Esteban, 2025). Existing studies in the tertiary education context reveal that EFL postgraduate students conceptualize digital literacy as soft skills for managing digital information, such as searching, comprehending, evaluating, creating, and sharing digital content which use the eight dimensions from Hague and Payton's framework (Rineksa et al., 2021). Additionally, previous research has applied combined frameworks to investigate digital literacy in EFL contexts. For example, studies have utilized Hague and Payton's eight components in conjunction with Martin's three-tiered levels (Competence, Usage, Transformation) to examine teacher competence, revealing varied proficiency across awareness, usage, and transformation stages (Christiani et al., 2022; Nadhifa & Santosa, 2022; Sudirman, 2025). These works highlight both the potential of such frameworks in profiling digital competencies and the persistent barriers, including limited training opportunities and infrastructure, that restrict effective integration. However, these studies focus predominantly on in-service teachers and seldom address the specific realities of pre-service EFL teachers, who face distinct challenges, such limited formal training, inconsistent exposure to pedagogical technologies, and a widening gap between policy expectations as Indonesia's *Merdeka Belajar-Kampus Merdeka* mandate digitally competent educators and actual classroom preparedness. In this context, applying dual framework is particularly urgent. Hague & Payton illuminate which digital practices pre-service teachers possess or lack, while Martin's levels clarify how deeply these practices are internalized and whether they are capable of transformative pedagogical use. Without such a combined lens, the field risks overlooking critical readiness gaps among future EFL teachers and missing opportunities to design interventions that align with national digital literacy policies and 21st century teaching demands (Bunmy et al., 2025; Konovalenko et al., 2023; Pazilah et al., 2024; Rahimi & Mosalli, 2025).

Other empirical investigations Large-scale studies in China and Vietnam, for instance, demonstrate that while attitudes toward technology and prior exposure significantly shape digital literacy practices, demographic factors such as gender and teaching experience appear less influential (Nguyen & Habók, 2025; J. Zhang, 2023). Moreover, both studies found consistent discrepancies between self-reported abilities and objectively measured skills, reinforcing the need for triangulated instruments to obtain accurate and comprehensive profiles of learners' competencies. These findings align with calls for methodological rigor in digital literacy research and justify the present study's adoption of multiple instruments.

The relevance of Martin's (2009) hierarchical model has also been reinforced across diverse educational contexts. Research in Europe, Latin America, and Asia has consistently demonstrated a

progressive pathway from basic digital awareness to transformative practices, validating Martin's three-level framework as a developmental continuum rather than a static skill set (Mejías-Acosta et al., 2024; Sánchez-Caballé & Santos, 2025). In language education contexts, Lei & Jiang (2025) found that most foreign language teachers across Chinese universities demonstrated intermediate levels of digital competence, with only a small proportion achieving transformative use that reshaped pedagogy. Taken together, these studies confirm that Martin's framework remains both theoretically robust and empirically validated, offering a reliable lens for analyzing the depth of digital literacy engagement.

Empirical evidence from language education contexts further supports this claim. Research with foreign language teachers across Chinese universities found that most participants demonstrated intermediate digital competence, with only a minority reaching transformative practices that reshaped pedagogy (Lei & Jiang, 2025). Together, these studies (Lei & Jiang, 2025; Mejías-Acosta et al., 2024; Sánchez-Caballé & Santos, 2025) affirm that Martin's three levels remain theoretically robust and empirically validated across diverse contexts, offering a strong foundation for profiling the digital readiness of prospective EFL teachers.

Against this backdrop, the present study draws on the strengths of both frameworks. Hague & Payton (2010) define digital literacy as a set of skills, knowledge, and understanding that enable critical, creative, distinctive, and safe practices with digital technologies, emphasizing competence, creativity, evaluation, communication, and sociocultural awareness (Korkmaz & Akçay, 2024). To illustrate this framework more clearly, Figure 1 presents Hague & Payton's eight dimensions of digital literacy, which serve as the foundational components for profiling participants' competencies.

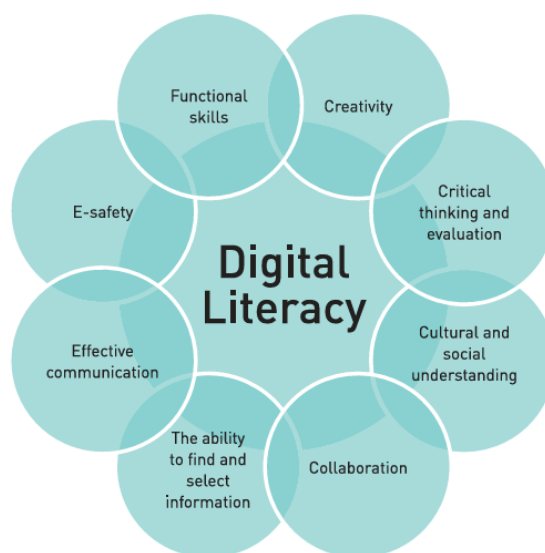


Figure 1. Hague & Payton's (2010) Dimensions of Digital Literacy

Martin (2009), in contrast, conceptualizes digital literacy as a ladder of progression, with Level 1 (Competence) referring to basic operational ability, Level 2 (Usage) to purposeful application in academic and teaching contexts, and Level 3 (Transformation) to the innovative and integrative use of technology for pedagogical change (Nadhifa & Santosa, 2022). Together, these frameworks enable the profiling of participants not only by the breadth of their digital practices but also by the depth of their engagement, ranging from foundational competence to transformative use. As shown in Figure 2, Martin's three levels complement Hague & Payton's multidimensional framework by categorizing the depth of engagement with digital tools. Together, the two frameworks enable the profiling of participants not only by the breadth of their digital practices but also by the depth of their engagement, ranging from foundational competence to transformative use.

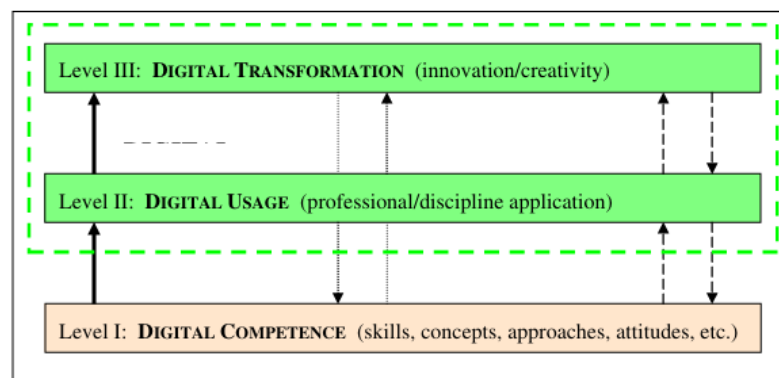


Figure 2. Martin's (2009) Digital Literacy Levels

The novelty of the present study lies in its dual-framework application to prospective EFL teacher candidates, an underexplored group. By profiling their digital literacy using both the multidimensional components of Hague and Payton and the hierarchical levels of Martin, the study provides unique insights into the digital readiness of future educators. This profiling can inform targeted interventions such as curriculum redesign, pedagogical innovation, and professional development programs that are sensitive to both the specific digital practices needed and the levels of engagement required. In the Indonesian higher education context, where digital tools are increasingly embedded in teacher education programs, such insights are essential. Previous research has emphasized the need for strengthening digital literacy through training on academic tools and access to scholarly resources (Begimbetova et al., 2025; Nguyen & Habók, 2024; Rinekso et al., 2021). Profiling prospective teachers through the dual-framework approach can therefore pinpoint concrete training needs, whether in critical evaluation, creative use, online safety, or transformative pedagogical application. Yet, few studies have systematically addressed this intersection of frameworks, leaving a clear research gap. Addressing this gap, the present study contributes a richer understanding of digital literacy readiness among EFL teacher candidates and underscores the urgency of preparing them for the demands of 21st-century classrooms.

METHODS

This study employed a qualitative descriptive design aimed at profiling the digital literacy of prospective EFL teachers. A qualitative approach was selected because the research sought to provide a comprehensive description of participants' competencies, practices, and challenges rather than to test hypotheses or establish causal relationships. As Sandelowski (2000) notes, qualitative descriptive studies are particularly suited for producing "a rich, straight description of phenomena" (p. 337), which aligns with the objective of portraying the digital literacy profiles of teacher candidates. Moreover, Creswell & Clark (2018) emphasize that qualitative inquiry is effective in capturing participants' lived realities, providing depth and context beyond numerical representations. The use of multiple instruments enabled data triangulation, which strengthened the trustworthiness and depth of the findings. Denzin (2012) affirms that triangulation enhances credibility by allowing researchers to cross-validate data through different sources and methods, thereby minimizing bias and offering more holistic insights.

The participants were 26 sixth-semester students enrolled in the English Education Department of a private university in West Java, Indonesia. These students were selected purposively because they were in the middle stage of their teacher education program, had completed foundational pedagogical and linguistic courses, and were beginning to integrate digital tools into their coursework and teaching preparation. Purposive sampling was deemed appropriate as it allows researchers to "intentionally select individuals who can best inform the research problem" (Palinkas et al., 2015, p. 534). All participants were informed of the objectives of the study and gave their consent prior to participation. To maintain confidentiality, pseudonyms were used and no personal identifiers were reported.

Three instruments were used in data collection. The first was a structured questionnaire adapted from Hague & Payton's (2010) digital literacy framework. While retaining the eight core dimensions, several adaptations were made to suit the context of pre-service EFL teachers and the

objectives of this study. Items were rewritten to reflect academic and pedagogical tasks commonly undertaken in teacher education, such as evaluating online sources for lesson planning, creating multimodal teaching materials, and collaborating through digital platforms (Rinekso et al., 2021). The questionnaire measured eight components of digital literacy, such as functional ICT skills, creativity, critical thinking, cultural and social understanding, communication, collaboration, information evaluation, and online safety. Items were designed on a four-point Likert scale ranging from “strongly disagree” to “strongly agree.” This instrument was intended to capture participants’ self-perceptions of their digital literacy practices. These adaptations ensured that the questionnaire not only measured the original eight components, but also reflected the specific digital literacy expectations and challenges experienced by prospective EFL teachers. The second instrument was a digital literacy test developed to assess participants’ practical abilities in performing academic and pedagogical digital tasks. According to Hatlevik & Christophersen (2013), assessing both perceived and demonstrated digital skills is essential, as self-reports alone often overestimate competence levels. The test was constructed through a multi-step development process. First, the eight dimensions of Hague and Payton’s (2010) framework were operationalized into observable performance indicators relevant to pre-service EFL teachers, for example, formatting documents using Microsoft Word, designing teaching media through Canva or PowerPoint, editing simple video content with CapCut, and evaluating the credibility of online sources. Second, these indicators were mapped onto Martin’s (2009) three levels to ensure the test could distinguish not only what participants could do but how deeply they engaged with digital tasks. Third, tasks were contextualized to reflect authentic teacher-education activities, such as creating lesson slides, editing instructional videos, selecting credible references, and collaborating through shared documents. Each task was scored using a rubric assessing accuracy, creativity, and functionality. This instrument provided an objective measure of participants’ actual digital skills to complement their self-reported data from the questionnaire. The third instrument was semi-structured interview guidelines conducted with eight selected participants. The selection represented a range of competency levels based on questionnaire and test outcomes to ensure diversity of perspectives. Semi-structured interviews are widely used in educational research because they allow “both consistency across participants and flexibility to pursue unexpected themes” (Cohen et al., 2018, p. 523). The interviews explored participants’ experiences, challenges, and strategies in using digital tools for academic work and teaching preparation. Questions focused on areas such as evaluating online information, integrating technology into teaching scenarios, collaborating through digital platforms, and ensuring online safety. Each interview lasted between 30 to 40 minutes, was audio-recorded with consent, and later transcribed for analysis. The interview protocol was developed through a systematic process to ensure alignment with the study’s conceptual frameworks and research aims. First, the eight dimensions of Hague and Payton’s (2010) model were translated into open-ended prompts designed to elicit participants’ lived experiences in functional skills, creativity, information search, evaluation, communication, collaboration, cultural awareness, and e-safety. Second, each prompt was further linked to Martin’s (2009) three levels of digital literacy so that participants’ narratives could reveal whether their practices reflected basic competence, routine usage, or transformative engagement. Third, the questions were contextualized to authentic pre-service EFL teacher activities such as lesson planning, microteaching, digital material creation, and peer collaboration. This ensured ecological validity and allowed the interview to uncover how digital literacy operates within pedagogical practices rather than merely in general technology use. Through this development process, the interview guidelines were able to probe constructs that cannot be captured through questionnaires or tests alone. These interviews thus provided rich, contextualized data to triangulate and deepen the interpretation of participants’ digital literacy profiles (Leckner & Severson, 2019; Polizzi, 2025; Showkat et al., 2025; Yang et al., 2025).

Data collection was conducted in three stages. The questionnaire was distributed first through google forms and completed asynchronously. Participants were given instructions on how to respond to items and were encouraged to ask clarifying questions to ensure accurate self-reporting. Second, the digital literacy test was administered in a controlled computer lab session during the same week. Participants were guided through each task, and standardized instructions were provided to ensure consistency. The outputs were collected through uploaded files and screenshots, allowing for systematic scoring based on the performance rubric. Third, after preliminary analysis of both instruments, interviews were scheduled to explore and validate emerging findings. Purposeful sampling was used to select participants representing high, medium, and low digital literacy profiles.

Each interview followed a protocol and was audio-recorded, transcribed, and checked for accuracy. This sequential procedure ensured that qualitative narratives could be used to explain trends and gaps identified in the earlier instruments. The data analysis followed two complementary steps. First, descriptive analysis was used for the questionnaire and test results, including percentages, mean scores, and distribution patterns. These results were further aligned with Martin's (2009) three levels of digital literacy: Level I (Digital Awareness), Level II (Digital Usage), and Level III (Digital Transformation). Second, thematic analysis (Braun & Clarke, 2006) was applied to interview transcripts. Braun and Clarke highlight thematic analysis as a “flexible and accessible approach to analysing qualitative data” (p. 77), suitable for identifying patterns across participants’ accounts. The process followed the six steps, namely familiarizing with the data, generating initial codes, grouping codes into categories, developing themes, reviewing themes, and defining broader thematic patterns. Coding was conducted deductively using insights emerging directly from participants’ narratives (Fife & Gossner, 2024; Zhang et al., 2025). This approach allowed the analysis to reveal both expected and unanticipated patterns in how pre-service teachers experience digital literacy (Tomczyk, 2020, 2024; Xiao et al., 2026). To illustrate how themes were generated, Table 1 presents an example of the analytic progression from raw excerpts to codes, categories, and final themes.

Table 1. Example of Thematic Analysis Process

Interview Excerpt	Initial Code	Category	Theme	Broader Theme
“I usually just use WhatsApp to coordinate group work. We don’t really discuss ideas deeply.”	Reliance on WhatsApp, Surface-level collaboration	Functional coordination	Limited collaborative depth	Predominance of Level 2 (Usage)
“I check information on Google, but I’m not sure how to verify if it’s credible.”	Uncertain evaluation skills	Basic information checking	Weak critical information literacy	Gaps in transformative digital literacy
“I design materials on Canva and sometimes sell templates online.”	Creative digital production	Advanced creation practices	Emerging transformative creativity	Evidence of Level 3 (Transformation)
“I know password safety, but I never teach others about online risks.”	Basic e-safety knowledge, Lack of advocacy	Personal safety practices	Partial digital responsibility	Uneven development across dimensions

Ensuring validity and trustworthiness, several procedures were embedded throughout instrument development, data collection, and analysis. Both the questionnaire and digital literacy test underwent expert validation by two specialists in digital literacy and language education (Abramo & D’Angelo, 2025; George et al., 2026). A pilot study involving five non-participant students was then conducted to evaluate item clarity, task difficulty, and overall usability. Feedback from the pilot resulted in minor wording adjustments to reduce ambiguity and the reordering of some test tasks to improve flow. No major structural revisions were needed, indicating that the instruments were already appropriate for the target population. Inter-rater reliability for the digital literacy test was ensured by involving two independent evaluators who scored participant outputs using a shared rubric. Differences in scoring were discussed and resolved, resulting in consistent interpretations of performance criteria. Triangulation was achieved by collecting three complementary types of data, namely self-reported practices from the questionnaire, performance-based evidence from the test, and contextualized explanations from interviews. This combination strengthened the credibility of the dataset by capturing digital literacy from multiple angles. Member checking was employed during the interview analysis stage to confirm the accuracy of the interpretations. Furthermore, thematic analysis was applied to interview transcripts, and descriptive procedures were used for quantitative data, as previously outlined. These strategies enhanced the credibility, dependability, and confirmability of the study, consistent with recommendations by Mack et al. (2005).

The methodological design in this study provided a rigorous and trustworthy framework for profiling the digital literacy of prospective EFL teachers. By combining a questionnaire, a performance-based test, and semi-structured interviews within a qualitative descriptive approach, the study ensured triangulation and captured the complexity of participants' digital practices. This strategy allowed for a nuanced understanding of both competencies and challenges, generating meaningful insights into their preparedness to navigate, adapt, and innovate in the digitally driven landscape of 21st-century teaching and learning.

FINDINGS AND DISCUSSION

Findings

This study investigated the digital literacy of prospective EFL teachers, comprising 26 who completed a questionnaire and test, and 5 prospective EFL teachers at a private university in West Java who participated in semi-structured interviews. Their competencies were analysed using (Hague & Payton, 2010) framework, which identifies eight dimensions: functional skills, creativity, information evaluation, cultural awareness, collaboration, information search, communication, and e-safety. Providing a deeper categorization of digital engagement, the results were further mapped onto Martin's (2009) three levels of digital literacy, stated as Level 1 (Awareness), Level 2 (Usage), and Level 3 (Transformation), which served as the final analytical lens for profiling the overall digital literacy of the participants. Through this combined analytical lens, for recurrent themes emerged from the triangulated data, such as the predominance of functional digital usage, the presence of emerging yet uneven transformative practices, largely superficial forms of collaboration and cultural engagement, and limited critical awareness in information evaluation and e-safety.

Predominance of Function Digital Usage

Across all data sources, participants demonstrated strong functional competence in using everyday digital tools for academic purposes. Questionnaire and test results showed that more than 80% of coded responses were situated at Level 2 (digital usage), particularly in functional ICT skills and collaboration. This functional orientation was strongly echoed in interview narratives. Most interviewees described routine reliance on familiar platforms such as WhatsApp, Google Docs, Canva, and PowerPoint to complete coursework and coordinate group tasks, as one participant explained as stated below:

"For group work, we usually just use WhatsApp to divide tasks and Google Docs to combine the assignments. It's enough for finishing the work." (12)

Although such practices indicate confidence and efficiency, they reflect instrumental rather than reflective engagement with digital tools. Participants rarely described using technology to redesign learning processes or critically reflect on pedagogical outcomes. This convergence of self-reports, test performance, and interview accounts confirms that functional usage dominates participants' digital literacy profiles.

While functional usage was dominant, evidence of transformative digital literacy emerged in limited but meaningful ways, particularly in the dimension of creativity and information search. Questionnaire and test data showed that 16-36 % of participants reached Level 3 in these areas. Interview data provided concrete illustrations of how transformation occurred. One interviewee (I3) described extending Canva and CapCut beyond coursework into entrepreneurial and pedagogical contexts. "I use Canva not only for assignments but also to design templates that I sell online. I also think about how the design would work if I used it for teaching" (I3)

Emerging but Uneven Transformative Practices

Although functional digital usage represented the dominant pattern among participants, the findings also revealed emerging instances of transformative digital literacy, particularly in the dimensions of creativity and information search. Questionnaire and performance-based test results indicated that approximately 16–36% of participants reached Level 3 (Digital Transformation) in these areas. According to Martin's (2009) framework, this level reflects the ability to apply digital technologies not only for routine operational tasks but also for innovative, reflective, and context-sensitive practices. Participants who demonstrated Level 3 competencies were able to extend digital tools

beyond basic academic requirements and employ them creatively or strategically in ways that supported knowledge production and pedagogical design.

Several participants used digital tools to create multimodal instructional materials, including video-based explanations and visually enriched teaching slides. In the digital literacy test, some participants integrated Canva templates, visual design elements, and multimedia features to produce engaging digital learning resources. Such practices align with contemporary perspectives on digital literacy that emphasize creative production and multimodal communication as key competencies for 21st-century educators (Castro et al., 2022; Ghaluh et al., 2026; Temirkhanova et al., 2024; Zhazira et al., 2025). According to interview narratives provided additional evidence of these transformative practices. One participant described using Canva and CapCut not only for coursework but also for entrepreneurial purposes:

“I use Canva not only for assignments but also to design templates that I sell online. I also think about how the design would work if I used it for teaching.” (I3)

This statement illustrates how digital tools can support both creative expression and professional identity development, allowing prospective teachers to experiment with authentic digital production beyond formal academic tasks. Similar patterns have been identified in recent studies showing that pre-service teachers who engage in creative digital design activities tend to develop stronger technological-pedagogical competencies (Duangngern et al., 2025; Gu & Lee, 2025; Kim et al., 2025; Yunus & Hua, 2021). Transformative practices were also evident in the dimension of information search and evaluation. Some participants demonstrated more advanced research behaviours by deliberately accessing academic databases rather than relying solely on general search engines. One interviewee explained:

“If it’s for a paper, I try to use Google Scholar because I’m afraid normal websites are not reliable.” (I4)

This practice reflects an emerging awareness of information credibility and academic sourcing, which are widely recognized as central components of digital literacy in higher education. The ability to distinguish between scholarly and non-scholarly sources indicates a shift from passive information consumption toward more critical information practices (Chizwina & Moyo, 2024; Dzogovic et al., 2025; Ergün, 2025; Ravikumar et al., 2024)

However, these transformative digital practices were not evenly distributed across participants. While a small group demonstrated Level 3 engagement, the majority remained positioned at Level 2 (Digital Usage) despite having access to similar digital technologies. This uneven distribution suggests that the development of transformative digital literacy may depend less on the availability of technological tools and more on pedagogical exposure, instructional design, and opportunities for creative experimentation within teacher education programs. Recent research similarly emphasizes that meaningful digital transformation in education is driven not merely by technology access but by learning environments that encourage critical reflection, multimodal production, and authentic digital problem-solving (Alsulami, 2025; Lytras et al., 2024; Park & Kim, 2025; Wu et al., 2023; Zhang et al., 2024)

These findings indicate that while prospective EFL teachers are generally comfortable using digital technologies for routine academic purposes, only a subset have begun to develop the higher-order competencies associated with transformative digital literacy. Strengthening these competencies therefore requires intentional pedagogical interventions that encourage creative digital production, critical information evaluation, and innovative technology integration in teaching practice.

Largely superficial forms of collaboration and cultural awareness

Collaboration and cultural awareness emerged as relatively underdeveloped dimensions of digital literacy across the three data sources. Quantitative results from the questionnaire and performance-based test indicated that over 90% of participants were positioned at Level 2 (Digital Usage) in the collaboration dimension, suggesting that most participants were able to use digital tools for coordination but had not yet progressed toward more transformative forms of collaborative knowledge-building. These patterns were further clarified through interview data, which revealed how participants conceptualized and practiced digital collaboration in their academic activities.

Most participants described collaboration primarily as a process of task division and coordination, rather than as an opportunity for shared problem-solving or co-construction of knowledge. For instance, one participant explained:

“Everyone does their own part, then we combine it at the end. We rarely discuss ideas deeply.” (I1)

This illustrates that collaboration was often structured around efficiency and task completion rather than meaningful interaction or collective reflection. Although participants regularly used digital platforms such as WhatsApp and Google Docs to coordinate group assignments, these tools were mainly employed to manage logistical aspects of teamwork rather than to facilitate sustained academic dialogue. Previous research similarly suggests that frequent use of digital communication platforms does not necessarily translate into deeper collaborative learning unless tasks are intentionally designed to promote knowledge negotiation and collective inquiry (Alberti & Espinoza, 2023; Basille et al., 2025; Inostroza-Contreras et al., 2025; Korosidou & Bratitsis, 2023; Tang & Bradshaw, 2020)

A similar pattern was observed in the dimension of cultural awareness, which participants often interpreted in a limited and passive manner. Instead of engaging in reflective intercultural dialogue, many participants equated cultural awareness with exposure to global content on social media platforms. One participant noted:

“I follow people from different countries on Instagram, so I think that already shows cultural awareness.” (I5)

While such practices may increase awareness of cultural diversity, they rarely involve critical reflection or meaningful intercultural interaction. Contemporary digital literacy frameworks emphasize that cultural awareness in digital environments should include the ability to engage respectfully with diverse perspectives, reflect on cultural differences, and participate in intercultural communication within online communities (Borger, 2022; Dooly & Darvin, 2022; Kayyali, 2025; Sinaga et al., 2025; Xu et al., 2025). However, the participants’ responses suggest that cultural engagement remained largely observational rather than dialogical, reflecting a surface-level understanding of intercultural digital communication.

Collaboration and cultural awareness among the participants were largely transactional rather than transformative. Digital platforms enabled frequent interaction and exposure to diverse information sources, but they did not automatically promote critical intercultural understanding or collaborative knowledge construction. This observation aligns with previous studies arguing that digital technologies alone cannot foster meaningful collaboration or intercultural competence without pedagogical guidance and structured learning activities that encourage reflective dialogue and shared knowledge creation (Ayazbayeva et al., 2025; Bleicher et al., 2025; Knoth et al., 2023; Rosmayanti, 2025; Shonfeld et al., 2021).

Consequently, these results highlight the importance of integrating collaborative inquiry tasks, intercultural digital exchanges, and reflective discussions within teacher education programs. Such pedagogical strategies may help prospective EFL teachers move beyond functional communication toward more transformative forms of collaboration and intercultural engagement in digital learning environments.

Limited critical awareness in information evaluation and e-safety

The dimensions of information evaluation and e-safety also revealed uneven development among the participants. Across the questionnaire and performance-based test results, most participants demonstrated basic awareness of online credibility and digital safety, but only a small proportion showed evidence of more advanced or proactive practices. In Martin’s (2009) framework, this pattern corresponds primarily to Level 2 (Digital Usage), where individuals can apply digital tools functionally but have not yet developed the critical and reflective capacities associated with Level 3 (Digital Transformation).

For instance, many participants reported that they typically verify online information by consulting more than one source. While this practice indicates a basic awareness of information credibility, it does not necessarily reflect the systematic evaluation skills required for academic inquiry. In the digital literacy test, only a limited number of participants demonstrated structured

evaluation strategies, such as comparing sources based on authorship, publication credibility, or citation evidence. Interview responses further revealed uncertainty about how to assess the reliability of online information. As one participant explained:

"I usually just compare a few websites, but I don't really know any specific method to judge credibility." (I2)

This response suggests that although participants recognize the importance of verifying information, many lack familiarity with established evaluation frameworks such as the CRAAP test or other structured approaches to assessing accuracy, authority, and relevance of digital sources. Similar patterns have been reported in recent studies showing that students often rely on intuitive judgment rather than systematic evaluation when engaging with online information (Forzani, 2020; Lee et al., 2026). Such practices may limit their ability to critically navigate the increasingly complex digital information environment.

A comparable pattern was observed in the dimension of e-safety. Most participants demonstrated basic protective behaviors, such as creating strong passwords or avoiding suspicious links. However, these practices were primarily oriented toward personal security rather than broader digital responsibility. Interview narratives suggested that participants rarely considered digital safety as part of their future role as educators. For example, one participant stated:

"I know about password safety, but I've never thought about teaching others about online risks." (I4)

This statement reflects a narrow understanding of e-safety that focuses on individual protection rather than the ethical and pedagogical dimensions of digital citizenship. Contemporary digital literacy frameworks emphasize that educators should not only practice safe digital behaviour themselves but also guide students in developing responsible online practices, including privacy protection, respectful communication, and critical awareness of online risks (Casadomet, 2024; Dahal, 2023; Manzano & Orellana, 2026; Salendab et al., 2025). Without such awareness, prospective teachers may struggle to support learners in navigating digital environments safely and responsibly.

These findings indicate that participants' competencies in information evaluation and e-safety remain largely functional rather than transformative. Digital literacy was frequently interpreted as a practical skill for completing academic tasks or protecting personal accounts, rather than as a broader ethical, pedagogical, and social competence required in contemporary educational contexts. Similar conclusions have been reported in recent research suggesting that many pre-service teachers possess operational digital skills but require further support to develop critical information literacy and digital citizenship competencies (Ha et al., 2026; Sergeeva et al., 2024).

These results therefore highlight the importance of integrating explicit instruction in information evaluation, media literacy, and digital ethics within teacher education programs. Providing opportunities for prospective teachers to analyse online information critically, engage in discussions about digital responsibility, and design learning activities that address online safety may help strengthen their readiness to guide future learners in digitally mediated environments.

To provide a clearer visualization of these distributions across Martin's three levels of digital literacy, Figure 3 presents the overall percentages of participants' competencies, highlighting the dominance of Level 2 alongside the emerging but limited evidence of Level 3 transformation.

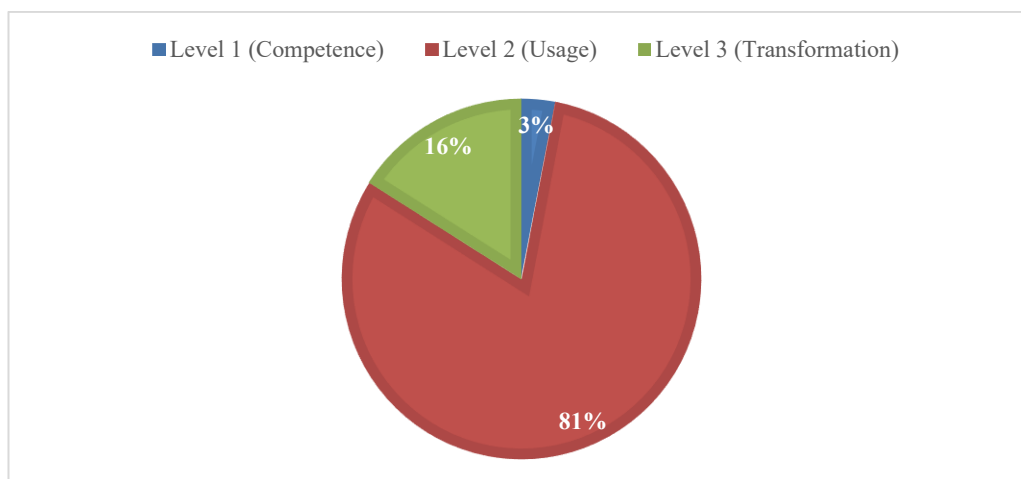


Figure 3. Distribution of Digital Literacy Levels among Participants

Figure 3 illustrates the distribution of digital literacy levels among prospective EFL teachers in a private university in West Java, categorized using Martin's (2009) framework. The chart shows that the overwhelming majority of participants, 81% are situated at Level 2 (Digital Usage). This indicates that most respondents possess sufficient functional skills to apply digital technologies effectively for academic and communicative purposes. By contrast, 16% of participants demonstrate Level 3 (Digital Transformation), reflecting a smaller but notable group who were able to employ digital tools for more critical, creative, and innovative practices, such as content creation, research evaluation, and entrepreneurial applications. Only 3% of participants remained at Level 1 (Digital Competence), suggesting that basic operational ability is no longer a major barrier in this cohort. Overall, the figure highlights the dominance of functional digital engagement while pointing to emerging but still limited evidence of transformative digital literacy among pre-service teachers.

Conversely, dimensions such as collaboration, communication, cultural awareness, and e-safety remained largely functional, indicating that students tend to use digital technologies primarily for coordination and information access rather than reflective engagement or ethical digital participation. These patterns suggest that teacher education programs should move beyond emphasizing operational digital skills and instead create learning environments that intentionally cultivate higher-order digital competencies. For instance, structured project-based learning tasks can encourage students to engage in collaborative digital production rather than merely coordinating assignments. Similarly, reflective pedagogical activities may help students critically evaluate online information sources and consider the ethical implications of digital participation. Explicit instruction in intercultural digital communication and online safety may also be necessary, particularly given the passive forms of cultural engagement and limited awareness of digital responsibility observed among participants. By integrating such pedagogical strategies into teacher education curricula, programs may better support the progression from functional digital usage toward transformative digital literacy that is pedagogically meaningful for future EFL classrooms.

Discussion

The dominance of Level 2 (Digital Usage) across questionnaire, test, and interview data provides compelling evidence of the functional orientation of digital practices among pre-service EFL teachers. This supports Martin's (2009) claim that learners often achieve operational competence without progressing to transformative digital literacy, which involves creativity, criticality, and innovation. The findings are also consistent with Ng (2012) and Spante et al. (2018) who observe that students commonly use digital tools to fulfil immediate academic tasks rather than to engage in higher-order, reflective, or innovative practices. In this sense, digital literacy remains more instrumental than developmental, serving pragmatic needs but not fully exploited as a vehicle for transformation.

The heavy concentration of Level 2 in collaboration and communication illustrates participants' reliance on widely available platforms such as WhatsApp, Google Docs, and Zoom for everyday academic interaction. While this indicates proficiency in resource-sharing and coordination, it does not necessarily reflect critical engagement with collaborative processes. As

Gillen (2014) argue, everyday digital practices cannot automatically be equated with advanced literacies: without explicit scaffolding and reflective pedagogy, collaboration risks remaining transactional, with students merely exchanging information rather than critically co-constructing knowledge. This transactional mode of interaction highlights the need for pedagogical frameworks that guide students in moving from coordination to genuine collaboration, where shared problem-solving and co-creation of digital content are prioritized.

By contrast, the relatively higher proportions of Level 3 in creativity and information search suggest that these are the dimensions where transformative practices are beginning to emerge. Participants who employed Canva for entrepreneurial outputs or adopted Google Scholar and academic database for systemic research represent instances of higher-order digital literacy. These practices move students beyond digital consumption to digital production, evaluation, and innovation. Such findings resonate with Buckingham's (2022) assertion that creativity and critical thinking constitute the core of digital literacy in the 21st century. They also signal that when learners are exposed to platforms and contexts that demand originality or critical research skills, transformation becomes more attainable. Importantly, these transformative practices often occur in self-initiated or entrepreneurial contexts, suggesting that formal learning environments may not yet provide sufficient space for students to experiment with creative and critical uses of technology.

In contrast, e-safety and cultural awareness emerged as the weakest dimensions, with limited progression towards transformation. While many students reported secure behaviours such as using strong passwords enabling two-factor authentication, fewer engaged in proactive practices like peer education, digital advocacy, or critical reflection on intercultural interaction. Similarly, although most students expressed openness towards cultural diversity online, their engagement tended to be passive, limited to social media exposure rather than reflective or dialogical. This uneven profile aligns with Helsper and Eynon (2013) observation that digital literacy is often domain-specific: learners may achieve advanced competence in creativity or information search digital communication. These weaknesses underscore potential risks for pre-service teachers, who must not only safeguard themselves but also model safe and culturally sensitive practice for future pupils.

Taken together, the findings underscore the critical importance of supporting the transition from usage to transformation. Teacher education programmes must go beyond training students in functional tools and deliberately cultivate critical reflection, intercultural competence, and advanced information literacy. Embedding reflective pedagogy, designing tasks that encourage innovative production, and incorporating explicit training on digital ethics and safety are key pathways to strengthening digital literacy in line with Hague & Payton's (2010) framework. Doing so would not only enhance students' capacity to act as innovative practitioners but also prepare them to guide future learners as digitally literate educators and responsible digital citizens. Viewed collectively, teacher education programmes may need to move beyond emphasizing operational digital skills and instead create learning experiences that intentionally cultivate higher-order digital competencies. This may involve integrating reflective pedagogical practices that encourage critical engagement with digital tools, designing project-based learning tasks that require collaborative digital production, and providing explicit training in information evaluation, intercultural digital communication, and online safety. By embedding these elements within teacher education curricula, programmes can better support prospective EFL teachers in progressing from functional technology use toward the transformative digital literacy required in contemporary language education.

CONCLUSION

This study set out to profile the digital literacy of 26 prospective EFL teachers at one private university in West Java, using Hague & Payton's (2010) eight dimensions and Martin's (2009) three levels of digital competence as analytical frameworks. The purpose was not only to map students' functional abilities but also to assess their potential for transformative engagement with digital tools in academic and pedagogical contexts. The findings confirmed that the majority of participants were situated at Level 2 (Digital Usage), demonstrating strong competence in everyday academic applications but with only limited progression to Level 3 (Digital Transformation). Evidence of transformative practice emerged most clearly in creativity and information search, while areas such as collaboration, communication, and cultural awareness remained largely functional and transactional.

These results highlight a significant gap between students' confidence in using digital technologies and their capacity to employ them critically, creatively, and reflectively in ways that

foster 21st-century teaching and learning. In line with the study's objectives, this uneven profile underscores the need for teacher education programmes to design pedagogical strategies that explicitly cultivate critical reflection, intercultural digital communication, and advanced information literacy. By embedding structured, practice-oriented digital training within the curriculum, pre-service teachers can be supported to move beyond functional usage toward becoming innovative educators and responsible digital citizens.

In terms of practical implications, the study suggests that curriculum developers and teacher educators should integrate more project-based and reflective digital tasks, provide explicit training on information evaluation and e-safety, and create opportunities for intercultural digital dialogue. These interventions would not only enhance the digital readiness of future teachers but also equip them to model best practices for their own students.

At the same time, the study acknowledges its limitations in terms of sample size, institutional scope, and cross-sectional design. Future research should therefore expand the participant pool across diverse institutions and geographical contexts, adopt longitudinal approaches to track the development of digital literacy as students transition into professional practice, and further investigate how transformative digital engagement can be fostered through specific pedagogical innovations. Such research would deepen the understanding of how digital literacy can evolve from functional competence to transformative practice, thereby addressing the demands of teaching and learning in the 21st-century digital era.

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