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Digital Literacy Profile of Prospective Elementary School Teachers in Indonesian Language Learning: a Case Study at Universitas Muhammadiyah Prof. DR. HAMKA

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Abstract

Digital literacy is essential for Prospective Elementary School Teachers to foster the development of technology-based teaching skills. Therefore, understanding the digital literacy profile of prospective is essential as a foundation for developing informed learning policies. This study aims to describe the digital literacy profiles of prospective elementary school teachers by analyzing their digital literacy skills through a quantitative survey-based research approach. The study population consisted of 1,400 students, from which a sample of 210 was selected using stratified random sampling. The research instrument consisted of a Likert-scale questionnaire encompassing indicators such as functional and technical skills in operating digital devices, creativity in producing digital learning content, collaboration abilities using digital platforms, communication skills within digital spaces, information literacy in locating and selecting learning resources, critical thinking in evaluating digital content, socio-cultural awareness related to digital ethics, electronic security in safeguarding personal data, and technical problem-solving competencies. The study's findings indicated that prospective of elementary school strong proficiency in information literacy, with an average score of 4.57, and digital communication, scoring 4.42. However, certain areas require further development, particularly electronic security (3.50) and digital socio-cultural understanding (3.65), which received comparatively lower scores. In light of these findings, measures should be taken to enhance the digital literacy of prospective primary school teachers,

particularly through language skills courses aimed at strengthening their understanding and effective use of digital technology and information.

Keywords: *digital literacy, Indonesian language learning, prospective elementary school.*

Abstrak

Literasi digital sangat penting bagi Calon Guru Sekolah Dasar untuk mendorong pengembangan keterampilan mengajar berbasis teknologi. Oleh karena itu, memahami profil literasi digital calon guru sangat penting sebagai dasar untuk mengembangkan kebijakan pembelajaran yang terinformasi. Penelitian ini bertujuan untuk mendeskripsikan profil literasi digital calon guru sekolah dasar dengan menganalisis keterampilan literasi digital mereka melalui pendekatan penelitian berbasis survei kuantitatif. Populasi penelitian terdiri dari 1.400 siswa, dengan sampel sebanyak 210 siswa dipilih secara acak. Instrumen penelitian terdiri dari kuesioner skala Likert yang mencakup indikator-indikator seperti keterampilan fungsional dan teknis dalam mengoperasikan perangkat digital, kreativitas dalam menghasilkan konten pembelajaran digital, kemampuan berkolaborasi menggunakan platform digital, keterampilan komunikasi dalam ruang digital, literasi informasi dalam menemukan dan memilih sumber belajar, berpikir kritis dalam mengevaluasi konten digital, kesadaran sosial budaya terkait etika digital, keamanan elektronik dalam menjaga data pribadi, dan kompetensi pemecahan masalah teknis. Temuan penelitian menunjukkan bahwa calon guru sekolah dasar memiliki kecakapan yang kuat dalam literasi informasi, dengan skor rata-rata 4,57, dan komunikasi digital, dengan skor 4,42. Namun, beberapa area perlu dikembangkan lebih lanjut, terutama keamanan elektronik (3,50) dan pemahaman sosial budaya digital (3,65), yang mendapatkan skor relatif lebih rendah. Berdasarkan temuan ini, langkah-langkah perlu diambil untuk meningkatkan literasi digital calon guru sekolah dasar, terutama melalui kursus keterampilan berbahasa yang bertujuan memperkuat pemahaman dan penggunaan teknologi dan informasi digital secara efektif.

Kata kunci: *literasi digital, pembelajaran bahasa indonesia, calon guru sekolah dasar.*

INTRODUCTION

The onset of the Fourth Industrial Revolution has brought significant transformations across various sectors of society, with education being notably affected. These changes influence nearly every facet of life, encompassing economic, social, and educational domains. Recent studies demonstrate that digital literacy has become a critical competency for educators in this new paradigm (Hasudungan et al., 2020; Saragih et al., 2024). UNESCO's 2023 Global The Education Monitoring Report highlights that teachers now need advanced digital competencies to successfully operate within technology-mediated learning environments.

In the digital transformation era, elementary school (SD) students utilize digital technology to learn and acquire knowledge under the guidance of their teachers (Moylan & Code, 2023). Therefore, proficiency in using digital technology is among the essential competencies that elementary school teachers must possess (Haryanti, 2024), alongside other skills such as creativity, critical thinking, communication, problem-solving, mathematical

abilities, and collaboration (Haile et al., 2024).

In response to the growing demands of the digital age, elementary educators are now called upon to blend time-honored instructional practices with technology-driven strategies. Such a hybrid approach is fast becoming essential if teachers are to nurture the wide range of competencies that modern learners require (Saragih et al., 2024). Elementary school students also need to recognize the rapid advancement of technology and leverage it as a resource for acquiring knowledge (Zeng et al., 2023).

Cardona and Rodríguez (2022) highlighted the importance of teachers guiding students to comprehend digital technologies and utilize them to access diverse learning resources. Consequently, digital technology literacy is a crucial skill for teachers to effectively support the learning process (Getenet et al., 2024). Digital-based learning equips students to meet the demands of the workforce, particularly in effectively utilizing technology. Conversely, without teachers' digital technology literacy, students are likely to struggle in developing these essential skills (Naimi-Akbar et al., 2023).

In response to the demands of the digital transformation era, the Indonesian government, through Law Number 14 of 2005 concerning Teachers and Lecturers, mandates that teachers possess four fundamental competencies: (1) professional competence, (2) pedagogical competence, (3) personality competence, and (4) social competence. However, these four competencies alone are insufficient to fully address the challenges of the digital era. Teachers must also acquire additional knowledge and skills, particularly in integrating digital technology into teaching practices, a proficiency commonly referred to as digital technology literacy (Istiani et al., 2023).

To address teachers' digital literacy requirements, UNESCO has developed a technology-based framework. The research of Bayne (2024) examines digital technology literacy in teachers, but the focus is still on the general picture, the factors that affect it, and efforts to improve this literacy. Bayne (2024) conducted a study focused on developing digital technology literacy among prospective teachers, aiming to prepare them to incorporate digital tools in their teaching. However, this research remains in the preliminary phase of identifying the specific competencies required by teachers in the technological domain.

Recent research by Moylan & Code (2023) developed an instrument to measure teachers' pedagogical competence in the use of digital technology. Meanwhile, Suwandi et al. (2024) emphasize the connection between the professional identity of elementary school teachers and their use of digital technology in the learning process. Furthermore, Getenet et al. (2024) argue that teachers must possess digital technology literacy skills to effectively integrate these tools into their instructional activities. The concept of digital technology literacy was initially defined by Gaol et al. (2024) as the capacity to comprehend and utilize information from diverse digital sources across various contexts, including academic, professional, and everyday settings. Similarly, Sebele-Mpofu (2024) describes digital technology literacy as an individual's ability to employ information and communication technology (ICT) to search for, evaluate, use, create, and communicate information, a process that demands both cognitive and technical skills.

Digital literacy reaches beyond mere technical know-how; it intertwines with everyday competencies such as organizing files, evaluating sources, and behaving ethically online. Mastery of these skills depends on the ability to think critically about the information one

encounters and to manage that material in ways that are both efficient and responsible (Lau et al., 2024). Within contemporary pedagogy, a sturdy grasp of digital technology empowers learners to unearth credible texts, sift through misdirection, and shield personal information from intrusive eyes. The same skill set flags hostile software and misleading claims before they take hold in a young researchers mind (McDougall et al., 2018). Digital literacy also allows students to communicate and collaborate with friends or teachers through digital media (Santiago-Garabieta et al., 2023).

Students possessing digital literacy are more likely to avoid plagiarism, achieve strong academic results, and have better prospects for success in the workforce. Given the importance of digital literacy in education, especially in today's digital era (Jariah, 2024), students especially prospective teachers are expected to have digital literacy as one of the main skills that must be mastered (Gilster, 1999).

Digital technology literacy enhances teachers' professionalism in facilitating the teaching and learning process with their students (Naimi-Akbar et al., 2023) . This professionalism is cultivated through the development of critical thinking, creativity, communication, collaboration, and multiple forms of literacy, including digital technology literacy (Rothe et al., 2024). This is crucial because contemporary learning demands that students develop critical and creative thinking abilities, proficiency in information technology, as well as strong communication and collaboration skills (Nalaila & Elia, 2024).

Therefore, prospective teachers must master digital technology literacy to enhance their professional competencies and effectively support students in developing these skills. Additionally, primary school students, as participants in this learning process, require early introduction to digital technology literacy (Moylan & Code, 2023). For prospective elementary school teachers, digital technology literacy is essential not only throughout their academic studies but also serves as a fundamental skill when they begin their professional teaching careers (Lemmi & Pérez, 2024).

The elementary school teacher education study program seeks to prepare future educators with well-rounded digital literacy skills, embedding these competencies across subjects such as Indonesian Language Skills. The curriculum invites participants to craft, test, and measure Indonesian-language pedagogies that respond to contemporary classroom realities. Because many future hires cite flexibility as critical, readings and workshops spotlight experimental routines and learner-centered exchanges without privileging any single platform. The agenda also steers enrollees toward digital scaffolding-apps, forums, even social media-where they can scout fresh resources, debate in real time, and track the field as it shifts (Nalaila & Elia, 2024). They learn to process and present information in diverse formats, enhancing their critical thinking, problem-solving, and analytical abilities (Haile et al., 2024). The syllabus assigns considerable weight to digital literacy; students are expected to navigate devices, applications, and the wider internet confidently. Mastery of these tools usually sharpens command of standard language skills and, crucially, prompts growth in critical analysis, problem solving, and evaluative reasoning. In the course design, fluency with technology is treated as a core competency, one that permits educators to pivot swiftly as platforms and practices change (Rizki et al., 2024).

The elementary school teacher education curriculum is deliberately crafted to immerse future instructors in classroom techniques anchored in contemporary digital tools. Faculty

members routinely incorporate tablets, interactive whiteboards, and learning-management platforms so that education majors graduate fluent in the technology students already expect (Chandler, 2017). Tanzania's University plays a significant role in promoting equitable access to digital literacy, particularly among students preparing to become future educators (Nalaila & Elia, 2024). The institution invites incoming learners who matured in networked spaces long before they enrolled.

Blending digital literacy into the elementary school teacher education curriculum empowers future educators to manage online obstacles and capitalize on emerging opportunities. Such training is no longer supplementary; it has become a core requirement of teaching in a technology-drenched landscape (van der Ploeg & Blankinship, 2024). The program prepares future instructors to navigate the digital classroom and pairs that technical fluency with a sustained emphasis on clear, communicative teaching methods. Participants leave with the confidence to shape activities that feel timely and locally resonant, yet still rooted in sound pedagogical theory. A deliberate focus on practice lets enrollees witness firsthand how apps, platforms, and one-off tools can break through the usual plateaus in language acquisition. By course end their portfolios already include prototypes stout enough for use in a network of partner schools (Nguyen et al., 2024). The syllabus deliberately emphasizes practical pedagogy infused with digital tools. Participants learn to present academic content in fresh, inventive formats that resonate with twenty-first-century learners (Moylan & Code, 2023). Such a framework provides educators with concrete strategies for tailoring language instruction to learner priorities while grounding those strategies in the realities of twenty-first-century communication.

The questions for analysis of students' digital literacy profiles in elementary school teacher education course such as 1) what is the level of digital literacy of students in the elementary school teacher education study program in understanding digital technology and information after taking various relevant courses in the program?; what is the ability of prospective of elementary school to use digital technology and information to support learning and teaching practices in primary education?. Guided by these questions, this study seeks to assess the digital literacy levels of prospective of elementary school who have completed several core in elementary school teacher education study program, focusing specifically on their capacity to comprehend and apply digital technology within the context of elementary education. Therefore, a comprehensive analysis of the digital literacy profiles of prospective elementary school—beyond just language skills courses—is essential to provide a broader foundation for policy-making and decision-making aimed at enhancing the quality of teacher education. The findings of this study are expected to inform the development and refinement of the elementary school teacher education curriculum strategies that effectively integrate and maximize digital literacy across various subjects, ultimately equipping future elementary school teachers to become competent and adaptable users of digital technology in educational settings.

METHODS

The present investigation employs a quantitative framework grounded in a descriptive research design, specifically calibrated to map the digital literacy profiles of prospective elementary school. Subsequent to courses such as language skills, the student cohort serves as the principal unit of analysis, such a descriptive design reliably catalogues behavioral and cognitive phenomena, thereby illuminating prospective teachers mastery and application of digital technologies in a primary-school context. The sampling protocol drew on a purposive random design, blending chance selection with explicit, criterion-driven filters. A total of 210 third-semester elementary school teacher education undergraduates who had already passed both the Language Skills module and several pedagogy courses aimed at digital instruction formed the final cohort. This deliberate vetting process was intended to secure respondents who were already comfortable with tech-rich pedagogy, thus aligning the ensuing data set closely with the studys core questions (Mukhyi, 2023). The authors constructed a compact battery of multiple-choice items, each one calibrated to probe respondents comprehension of everyday digital tools and the flow of online information. A second survey sheet, distinct in form yet included in the same field deployment, turned its attention to the practical dimensions of electronic security perceived by the subjects.

The study gathered information through a dual-instrument design, deploying both an objective test and a student-administered questionnaire. The test itself comprised multiple-choice items crafted to gauge respondents cognitive grasp of core ideas in digital technology and information science. The separate questionnaire, by contrast, set out to map learners attitudes and habits while also probing their awareness of electronic safety, digital ethics, and the everyday use of online media in classroom context.

The survey instruments were built around indicators of digital literacy coded for a primary-school audience. Content validity, widely viewed as the blueprint stage of test development, was confirmed in a round of expert reviews by scholars in both online pedagogy and early-childhood teaching (Pasaribu et al., 2022). In a preliminary review the panel of specialists aligned each survey question and performance task with its proposed indicator to check for direct correspondence. To gauge the devices overall reliability, researchers computed Cronbachs Alpha and thereby quantified internal consistency. The resulting index, well above conventional thresholds, confirmed that the instrument persistently reflected the target constructs.

A panel of scholars meticulously examined each test question and survey prompt to confirm that all items corresponded with the predetermined performance indicators. Internal consistency was subsequently gauged through Cronbachs Alpha; the derived score, which exceeded the conventional threshold, signalled that the instrument produced stable measurements for the constructs of interest.

The analysis drew on 1,400 prospective in the elementary school teacher education study program. Out of this larger cohort, 210 third-semester candidates were singled out through purposive sampling. The choice reflected an effort to reach learners who had already passed the core modules where digital literacy first appears. That prior engagement with technology-infused pedagogy means these students are well-positioned to demonstrate the practical digital skills future primary teachers will need in the classroom. Their shared course history thus provides a solid baseline for evaluating readiness to deploy tech-driven instructional approaches.

Table 1. Digital Technology Literacy Criteria

No.	Score	Category
1	4.2–5.0	Very high
2	3.4–4.2	High
3	2.6–3.4	Currently
4	1.8–2.6	Low
5	1.0–1.8	Very low

Data analysis was carried out with descriptive statistics through the distribution of questions and tests (Anwar, 2009). Descriptive statistics provided the initial lens through which the inquiry examined student proficiency with digital tools in Indonesian-language modules. Attention centred specifically on learners abilities both to grasp the underlying concepts of each platform and to put those concepts to practical use. Questionnaire responses and performance metrics from in-class exercises thus yielded the raw evidence that descriptive computations subsequently summarized and organized (Gilster, 1999). The analytic procedure presented here applies the standard mean calculation alongside the grand mean formulation in order to retrieve per-variable averages and a single collectively weighted average. Data rows have been compiled into tabular form before undergoing interpretive scrutiny to bolster comprehension of the findings. Table 1 stipulates the competency benchmarks governing proficiency in digital technology.

RESULTS AND DISCUSSION

The results of the digital literacy assessment were analyzed to evaluate students' understanding of technology and digital information within the context of learning. The average scores for each sub-variable were calculated based on responses from 210 prospective elementary school, using the formula presented in Table 2. Overall, the results indicate that students possess strong competencies in several key areas of digital technology literacy, particularly in information retrieval, communication, and critical thinking. However, electronic security remains a significant challenge, highlighting the need for targeted interventions to ensure a more comprehensive and balanced development of digital literacy skills.

Table 2. Digital technology literacy test results to understand aspects of understanding

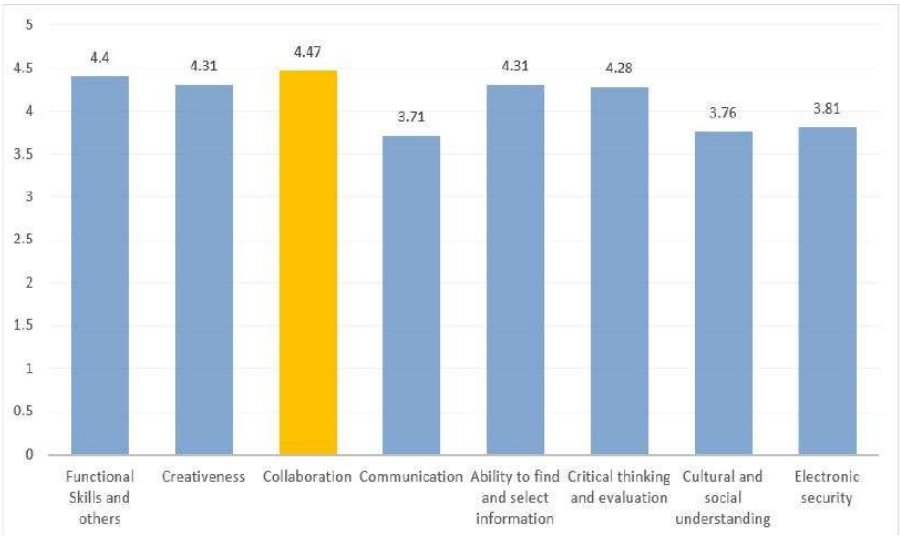
No	Question Aspect	Average	Category
Functional Skills and others			
1.	Understand how basic hardware such as computers, tablets, and smartphones work.	4,19	High
2.	Understand the basic functions of common software such as word processors, spreadsheets, and emails.	4,62	Very high
Creativeness			
3.	Understand how to use digital tools to create creative work, such as graphic design.	4,33	Very high
4.	Understand how to use multimedia applications to create creative content such as videos and animations.	4,29	Very high
Collaboration			

5.	Understand how to work in a team online using collaboration platforms like *Google Workspace*	4,95	Very high
6.	Understand how to share documents or files online and manage shared access.	4,00	High
Comunucation			
7.	Understand the principles of effective communication through digital media such as email or chat.	3,62	High
8.	Understand communication etiquette in the digital space, such as how to respond and comment.	3,81	High
Ability to find and select information			
9.	Understand how to search for the information you need on the internet quickly and accurately.	3,95	High
10.	Understand how to evaluate the credibility of sources of information I find on the internet.	4,67	Very high
Critical thinking and evaluation			
11.	Understand the importance of evaluating information before sharing it on social media.	3,81	High
12.	Understand how to assess the accuracy of information circulating on digital platforms.	4,76	Very high
Cultural and social understanding			
13.	Understand the social impact of digital media use on local culture and norms.	3,71	High
14.	Considering the social impact of the information I share on digital media.	3,81	High
Electronic security			
15.	Understand the importance of keeping personal data safe while doing activities on the internet.	3,33	Currently

The graph 1 presents the average scores across different dimensions of digital literacy. The highest score, 4.47, was achieved in the area of finding and selecting information, suggesting that students are proficient in locating and organizing relevant content. This is followed by strong performance in communication (4.42), creativity (4.40), and critical thinking (4.34). Functional skills and related domains recorded an average score of 4.21. Meanwhile, cultural and social understanding, along with collaboration, received lower scores of 4.02, indicating areas where further development is needed. Electronic security (e-safety) received the lowest score of 3.67, underscoring the need for increased emphasis on understanding digital security and privacy. While students exhibit strong competencies in information retrieval, communication, and critical thinking, enhancing their awareness and knowledge of electronic security is crucial for achieving a more comprehensive and balanced digital literacy profile.

Based on the assessment results presented above, the performance of each aspect is illustrated in the graph 1. The overall level of digital literacy understanding can be determined using the grand mean formula, as shown below.

$$Grand\ Mean = \frac{Total\ Averange}{\text{Amount of Indicator}} = \frac{33{,}05}{8} = 4.13$$



Graph 1. Results of the digital technology literacy test on the comprehension aspect

Based on calculations using the Grand Mean formula proposed by (Anwar, 2009), the overall score of the quantity indicator of the aspect of digital technology literacy use is calculated by dividing the total average 33.05 by the number of indicators (8). The results of the calculation indicate that the overall average, or Grand Mean, is 4.13. This score reflects that the digital technology literacy level of prospective elemenyary school at the University of Muhammadiyah Prof. Dr. HAMKA—particularly in terms of usage—is categorized as good.

A comparison of each indicator in the preceding chart reveals that most digital literacy components scored above the overall average of 4.13. Notably, the ability to find and select information (4.47), communication (4.42), and creativity (4.40) stood out as the highest-performing areas. A different picture emerges when the sub-scores are examined individually. Electronic security charts at 3.67 and socio-cultural insight lands at 4.02, both resting below the overall mean. Such a dip points to a lopsided command of digital literacy; the PGSD cohort at Muhammadiyah Prof. Dr. HAMKA sails confidently in some waters but stalls in others.

The data collected indicate that postgraduate-program students at Universitas Muhammadiyah Prof. Dr. HAMKA possess a respectable command of general digital technology. Nevertheless, pockets of relative weakness remain and invite deliberate pedagogical intervention. Electronic security surfaced as the single lowest competence, and that finding calls for an immediate infusion of focused training in password management, phishing discernment, and similar skills. Raising future teachers awareness of why such precautions matter is integral to nurturing responsible day-to-day use of technology. For those curious about the mathematics behind the summary number, its grand mean. The formula-means total scores divided by the number of items-appears below.

$$Grand\ Mean = \frac{Total\ Averange}{\text{Amount of Indicator}} = \frac{33{,}59}{8} = 4.19$$

In the second chart collaboration receives the top mark of 4.47, a figure echoed in the first visual by students capacity to locate and curate digital material, such a coincidence suggests that the cohort is equally comfortable working alongside others and navigating the online information landscape. Functional skills, creativity, and critical appraisal keep

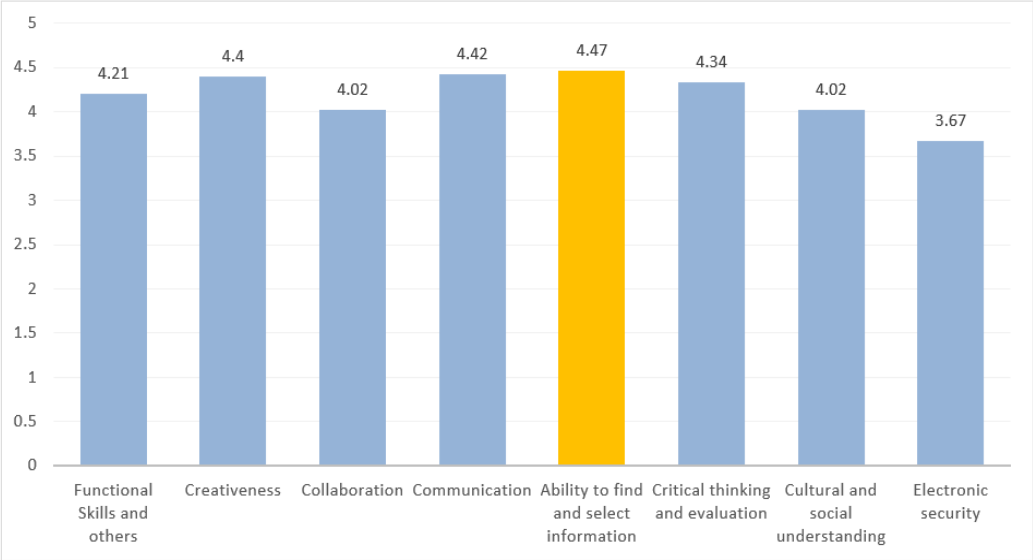
registering at generous levels throughout both displays, reinforcing the impression that this group routinely employs technology in purposeful, reflective ways.

Students enrolled in the Postgraduate Program of Educational Sciences at Universitas Muhammadiyah Prof. Dr. HAMKA display impressive command over collaborative software, judicious information sourcing, and applied technical skills. Their proficiency, however, exposes distinct gaps in clear communication, robust electronic security practices, and nuanced appreciation of diverse cultures. Bridging these gaps will yield the balanced digital literacy profile necessary for tomorrow's educators operating in increasingly networked classrooms.

Table 3. Results of a questionnaire on digital technology literacy skills in the aspect of use.

No	Question Aspect	Average	Categories
Functional Skills and others			
1.	Using basic software such as Microsoft Word and Excel for daily tasks.	4,38	Very high
2.	Using internet-based applications for data management purposes, such as *Google Drive*.	4,05	High
Creativeness			
3.	Using design or multimedia software to create creative digital content	4,38	Very high
4.	Utilizing digital applications to express creative ideas in work or projects.	4,43	Very high
Collaboration			
5.	Using online collaboration tools, such as Google Docs, to work with others in real-time	4,00	High
6.	Get used to sharing files and tasks with colleagues or friends online for joint projects.	4,05	High
Communication			
7.	Able to communicate effectively via email and instant messaging apps for professional purposes.	4,48	Very high
8.	Using various social media platforms to share information and ideas with a wide audience.	4,24	High
Ability to find and select information			
9.	Get used to using search engines to find relevant and valid information quickly.	4,33	Very high
10.	Being able to filter out inaccurate or irrelevant information when conducting *online research*.	4,62	Very high
Critical thinking and evaluation			
11.	Use critical thinking to assess the credibility of information before sharing it on social media.	4,41	Very high
12.	Evaluate information critically before making informed decisions.	4,19	High
Cultural and social understanding			
13.	Using digital technology to understand and respect other cultures in online communication.	3,90	High

14.	Considering the social impact of the information I share on digital media.	4,14	High
Electronic security			
15.	Get used to enabling security features like strong passwords and two-factor authentication.	3,67	Currently



Graph 2. Results of the Digital Literacy Questionnaire on the Usage Aspect

The graph presents the average digital literacy competency scores of prospective elementary school, assessed across eight key components on a 0 to 5 scale. The highest score was observed in the ability to find and select information, with a mean of 4.47, demonstrating that students possess strong skills in locating, evaluating, and choosing relevant digital information to support learning and teaching activities. Other components that achieved high scores include communication (4.42), creativity (4.4), and critical thinking and evaluation (4.34), reflecting students' strong capabilities in employing digital tools imaginatively, communicating effectively in online settings, and critically analyzing digital content. Additionally, the functional skills component scored 4.21, indicating a solid proficiency in the fundamental technical operation of digital devices and platforms.

Nonetheless, the components of collaboration and cultural and social understanding scored comparatively lower, each with an average of 4.02. Although these scores fall within the proficient range, they indicate that students' skills in digital collaboration and in navigating socio-cultural dynamics online could be further enhanced through targeted development. Electronic security received the lowest average score of 3.67, suggesting that students may have limited knowledge or awareness of online safety, digital identity protection, and ethical conduct in digital environments. Consequently, this domain demands focused attention to bolster students' comprehensive digital literacy.

In short, prospective elementary school demonstrate robust digital literacy in most domains—particularly in locating, managing, and sharing information. Yet their abilities in electronic security and in navigating the socio-cultural dimensions of online environments lag behind. These gaps should guide future curriculum design and targeted teaching interventions

so that the program fully equips students for the realities of a digitally driven era.

Digital technology literacy profile understanding aspects

An indicator-by-indicator analysis of the digital-technology literacy test shows that students' competence in technology and information security falls within the "average" range, as reflected by a mean score of 3.5. Students' grasp of technology and information security remains weak. This deficit appears across multiple indicators, including appreciation of personal-data protection during online activities, creative use of digital tools, collaborative and communicative abilities, effective information search and selection, cultural and social awareness, and general e-safety. Although their critical-thinking and evaluation skills reach a moderate level, these strengths are insufficient to compensate for shortcomings in the other areas.

The study shows that students habitually turn to the internet—both to exchange ideas with classmates and lecturers and to look up extra information when course concepts feel vague. Yet, instructors seldom offer clear, hands-on guidance on weaving internet-based ICT tools into their learning activities. Consequently, students' understanding and critical use of ICT for academic purposes remain limited. This finding is consistent with the study by Veum et al. (2020) reached comparable conclusions, underscoring the importance of first strengthening students' functional ICT abilities—particularly basic computer and internet operations that underpin effective learning. They likewise argue that lecturers should prioritize engaging pedagogical approaches and instructional models to heighten students' motivation and sustain their interest in the material.

Furthermore, the evidence suggests that students have not yet developed strong creative abilities in applying digital technologies to education. Most find it difficult to craft learning resources in multiple digital formats or to participate in genuinely inventive technology-mediated tasks. The shortfall is intensified by how little guidance lecturers—especially in core PGSD courses—provide on designing digital instructional materials. These findings are in line with research by Alrajhi (2024) who stresses the importance of integrating creativity with digital tools in teacher education, enabling students to produce multimedia learning resources. Additionally, Widiana et al. (2023) supports these findings, stating that creative thinking skills should go hand in hand with imaginative thinking skills. Innovative thought is indispensable for producing genuinely original work. Even so, our results mirror earlier scholarship, emphasizing that pre-service teacher programs must purposefully nurture both practical digital skills and imaginative digital competencies. However, these findings challenge the common assumption of students' inherent digital fluency, reinforcing the view that digital literacy should be approached as a structured learning objective rather than a presumed pre-existing competency. To bridge these gaps, lecturers—especially within primary teacher education study programs—should integrate explicit instruction and practical activities that promote critical, creative, and pedagogically effective uses of digital technology.

This study also highlights the role of collaboration as a key indicator of digital literacy, defined as the collective engagement of individuals or groups in working toward shared objectives. Findings indicate that students possess a relatively low level of understanding when it comes to articulating ideas collaboratively in digital learning

environments. Specifically, during Indonesian language skills courses, students have not received instruction on how to engage in discussions or collaborative activities through digital platforms. This finding is in line with the opinion of Giray et al. (2024), who stated that many platforms can be used for collaborative activities, such as PhET Interactive Simulations, Moodle, Google Classroom, Zenius Education, and others. However, in this study, students only use WhatsApp groups for collaboration activities.

Students also demonstrate a limited understanding of how to negotiate ideas with peers in digital learning environments. This is due to the absence of explanation or guidance from lecturers on how to conduct collaborative discussions effectively. These findings are consistent with the views of Bodén et al. (2023), who argue that collaborative skills can be enhanced through the explicit instruction and implementation of collaborative learning models supported by various applications functioning as Learning Management Systems (LMS).

Students' ability to understand their audience in digital environments—particularly in relation to learning interests—remains relatively low. This is in line with the analysis of Faisal et al. (2024), which emphasized that communication is an important tool for students as prospective teachers in carrying out learning activities. The limited level of student communication in digital environments can be attributed to their insufficient understanding of digital technologies. The lecturer has not provided sufficient guidance or instruction on the use of digital forms of communication. As a result, student participation in utilizing digital communication tools during the learning process remains minimal. In practice, students primarily rely on face-to-face interactions in the classroom, which are further constrained by limited instructional time. This face-to-face communication also does not always guarantee optimal understanding for students. These findings are supported by Hancock & Hancock (2024), who state that improving communication skills can be done by providing explanations and directions to utilize digital communication.

Undergraduate readers often treat the first webpage encountered as definitive and rarely check that claim against a printed monograph, a university press article, or another reliable repository. Rothe et al. (2024) observe precisely this tendency when they underline the verification skill as a core component of information literacy. A deliberate cross-examination of sources spares researchers repeated encounters with clickbait, falsehoods, and the fungible scams that multiply online. The research of Jyothy et al. (2024) also supports the importance of efforts to improve students' ability to search and sort information.

The application of aspects in digital technology literacy profiles

Statistical review of the dataset disclosed a troubling shortfall in digital-literacy, participants settling at a mean of only 3.14. This modest figure stems principally from lacklustre showings in creativity, teamwork, intercultural sensitivity, effective messaging, and basic electronic security. Even though the cohort exhibited solid command of functional skills plus decent ability in sourcing and assessing information, those pockets of strength proved too slender to mask short-comings elsewhere.

The data collected here reveal that learners command only rudimentary functional digital skills, a shortfall that persists even in 2023. In contrast, the same cohort reaches a middling benchmark when asked to locate and employ online resources for course work. That

inconsistency hints that daily smartphone traffic has yet to translate into real fluency for drafting, designing, or otherwise producing educational artifacts. Such an outcome echoes earlier surveys; those studies concluded that future teachers will not outgrow this plateau without sturdy networks and continuous, practice-based training.

Furthermore, the study revealed that students' creativity remains underdeveloped, as reflected in their limited ability to generate original ideas, produce creative outputs, and engage in imaginative thinking. Many students face challenges in presenting material in a coherent and engaging way and demonstrate minimal proficiency in utilizing digital tools to design innovative instructional content. This deficiency in creativity is attributed to the lack of structured guidance and encouragement provided by lecturers throughout the learning process. The findings align with research conducted by Astuty et al. (2024) who highlight that creativity in educational contexts must be intentionally nurtured, especially through project-based learning and digital storytelling tasks that require students to use technology creatively.

The research uncovered troubling gaps in the students digital collaboration skill set, most pointedly in their capacity to communicate, negotiate, and express concepts under the pressures of a web-based classroom. Such evidence indicates that many learners remain unpracticed in-or simply wary of-the give-and-take that interactive online forums demand. Heavy dependence on tools like Google Meet and Zoom for real-time instruction has, perhaps inevitably, fostered a culture of passive attendance; cameras and microphones are routinely switched off, leaving muted avatars to fill the screen. That pattern all but strangles the possibilities for genuine dialogue and the kind of idea-bargaining that elevates collective understanding. These findings support the work of Deressa et al. (2023) who propose the use of Learning Management Systems (LMS) such as Moodle, Edmodo, Flipped Classroom approaches, and Google Classroom to promote more active and participatory learning environments. Similarly, Castañeda and Williamson (2021) contend that fostering digital collaboration skills necessitates pedagogical strategies that promote knowledge co-construction and engagement in digital dialogue. The narrow bandwidth of collaboration detected in the present investigation might be broadened if instructors adopted learning management systems outfitted with live discussion forums, peer-review modules, and shared-content repositories.

Recent data suggest that communication metrics-land halfway between strong and weak-yet many dimensions still lag behind. For instance, survey-takers struggled to read a digital audience, show willingness for online learning, and tune in to students interests in web spaces; each of these scored in the low range. Taken together, the picture is one of chronic shortfall: the group uses, shares, and decodes ideas on screens only with modest confidence. Strengthening those core habits is not optional if the next phase of training is to succeed. Research by Mbandje and Loureiro (2023) revealed that the low communication skills of respondents are related to their habit of only using smartphones for direct communication, not for discussion in the context of lectures. Students are not yet accustomed to actively expressing their own ideas or attentively engaging with others' perspectives through digital platforms. This is also supported by the research of Naimi-Akbar et al. (2023), which suggests improving digital communication skills through the use of a LMS. The LMS provides a forum that enables students to engage in structured discussions, allowing them to exchange ideas and gain insights from others. This interaction contributes to the development of their

communication skills, particularly in the context of using digital technology.

Education researchers regularly cite a noticeable gap in beginning teachers mastery of socio-cultural content knowledge, especially when the focus shifts to Indonesi-s-language pedagogy. Many observation visits reveal that trainee instructors lean heavily on standard-textbook sequences, glossing over local customs and everyday vernacular that could truly anchor the lesson in learners lived experience.

The research of Nguyen et al. (2024) supports these findings, stating that today's evolving sociocultural understanding requires that the design and learning activities are based on certain criteria, such as critical thinking, collaboration, communication, and creativity (Martínez et al., 2024). Contemporary scholarship increasingly contends that student progress hinges on the provision of explicit guidance, sustained hands-on engagement, and immediate facilitation as learners adapt evaluative criteria to shifting socio-cultural contexts. Realizing this vision demands a purposeful choreography of instructional activities, each tightly calibrated to recognized pedagogical standards.

Further examination of the responses indicated that the e-safety indicator-an aggregate measure of secure web navigation, prudent content generation, and responsible collaboration-was assigned a disappointingly low rating. An identical pattern emerged with respect to basic protective practices; many participants reported infrequent use of simple defenses like unique passwords and personalized usernames across the educational applications they accessed. Collectively, these observations signal an urgent instructional gap and suggest that efforts to fortify digital handling skills must focus on safe browsing, prudent content creation, active teamwork, and the consistent application of account-security protocols. This finding is in line with the research of Istiani et al. (2023) corroborates the observation, labeling students digital safety literacy as low; many learners encounter programs that bundle multiple instructional utilities for the first time. In the same department, the instructors have yet to routinize platforms that support discussion boards, host background readings, display slide sets, or streamline the collection of course assignments. The recent evidence converges with Porcu et al. (2024) argument that a well-configured learning management system can organize course material in a way that invites students to engage more deliberately while also giving preservice teachers a sandbox for mastering platform administration. Faculty members, therefore, are advised to deliver on-the-spot demonstrations that not only build digital fluency but also reinforce basic security habits-for instance, choosing robust usernames and passwords-that protect the integrity of the virtual classroom.

Scholars who have surveyed pedagogical practice in Indonesia now caution that meager digital literacy arises not from outmoded hardware but from the very curriculum itself. Courses billed as strengthening Indonesian language skills give inadequate hands-on training with websites, databases, and adaptive software. Students therefore encounter those resources for the first time in exams and feel lost, a gap that drags national digital-competence scores downward. Research by Kumalasari et al. (2024) also suggests that a feasible remedy is to deliver targeted training sessions that instruct students on how to navigate digital tools and sift through online information. the observation corroborates earlier conclusions, indicating that localized workshops could be smoothly integrated into courses on Indonesian language. such an approach would, in all likelihood, bolster the participants digital literacy across the curriculum.

CONCLUSION

The research reveals that would-be elementary educators have only a modest grasp of digital literacy, falling short when asked to read, arrange, and maneuver online resources and software. Shortcomings surfaced in areas as varied as basic technical operation, inventive application, group-centered projects, clear messaging, source evaluation, awareness of cultural context, and safe browsing habits. Such weaknesses obstruct meaningful technology use in everyday classroom practice. Effective teacher training now demands more than the traditional syllabus; courses, especially those focused on language study, must weave in hands-on digital literacy practice if future educators are to bridge the persistent technology gap in classrooms. Admittedly, the present inquiry operates within a limited geographic footprint and rests on self-reported measures, yet even that narrow lens reveals sharp divides in how preservice teachers define essential digital skills. Broader comparative studies-fueled by survey, logfile, and ethnographic evidence drawn from schools nationwide-will be essential to confirm these initial impressions and to chart a truly inclusive course forward.

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REFERENCES

Alrajhi, A. S. (2024). The salient antecedents of boredom in formal English language learning. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2342672

Anwar, A. (2009). Statistika untuk Penelitian Pendidikan dan Aplikasinya dengan SPSS dan Excel. In *IAIT Press*.

Astuty, E., Sudirman, I. D., & Aryanto, R. (2024). Sustainable resilience strategy: unleash the micro-businesses's potential in the digitalization and sustainability era. *Cogent Business and Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2313672

Bayne, S. (2024). Digital education utopia. *Learning, Media and Technology*, *49*(3), 506–521. https://doi.org/10.1080/17439884.2023.2262382

Bodén, U., Stenliden, L., & Nissen, J. (2023). The construction of interactive and multimodal reading in school—a performative, collaborative and dynamic reading. *Journal of Visual Literacy*, *42*(1), 1–25. https://doi.org/10.1080/1051144X.2023.2168395

Castañeda, L., & Williamson, B. (2021). Assembling New Toolboxes of Methods and Theories for Innovative Critical Research on Educational Technology. *Journal of New Approaches in Educational Research*, *10*(1), 1–14. https://doi.org/10.7821/NAER.2021.1.703

Chandler, P. D. (2017). To what extent are teachers well prepared to teach multimodal authoring? *Cogent Education*, *4*(1). https://doi.org/10.1080/2331186X.2016.1266820

Deressa, A., Gamachu, M., Birhanu, A., Ayana, G. M., Raru, T. B., Negash, B., Merga, B. T., Regassa, L. D., & Ababulgu, F. A. (2023). Malaria Risk Perception and Preventive Behaviors Among Elementary School Students, Southwest Ethiopia. Generalized Structural Equation Model. *Infection and Drug Resistance*, *16*, 4579–4592. https://doi.org/10.2147/IDR.S415376

Faisal, F., Hapsari, M. A., Joseph, C., & Pramono Sari, M. (2024). Sustainable development goals on gender equality disclosure practices of Indonesian companies. *Cogent Business and Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2362423

Gaol, R. A. L, David Sidebang, D., Amelia Taufiq, T., William Iskandar Ps, J. V, Baru, K., Percut Sei Tuan, K., & Deli Serdang, K. (2024). Penulisan Teks Artikel Ilmiah. *Jurnal Bintang Pendidikan DanBahasa*, *2*(3), 107–114. https://doi.org/10.59024/bhinneka.v2i3.844

Getenet, S., Haeusler, C., Redmond, P., Cantle, R., & Crouch, V. (2024). Bridging the digital divide: gender and learning mode impacts on pre-service teacher digital competence and online engagement. *Irish Educational Studies*, *May*, 1–17. https://doi.org/10.1080/03323315.2024.2359694

Gilster, P. (1999). Digital_Literacy gilster. *Meridian: A Middle School Computer Technologies Journal*, 141. https://www.academia.edu/1354072/Digital_Literacy?bulkDownload=thisPaper-topRelated-sameAuthor-citingThis-citedByThis-secondOrderCitations&from=cover_page

Giray, L., Nemeño, J., Braganaza, J., Lucero, S. M., & Bacarra, R. (2024). A survey on digital device engagement, digital stress, and coping strategies among college students in the Philippines. *International Journal of Adolescence and Youth*, *29*(1), 1–19. https://doi.org/10.1080/02673843.2024.2371413

Haile, K. W., Gebremariam Olamo, T., & Abera Yemiru, M. (2024). English as a foreign language instructors' questioning behaviors and strategy uses for reflective learning facilitation. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2380632

Hancock, J., & Hancock, A. (2024). School leaders as projective agents: online spaces for heritage languages during COVID-19. *Current Issues in Language Planning*. https://doi.org/10.1080/14664208.2024.2309777

Haryanti, Y. D. (2024). *Project-based Authentic Assessment Needs Analysis for Teachers in Primary Schools*. *11*, 30–44. https://doi.org/http://dx.doi.org/10.24235/al.ibtida.snj.v11i1.16982

Hasudungan, A. N, Joebagio, H., & Dewi Sartika, L. (2020). Transformasi Kearifan Lokal Pela Gandong dari Resolusi Konflik Hingga Pendidikan Perdamaian di Maluku. *Sosial Dan Budaya*, *5*(1). https://doi.org/10.25217/jf.v5i1.784

Istiani, I., Fatimah, E., Husain, A., Yuvita, Nf., Eka Sulistyawati, A., & Sunmud, S. (2023). Analyzing the Development of Digital Literacy Framework in Education: a Systematic Literature Review. *Kwangsan: Jurnal Teknologi Pendidikan*, *11*(1), 242. https://doi.org/10.31800/jtp.kw.v11n1.p242--254

Jariah, A. (2024). *The Digital Era : Transformation of Elementary School Students ' Character through Social Media Interaction*. *11*, 200–213. https://doi.org/http://dx.doi.o10.24235/al.ibtida.snj.v11i1.16992

Jyothy, S. N., Kolil, V. K., Raman, R., & Achuthan, K. (2024). Exploring large language models as an integrated tool for learning, teaching, and research through the Fogg Behavior Model: a comprehensive mixed-methods analysis. *Cogent Engineering*, *11*(1). https://doi.org/10.1080/23311916.2024.2353494

Kumalasari, R. A. D., Rahardjo, K., Kusumawati, A., & Sunarti, S. (2024). Biometric-based self-service technology adoption by older adult: empirical evidence from pension fund sector in Indonesia. *Cogent Business and Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2325543

Lau, K. L., Qian, Q., & Chiu, T. K. F. (2024). Effects of instructional factors on students' acceptance of and participation in flipped language learning. *Interactive Learning Environments*, 1–15. https://doi.org/10.1080/10494820.2024.2375642

Lemmi, C., & Pérez, G. (2024). Translanguaging in elementary science. *International Journal of Science Education*, *46*(1), 1–27. https://doi.org/10.1080/09500693.2023.2185115

Martínez, M., Clarke, L., Hamilton, L., & Hall, C. J. (2024). Fostering crosslinguistic knowledge about language in young learners: effects of explicit L2 Spanish grammar learning on L1 English grammar. *Language Awareness*, *33*(2), 304–327. https://doi.org/10.1080/09658416.2023.2228196

Mbandje, D. C., & Loureiro, M. J. (2023). Digital competence and information literacy: clarifying concepts based on a literature review. *Educational Media International*, *60*(3–4), 306–316. https://doi.org/10.1080/09523987.2023.2324584

McDougall, J., Readman, M., & Wilkinson, P. (2018). The uses of (digital) literacy. *Learning, Media and Technology*, *43*(3), 263–279. https://doi.org/10.1080/17439884.2018.1462206

Moylan, R., & Code, J. (2023). Algorithmic futures: an analysis of teacher professional digital competence frameworks through an algorithm literacy lens. *Teachers and Teaching: Theory and Practice*, *30*(4), 452–470. https://doi.org/10.1080/13540602.2023.2263732

Mukhyi, M. A. (2023). *Metodologi Penelitian panduan praktis penelitian yang efektif*. Malang: PT Literasi Nusantara Abadi Grup

Naimi-Akbar, I., Weurlander, M., & Barman, L. (2023). Teaching-learning in virtual learning environments: a matter of forced compromises away from student-centredness? *Teaching in Higher Education*, 1–17. https://doi.org/10.1080/13562517.2023.2201674

Nalaila, S., & Elia, E. F. (2024). Students' digital literacy skills for learning in selected Tanzania's public universities. *Cogent Education*, *11*(1), 1–13. https://doi.org/10.1080/2331186X.2024.2355350

Nguyen, H. T. M., Nguyen, H. T. T., Gao, X., Hoang, T. H., & Starfield, S. (2024). Developing professional capacity for Content Language Integrated Learning (CLIL) teaching in Vietnam: tensions and responses. *Language and Education*, *38*(1), 118–138. https://doi.org/10.1080/09500782.2023.2260374

Pasaribu, B., & Dkk. (2022). Metodologi Penelitian Untuk Ekonomi dan Bisnis. In *UUP Academic Manajemen Perusahaan YKPN*. https://repository.uinjkt.ac.id/dspace/bitstream/123456789/65013/1/Metodologi Penelitian.pdf

Porcu, O., Hermans, L., & Broersma, M. (2024). Creative Autonomy in the Newsroom: How Hierarchy Impacts Innovative Behaviour. *Journalism Practice*, 1–20. https://doi.org/10.1080/17512786.2024.2310056

Rizki, S., Yanti, L. P., & Akinola, F. A. (2024). Optimizing the Role of ICT and Educational Innovation in the Digital Era: Challenges and Opportunities. *International Seminar on Student Research in Education, Science, and Technology*, *1*(April 2024), 661–678. https://journal.ummat.ac.id/index.php/issrectec/article/view/22758

Rothe, J., Darcourt, A., Moll, K., Schulte-Körne, G., & Schmalz, X. (2024). Mediation in the Relation of Orthographic Processing on the Lexical and Sublexical Level with Reading and Spelling Skills. A Large Cross-Sectional Study in Elementary School Children in Germany. *Scientific Studies of Reading*. https://doi.org/10.1080/10888438.2024.2352402

Santiago-Garabieta, M., Zubiri-Esnaola, H., García-Carrión, R., & Gairal-Casadó, R. (2023). Inclusivity, friendship and language learning: boosting collaboration in interactive groups. *Educational Research*, *65*(2), 189–203. https://doi.org/10.1080/00131881.2023.2189433

Saragih, S., Hidajat Tjakraatmadja, J., & Putra Pratama, A. (2024). Decent work in a digital age: a comprehensive review of research and theory. *Cogent Business and Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2371552

Sebele-Mpofu, F. Y. (2024). Hidden curriculum in accounting education in the digital era: the evolution, role, controversies, challenges and implications. *Cogent Arts and Humanities*, *11*(1). https://doi.org/10.1080/23311983.2024.2402123

Suwandi, S., Drajati, N. A., Handayani, A., & Tyarakanita, A. (2024). The analysis of Ecoliteracy elements in language textbooks. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2023.2300907

van der Ploeg, M., & Blankinship, B. (2024). Online language learning in the third-age: Concrete recommendations to improve seniors' learning experiences. *Gerontology and Geriatrics Education*, *45*(1), 114–124. https://doi.org/10.1080/02701960.2022.2143357

Veum, A., Siljan, H. H., & Maagerø, E. (2020). Who am I? How Newly Arrived Immigrant Students Construct Themselves Through Multimodal Texts. *Scandinavian Journal of Educational Research*, 1–16. https://doi.org/10.1080/00313831.2020.1788147

Widiana, I. W., Triyono, S., Sudirtha, I. G., Adijaya, M. A., & Wulandari, I. G. A. A. M. (2023). Bloom's revised taxonomy-oriented learning activity to improve reading interest and creative thinking skills. *Cogent Education*, *10*(2), 1–15. https://doi.org/10.1080/2331186X.2023.2221482

Zeng, S., Sha, H., & Xiao, Y. (2023). How does digital technology affect total factor productivity in manufacturing industries? Empirical evidence from China. *Economic Research-Ekonomska Istrazivanja* , *36*(1). https://doi.org/10.1080/1331677X.2023.2167221