Understanding University Students' Digital Literacy in Distance and Face-To-Face Learning

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A R T I C L E I N F O

A B S T R A C T

For all generations, not just Generation Z, who are often labelled as digital natives, having the skill to use technology appropriately and effectively is essential as it is a vital part of our life. Since we cannot be certain that we have the abilities required to evaluate digital information, understanding digital literacy is even more important in the context of higher education because it helps us to measure and define our skill in using digital information. Therefore, this comparative study aims at measuring the Digital Literacy (DL) of Face-to-Face (FTF) campus students (group 1) and Distance Learning (DLe) campus students (group 2). The Digital Literacy Scale (DLS) was distributed to 500 students at various levels (freshman undergraduates to postgraduates) spread across several campuses in Indonesia which apply Distance Learning or Face-to-Face Learning. The result of the analysis provides an up-to-date overview of the DL abilities of students in relation to their learning and socialization skills during their time as students. Furthermore, we also discuss the implications that indicate how they will continue to adapt to the drastic changes in the era of Industry 4.0.

INTRODUCTION

In the ever-changing world of education, digital literacy is an essential ability that students need to have in order to succeed in a variety of settings. While obtaining supplemental materials and engaging in in-person discussions still require some level of digital literacy in traditional classroom settings, the dependence on digital resources is significantly lower than in distant learning. In contrast, a lot of the resources, conversations, and interaction with the course materials in distant education are reliant on digital platforms. Hence, students in distance learning environments must possess robust digital literacy skills to effectively navigate online systems, retrieve academic materials, and engage with peers through various online tools, including multimedia presentations (Thyssen et al., 2023).

Furthermore, because distance learning relies heavily on digital platforms, technological difficulties frequently occur (Pandiangan et al., 2021). This emphasizes how important it is for students to be able to troubleshoot problems on their own. Comprehending the disparities in digital literacy among pupils in diverse educational settings enables instructors to customize assistance programs appropriately. Open Thinking skill is one of the keys because they need to have open minded and positive attitude toward change (Rohmah & Rizqon, 2023) because it allows them to accept the emergence of various digital literacies. Teachers can promote equal access to technology infrastructure and training in digital skills, especially for underprivileged student groups, by pointing out differences in digital literacy.

In addition, it is imperative to incorporate the development of digital literacy abilities into curriculum design and instructional techniques to guarantee that students are suitably equipped to meet the challenges of the digital era. (Öncül, 2020). By comparing digital literacy across different learning contexts, educators can pinpoint effective pedagogical practices and technology-enhanced learning strategies that enhance student engagement and learning outcomes.

Even while digital literacy is important, there is still a need for focused guidance, particularly for first-year students who can overestimate their own computer proficiency. In addition to performance activities and online tests, self-assessment surveys provide insightful information about students' knowledge of their digital literacy deficiencies. However, a more comprehensive strategy is needed to properly address students' digital literacy needs. Such an approach can provide a nuanced understanding of students' digital literacy skills and inform targeted interventions to support their development in higher education contexts (Öncül, 2020; Thyssen et al., 2023).

A number of studies on DL provided various outcomes as well. We collected some studies from Turkey and one study from Indonesia. First, Gokdas and Çam (2022) exposed that there is no significant different between female and male teachers towards DL. Interestingly, teachers with less professional experience gained more positive the DL score than teachers with more professional experience. Second, (Gunduzalp, 2021) it was confirmed that there is a significant relationship between information literacy and DL skills.

Third, Zan et al. (2021) found that the level of students' DL was varied across majors (Psychology, History, Turkish Language and Literature, Contemporary Turkish Dialect and Literature). Their level was influenced by their devices ownership and time spent on the internet and the computer/the smartphone. Meanwhile in Indonesia, Liza and Andriyanti (2020) uncovered that preservice teachers obtained high level of DL scale which implies their high readiness toward the application of digital technology.

By comparing digital literacy across different learning environments, educators can identify effective pedagogical practices and technology-enhanced learning strategies. Through the use of digital tools and platforms, this comparative research enables the investigation of cutting-edge teaching strategies that improve student engagement and learning results in both face-to-face and virtual learning environments. Furthermore, assessing the differences in digital literacy between students enrolled in face-to-face and online courses can provide insight into the presence of digital divides and unequal access to resources and technology. By promoting fair access to internet connectivity, digital skills training, and technology infrastructure, especially for underprivileged or marginalized student groups, this analytical data can direct efforts to eliminate gaps. Therefore, this study intend to: 1) to measure the Digital Literacy (DL) of Face-to-Face (FTF) campus students (group 1) and Distance Learning (DLe) campus students (group 2), and 2) to compare between the two groups of students.

METHODOLOGY

This study utilizes a correlational research design to measure digital literacy (DL) among two distinct groups of university students and to compare the correlation between them. DL, as explained by Amin, Malik, & Akkaya (2021) and Reddy et al. (2023), encompasses expert use of digital resources. Correlational research is ideally suited for evaluating digital literacy levels among Face-to-Face (FTF) and Distance Learning (DLe) campus students since it may examine correlations between variables without interfering, which is necessary to get the desired outcome. Researchers can examine digital literacy levels in various learning environments and learn more about how these levels differ by using this design. This method offers a useful understanding of the variables impacting digital literacy in higher education settings and is consistent with the theoretical framework of the Theory of Digital Literacy.

The participants in this study consisted of 500 university students from diverse academic levels, ranging from freshman undergraduates to postgraduates. These students were selected from multiple campuses across Indonesia that offer both face-to-face or distance learning programs. Group 1 comprised FTF campus students, while Group 2 consisted of DLe campus students.

To measure digital literacy, the Digital Literacy Scale (DLS) was utilized as the primary instrument. The DLS is a validated tool designed to assess various dimensions of digital literacy, including information literacy, media literacy, communication skills, critical thinking, and technical proficiency

(Reddy et al., 2023). The DLS was selected due to its thorough coverage of digital literacy competencies that are pertinent to settings in higher education. Media literacy, information literacy, communication literacy, visual literacy, technology literacy, and computer literacy are the six dimensions measured by the five-point Likert scale in the DLS. In total, there are 60 statements.

The DLS survey was given to the chosen participants as part of the data collection process. In order to guarantee effective data collecting and to accommodate respondents from many campuses, the survey was conducted electronically. The participants were furnished with unambiguous guidelines on how to fulfil the survey, stressing the significance of truthful and precise answers. Furthermore, steps were taken to guarantee participant responses' anonymity and confidentiality.

The obtained responses were put through a thorough statistical analysis once the data collection process was complete. An outline of the participants' degrees of digital literacy was produced using descriptive statistics, such as means, standard deviations, and frequencies. A comparison and test of the relationship between the digital literacy levels of FTF and DLe campus students were conducted using inferential statistics.

RESULTS AND DISCUSSION

We conduct a thorough examination of students' media, information, communication, visual, technology, and computer literacy competency across both Face-to-Face (FTF) and Distance Learning (DLe) campuses by looking at the data shown in Tables 1 through 6. Starting with Table 1, which compares the two groups' mean scores for media literacy proficiency, we observe that the t-test findings show no statistical significance, despite the modest differences in mean scores between the two groups. In spite of this, further examination reveals fascinating discrepancies in a range of literacy domains, stimulating research into the fundamental causes of these variations.

Media Literacy

It should be noted that the t-test results indicate that the difference in mean media literacy abilities between these two groups is not statistically significant. The t-value is 1.75 with a p-value of 0.082 ($p > 0.05$), indicating that this difference cannot be considered statistically significant. In the context of this study, although DLe campus students have slightly higher averages in the "media literacy" component, this difference is not significant enough to be considered meaningful. This may suggest that both groups have a relatively high level of similarity in this ability within the context of the research.

Tabel 1. Comparison of Students' Media Literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	46.5	49.9
Standard Deviation	10.4	7.3
N	242	248
t Score	1.75	
p Score	0.082	

While the t-test results show no significant difference in media literacy between Distance Learning (DLe) and Face-to-Face (FTF) students, several factors may explain this similarity. Since social media and online news are common media channels used by both populations, their media literacy is probably similar. Further factors that could support this parity include the incorporation of multimedia into curriculum design and learning modalities. Undoubtedly, the focus educators place on digital citizenship and critical media analysis also contributes. The need of developing critical thinking abilities in order to navigate the media landscape of today is highlighted by these findings, which also emphasize the universality of media literacy development across educational settings.

Even though the statistical research indicates that DLe and FTF students have similar levels of media literacy, it is important to take into account the impact that unique learning experiences and preferences have on the development of media literacy. For example, because they are used to digital platforms and self-directed learning, DLe students might be more conscious of online media literacy practices. Conversely, face-to-face encounters between FTF students and their professors may prove advantageous as they allow for more in-depth conversations and group media analysis. The apparent consistency in media literacy abilities may be attributed to the complimentary skill sets that these different learning settings foster.

Students' media literacy outcomes may also be influenced by societal changes toward digitization and the democratization of media creation and consumption. With the rise of user-generated content platforms such as YouTube and TikTok, the distinction between media producers and consumers is becoming increasingly hazy as more people have the ability to create and share multimedia content. Students enrolled in DLe and FTF programs are probably using these platforms as well, developing their critical analysis skills and learning how to maneuver through dynamic digital environments. The amalgamation of conventional and digital media environments could thus foster a mutual basis of media literacy proficiencies among learners, regardless of their mode of instruction.

Information Literacy

In Table 2, data comparing the information literacy of distance learning (DLe) and face-to-face (FTF) students is presented. Analysis results reveal that DLe students demonstrate a higher average proficiency, scoring a mean of 41.2, whereas FTF students score a mean of 37.8. Despite similar levels of variability

indicated by the standard deviations for both groups, the t-test indicates a statistically significant difference in means between them. With a t-value of 2.12 and a p-value of 0.035 (p < 0.05), this suggests that DLe students exhibit significantly superior information literacy levels compared to FTF students within the scope of this study. This observation may suggest their enhanced capability to engage with a wider range of information.

Tabel 2. Comparison of Sinformation Literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	41.2	37.8
Standard Deviation	7.4	9.3
N	242	248
t Score	2.12	
p Score	0.035	

In addition to the statistical findings, it is essential to consider the potential underlying factors contributing to the disparity in information literacy between DLe and FTF students. One plausible explanation could be the inherent nature of distance learning environments, which often require students to navigate various digital resources and online platforms independently. Engaging in online discussions, conducting research through digital libraries, and accessing multimedia learning materials are integral components of the distance learning experience, which may foster a heightened level of information literacy among DLe students. Conversely, while face-to-face instruction offers opportunities for real-time interactions and immediate feedback from instructors, it may not provide the same degree of exposure to digital information sources and digital literacy skills development. Thus, the structural differences between DLe and FTF learning modalities could contribute to the observed difference in information literacy proficiency.

Moreover, investigating the ramifications of the noted disparity in DLe and FTF students' information literacy proficiency can provide insight into viable approaches to improving information literacy in a variety of educational settings. For example, in order to better equip students for navigating the digital landscape, educators should think about adding additional training in digital literacy and information literacy to traditional face-to-face courses. Furthermore, it may be advantageous for face-to-face instructors and distant learners to collaborate on sharing pedagogical strategies and best practices for promoting information literacy. Education establishments can endeavor to develop a student body that possesses the strong information literacy abilities necessary for success in the knowledge-driven world of today by utilizing the advantages of both learning modalities and implementing creative teaching strategies.

Communication Literacy

The comparison data in the Table 3 reveals an intriguing difference in students' communication literacy between DLe and FTF students. The analysis indicates that DLe students exhibit a higher average ability, with a mean information literacy value of 19.6, whereas FTF students have a mean value of 18.7. Despite a relatively similar level of variability in the abilities, the t-test results highlight a statistically significant difference in mean between the two groups. With a t-value of 2.61 and a p-value of 0.009 ($p < 0.05$), it can be concluded that DLe students possess a significantly higher level of communication literacy compared to FTF students. This suggests their enhanced ability to receive, deliver, and communicate information better, within the context of this study.

Tabel 3. Comparison of Students' Communication Literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	19.6	18.7
Standard Deviation	3.2	4.0
N	242	248
t Score	2.61	
p Score	0.009	

Beyond the statistics, the difference in communication literacy between DLe and FTF students highlights the impact of technology-mediated communication. DLe students, accustomed to digital tools, may excel in online communication, whereas FTF students might lack exposure to these modalities. Integrating digital communication skills into all educational settings is crucial for equipping students with versatile communication abilities.

By comprehending the causes of the communicative literacy gap, instructional strategies can be improved. Including interactive exercises in traditional classroom settings as well as online can help students become more proficient communicators. Giving them the chance to reflect and receive feedback helps them become even more competent.

The disparity in communication literacy could reflect societal changes toward digital communication when taking larger trends into account. Being able to communicate digitally is essential for getting around in the linked world of today. Students who prioritize the development of their communication skills are more equipped to succeed in the personal, academic, and professional spheres.

Visual Literacy

From Table 4, concerning the examination of visual literacy proficiency among DLe and FTF students, it is evident that DLe students showcase superior average proficiency, scoring a mean of 47.3, while FTF students score a mean of 43.4. Despite both groups showing relatively similar variability levels indicated by standard deviations, the t-test results highlight a statistically significant disparity in average proficiency between them, with a t-value of 2.23 and a p-

value of 0.020 (p < 0.05). Consequently, within the context of this study, it can be inferred that DLe students possess significantly higher levels of visual literacy compared to FTF students, potentially indicating their adeptness in sharing and comprehending visual information.

Tabel 4. Comparison of Students' visual Literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	47.3	43.4
Standard Deviation	11.2	8.8
N	242	248
t Score	2.23	
p Score	0.020	

Moreover, delving into the reasons behind the difference in visual literacy between DLe and FTF students sheds light on instructional methods and learning environments. Digital multimedia resources and interactive materials in distance learning courses likely contribute to DLe students' enhanced visual literacy. Interacting with digital images and visual data in online settings encourages interpretation and analysis, fostering visual literacy skills. Conversely, traditional instruction may offer fewer opportunities for hands-on exploration, limiting exposure to diverse visuals. Investigating pedagogical strategies in DLe and FTF courses can reveal effective approaches for promoting visual literacy.

The broader implications of the visual literacy gap extend to academic and professional realms. Proficiency in visual literacy is increasingly vital in a digital society where visual communication is prevalent. Strong visual literacy enables students to interpret, create, and analyze visual content effectively. It prepares them for careers in design, media, marketing, and technology. By prioritizing visual literacy in curricula and offering diverse visual experiences, educational institutions equip students to navigate the visual complexities of the digital age and succeed in various fields.

Technology Literacy

From Table 5, it can be observed that there is a comparison of technology literacy proficiency between Distance Learning (DLe) and Face-to-Face (FTF) students. The analysis results indicate that FTF students have a lower average proficiency in this aspect, with a mean score of 35.9, whereas DLe students have a mean score of 38.5. The standard deviations for both groups are relatively similar, indicating nearly equivalent levels of variability in technology literacy proficiency. The conducted t-test yields a t-value of 2.76 with a p-value of 0.006 (p < 0.05), showing that the difference in average technology literacy proficiency between the two groups is statistically significant, with DLe students demonstrating significantly higher levels of technology literacy within the context of this research.

Tabel 5. Comparison of Students' Technology Literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	38.5	35.9
Standard Deviation	4.4	4.3
N	192	144
t Score	-2.76	
p Score	0.006	

The observed difference in technology literacy proficiency between Distance Learning (DLe) and Face-to-Face (FTF) students prompts a deeper examination of its implications. Integrating educational technology effectively into both settings is vital for enhancing students' technology literacy. Addressing the digital divide is crucial to ensure equitable access to technology resources and digital literacy training. Looking ahead, emerging trends such as coding, data literacy, cybersecurity awareness, and digital citizenship represent important areas of focus for technology literacy education. Educational institutions must adapt their curriculum and pedagogical practices to prepare students for the demands of an increasingly technology-driven society, fostering a culture of innovation and digital fluency among learners.

Furthermore, concerns on the future course of technology literacy education are raised by the observed discrepancy in technology literacy proficiency. Our methods for teaching and learning must also change as technology does. Digital literacy programs and resource access are two examples of strategies that can help close the digital divide by enabling all students to acquire the skills they need to become productive members of the digital society. Students may be prepared for success in the digital age and beyond by cultivating a culture of innovation, adaptability, and digital fluency among educators.

Computer Literacy

From Table 6, it is clear that students from the Distance Learning (DLe) campus have significantly greater computer literacy skills compared to those from the Face-to-Face (FTF) campus. This is supported by the higher average score for the DLe campus (23.4) compared to the FTF campus (21.7). Although there's no significant difference in standard deviations between the two groups, the t-test indicates a statistically significant gap in average computer literacy skills, with a t-value of 2.17 and a p-value of 0.031 ($p < 0.05$). Therefore, we can conclude that students from the DLe campus demonstrate higher levels of computer literacy within the context of this study. These findings underscore the potential advantages of the Distance Learning format in fostering computer literacy skills among students, suggesting that it may be a particularly effective approach for developing digital competencies in educational settings.

Tabel 6. Comparison of Students' Computer literacy in FTF and Dle Campuses

Variable	Dle	FTF
Mean	21.7	23.4
Standard Deviation	4.3	4.4
N	192	144
t Score	2.17	
p Score	0.031	

Furthermore, the disparity in computer literacy proficiency between Distance Learning (DLe) and Face-to-Face (FTF) students prompts consideration of unique instructional methodologies and learning environments. DLe's self-directed learning and reliance on digital resources likely contribute to enhanced computer literacy, while FTF settings may offer fewer digital exploration opportunities. Exploring pedagogical strategies in DLe and FTF courses informs effective approaches for cultivating computer literacy skills.

There are deeper concerns regarding digital fairness and access to technology-enhanced learning due to the discrepancy in computer literacy skills. Ensuring that all pupils succeed in the digital society requires addressing the inequities in technology access and fostering digital inclusion. The digital divide can be closed by using tactics like community collaborations, digital literacy training, and inexpensive technology access. These will enable kids from a variety of backgrounds to acquire the computer literacy skills they need to thrive in the digital age.

CONCLUSIONS AND RECOMMENDATIONS

To sum up, our investigation into students' media, information, communication, visual, technology, and computer literacy proficiencies in both Face-to-Face (FTF) and Distance Learning (DLe) environments has illuminated the complex process of literacy development in modern educational environments. Although statistical analyses reveal different levels of skill between the two modalities, more investigation reveals the impact of learning environments, instructional strategies, and cultural trends on students' reading abilities.

These findings highlight how crucial it is to teach literacy in a comprehensive way that incorporates cooperation, critical thinking, and digital fluency in a variety of educational settings. By using these discoveries to guide policy and pedagogical endeavours, we may equip kids with the fundamental abilities required to prosper in a rapidly changing digital world. Let's not waver in our resolve to promote equitable opportunities for all learners and lifelong learning as we negotiate the difficulties of literacy instruction.

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