International Journal of Instruction *April 2025 ● Vol.18, No.2*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*
pp. 51-68

Article submission code: 20240209043413
Received: 09/02/2024 Revision: 15/10/2024
Accepted: 23/10/2024 OnlineFirst: 01/01/2025

Exploring Digital Literacy of University Students and Variables Affecting Digital Literacy Levels

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Considered a pressing need for students in the 21st century, digital literacy is indispensable to navigate the digital world as much as the real world. This study aims to gain a comprehensive understanding of current Vietnamese university students' digital literacy levels and to see if there is any difference between their digital literacy levels in terms of gender as well as regional settings among undergraduate students in Vietnamese universities. A mixed-methods approach included a questionnaire administered to 300 Vietnamese university students, semi-structured interview with 25 of them, was applied to collect the data. After analyzing the data, the findings indicated that Vietnamese students considered their digital competencies at good levels. In addition, there was a significant difference in digital transformation skills among undergraduate students in various parts of the country. In addition, the difference in genders did not result in distinct digital literacy levels. In light of the findings, some pedagogical implications are put forward with a view to improving university students' digital ability and hence supporting the development of technology education in Vietnamese context.

Keywords: digital literacy, Vietnamese university student, regional setting, gender, information skill, digital transformation skill

INTRODUCTION

In the era of digital transformation, it can be said that digital literacy is a prerequisite to the cultivation of mental well-being (Sánchez-Caballé et al., 2020). Regarding the unprecedented advancement of digital technology, undergraduate learners have indulged in a myriad of digital literacy tools such as the Internet, mobile phones, gaming and messaging platforms (Mudra, 2020). In response to the current situation, there is a compelling need for education to shift away from conventional teaching and learning methods centering on printed materials to a more dynamic approach via digital

Citation: Hanh, L. T. T., Huyen, P. K., & Linh, H. K. (2025). Exploring digital literacy of university students and variables affecting digital literacy levels. *International Journal of Instruction*, *18*(2), 51-68. https://doi.org/10.29333/iji.2025.1824a

media (Techataweewan & Prasertsin, 2018). Consequently, the educational systems are under pressure to create innovative programs that meet the demands of cultivating skills and capabilities essential for the proficient and comprehensive utilization of digital technology. These programs, in turn, are envisioned to serve as a robust foundation for lifelong learning (Shopova, 2014). Given that it may assist students in obtaining and developing digital cognitive and technical abilities skills that can serve as valuable assets post-graduation, digital literacy emerges as a paramount priority among students (Tiernan & Farren, 2017). Furthermore, Vodă et al. (2022) expressed that digital literacy encompasses mandatory abilities at any higher education level and represents a fundamental ingredient in successful professionalization.

Nevertheless, incorporating digital technology into education presents a noteworthy challenge—students often exhibit a reluctance to embrace and understand the use of such technology in the learning process (Littlejohn et al., 2012). Despite students' widespread access to technology, their efficacy in utilizing it, particularly in the context of the learning process, remains limited (Shopova, 2014). Indeed, students' reliance on technology usage demonstrates a deficiency in essential competencies such as critical evaluation, selection, proficient use, coupled with a lack of academic skills (Littlejohn et al., 2012). This poses a substantial challenge for undergraduates who must equip themselves thoroughly to meet the evolving demands of the labor market (Cen, 2020).

In the Vietnamese context, the Ministry of Education and Training has recognized the important role of digital technologies in education (Nguyen & Habók, 2021). Digital abilities have been regarded as one of seven competencies that innovative educational program aims to develop for students in decree 32/2018/TT-BGDĐT dated November 28th 2018 (MOET, 2018). In spite of the national emphasis on the integration of technology, various challenges impede the pace of integration in the realms of teaching and learning, including students' digital literacy (Dashtestani & Hojatpanah, 2020). Several preceding research suggests limitations in the utilization of ICT applications for English instruction in Vietnam (Le et al., 2019). Meanwhile, it is noteworthy that digital literacy is recognized as a significant factor influencing the effective implementation of digital technologies in education (Alavi, Borzabadi & Dashtestani, 2016).

However, few studies were conducted to gain a holistic view of Vietnamese students' digital abilities. Therefore, this study was carried out to (1) investigate Vietnamese students' digital literacy levels, (2) determine if there is a significant difference in digital literacy levels among university students in three regions of Vietnam, and (3) examine if there is a significant difference between male and female undergraduate students in their digital literacy levels.

In pursuit of these objectives, this study aimed at elucidating the answers to three following questions:

- *RQ1: What are Vietnamese students' digital literacy levels?*
- *RQ2: Are there any differences in digital literacy levels among university students in different regions in Vietnam?*

- *RQ3: Are there any differences between male and female students in digital literacy levels?*

Literature Review

Digital literacy

The term *"digital literacy"* was initially introduced as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (Gilster, 1997, p.17). This definition has garnered acknowledgment, particularly characterized as a practical "know-how," within numerous scholarly publications (Gourlay et al., 2013; Hall et al., 2013). The conceptual framework introduced by Gilster (1997) has been assimilated by various scholars, in an attempt to provide a more accurate understanding of digital literacy, focusing on the abilities to evaluate information and synthesize knowledge with an array of knowledge and attitudes (Bawden, 2008). Subsequently, digital literacy was regarded as individual knowledge, attitude, and capacity of digital tools usage in order to communicate, create, and solve problems within a digital society (Martin, 2006). Moreover, digital literacy does not refer only to individual competencies, but also to "social practices" (Vodă et al., 2022).

This research was underpinned by the digital literacy framework of Martin (2006), by which the researcher selected related information and divided digital literacy skills into three skill indicator categories including Information skills, Skills in digital tools usage, and Skills in digital transformations. Information skills were defined as the ability to search for, access, manage, understand, secure, and classify content found in different formats on the web (Sánchez-Caballé et al., 2020). This category encompassed problem definition, conducting issue searches, methods and strategies for accessing analysis, synthesis, content systematization, evaluation, interpretation, and information application for problem-solving or effective work (Senkbeil & Ihme, 2017). Meanwhile, skills in digital tools usage could be understood as the necessary skills relating to the ability to learn and use diverse software applications, the usage of digital tools for daily life convenience and goal attainment, proficiency in managing and resolving basic computer issues, effective communication skills, capability in managing personal information on networks, and the application of technology for collaborative work and ethical considerations (Techataweewan & Prasertsin, 2018). They were also considered as a combination of communication, problem-solving, technical skills, and strategic digital skills (Sánchez-Caballé et al., 2020). On top of that, digital transformation is set forth as the capacity to synthesize information through the application of evaluative skills with the goal of generating, enhancing, designing, producing, and presenting new forms of information (Loureiro et al., 2012). This process involved creating innovative knowledge, fostering digital innovation through collaborative learning, reflecting on potential improvements, and publishing work while being cognizant of Internet information copyright laws (Cardoso & Oliveira, 2015).

Previous studies

A plethora of studies on digital literacy have been done on students' digital literacy (Dashtestani, & Hojatpanah, 2022; Techataweewan & Prasertsin, 2018). Investigating Turkish pre-service teachers' digital literacy, it was reported they had high and positive perceptions of digital literacy (Ata & Yıldırım, 2019). In addition, researching the digital literacy levels of Iranian students, Dashtestani, & Hojatpanah (2022) depicted that students' digital literacy is low, and they do not apply a broad range of computer applications and software. Also, a study of digital literacy among Thai students revealed that the majority of students indicated that their level of digital literacy was good or very good (Techataweewan & Prasertsin, 2018). Studying literacy among Mulism students, Hussain (2013) noted that students attained favorable and smart use of digital technology as an extra reference resource for appropriate and sensible speech, sports, and entertainment components.

Furthermore, the correlation between learning contexts and students' digital literacy was investigated. A significant difference between students brought up in urban and rural settings in their exposure was identified by Patrick & Benwari (2014) that while most rural Nigerian students had computer teachers and they could operate computers, students' literacy levels were at pretty low levels. Additionally, it was noted that there were no differences between students brought up in urban and rural settings in their exposure in a study by Podgorny & Volokhova (2020).

Moreover, a multitude of studies examined whether gender disparities affected students' literacy levels or not. Siddiq & Scherer (2019) stated that the gender gap in digital literacy levels was not as significant as it was remarked to be. It was also shown that the level of digital literacy is clearly independent of gender (Podgorny & Volokhova, 2020). In the same vein, no significant difference was found in the digital competencies and technological competencies of the participants with regard to gender (Koyuncuoglu, 2022). Similarly, research by Jan (2019) displayed insignificant differences in terms of the students' digital literacy between male and female students. In contrast, Alakpodia (2014) illustrated that male students were dominant over females in terms of digital literacy levels.

In addition, the relationship between digital literacy and academic majors garnered interest from a multitude of researchers. Panahi et al. (2020) found that medical students exhibited lower-than-expected levels of information literacy. Interestingly, Pinto et al. (2016) highlighted overall low perceived self-efficacy among social science students in Spain regarding information literacy skills. In the same vein, Vodă et al. (2022) highlighted in their study that higher digital skills in economics and social sciences, attributing it to the use of management tools in business operations. Additionally, a notable portion of student-teachers demonstrated a limited level of digital literacy, indicating their unpreparedness to incorporate digital technologies into the teaching and learning of English (Liza & Andriyanti, 2020).

Despite a significant body of research on digital literacy, several gaps remain. Most studies have focused on students, particularly their perceptions and self-reported

competencies across various contexts (Ata & Yıldırım, 2019; Dashtestani & Hojatpanah, 2022; Techataweewan & Prasertsin, 2018). However, findings are inconsistent across different regions, with some students showing high digital literacy levels while others, particularly in rural or resource-limited settings, demonstrate lower competence (Patrick & Benwari, 2014; Podgorny & Volokhova, 2020). Furthermore, while gender disparities are widely debated, with some studies finding no significant differences (Siddiq & Scherer, 2019; Jan, 2019), others suggest male students outperform females in digital literacy (Alakpodia, 2014). Additionally, research is lacking in how digital literacy varies across different academic majors, particularly in disciplines such as social sciences and education, where lower literacy levels have been reported (Pinto et al., 2016; Liza & Andriyanti, 2020). Finally, there is limited understanding of how these varying digital competencies translate into actual technology integration in professional or educational settings, highlighting a need for further research into practical applications and interventions.

In the Vietnamese context, a multitude of studies took Vietnamese students' digital literacy into consideration. According to a study by Le et al., (2019), which encompassed 1061 observations on the digital competency of 10th-grade students across 20 surveyed schools, students tended to attain high levels of usage of technological devices. Furthermore, it was shown that despite possessing good digital skills, students face hurdles in applying digital information creatively and demonstrating emotional intelligence (Tran & Le, 2023). Similarly, in a study involving 1661 English as a foreign language (EFL) learners at Vietnamese universities, the results highlighted that students attained an adequate level of knowledge regarding digital literacy, with their technological skills ranging from low to average (Nguyen & Habók, 2021).

Besides, the effects of diverse study environments on Vietnamese students were undertaken. In a study taking place during the COVID−19 pandemic lockdowns, Tran et al. (2020) found only a slight difference in the levels of digital literacy between secondary students from urban and rural schools in Vietnam, implying that the location of a school may not be a significant factor in explaining the variation in digital literacy and resilience among Vietnamese students. Interestingly, data collected from students across five provinces and cities in Vietnam including Lao Cai, Hanoi, Danang, Lam Dong, and Can Tho, revealed that students in many schools from more developed cities, such as Hanoi or Danang, exhibited a low-level of digital device usage (Le et al., 2019).

Moreover, addressing gender differences in the digital landscape is crucial for fostering equitable digital literacy development among Vietnamese students. Le et al. (2019) indicated that the sex and usage of digital devices show a low correlation, but female students demonstrate a slightly higher level of usage than their male counterparts. Conversely, in their analysis of 1,661 respondents from Vietnamese universities, Nguyen & Habók (2021) found that while female students demonstrate greater awareness of the benefits of digital integration in learning than their male peers, males tend to utilize technologies more extensively than females. Tran et al. (2020) noted that school location does not have an association with Vietnamese students' digital literacy.

The evidence from this study showed that even though the students from urban areas do have higher digital literacy than students in rural areas, the difference is insignificant.

Despite the existing body of literature on digital literacy among Vietnamese university students, there are notable research gaps that our study seeks to address. First, although a few prior investigations have studied Vietnamese digital literacy levels, they focused mainly on the ability to use digital tools, this study went a step further to investigate the digital transformation skills, which are believed to be a necessary skill in the current education trend in Vietnam. Second, some studies investigated the difference in digital literacy levels in terms of regional educational settings, they mostly concentrated in secondary and high schools. Accordingly, this research strives to gain a more holistic insight into Vietnamese university students' digital literacy levels. Secondly, previous studies mostly employed the use of separate research tools such as merely observation, interview, or questionnaire, and solely quantitative or qualitative approaches which might lead to a limited set of data. Therefore, three research tools including questionnaires, interview are utilized, which possibly assure the reliability and validity of the research results by comparing information obtained through different methods. Besides, apart from having a richer exploration of complex phenomena, this might help the researchers cross-verify and validate findings. Lastly, despite the fact that a plethora of research delves into the correlation between gender and school locations and Vietnamese students' digital literacy levels, a limited number of studies look into the relationship between majors and students' e-literacy. Thus, this research set out to further address this gap, and suggest such implications to better Vietnamese students' digital literacy.

METHOD

Research design

In this study, the authors utilized an explanatory mixed-method approach (as illustrated in Figure 1). This study aimed to examine Vietnamese students' digital literacy levels and explore disparities based on regional context and gender. This comprehensive approach allowed for the investigation of the research questions from multiple perspectives, yielding more nuanced insights. By employing two research instruments—surveys and interviews—a more holistic understanding of the relationship between reading strategies and reading comprehension achievement was obtained. This combination of methods provided a more robust analysis, facilitating a deeper exploration of the interplay between these variables. More specifically, for the first part, the research team applied a quantitative approach with the questionnaire which aimed to gather information related to digital literacy levels of Vietnamese university students. In the following stage, the interviews were administered to enable the researchers to access a more comprehensive findings on the topic of digital literacy among students.

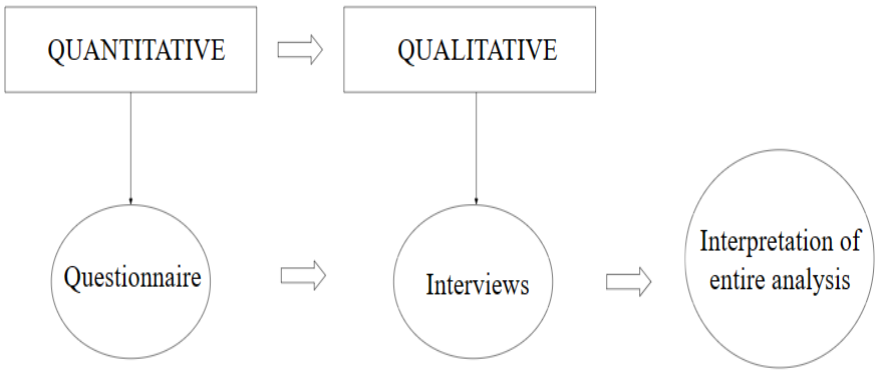

Figure 1
Research design and procedure

Participants

The study population was made up randomly of students enrolling in standard tertiary programs at Vietnam universities. There were a total of 300 students from different parts of Vietnam: 105 of them (35%) enrolled in educational programs in schools situated in the central region of Vietnam, 98 students (32,7%) studied in the North, and the remainder, accounting for 32,3 %, came from a variety of universities the South of Vietnam. More than half of the respondents are female (53%), 159 of them (46%) are male and a minimal number (1%) of them are another gender. In addition, 25 participants were involved randomly in the semi-structured interview, and 20 students participated in the observation process.

Research instruments

Questionnaire

A questionnaire adapted from Techataweewan & Prasertsin (2018) was employed in this study. The questionnaire consisted of two main sections: (1) participants' demographic information, including gender, university years, and majors were included in the first part and (2) the second part required students to rate the perceptions towards 3 aspects of digital literacy (information skills, digital tools usage, and digital transformation), in a 5-point Likert scale ranging from never (1) to always (5). The researchers conducted the survey online, and it was posted on the Internet to collect data from target participants. In addition, to make it more accessible for the majority of students, the questionnaire was translated from English into Vietnamese. Furthermore, instruction was given properly in the open letter so that students participating in the survey felt clear and ready to complete the survey.

Interview

Semi-structured interviews were conducted to gain more insights into participants' perspectives on digital literacy. In the process of conducting the interview, 25 students were chosen randomly from a total of 300 participants joining the survey. The

interviews were carried out in the interviewees' mother tongue for 10–15 minutes via online meetings, and all responses were recorded with the student's permission. Each student interviewed discussed the research questions and additional questions the interviewers raised to collect more specific data. Moreover, in order to maintain a natural and comfortable environment between interviewer-interviewee interactions, the interviewers direct the interview process to go naturally in order to create space for the participants to reveal their opinions. However, to make it convenient for the interviewees, they were free to discuss any aspects related to digital literacy in Vietnamese.

Data analysis

Statistical Package for the Social Science (SPSS) software version 20.0 was utilized to analyze quantitative data from the questionnaire. The internal consistency reliability calculated and tested using Cronbach's alpha (α) was 0.88, which was asserted as highly reliable. For analyzing the responses to semi-open-ended questions, the research team applied keywords in context technique (Fielding & Lee, 1998) and a thematic approach (Braun & Clarke, 2006). From the interview results, the data was collected, put into relevant themes, and interpreted by the researchers. Furthermore, additional information was recorded for the discussion part.

FINDINGS AND DISCUSSION

Vietnamese university students' digital literacy levels

To find out the answer the research question 1, the data obtained from the questionnaire was gathered, examined, and analyzed through SPSS to determine the students' digital literacy levels. The findings regarding students' perceptions of digital literacy were categorized into three following areas: information skills, digital tools usage, and digital transformation. The results are shown below.

Table 1
Vietnamese university students' digital literacy

	Mean	Standard Deviation
Information skills	3.72	1.160
Skills in digital tools usage	3.85	0.928
Skills in digital transformations	3.59	0.985
Total	3.72	1.024

As illustrated in the table, students showed high moderate competence in information skills with an overall mean of 3.72 out of 5. Furthermore, the results indicated that students perceived most skillful in digital tools usage (m=3.85). In contrast, skills in digital transformations were the set of skills that students could control the least (m=3.59). More details will be analyzed in the following sections.

Table 2
Information skills

	Mean	Standard Deviation
Consider consequences before giving opinions on social media	3.92	0.940
Always evaluate data before sharing it on the Internet	3.88	0.928
Evaluate the reliability of information sources before application	3.88	0.940
Select appropriate data for solving problems	3.84	0.841
Evaluate the reliability of information sources before application	3.82	0.923
Define information sources that match expected information	3.81	0.844
Always examine the accuracy of information before using	3.81	0.928
Integrate knowledge in order to create new knowledge	3.68	0.852
Categorize related information	3.66	0.852
Indicate frameworks in order to make the search more efficient	3.63	1.015
Share files on the Internet	3.61	0.960
Define keyword in order to search for expected information	3.55	1.045
Distinguish facts and opinions	3.53	1.029
Understand information management by applying Metadata	3.44	1.054
Total	*3.72*	*1.160*

As can be seen from the above table, the majority of students perceived their information skills at a high level, with a total mean of 3.72. In addition, the study results revealed that many participants had proper awareness of possible repercussions before sharing their views on social platforms, with the highest mean of 3.92. Likewise, results from the interview showed that students had the tendency to be considerate before expressing their opinions on social media. In the same vein, the interview results revealed as follows:

> *Nowadays, it is advised that we should take the possible consequences of sharing something on social media into consideration as well as be aware of what we share and even comment on social platforms because it can lead to misunderstanding among others." (Interview, student 7)*

In addition, a multitude of respondents expressed their priorities in selecting appropriate information to address relevant issues (m=3.84). Moreover, having information analyzed and gathered from different sources, checking the reliability as well as the accuracy of data before publicizing them online, and identifying the appropriateness of the information found with the target information received a great evaluation from students, with a quite uniform mean, ranging from 3.81 to 3.82. The results from the interview unveiled similar respondents.

Last but not least, participants evaluate their understanding of the application of Metadata for information management at an intermediate level, ranking the lowest at 3.49. In a parallel fashion, the observation further confirmed these outcomes that students hardly know how to manage information by Metadata. Similarly, the interview

results confirmed this results as follows *"... This is the first time I have been exposed to the term "Metadata", so it is clear that I barely understand about this concept." (Interview, student 9).* In fact, the mass of participants attained proper use of social media. However, the gradual decrease in the mean when it comes to specific information skills, namely distinguishing, categorizing, integrating, and applying information indicated a number of challenges students might face with information skills.

Table 3
Skills in digital tools usage

	Mean	SD
Use social media as the usual medium to communicate with other people	4.30	0.807
Always evaluate data before sharing it on the Internet	4.16	0.840
Evaluate the reliability of information sources before application	3.99	0.784
Select appropriate data for solving problems	3.85	0.901
Aware of the methods used to protect personal data on the Internet	3.82	0.918
Aware of the advantages, disadvantages and impact of using the Internet	3.82	0.912
Well-adjusted in learning new technologies	3.80	0.908
Find tools and applications in order to support everyday life	3.78	0.918
Organize collected data on a personal computer	3.78	0.928
Self-teach in order to use applied programs	3.68	0.939
Self-teach in order to study a special function of different programs	3.61	0.932
Fix technical problems on a computer system	3.57	0.928
Total	*3.85*	*0.891*

With respect to skills and abilities needed to use Internet-based tools, the results indicated a high level of proficiency among students, with a total mean of 3.85. A significant number of respondents demonstrated strong abilities in utilizing social media for effective communication (mean=4.3) and applying technological innovations to meet the evolving demands of life (mean=4.16). Similarly, the interview results revealed that the majority of participants chose social platforms as a means of communication. More specifically, they mostly use social platforms to communicate with others. Furthermore, a notable portion exhibited, to some extent, lower proficiency when dealing with technical problems, reflected in the lowest mean of 3.57. As observed, as students encountered technical problems, they were more likely to seek the help of others than find the solutions themselves. It also was in concert with the following results: *"I think dealing with technical problems can be done by people majoring in these fields. Therefore, whenever there are any problems with such devices, I tend to contact them instead of solving them myself." (Interview, student 3).*

Table 4
Skills in digital transformations

	Mean	Standard Deviation
Aware when using others' work without owners' permission	4.13	0.869
Understand plagiarism	3.73	0.977
Create new content by themselves and avoid plagiarism	3.72	0.923
Transform forms of information in order to serve different purposes	3.72	0.890
Understand the creative commons concerning their published works on the Internet	3.72	0.885
Create new content with the tools on the Internet	3.69	0.915
Understand how to paraphrase in academic writing	3.47	1.042
Share works designed by each other with their friends on the Internet	3.27	1.043
Create video media to use in a presentation	3.21	1.135
Total	*3.59*	*0.985*

Regarding the capability to execute digital transformations, the data demonstrated students possessed moderate digital competence, which is fundamental in the realm of digital transformation, with a total mean of 3.59 out of 5. The vast majority of students displayed that they had a proper understanding of copyright infringement, with the highest mean of 4.13. Comparably, the interview responses also indicated that students were well aware of authors' copyright, as they were afraid of being fined.

Moreover, a variety of them expressed their perceptions of plagiarism with such high frequency of four following statements (1) "I understand plagiarism"; (2) "I understand the creative commons concerning their published works on the Internet"; "I transform forms of information in order to serve different purposes", and (4) "I create new content by themselves and avoid plagiarism" were rated at high levels among students with quite equal mean, ranging from 3.72 to 3.73. Nevertheless, the students' attitudes towards making such creative works like videos for presentation purposes, and registering copyright for their own was at the lowest level (M=3.21 and M=3.19, respectively). Correspondingly, it was observed that students evaluated themselves as non-professional content creators, so they found it unnecessary to obtain registration for copyright.

Differences in digital literacy levels among Vietnamese university students in different regions

To investigate the difference, if any, between university students from different parts of the country, the ANOVA was performed and the table below illustrated the relationship between digital literacy and students' university location, consisting of Ha Noi, the capital city; Ho Chi Minh, the biggest city, and Vinh city, a provincial city.

Table 5
ANOVA analysis of the difference in digital literacy among Vietnamese students

		Sum of Squares	df	Mean Square	F	Sig.
Learning objectives using online service tools	Between Groups	64.0676	2	.13	5.583	.157
	Within Groups	242.080	297	.018		
Information skills table	Between Groups	36.775	2	.031	12.318	.075
	Within Groups	238.595	297	.003		
Skills In Digital Tools Usage	Between Groups	15.642	2	.100	8.187	.109
	Within Groups	239.275	297	.012		
Skills In Digital Transformation	Between Groups	14.491	2	.096	15.958	.007
	Within Groups	317.4601	297	.001		

As can be seen in Table 5, the significance (Sig.) values for learning objectives using online service tools, information skills, and digital tools usage skills as demonstrated in the table above surpass 0.05. However, in the case of digital transformation skills, the Sig. level was 0.007, which indicated significant differences among the regions. Consequently, while there were no differences in learning objectives using online service tools, information skills, and digital tools usage skills among university students in Vietnam, there was notable evidence suggesting significant divergences in digital transformation skills across regions in the context of digital literacy.

Table 6
Regional difference in skills in digital transformation among Vietnamese students

Skills	Region	Mean
Skills In Digital Transformation	Hanoi	3.82
	Ho Chi Minh	3.62
	Vinh	3.22

The highest mean score (m=3.82) among the three regions suggests that, on average, individuals in the North tend to have higher digital transformation skills than the other two regions. Following that, with a mean value of 3,62, the South attained an intermediate level of skills, and students in the central had the lowest mean, indicating the lowest average skills.

Differences in digital literacy levels between Male and Female Vietnamese students

In order to determine whether these differences between males and females are substantial, overall comparisons were computed using a paired-sample T-test. The results are presented in the table below:

Table 7
Gender difference in digital literacy

	Gender	Mean	Std. Deviation	95% Confidence Interval of the Difference		Sig. (2-tailed)
				Lower	Upper	
Learning objectives using online service tools	Male	3.53	1.166	-.026	.466	.079
	Female	3.31	.999	-.029	.469	.083
Information skills	Male	3.86	.993	-.334	.094	.270
	Female	3.98	.891	-.336	.096	.274
Skills In Digital Tools Usage	Male	3.86	.932	-.064	.354	.173
	Female	3.71	.903	-.064	.355	.174
Skills In Digital Transformation	Male	3.51	1.059	-.323	.153	.483
	Female	3.43	1.029	-.323	.154	.484

The SPSS T-test table compared male and female students across different domains. The outcomes indicated no significant differences between genders in learning objectives using online service tools, information skills, skills in digital tools usage, and skills in digital transformation. That could be proved by the statistics from the table that the p-values for all tests were greater than the conventional significance level of 0.05, suggesting no meaningful distinctions between males and females in the aforementioned aspects. In conclusion, the results suggest a consistent performance between male and female students across the four evaluated classifications.

DISCUSSION

The findings revealed that Vietnamese university students' digital literacy was at a moderately high level, consistent with the results of Nguyen and Habók (2021). This outcome may be attributed to the fact that many students lacked the initiative to develop and enhance their digital competencies, as well as to effectively integrate digital tools into their academic endeavors—skills deemed "an essential asset" for success in the 21st century (Sánchez-Caballé et al., 2020; Tran & Le, 2023). In contrast, students in other Asian countries, such as Thailand (Techataweewan & Prasertsin, 2018); Iran (Dashtestani & Hojatpanah, 2022); Turkey (Ata & Yıldırım, 2019), exhibited varying levels of digital competence, suggesting regional differences in digital literacy development across the region.. It is recommended that education programs in tertiary contexts should pay more focus on the development of this competence among their students to the extent that they can adapt critically and effectively to the technological area.

The study also depicted that a wide number of students utilized digital tools for communication. It was in unity with Dang & Robertson (2010) that Vietnamese students show a clear preference for synchronous communication modes and an inclination toward instant responses, regardless of their online activity frequency. In addition, as the results suggested, the university students were well-informed about copyrights. This was inconsistent with the findings by Lilian (2022) that students do not

have a proper understanding the copyright issues when using digital information. However, it was also revealed that they were not aware of registering copyrights for their own works. One suggestion could be the integration of copyright instructions and policies to the beginning of the training program at universities.

Regarding students' abilities in digital transformation, the capabilities that require the employment of digital assistance to create new content were limited. It was in line with Le et al. (2019) that the average Vietnamese student achieved the least in digital creativity and innovation. Nevertheless, according to Vodă et al. (2022), such capacities were proven to promote autonomous learning improve performance in more learning activities, and improve digital literacy. Hence, the teachers and educators might create more space in their teaching procedure which requires the students to create themselves digital products.

Plus, the study results indicated that there were regional disparities regarding skills in digital transformation. These substantial variations in the mastery of digital transformation skills might be on the ground that regional variations in digital literacy levels are evident, influenced by factors such as living environment, age, education, and employment type (Podgorny, 2021). Indeed, the predictive reasons might be that such universities located in the two biggest and the most modern cities in Vietnam have access to a higher level of funding for digital facilities than ones in central of Vietnam (Tran et al., 2020). Besides, the access of students to innovative technological facilities may not have been implemented yet due to the tight budget (Nguyen & Habók, 2021). On top of that, in large cities, students tend to start using the Internet sooner than students from other provinces. Along with the development of technology, the computer teaching program for children at training centers is constantly changing, meeting the actual needs of learners (Le et al., 2019). The study also argues that underlying all the technical challenges, there are also psycho-cultural barriers (Vuong et al., 2019). This finding is likely to imply the imbalance in the infrastructure investment between regions in Vietnam, the MOET should take this into account for their financial distribution.

Another finding that emerged from the study is that Vietnamese male and female university students in Vietnam demonstrate comparable levels of competency in utilizing examined subcategories of digital literacy. This finding is similar to results from Siddiq (2019) which indicated no significant differences in digital literacy levels between genders. In fact, the gender gap in ICT literacy may not be as severe as it had been claimed to be. Accordingly, the preparedness of students to enhance digital literacy may have been shaped by the attitudes of modern parents, teachers, and society, regardless of any self-perceptions or stereotypes towards boys or girls (Tran et al., 2020).

CONCLUSION

The study was carried out to examine how Vietnamese students perceived their digital literacy levels, and explored if there were any differences in digital literacy levels in terms of learning environments and genders, hence, suggesting some recommendations to improve the digital literacy levels among students. As the data suggested, an array of students had positive perceptions of digital literacy competency, indicating more

confidence in using digital literacy skills to assist both their daily life and their academic performance. Furthermore, the results unveiled that the differences in digital transformation skills levels among the three regions were significant. Also, it was indicated that students from the North tend to have higher digital transformation skills than the other two regions. Finally, no meaningful distinction between males and females was found.

The broader implications of these findings suggest a need for targeted educational policies and practices aimed at reducing regional disparities in digital literacy. Educational institutions, particularly in regions with lower digital literacy, could develop tailored programs that enhance students' digital skills, fostering equitable access to the benefits of digital transformation. Moreover, incorporating digital literacy training into university curricula across all regions may equip students with the necessary competencies to thrive in a technology-driven world. Policymakers should prioritize investments in digital infrastructure and training to ensure that students nationwide have equal opportunities to build essential digital skills.

For future research, several recommendations are proposed. First, studies should include larger and more diverse sample sizes to enable more robust generalizations about Vietnamese university students' digital literacy levels. Second, longitudinal research could provide insights into how students' digital literacy evolves over time, especially in response to technological advancements and educational reforms. Third, cross-cultural studies would deepen the understanding of how cultural factors influence students' digital literacy development, offering a comparative perspective that can inform global strategies for digital literacy education. These avenues for further research will contribute to a more comprehensive understanding of digital literacy and its role in contemporary education.

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