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Navigating the Digital Landscape: An Exploration of the Digital Competence of Indonesian University Students

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Abstract

Background: The background of this research is based on the rapid development of digital technology, which has transformed the ways students interact, access information, learn, and engage in civic life. Conversely, the role of students as active and reflective digital citizens has not been extensively explored in academic literature.
Aims: This research aims to analyze the digital competencies of higher education students in Indonesia, with a focus on how their digital skills support their roles as digital citizens, both in academic contexts and in digital civic participation.
Methods: The research employs a quantitative approach using a survey conducted with 145 students from various study programs. The survey instrument measures several dimensions of digital competency, including information literacy, digital research, communication, and engagement on platforms.
Results: The results indicate that 85% of students demonstrate a high level of proficiency in the use of information and communication technology (ICT) for academic purposes. However, participation in digital civic activities remains low, with competency levels ranging only from 46.8% to 52.8%. The majority of students exhibit a utilitarian orientation, showing high levels of usage for entertainment and learning (74.8%) but demonstrating moderate competencies in information literacy (74.6%), digital research (67.2%), and digital communication (61.7%).
Conclusion: These findings suggest a need for enhanced digital civic education that not only focuses on technical aspects but also aims to develop ethical, creative, and participatory capacities among students as responsible digital citizens.

A. Introduction

The rapid advancement of digital technology within the information society has precipitated significant transformations across various facets of life, including higher education (Guillén-Gámez & Ramos, 2021; Noh & Hong, 2022; Ziemba, 2019). The global shift towards the utilization of information and communication technology underscores the importance of strengthening digital competencies within the higher education environment (Gurcan et al., 2023; Zhao et al., 2021). Digital competence refers to the individual's capacity to use digital technology effectively, responsibly, and ethically (Caena & Redecker, 2019). In recent years, the urgency of digital competence has intensified due to the increasing demands for civic engagement, ethical digital behavior, and digital resilience in the face of misinformation and algorithmic influence (Gurcan et al., 2023; Zhao et al., 2021). Studies show that while digital access has

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improved, the quality of digital participation especially in civic and ethical domains remains underdeveloped among university students (Li, 2024; Islambouli et al., 2024). This gap raises concerns about students' readiness to participate meaningfully in democratic life through digital platforms, particularly in developing countries where digital citizenship education is still limited within the curriculum.

The evolving body of literature indicates that the topic of students' digital competence has become a focal point, despite ongoing debates regarding its definition, theoretical frameworks, and the methodologies employed (Esh & Ghosh, 2024; Spante et al., 2018). Nevertheless, there exists a general consensus that digital competence constitutes the ability to effectively utilize ever-evolving digital tools for learning and performing digital tasks, to engage in digital behaviors such as online communication, collaboration, and ethical information sharing, as well as to embody a digital mindset that reflects an appreciation for lifelong digital learning and development (Guillén-Gámez & Ramos, 2021; Łukasz, 2021; Paterra, 2023).

To contextualize the multifaceted nature of digital competence, this research refers to the DigComp 2.1 framework by the European Commission, which categorizes digital competence into five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving (Tuamsuk et al., 2023). These categories reflect both technical and civic dimensions of digital engagement. Additionally, Ribble's Digital Citizenship model highlights nine elements of responsible digital behavior ranging from digital access and communication to digital rights and responsibilities, offering a normative foundation for evaluating how students engage in ethical and participatory practices online (Carretero et al., 2017). Both models enrich this research by framing digital competence not merely as a technical skill but as an integrated set of behaviors essential for responsible participation in a digital society.

However, currently, few universities actively explore or map students' digital competencies, and when such investigations are conducted, they generally concentrate on aspects related to technology usage, such as the types of technology employed by students and the technologies they are reluctant to integrate into their academic activities (Esteve-Mon et al., 2020; Levano-Francia et al., 2019; López-Meneses et al., 2020). Preliminary designs in prior studies that identified various gaps in students' digital competencies, including information literacy, digital creation, digital research, and digital identity management skills (Martzoukou et al., 2022). This research is deemed critical, considering that university students possess diverse demographic backgrounds, such as age, region/ethnic origin, religion, and educational history. This diversity may create varying needs for digital competence support and potentially exacerbate the digital divide (Heponiemi et al., 2022; Shala & Grajcevci, 2018). Additionally, previous studies have revealed a correlation between students' self-perception of their digital competence in the context of 'everyday participation as digital citizens' and various other domains of digital competence that are crucial for academic activities, such as the ability to identify information across diverse contexts, and digital-based learning and development, as well as information literacy skills (Martzoukou & Sayyad Abdi, 2017).

This research then focuses on eleventh primary themes of digital competence that have been developed, encompassing technical proficiency in ICT (Information and Communication Technology) for accomplishing various tasks/learning, the use of digital devices, the ability to identify different types of information to support learning, information literacy skills, digital content creation skills, digital research skills, digital communication skills, digital innovation capabilities, skills for self-directed learning and development in a digital context, digital identity management skills, and awareness of digital well-being (Martzoukou et al., 2022; Martzoukou & Sayyad Abdi, 2017).
These themes are used to assess the extent to which students feel capable of independently performing various digital tasks. In addition to measuring technical digital competence, this survey also encompasses the dimension of 'everyday participation as digital citizens', which evaluates students' digital behavior tendencies based on two decision-making orientations: hedonistic and utilitarian. The hedonistic dimension includes activities oriented toward experience and emotion (such as digital entertainment and self-development), while the utilitarian dimension emphasizes functional activities such as e-democracy, e-government, and e-health. This dimension is designed to reflect the context of technology use in students' daily lives and its relationship with the values of digital consumption in education (Akdim et al., 2022). Therefore, this research aims to: (1) assess students' self-perceived digital competence across technical, cognitive, and civic domains; (2) analyze their level of engagement in civic-oriented digital behaviors; and (3) identify gaps that may inform the development of digital literacy and citizenship education in higher education institutions.

B. Research Methods

This research employs a quantitative approach through a questionnaire survey developed based on eleven primary themes of digital competency (Martzoukou et al., 2022). A quantitative approach was selected because it enables systematic measurement of self-perceived digital competence across diverse dimensions, allowing for clear comparisons and statistical generalization (Creswell & Creswell, 2022). This method is particularly effective for identifying patterns in students' digital behavior, levels of engagement, and skill gaps relevant to digital citizenship. The questionnaire comprises a series of questions designed to explore the learning experiences of students in developing digital competencies, both in everyday life and within the context of formal education. The questions investigate how respondents acquire and enhance the digital skills necessary for participation in digital citizenship activities, as well as how they cultivate relevant ICT competencies to complete various digital tasks through work experience, domestic activities, training, and self-directed learning. The survey utilizes a five-point Likert scale, which delineates competency levels ranging from Level 1 (Novice) to Level 5 (Expert). The research population consists of students from the Elementary School Teacher Education Program (PGSD), Faculty of Education, Universitas Negeri Makassar, who are in their second, fourth, sixth, and eighth semesters. All students were invited to complete the questionnaire disseminated via Google Forms following the conclusion of classes. Students were granted the freedom to fill out the questionnaire online at their chosen time and location, as well as to express their views openly (Tapingkae et al., 2020). Data collection was conducted from January to February 2025. A total of 145 responses were successfully collected and analyzed. Table 1 presents a description of the characteristics of the respondents based on gender, age, and semester level.

Table 1. Description of the Research Sample

Variable	Sub-variable	*N*	Percent
Gender	Male	27	18.8 %
	Female	118	81.4%
	Total	145	100%
Semester	2	39	26.9 %
	4	24	16.6%
	6	55	37.9%
	8	27	18.6%
	Total	145	100%
Age	17 years	1	0.7%
	18 years	34	23.4%
	19 years	31	21.4%
	20 years	56	38.6%
	21 years	21	14.5%
	22 years	2	1.4%
	Total	145	100%

C. Results and Discussion

1. Result

This section presents an overview of the survey results concerning ten key themes related to the enhancement of digital competencies among students. Table 2 summarizes the results of self-assessment of digital competencies as reported by students, reflecting the extent to which they are engaged and capable in various dimensions of digital competencies relevant to everyday life, as well as formal learning contexts.

Table 2. Self-Assessment of Student Digital Competencies

No	Item	N	Mean	Std. Deviation
1	Engagement and ability in each daily digital activity	145	14.78	4.114
2	Proficiency/skills in ICT (Information and Communication Technology) for completing various tasks/learning using digital tools	145	22.08	6.132
3	Ability to use ICT (Information and Communication Technology)	145	6.79	1.822

No	Item	N	Mean	Std. Deviation
4	Ability to identify types of information supporting learning	145	8.25	2.618
5	Information literacy skills	145	18.66	5.024
6	Skills in creating digital content	145	6.57	1.859
7	Digital research skills supporting the learning process	145	16.80	5.020
8	Digital communication skills	145	15.43	4.166
9	Skills in learning and self-development digitally	145	11.14	2.648
10	Skills in managing digital identity	145	13.48	3.588
11	Digital well-being	145	13.81	3.795
	Valid N (listwise)	145		

In the category of student assessment related to 'everyday participation as digital citizens,' the average reported digital competency is at a moderate level. This suggests that, students feel reasonably competent in conducting everyday digital activities, generally. Conversely, higher competency levels are observed in activities categorized under leisure and learning, such as e-leisure and e-learning (average 3.74), compared to digital activities more closely related to civic functions such as e-democracy, e-government, and e-health (averages ranging from 2.34 to 2.64). Consequently, there is a need to enhance students' literacy and awareness regarding the utilization of ICT in the context of active citizenship, particularly concerning public digital participation, digital government services, and digital health. These enhancement efforts are crucial in shaping digital citizens who are not only active consumers of leisure and learning but also engage in their social and political roles within the digital sphere. This phenomenon indicates that students' digital literacy remains utilitarian and consumptive, focusing on activities that support personal comfort and academic learning but have yet to develop optimally to support active roles as digital citizens. In this context, strengthening competencies in e-democracy becomes vital, given that digital participation in democratic processes (such as voicing opinions, participating in online petitions, or accessing public policy information) is an essential aspect of a healthy democracy in the digital era (Lindner & Aichholzer, 2020; Petr Balog & Badurina, 2017).

The findings of this research illustrate a diverse profile of students' digital competencies across various skill dimensions. Students demonstrate a comparatively high level of ICT proficiency in task completion and learning, as evidenced by the highest average score in ICT proficiency (mean 22.08, SD 6.13). This indicates that, in general, students possess adequate operational capabilities in employing digital devices for academic purposes. Additionally, aspects such as the ability to identify information (mean 8.25) and information literacy (mean 18.66) also reflect a commendable level of mastery, indicating students' readiness to navigate and critically evaluate digital information. Nonetheless, students' general ability to use ICT (mean 6.79) and create digital content (mean 6.57) remains categorized as moderate, highlighting the need for improvement in digital productivity and creativity. Competency in digital research (mean 6.80) as well as in digital communication and self-development (means 15.43 and 11.14) indicates that students are beginning to integrate technology into more independent and collaborative learning processes, although this integration is not yet fully optimized.

2. Discussion

Although students demonstrate a high level of competency in utilizing information and communication technology (ICT) for academic tasks, there exists a significant gap in their engagement in civic-oriented digital activities, such as e-democracy, e-government, and e-health. This observation reflects the findings of Febriyani et al. (2023), who highlight that the digital transformation in higher education in Indonesia has not yet fully succeeded in developing comprehensive digital competencies, particularly in the realm of digital civic participation. A systematic evaluation of students' digital competencies is necessary to identify areas that require further development. López-Nuñez et al. (2024) in their systematic review, emphasize the importance of comprehensive assessment tools for evaluating digital competencies in higher education, which encompass technical, informational, communicative, and ethical aspects. Meanwhile, Dahlen & Hanson (2023) assert that information literacy and digital literacy should not solely rest on individual responsibility but must be strategically integrated into teaching practices and curriculum design in higher education. These findings are consistent with studies indicating that a portion of students have demonstrated awareness of the ethical dimensions of digital literacy and digital wellbeing, as reflected in relatively good scores on indicators of digital identity management and digital

wellbeing. Nevertheless, the presence of significant standard deviation in several indicators suggests a diversity of digital competency levels among students. This variability indicates the need for more inclusive and sustainable digital education interventions to ensure that all students can access and develop digital competencies that are not only technical but also ethical and responsible.

Consequently, there is a need for curriculum design that emphasizes not only the mastery of digital tools but also fosters reflective, collaborative, and participatory skills to meet the challenges of the digital era. This aligns with the DigComp 2.1 framework, Mattar et al. (2022), which underscores the dimension of digital responsibility as an integral part of citizenship competencies in the digital age. Sustainable and civically oriented digital education is a crucial prerequisite for shaping students into active, critical, and ethical agents of social transformation within an ever-evolving information ecosystem. These research findings align with those of Öncül (2021), emphasizing the importance of mastering fundamental digital literacy skills among first-year students, particularly in evaluating and integrating digital information from various formats. This finding is consistent with Li (2024) who indicates that university social responsibility can contribute to enhancing digital ethics literacy and knowledge of data security, particularly when the integration of these values occurs continuously from the first year through to the final year of study, students who receive systematic exposure to digital ethics tend to have greater awareness of personal data protection practices and digital responsibility. It is essential to instill a conceptual understanding of digital ethics and well-being while equipping students with practical skills to manage technology usage in a healthy, responsible, and sustainable manner (Islambouli et al., 2024).

2.1 Implications

This research demonstrates that higher education must adapt its digital curriculum to encompass the development of participatory and ethical skills. Educational institutions should begin instilling digital citizenship values from the outset of academic courses, as well as integrating digital competence training across various interdisciplinary subjects.

2.2 Research Contribution

This research contributes to the literature on digital citizenship in Indonesia by providing a comprehensive overview of students' digital competencies while highlighting aspects that require improvement, particularly in terms of digital civic participation. Furthermore, this research reinforces the urgency of integrating ethical and social responsibilities within digital education at the collegiate level.

2.3 Limitations

The research is limited by the respondent population, which consists solely of students from a single program (Elementary Teacher Education) at one university, thereby restricting the generalizability of findings to students in other higher education institutions or programs. Additionally, the quantitative approach based on self-perception has not sufficiently captured the actual digital practices of students in everyday contexts.

2.4 Suggestions

Future research is recommended to employ a mixed-methods approach to explore the behavioral dimensions and values underlying students' digital usage. Comparative studies across different academic programs or regions are also necessary to obtain a broader and deeper mapping of competencies and digital citizenship among Indonesian students. Higher education institutions are advised to develop more integrative, adaptive, and participatory digital learning modules, using frameworks such as DigComp 2.1 as a reference.

D. Conclusion

This research demonstrates that students possess relatively good digital competencies in operational aspects, information literacy, and digital learning. However, ICT usage remains predominantly consumptive and utilitarian, with low levels of digital participation in civic contexts such as e-democracy, e-government, and e-health. This reflects the necessity for strategic interventions to strengthen the participatory dimensions of students' digital literacy, including digital creativity, digital ethics, and awareness of their roles as digital citizens. These findings resonate with the literature emphasizing the importance of integrating digital literacy and ethics within higher education curricula sustainably, to cultivate students who are not only technically proficient but also reflective, participative, and responsible in their digital lives.

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F. Author Contribution Statement

FA, was responsible for the drafting and composition of the manuscript. **KS**, **ISM**, and **S** served as academic supervisors, offering conceptual guidance and essential revisions throughout the research process. **MA**, conducted the data analysis and contributed to the interpretation of the findings. All authors reviewed and approved the final version of the manuscript.

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