








A Direction for AI Education: An Investigation of Digital Skills among Undergraduate Students in Malaysia

Sian Hoon Teoh*¹, Sharipah Ruzaina Syed Aris², Fazyudi Ahmad Nadzri³,
Sayang Mohd Deni⁴ and Siti Fairuz Dalim⁵

^{1,2,3,5} Faculty of Education, Universiti Teknologi MARA, 42300 Bandar Puncak Alam,
Selangor, Malaysia

⁴ College of Computing Informatics and Mathematics, Universiti Teknologi MARA, 40450
Shah Alam, Selangor, Malaysia

*tehsian@uitm.edu.my

Abstract. The adoption of AI has heightened the significance of digital skills in education. Thus, by observing the level of digital skills and factors associated with their development, this study seeks to identify strategies for equipping undergraduate students with digital skills. Specifically, this study aims to answer the following research questions: (1) What is the proficiency of undergraduate students in digital skills? (2) Is there any association between digital skills and faculties? and (3) Is there any association between digital skills and semesters of study? This study employed a survey research design to collect quantitative data. A questionnaire was designed to measure digital skills among undergraduate students. The items were divided into five dimensions: information literacy, computer and technology literacy, digital communication and collaboration skills, digital identity and well-being, and digital ethics. A total of 218 undergraduate students were randomly selected from a public university. This study found that undergraduate students rated themselves highly across all the dimensions of digital skills. However, they needed more attention to improve their computer skills. The weak association between digital skills, faculty, and semester factors suggests that educators can enhance digital skills independently, allowing students to participate in educational development with a fair approach. This would save expenses in conducting courses or planning for digital skills since all students could join together regardless of their backgrounds. Hence, this study suggests an approach to enhance computer and technology literacy, particularly knowledge and the ability to use computers and technology efficiently, for the development of AI education.

Keywords: Artificial Intelligence (AI), Digital Skills, Education, Computer Skills

1 Introduction

In the advanced digital world, many life activities rely heavily on current technological tools for problem-solving, decision-making, and other tasks [1]. Artificial intelligence (AI) has emerged as a field of expertise across all fields, underscoring the importance of digital technology. Previously, teachers played pivotal roles in leading a nation's educational development; now, their roles are diminishing, resulting in a significant reliance on AI for content delivery [2]. The increasing role of

© The Author(s) 2024

N. A. S. Abdullah et al. (eds.), *Proceedings of the International Conference on Innovation & Entrepreneurship in Computing, Engineering & Science Education (InvENT 2024)*, Advances in Computer Science Research 117,
https://doi.org/10.2991/978-94-6463-589-8_14

AI in various fields underscores the importance of digital literacy in leveraging technological advancements.

Digital literacy encompasses a range of competencies that are essential for individuals to engage with digital-based systems, allowing them to utilise these tools in a meaningful and responsible manner. However, when developing digital skills, individuals should possess competence in specific areas such as information literacy, computer and technology literacy, digital communication and collaboration skills, digital identity and well-being, and digital ethics [3]. These skills collectively play a crucial role in guiding individuals towards the effective and responsible use of AI. Additionally, these skills contribute to the development of 21st century skills in teaching and learning [4].

On the other hand, the existence of AI aligns with the strategic use of technology to enhance 21st-century skills. Recent research has underscored this endeavour by emphasizing the integration of AI skills into the current curriculum, thereby involving undergraduates in interdisciplinary learning and preparing them for careers [5]. For example, students can develop creativity by equipping themselves with necessary skills. Therefore, it is crucial for undergraduate students to acquire digital skills, ensuring they are prepared to navigate AI practices in society and their future careers. Before entering a career prospect, they must possess the fundamental digital skills. Consequently, it is crucial to assess the current digital skills of undergraduate students. Therefore, the goal of this study is to determine undergraduate students' proficiency in digital skills. The significance of this study lies in its insights on identifying digital skills that meet AI requirements. Specifically, this study seeks to answer the following research questions:

- (1) What is the proficiency of undergraduate students in digital skills?
- (2) Is there any association between digital skills and faculties?
- (3) Is there any association between digital skills and semesters of study?

2 Literature Review

Information literacy involves the ability to locate, evaluate, and use information efficiently, which is crucial in an era where data drives decision-making processes [6]. Computer and technology literacy, on the other hand, focuses on proficiency in using digital tools and understanding the underlying principles of technology in solving problem [7]. Digital communication and collaboration skills highlight the necessity of communication tools and technological proficiency in creating opportunities for collaborative efforts and building up a digital society [8]. In addition to technical skills, the rapid development of digital technology has led to issues of misinformation about its use, necessitating an awareness of digital identity and well-being [9]. This underscores the importance of managing one's online presence and mental health in a balanced and secure manner. Furthermore, digital ethics underline the importance of ethical considerations and responsible behaviour in digital interactions, guiding individuals to make informed and morally sound decisions in the digital realm. Since many people are coping with and attached to AI, how does an individual develop the skills deemed necessary for moderating? Similarly, since AI has become a prominent aspect in many fields of development, more expertise is required for future development and to address related issues. Consequently,

universities need more guidance and insights to provide courses or programmes on digital skills for producing AI experts. On this matter, universities can choose to include these kinds of skills by directly offering AI courses or programs. Alternatively, universities could integrate these skills into any course. This arrangement is essential as the current trend focusses on nurturing interdisciplinary engagement to increase students' confidence in career readiness [5].

3 Research Methodology

This study employed a survey research design to collect quantitative data. A questionnaire was designed to measure digital skills among undergraduate students in Malaysia. The items were divided into five dimensions: information literacy, computer and technology literacy, digital communication and collaboration skills, digital identity and well-being, and digital ethics. A total of 218 undergraduate students from various disciplines were randomly selected from a public university. All university students received equal selection opportunities, regardless of their history or context. The investigation on AI education concentrates on common, specific skills, particularly digital skills, which are integral to Malaysian Higher Education's goal of developing students with digital literacy. As a result, it was acceptable to generalise the findings to a Malaysian university.

The questionnaire assessing digital competencies was developed from a study as presented by [3]. The competencies included five distinct domains: information literacy, computer and technology literacy, digital communication and cooperation skills, digital identity and well-being, and digital ethics. The validity was established by modifying the items according to the comments of three experts. Subsequently, the pilot test was conducted with a specific group of samples.

4 Findings

The development of digital skills needs to be observed and monitored through several components: information literacy, computer and technology literacy, digital communication and collaboration skills, digital identity and well-being, and digital ethics. These components collectively impart AI engagement. Therefore, monitoring the achievement levels in these skills can provide valuable insights into areas that require improvement and focus. Additionally, comparing skill levels according to various factors, such as faculty and year or semester of study, offers more insight into the direction of AI development. The results are presented in line with the research questions.

4.1 Finding 1: Descriptive Statistics for Measuring Digital Skills

This study revealed that undergraduate students perceived their digital skills at higher levels, with means ranging from 3.92 to 4.28 out of a maximum level of 5, as depicted in Table 1. Digital skills were measured as a mean with a range of 0 to 5. Specifically,

Table 1 shows that the overall mean of digital skills is 4.12, with a standard deviation of 0.72. The results for each dimension of digital skills were presented in ascending order. The means and standard deviations for each dimension are as follows: digital identity and well-being (mean = 4.28; standard deviation = 0.692), digital ethics (mean = 4.27; standard deviation = 0.704), information literacy (mean = 4.12; standard deviation = 0.658), digital communication and collaboration skills (mean = 4.02; standard deviation = 0.733), and computer and technology literacy (mean = 3.92; standard deviation = 0.746). It is noteworthy that the means consistently exceed the average value of 3.

Table 1. Level of digital skills

Dimension	Description	Sample item	Mean	Std. Deviation
Digital Identity and Well Being	The required skills are ensuring well-being development via technology facilities	<i>I can manage online and real -world interactions that support healthy physical, emotional and mental health.</i>	4.28	0.692
Digital Ethics	The required skills are emphasising ethics practices in any invention and innovation practices	<i>can evaluate the credibility of sources, use and cite them ethically and legally</i>	4.27	0.704
Information Literacy:	The required skills are identifying and applying resources.	<i>I am able to find and identify sources of information.</i>	4.12	0.658
Digital Communication / Collaboration Skill	The required skills are applying technology to communicate and collaborate;	<i>I can use technology or platforms for collaboration or networking purposes.</i>	4.02	0.733
Computer and Technology Literacy:	The required skills are applying technology for the development of knowledge and solving problems	<i>I have the ability to use computers and application software for practical/studio purposes.</i>	3.92	0.746
N=218			4.12	0.572

4.2 Finding 2: Digital skills among undergraduate students from different faculties

Table 2 presents the results of comparing digital skills among undergraduate students across various faculties. The results show that there is no significant association between the level of digital skills and faculty ($\chi^2=16.289$, and p-value =0.092), given

that the p-value exceeds the significance level of 0.05. This suggests that students from different faculties have an equal ability to acquire digital skills, as their levels of digital skills did not exhibit significant differences among them.

Table 2. Association between level of digital skills and faculty

	Chi-square, χ^2	p-value
Comparing between digital skill and faculty	16.289	0.092

4.3 Finding 3: Digital skills among undergraduate students from different semesters (year)

Table 3 shows the results of comparing digital skills among undergraduate students across various semesters of their studies. The results show that there is no significant association between the level of digital skills and faculty ($\chi^2=3.107$, and p-value =0.875) since the p-value exceeds the significance level of 0.05. This suggests that students in different semesters of their studies possess equal abilities to acquire digital skills, with no significant differences in their levels of digital skills.

Table 3. Association between level of digital skills and semester

	Chi-square, χ^2	p-value
Comparing between digital skill and semester	3.107	0.875

5 Discussion

The emphasis on AI readiness in improving digital skills must be integrated, as it not only equips students with competency in using AI tools but also fosters an ethical culture for developing innovative ideas and products. This study discovered that the students were willing to explore AI tools in a responsible manner, with a positive understanding of ethical compliance while enhancing their digital skills. They rated digital identity and well-being (mean = 4.28; standard deviation = 0.692) and digital ethics (mean = 4.27; standard deviation = 0.704) the highest. These findings indicate that Malaysians are emphasising digital ethics while adapting to the advancement of digital artificial intelligence. This effort aligns with Malaysia's growth strategy for the digital economy, aiming to prepare for its growth [10].

While global development is increasingly shaped by technology and innovative solutions to address various challenges, the importance of protecting intellectual property rights requires greater emphasis [11], [12]. This underscores the need for ethical considerations in the development of Artificial Intelligence (AI). The findings of this study demonstrated that academically well-prepared undergraduate students are confident in their digital skills. Consequently, they are capable of guiding teams

by demonstrating how to implement ethical principles such as transparency and accountability in collaborative AI development projects.

In addition to showcasing their digital information literacy skills (mean = 4.12) by using AI tools to identify resources, undergraduate students frequently demonstrated strong communication and collaboration skills (mean = 4.02). This indicates their active engagement in networking and their reliance on cutting-edge methods of information retrieval. While the students were using AI tools to identify resources, demonstrating their digital information literacy skills (mean = 4.12), they frequently demonstrated communication and collaboration skills (mean = 4.02), indicating that the undergraduate students were active in networking and heavily relied on the latest methods of retrieving information. Additionally, recent studies have confirmed high levels of activity by students on Facebook [13]. This study also discovered that the students showed lower performance in gaining computer and technology literacy (mean = 3.92). This is a common finding in studies, and empirical evidence highlights the need to develop these skills [14].

The results also showed that the students did not exhibit differences in their digital skills abilities, regardless of their faculties and semesters. The Chi-squares analysis shows that the association between digital skills and faculty, as well as semester, is not significant. Hence, all students possess a certain level of digital skills, suggesting that these skills are commonly learned within university courses. In addition, there is awareness of the importance of possessing this knowledge [15].

6 Conclusion

This study found that undergraduate students rated themselves highly in digital skills across all dimensions. However, they required more attention to improve their computer skills. The weak correlation between digital skills, faculty, and semester factors suggests that educators can enhance digital skills independently. This would allow students to participate in educational development with a fair approach and structure, saving expenses in conducting courses or planning for digital skills, since all students, regardless of their backgrounds, could join together. Hence, this study suggests an approach to enhance computer and technology literacy, focusing on knowledge and the ability to use computers and technology efficiently, for the development of AI education.

Acknowledgments. The authors wish to thank the Faculty of Education and Research Management Centre (RMC) of Universiti Teknologi MARA (UiTM) for their assistance and support throughout this research. This research was funded by a special research grant from Universiti Teknologi Mara (600-RMC/GPK 5/3 (007/2020)).

References

- [1] S. Holroyd, “From the world wide web to AI: 11 technology milestones that changed our lives,” *Emerg. Technol.*, 2024, [Online]. Available: <https://www.weforum.org/agenda/2024/03/11-technology-milestones-ai-quantum-computing-vr/>
- [2] Milberg, “The future of learning: How AI is revolutionizing education 4.0,” *World Econ. Forum*, 2024, [Online]. Available: <https://www.weforum.org/agenda/2024/04/future-learning-ai-revolutionizing-education-4-0/>
- [3] S. F. Dalim *et al.*, “Framework for Numeracy and Digital Skills Attributes in Higher Education,” *Res. Soc. Sci. Technol.*, vol. 8, no. 3, pp. 16–35, Aug. 2023, doi: 10.46303/ressat.2023.18.
- [4] E. van Laar, A. J. A. M. van Deursen, J. A. G. M. van Dijk, and J. de Haan, “The relation between 21st-century skills and digital skills: A systematic literature review,” *Comput. Human Behav.*, vol. 72, pp. 577–588, 2017, doi: 10.1016/j.chb.2017.03.010.
- [5] J. Southworth *et al.*, “Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy,” *Comput. Educ. Artif. Intell.*, vol. 4, p. 100127, 2023, doi: 10.1016/j.caeai.2023.100127.
- [6] D. C. Mbandje, M. J. Loureiro, and M. Lucas, “Digital competence and information literacy: clarifying concepts based on a literature review,” *EMI. Educ. Media Int.*, vol. 60, no. 3–4, pp. 306–316, Oct. 2023, doi: 10.1080/09523987.2023.2324584.
- [7] D. M. Velliariis and P. Breen, “Native or Novice?,” in *Handbook of Research on Engaging Digital Natives in Higher Education Settings*, M. M. Pinheiro and D. Simões, Eds. IGI Global, 2016, pp. 1–20. doi: 10.4018/978-1-5225-0039-1.ch001.
- [8] A. Cherbonnier, B. Hémon, N. Michinov, E. Jamet, and E. Michinov, “Collaborative Skills Training Using Digital Tools: A Systematic Literature Review,” *Int. J. Human–Computer Interact.*, pp. 1–19, May 2024, doi: 10.1080/10447318.2024.2348227.
- [9] S. Cao and H. Li, “A Scoping Review of Digital Well-Being in Early Childhood: Definitions, Measurements, Contributors, and Interventions,” *Int. J. Environ. Res. Public Health*, vol. 20, no. 4, p. 3510, Feb. 2023, doi: 10.3390/ijerph20043510.
- [10] B. Edrak, Z. M. Nor, and A. R. Shaik, “The Readiness of Malaysia Digital Economy: A Study of Three Government Policies from 1991 to 2020,” *Int. J. Econ. Financ.*, vol. 14, no. 12, p. 84, Nov. 2022, doi: 10.5539/ijef.v14n12p84.
- [11] B. S. Ayinla, O. O. Amoo, A. Atadoga, T. O. Abrahams, F. Osasona, and O. A. Farayola, “Ethical AI in practice: Balancing technological advancements with human values,” *Int. J. Sci. Res. Arch.*, vol. 11, no. 1, pp. 1311–1326, Feb. 2024, doi: 10.30574/ijrsra.2024.11.1.0218.
- [12] Y. K. Dwivedi *et al.*, “Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research,

- practice and policy,” *Int. J. Inf. Manage.*, vol. 57, p. 101994, Apr. 2021, doi: 10.1016/j.ijinfomgt.2019.08.002.
- [13] U. Kelzang and T. Lhendup, “Relationship between Facebook Usage and Academic Performance of College Students under the Royal University of Bhutan,” *J. Educ. Soc. Behav. Sci.*, pp. 29–38, Apr. 2021, doi: 10.9734/jesbs/2021/v34i230303.
- [14] A. Aydınlar *et al.*, “Awareness and level of digital literacy among students receiving health-based education,” *BMC Med. Educ.*, vol. 24, no. 1, p. 38, Jan. 2024, doi: 10.1186/s12909-024-05025-w.
- [15] G. A. Abrosimova, “Digital Literacy and Digital Skills in University Study,” *Int. J. High. Educ.*, vol. 9, no. 8, p. 52, Oct. 2020, doi: 10.5430/ijhe.v9n8p52.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

