EXPLORING STUDENTS' DIGITAL AND INFORMATION LITERACY SKILLS: A QUALITATIVE APPROACH

D. POPA[1]   A. VASILESCU[2]

Abstract: *This study investigates students' digital and information literacy competencies through a qualitative design, emphasizing their ability to use digital resources effectively. Through semi-structured interviews, focus groups, and document analysis, data were collected from a diverse group of students. Findings show that students rate their level of information and digital literacy as average, which may suggest some uncertainty about the applicability of these competencies in academic and professional settings. The study highlights the crucial role of educators in promoting these skills through targeted interventions. Recommendations are offered for policy development and practical strategies to bridge the skills gap.*

Key words: *digital competencies, information evaluation, higher education.*

1. Introduction

Literacy involves the use of all language methods. Following this line, we observe that information literacy focuses on identifying and solving specific problems through the use of information (Bruce et al., 2006). By recognizing the importance of information, academia plays a key role in guiding the next generation to effectively use information to solve problems during their study years and in their future professions. Therefore, information and digital literacy aim to improve students' learning skills and effective expression. Achieving a high level of expression of these competencies enables future citizens to participate actively in civic and societal engagement (Rafi et al., 2019). The concept of information is well-known and widespread. Over 150 definitions are encountered. The operationalization of the concept refers to data presented in traditional (paper) formats as well as new ones: "digital data, logs, blogs, electronic books, and multimedia file formats, as well as those to come" (Simard & Karsenti, 2016,

[1] Department of Teachers Training, Transilvania University of Brasov, Romania, danapopa@unitbv.ro, corresponding author
[2] Department of Mathematics and Computer Science, Transilvania University of Brasov, Romania.

p. 4). Information literacy is frequently defined as the ability to identify, evaluate, process, organize, and disseminate information in various formats (Bell, 2021). In a broad sense, digital literacy is often defined as a set of competencies that empower people to live and contribute to a digital society (List, 2019). Recent studies emphasize the need to focus especially on the attitudinal component of the skill set mentioned above, enabling individuals to make conscious decisions regarding integrating and using digital resources (Gouseti et al., 2023).

Digital literacy includes information literacy in addition to ICT and media skills. There is also a strong focus on shaping appropriate attitudes in interacting with technology for sustainable development (Vongkulluksn et al., 2024). Skills like those are essential in a future that demands the younger generation not only to be consumers but also producers of information and media content. Present research argues that the full and effective use of these competencies prerequisites self-expression and democratizes social dialogue (Al-Zou'bi, 2021).

Recent research explores the critical role of media and information literacy in equipping citizens with the skills to navigate the information age and combat misinformation. It highlights the importance of optimizing digital tools to make them more accessible, inclusive, and tailored to the needs of young people, helping to reduce existing barriers (Lo et al., 2024). It also analyzes media and information literacy interplay, particularly in decision-making and entrepreneurship. It emphasizes that informed decisions based on media literacy skills can influence business success in the early years of existence (Guerola-Navarro et al., 2023).

Although Generation Z is considered to be digital natives, recent studies indicate that Gen Z has specific training needs to develop critical thinking and applied logic in professional contexts. It emphasizes the need for an educational approach tailored to Generation Z, combining technology and modern pedagogy with digital competencies is a key determinant of success in academic preparation and future careers (Imjai et al., 2024). The integration of digital technology in the teaching and learning process in educational institutions leads to improved educational outcomes for students. By actively incorporating digital technology into complex teaching processes, teachers can stimulate both subject learning and the development of students' information and digital competencies. Although it has an actual role to play, frequent use of digital technology does not implicitly lead to better learning outcomes. Alongside this, particular attention needs to be paid to developing critical thinking (Lohr et al., 2024).

Moreover, students' use of generative language models is a reality that generates divergent opinions among specialists. The main opposing poles are, on the one hand, increased productivity and efficiency in academic and professional work and, on the other hand, possible over-reliance on artificial intelligence that could lead to superficiality in learning and critical thinking of students (Mogavi et al., 2024). Digital resources enable students to access diverse cultural and social perspectives, facilitating the development of empathy, respect, and responsibility (Sujarwo et al., 2023; Yetti,

2024). Although integrating digital technology into learning can improve language skills and contribute to character development, many limitations remain. Some of these relate to the lack of adequate infrastructure or teachers' digital skills (Meum et al., 2021; Fernández-Otoya et al., 2024).

This research aimed to explore the information and digital literacy skills of students from higher education institutions. The main research questions are: what kind of experiences do students have with information and digital literacy, and what difficulties do they face in using resources for educational purposes?

2. Material and Methods

The study used a phenomenological approach to explore students' subjective experiences of information and digital literacy. The methods used for data collection were semi-structured interviews, two focus groups of 8 individuals each, and document analysis. The main themes of the interviews and focus groups were as follows:
  (1) the use of digital tools and platforms for learning,
  (2) the experiences associated with them, and
  (3) the difficulties encountered in the digital-based learning process.

2.1. Participants and data collection

A purposive sampling technique was used to select participants. Participants' informed consent was obtained before the interviews began, and the research's purpose and the student's rights were previously explained. Anonymity was ensured when presenting the results so that no information could be used to identify participants. Students from different faculties and years of study were selected to reflect a diversity of perspectives on information and digital literacy according to their primary and educational backgrounds. On average, an interview lasted about 30 - 40 minutes and had between 18 and 20 questions. To compare the interview data with the focus group data, the research team decided to use the same interview guide.

The sample had a total of 28 students, consisting of 6 males and 22 females. One focus group consisted of 8 students (3 males) pursuing engineering degree programs (Applied Automation and Computer Science, Road Vehicles, Food and Tourism, Construction, Industrial Design, Electrical Engineering, Materials Science and Engineering, Engineering and Business Management), aged between 22 and 26 years. The second focus group consisted of 8 students from social and humanities faculties (Social Work, Law, Physical Education and Mountain Sports, Clinical Laboratory, Computer Science, Psychology, and Management), aged between 22 and 24 years. Twelve individual interviews were also conducted with students aged between 20 and 27. They are following various study programs. In addition to the fields of study listed among the focus group participants, specializations such as Applied Informatics, Digital Media, Healthcare, and Marketing are emerging.

3. Results

The interviews aimed to explore various aspects of information and digital literacy among students, including how they use their digital competencies in academic activities, how they perceive their comfort in finding and evaluating relevant information, and what strategies they use to access online or database academic resources. An important focus was placed on institutional support, analyzing how universities contribute to developing digital and information literacy through training sessions or dedicated resources. Finally, it assessed the impact of these skills on academic success and students' perceptions of their relevance to their professional careers, as well as suggestions for improving the support provided by institutions.

The analysis procedure had the following steps: transcription of the recorded interviews into Excel documents, followed by inductive analysis, repeated reading of the transcripts, and the notes made during the interviews. Significant units were extracted from the data and coded by researchers (blinded). One of the authors performed the coding and subsequently confirmed with the other researcher (Mensonen, 2024). The codes (n = 67) were grouped into subcategories (n = 20) and main categories (n = 6). Finally, the main categories were organized under three themes (n = 3) to help interpret the results.

Data was considered to have reached saturation when no new information emerged in the most recent interviews (Lindgren, 2020). Particular attention was given to representative sampling and achieving saturation. By triangulating the sources, with data being obtained from three different sources (interviews, focus groups, and document analysis), we sought to increase the credibility of the obtained results. We also discussed interpretations with some participants to confirm whether the results accurately reflected their experiences.

3.1. The extent to which information and digital literacy competencies are developed

To get a detailed insight into the level of students' information and digital literacy, we considered the following aspects: the extent to which students use their digital and information management skills in academic activities, the methods and strategies used to search for academic information on the internet or in databases, the extent to which digital resources are used for academic work, the most frequently used digital applications or tools for learning, and the difficulties encountered in using digital resources for study or research. Another essential aspect to investigate was the identification of strengths and weaknesses in their digital competencies, as well as the factors contributing to or limiting their development.

Most students say they use their digital and information management skills to a significant extent in their academic activities. Quick access to online resources and the ability to organize information efficiently allow them to optimize their time and focus on the essence of assignments and projects. A large proportion of interviewees find it a

deep challenge to discern from the plethora of information they find. They note that they spend a lot of time selecting the most relevant ones, which reduces their comfort level.

The main tool they use to search for information is a web-based search engine, but many voices claim that they check bibliographic citations and go to websites for scientific papers.

> "*When I search for academic information online or in databases, I start by defining the keywords relevant to my topic as clearly as possible, and sometimes I also add domain-specific terms to narrow the search. To streamline the process, I apply filters available in databases: I can select recent articles, limit myself to scholarly articles, or choose sources written by authors known in the field. I also like to consult multiple platforms, such as Google Scholar or ScienceDirect*" (P9).

There are quite a few participants who check by simulating a model in which they use the information found. Few are concerned with checking whether the information fits within a predetermined range or whether the same information is found in at least three resources.

3.2. Impact of information and digital literacy on the academic experience

We aimed to identify the degree to which people are aware of these competencies' effect on academic work and future careers. Another significant aspect to investigate was the identification of strengths and weaknesses in their information and digital competencies, as well as the factors contributing to or limiting their development.

Examples of digital tools used by the students included GeoGebra, MedBridge, Github, Canva, etc. The exemplified tools show a highly specialized area in which the students use them. However, students recognize many digital-based challenges they should implicitly face.

> "*Digital multitasking has been a challenge. I often had multiple apps open simultaneously - learning platforms, collaborative applications, or note management apps, which led to a scattering of attention. Trying to manage all the digital resources, I sometimes failed to focus enough on the essential tasks, and learning became more fragmented and less efficient*" (P3).

The most considerable difficulties they encounter in using digital resources for study or research are related to the lack of free-of-charge use of some resources, the persistent advertisements that make them difficult to use, the information overload they give, and limited access to paid articles. "*I sometimes find too much information and have to spend time filtering and selecting the most relevant and reliable resources*"

(P7). "*Some studies and articles are only available through expensive subscriptions, and access to them is limited*" (P11). Some participants noted that the main quality of information is ease of access, often at the expense of depth.

3.3. Suggestions for improving resources or training offered by the university

Digital transformation and digital literacy influence and shape educational practices in higher education institutions (Farias-Gaytan et al., 2022). It is not only the skills needed to access, search, and critically analyze information in the digital environment that are becoming important, but also the context in which they are developed. Many students consider that the university supports them in developing their information and digital competencies through the available programs, the educational platforms, the user guides and the courses offered (e.g. Intellectual Work Techniques, Academic Ethics), the library support, and the challenging learning tasks. However, a significant number of students feel that they only receive the context of trying to improve their learning ability, but this is reflected subjectively.

> "*I would say that the university provides some support, but some aspects could be improved. Even if the university has and is making resources and workshops available to students, the support is not always enough to develop more advanced skills and to be able to solve specific technical problems*" (P22).

4. Discussions

The results suggest that students assess their level of information and digital competencies at an average level, which may indicate an awareness of the importance of these competencies and a certain insecurity about their application in academic and professional contexts. It has been observed that technical students tend to report a higher level of confidence in their digital competencies, while social science students perceive their competencies as more limited, which underlines the need for a tailored approach by discipline. The challenges that students highlight can be linked to the fact that formal instruction on the use of digital resources is often insufficiently integrated into curricula, and students are forced to learn these skills on their own.

To verify and compare with students' statements, relevant documents such as textbooks and handbooks, guides, or lecture materials in the form of digital and open educational resources made available by the university at which they are enrolled were analyzed. A total of 65 relevant sources available on the university platform were identified and selected. They were grouped into the categories: textbooks, guides, and online resources. The quality, relevance, and actuality of the information were analyzed. The findings of the analysis show that textbooks provide a solid foundation of theoretical knowledge, but they are available only to students from certain study programs, not to all students. The guides are well structured and easy to use, provide

clear and useful guidance on the use of the e-learning platform, and are available to both teachers and students.

While the university provides a variety of guides and digital resources through its specific communication channels built into the e-learning platform, digital library, or even during educational events, there is a notable gap between what is available and what students perceive as accessible or useful for their learning needs. Specifically, students reported challenges in locating and effectively utilizing these resources, suggesting that the dissemination and promotion of such tools may be insufficient or not aligned with their learning styles and preferences. This disconnect highlights the need for improved communication, more accessible resources, and targeted training to reduce barriers and bridge the gap between institutional offerings and student utilization. Current studies suggest that students in private universities have shown more deeply developed digital competencies than students in public institutions. This conclusion is possibly due to the greater number of technological resources available in the private sector (Glasserman-Morales et al., 2024).

5. Conclusions, Limitations, and Implications

The research findings align with previous studies highlighting that although students are competent in using technologies, they often lack the advanced skills needed to evaluate the quality and relevance of information (Martzoukou et al., 2024). Moreover, the findings follow recent studies suggesting that to improve digital literacy skills it is essential to develop personalized curricula and use appropriate technology tailored to the needs and learning objectives of different groups of students (Park et al., 2021).

The results cannot be generalizable as this study focuses on a detailed exploration of individual or group experience. Besides, the small sample (28 people) may not be representative of the wider population. Participants' subjectivity could have affected the validity of the conclusions and introduced bias into the data. The subjectivity of the researchers may also have generated a personal influence on the results. Diversity of age, socio-economic background, and culture could not be ascertained, so the results cannot be extended to other categories of students.

Future research could explore the effects of digital and information literacy programs on academic performance or how cultural differences influence perceptions and digital competencies. Impactful research directions could also consider assessing the involvement of artificial intelligence in generating digital learning resources according to the student needs, developing students' information and digital competencies, or analyzing the relationship between the digital competencies acquired during studies and the adaptability of graduates in the labor market.

Acknowledgments

References

Al-Zou'bi, R. (2021). The impact of media and information literacy on acquiring the critical thinking skill by the educational faculty's students. *Thinking Skills and Creativity, 39,* 100782. https://doi.org/10.1016/j.tsc.2020.100782

Bell, D. (2021). A qualitative investigation of the digital literacy practices of doctoral students. *Journal of Information Literacy, 15*(3), 82–99. https://doi.org/10.11645/15.3.2829

Bruce, C., Edwards, S., & Lupton, M. (2006). Six frames for information literacy education: A conceptual framework for interpreting the relationships between theory and practice. *Innovation in Teaching and Learning in Information and Computer Sciences, 5*(1), 1–18. https://doi.org/10.11120/ital.2006.05010002

Farias-Gaytan, S., Aguaded, I., & Ramirez-Montoya, M. S. (2022). Transformation and digital literacy: Systematic literature mapping. *Education and Information Technologies, 27*(2), 1417–1437. https://doi.org/10.1007/s10639-021-10624-x

Fernández-Otoya, F., Cabero-Almenara, J., Pérez-Postigo, G., Bravo, J., Alcázar-Holguin, M. A., & Vilca-Rodríguez, M. (2024). Digital and information literacy in basic-education teachers: A systematic literature review. *Education Sciences, 14*(2), 127. https://doi.org/10.3390/educsci14020127

Glasserman-Morales, L. D., Alcantar-Nieblas, C., & Sisto, M. I. (2024). Demographic and school factors associated with digital competencies in higher education students. *Contemporary Educational Technology, 16*(2), ep498. https://doi.org/10.30935/cedtech/14288

Gouseti, A., Lakkala, M., Raffaghelli, J., Ranieri, M., Roffi, A., & Ilomäki, L. (2023). Exploring teachers' perceptions of critical digital literacies and how these are manifested in their teaching practices. *Educational Review*, 76(7), 1751–1785*.* https://doi.org/10.1080/00131911.2022.2159933

Guerola-Navarro, V., Stratu-Strelet, D., Botella-Carrubi, D., & Gil-Gomez, H. (2023). Media or information literacy as variables for citizen participation in public decision-making? A bibliometric overview. *Sustainable Technology and Entrepreneurship, 2*(1), 100030. https://doi.org/10.1016/j.stae.2022.100030

Imjai, N., Aujirapongpan, S., & Yaacob, Z. (2024). Impact of logical thinking skills and digital literacy on Thailand's generation Z accounting students' internship effectiveness: Role of self-learning capability. *International Journal of Educational Research Open, 6,* 100329. https://doi.org/10.1016/j.ijedro.2024.100329

Lindgren, B. M., Lundman, B., & Graneheim, U. H. (2020). Abstraction and interpretation during the qualitative content analysis process. *International Journal of Nursing*

Studies, 108, 103632. https://doi.org/10.1016/j.ijnurstu.2020.103632

List, A. (2019). Defining digital literacy development: An examination of preservice teachers' beliefs. *Computers & Education, 138,* 146–158. https://doi.org/10.1016/j.compedu.2019.03.009

Lo, B., Teferi, B., Wong, H. W., Abi-Jaoude, A., Chopra, J., Charow, R., ... & Wiljer, D. (2024). Enhancing the value of digital health tools for mental health help-seeking in Canadian transitional aged youth during the pandemic: Qualitative study. *International Journal of Medical Informatics, 182,* 105299. https://doi.org/10.1016/j.ijmedinf.2023.105299

Lohr, A., Sailer, M., Stadler, M., & Fischer, F. (2024). Digital learning in schools: Which skills do teachers need, and who should bring their own devices? *Teaching and Teacher Education, 152,* 104788. https://doi.org/10.1016/j.tate.2024.104788

Martzoukou, K., Luders, E. S., Mair, J., Kostagiolas, P., Johnson, N., Work, F., & Fulton, C. (2024). A cross-sectional study of discipline-based self-perceived digital literacy competencies of nursing students. *Journal of Advanced Nursing, 80*(2), 656–672. https://doi.org/10.1111/jan.15801

Mensonen, M., Pramila-Savukoski, S., Mikkonen, K., Törmänen, T., Juntunen, J., & Kuivila, H. M. (2024). The experiences of social and health care and health sciences educators of implementing hybrid teaching in higher education: A qualitative study. *Nurse Education Today, 133,* 106079. https://doi.org/10.1016/j.nedt.2023.106079

Meum, T. T., Koch, T. B., Briseid, H. S., Vabo, G. L., & Rabben, J. (2021). Perceptions of digital technology in nursing education: A qualitative study. *Nurse Education in Practice, 54,* 103136. https://doi.org/10.1016/j.nepr.2021.103136

Mogavi, R. H., Deng, C., Kim, J. J., Zhou, P., Kwon, Y. D., Metwally, A. H. S., ... & Hui, P. (2024). ChatGPT in education: A blessing or a curse? A qualitative study exploring early adopters' utilization and perceptions. *Computers in Human Behavior: Artificial Humans, 2*(1), 100027. https://doi.org/10.1016/j.chbah.2023.100027

Park, H., Kim, H. S., & Park, H. W. (2021). A scientometric study of digital literacy, ICT literacy, information literacy, and media literacy. *Journal of Data and Information Science, 6*(2), 116–138. https://doi.org/10.2478/jdis-2021-0010

Rafi, M., JianMing, Z., & Ahmad, K. (2019). Technology integration for students' information and digital literacy education in academic libraries. *Information Discovery and Delivery, 47*(4), 203–217. http://dx.doi.org/10.1108/IDD-07-2019-0049

Simard, S., & Karsenti, T. (2016). A quantitative and qualitative inquiry into future teachers' use of information and communications technology to develop students' information literacy skills. *Canadian Journal of Learning and Technology* [*La revue canadienne de l'apprentissage et de la technologie*]*, 42*(5), 1-23. https://www.learntechlib.org/p/188091/

Sujarwo, S., Asdar, A., Sabillah, B. M., Sukmawati, S., Akhiruddin, A., & Syata, W. M. (2023). Innovation in English language learning model based on digital literacy to construct young learners' character. *Ethical Lingua: Journal of Language Teaching and Literature, 10*(2), 465-477. https://doi.org/10.30605/25409190.v10.2.2023

Vongkulluksn, V. W., Shortt, M. B., Akinkuolie, B., & Xie, K. (2024). Information literacy instruction in naturalistic high school science classrooms: Instructional strategies and associations with students' prior knowledge. *Teaching and Teacher Education, 144,* 104572. https://doi.org/10.1016/j.tate.2024.104572

Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(1), 100233. https://doi.org/10.1016/j.joitmc.2024.100233