

Critical digital literacy as a key skill in higher education: Attitudes of students and professors

Marin MILKOVIĆ

University of the North
42 000 Varaždin, Jurja Križanića 31b, Croatia

Dijana VUKOVIĆ

University of the North
42 000 Varaždin, Jurja Križanića 31b, Croatia

Fani KERUM

Doctorate Paneuropean Studies
Campus 2, A-7000 Eisenstadt, Austria

ABSTRACT

Critical digital literacy is becoming a key skill in higher education, given the increasing integration of digital technologies into teaching and research. This paper explores the attitudes of students and professors in higher education institutions towards critical digital literacy, which includes technical skills, the ability to analyze and evaluate digital sources, and the active use of digital tools in an educational context. The research is based on an analysis of the perception of critical digital literacy as an important component of academic success and professional development. Through survey research and interviews with 900 students and 300 professors from all levels of study, attitudes were examined on the importance of digital technologies in education, online safety, and their role in developing critical thinking and recognizing disinformation. The results show that students and professors are mostly aware of the importance of critical digital literacy. Still, there are significant differences in the level of engagement and trust in digital tools among different groups. Students at lower levels of education show greater trust in technology, while professors highlight the challenges in integrating digital tools into teaching, especially in terms of assessment and maintaining academic ethics. This paper points to the need for further development of critical digital literacy in higher education institutions and suggests strategies for improving educational practices, including training for faculty and students in critical thinking, internet safety, and proper use of digital resources. In conclusion, the paper highlights the importance of continuous investment in developing digital skills, which are necessary for successfully facing the challenges of the digital age and preparing students for the labour market.

Keywords: critical digital literacy, education, skills, labour market

1. INTRODUCTION

Digital technologies have become an indispensable part of everyday life, transforming how we communicate, learn, work and exchange information. In higher education, digital literacy is no longer just a matter of knowing and using technological tools, but also developing the ability to critically analyse and interpret information from digital sources. Given the speed at which the digital space is developing, the skill of critical digital literacy is becoming essential for students and professors in the modern educational environment. Critical digital literacy does not only

imply the technical ability to use tools, but also the ability to recognize disinformation, assess the credibility of sources, understand the ethical implications of digital technologies, and behave responsibly online. This paper explores the attitudes and perceptions of critical digital literacy among students and professors at higher education institutions, to determine the extent to which this skill is recognized as crucial for academic success and personal development in a digital environment. Digital literacy and its critical dimension are becoming key factors in understanding how contemporary educational systems shape and develop competencies that enable students and teachers to successfully navigate the dynamic digital world. By analyzing the opinions and experiences of students and teachers, the paper seeks to contribute to a better understanding of the role of critical digital literacy in the educational process, as well as the challenges and opportunities it brings. In recent decades, educational institutions have become increasingly digitalized, and teaching and communication between students and teachers have largely moved online. In this context, higher education systems must integrate digital and critical digital literacy education into their curricula, to enable students to develop not only technical but also analytical and ethical skills necessary for effective functioning in the digital era. Given the increasing importance of digital competence, it is crucial to understand the attitudes of key stakeholders in the educational process – students and teachers – towards this skill, and to determine how it is applied in the educational context.

This paper aims to investigate the attitudes and experiences of students and professors regarding critical digital literacy, with special emphasis on how these actors perceive the importance of this skill in higher education, as well as the challenges they face in its application. Through this research, the work will contribute to a better understanding of the necessity of a critical approach to digital information, to form informed, responsible and ethically aware users of digital technologies in the academic world.

2. INTEGRATION OF DIGITAL SKILLS: FROM DIGITAL LITERACY TO MULTIPLE DIGITAL LITERACIES

The phrase "new literacies" refers to literacies that appeared in the post-typography era, with the advent of digital technology (Galloway, 2006). According to proponents of new literacies, digital technology has not only changed existing social practices but has created new forms of practices (Lankshear & Knobel, 1997). Technology is transforming the nature of literacy, and its meaning (Leu et al., 2004; Schmar-Dobler, 2008). Literacy is no

longer limited to basic alphanumeric skills and knowledge (reading, writing and arithmetic), but is defined as competence in speaking and listening, understanding codes, numbers, signs, animations and different types of symbols, including audio and video formats (Leino, 2014; Säljö, 2012). Parallel to the expansion of the meaning of literacy, there is a multiplication of literacy modalities, so the construct of multiple literacies (eng. multiliteracies) is encountered in literature, which is associated with representatives of the so-called New London Group (New London Group, 2000). The term multiple literacies refers to a set of open and flexible literacies necessary for functioning in different contexts and communities. Instead of defining literacy as a unitary (unique) construct, this group recognizes the diversity inherent in literacy, in a world defined by new communication technologies and new linguistic and cultural contexts, which become increasingly visible with globalization. In addition to the term digital literacy (Bawden, 2001; Belshaw, 2012; Comba, 2011; Covello, 2010; Gilster, 1997; Erstad, 2006; Eshet-Alkalai, 2004), the term digital competence is often used in the literature. , especially in official European documents from the field of education (Ala-Mutka, 2011; European Parliament and the Council, 2006; European Commission/Eurydice, 2012; Ferrari, 2013), as well as among authors from Scandinavian countries (Krumsvik, 2008). Although these two terms are most often used as synonyms (eg Calvani et al., 2009; Calvani et al., 2012; Comba, 2011), some authors define digital literacy more broadly, as a term superior to the term digital competence. For example, according to one interpretation, digital literacy represents a more basic information communication and technological skill and it is the basis for acquiring digital competencies that are more specific and related to a certain context (ECDL Foundation, 2011). The possession of digital competencies is the lowest level in the development of digital literacy, which implies the successful use of digital competencies in different life situations (Martin & Grudziecki, 2006). Digital literacy is a survival skill" in the modern era, it enables intuitive and efficient solving of complex digital tasks. To function effectively in digital environments, a wide range of technical-procedural, motor, cognitive and emotional-social skills is necessary.

Previous research shows that the level of digital literacy development fluctuates depending on several factors, both at the student level and at the faculty level, i.e. the education system. Just as there is no empirically validated construct of digital literacy, there is also no theoretically based and empirically validated predictive model. model that explains individual differences in achievement. Therefore, this paper reviews all factors whose predictive value has been considered in previous research. For this research, factors that have been linked to student achievement in digital literacy in various studies have been classified into two groups: student characteristics (both those related to the use of digital technology and those not) and faculty characteristics (use of digital devices in the classroom, digital competencies of teachers, attitudes of teachers towards the use of digital technology, faculty vision regarding the use of digital technology, support for teachers). Multiple digital literacy is a concept that refers to the development and application of different types of skills that are needed for the effective and critical use of digital technologies in different contexts. This term expands the traditional definition of digital literacy, which mainly focuses on the basic ability to use technology, and includes a wide range of competencies needed to navigate a complex digital environment. Multiple digital literacy includes multiple dimensions of digital skills and knowledge, which enable users to use digital resources efficiently and responsibly,

as well as a critical attitude towards information found in the digital environment and includes several key aspects:

- *Technical literacy* - technical literacy refers to the basic skill of using digital devices and tools. This includes knowledge of operating systems, applications, internet browsers, e-mail systems and other technologies. People with high a level of technical literacy can effectively use digital tools in everyday and professional activities;
 - *Information literacy* - this aspect refers to the ability to recognize, search, analyze and evaluate information in the digital environment. Information literacy includes skills such as searching the Internet, assessing the relevance and credibility of sources, organizing data and managing information online;
 - *Critical digital literacy* - goes beyond the basic use of technology and deals with the analysis, understanding and evaluation of content in the digital environment. This includes the ability to recognize disinformation, fake news, and manipulative techniques on the Internet and social networks, as well as the ability to think about the ethics of digital behaviour and privacy. Critical digital literacy allows users to not be passive consumers of digital information, but to actively ask questions and analyze the information that is placed;
 - *Communication and collaboration in the digital environment* - the skill of communication in the digital environment involves the use of various digital platforms and tools (such as e-mail, instant messaging, social networks, and video conferencing) for mutual interaction, exchange of ideas, collaboration and problem-solving. The ability to communicate and collaborate effectively online is becoming crucial in educational, professional and social contexts.
 - *Ethics and responsibility in the digital world* - ethics in the digital environment refers to the understanding of ethical norms that apply to behaviour on the Internet. This includes issues such as privacy protection, data security, copyright compliance, responsibility for online behaviour and the avoidance of harmful digital practices (e.g. cyberbullying, online discrimination). Learning about digital ethics helps users to have a higher level of responsibility, awareness and ethical orientation in their digital interactions;
 - *Media literacy* - media literacy in the digital context encompasses the understanding and ability to critically analyze media content created by various digital platforms (newspapers, blogs, social networks, etc.). This includes the ability to recognize how the media shape information, and influence attitudes and behaviour, as well as recognizing the commercial and political interests that may lie behind media content.
- Multiple digital literacy is not only a matter of using digital tools but also of developing a wide range of competencies that enable users to critically engage in the digital world. Given the challenges and opportunities that digital technologies bring, higher education systems must incorporate these skills into their curricula, so that students, faculty, and the wider community are equipped to use digital tools and resources safely, responsibly, and in an informed manner. According to Rodríguez-Abitia et al. (2020), the digital maturity of universities is assessed based on three factors: their IT infrastructure (e.g., internet access and computing devices), their use of technology in teaching and learning (e.g., free educational resources and engaging lessons), and their collaboration and institutional platforms for process integration (workflow systems and learning social ecosystems). Conceptually, universities face political, social, and economic deep-rooted barriers that limit their ability to achieve their goals (Rodríguez-Abitia and Briebesca-Correa 2021). In the context of e-learning, access to technology alone is not sufficient to ensure that individuals achieve desired socioeconomic goals, as certain

fundamental skills are required to properly use information technology (Buckingham 2015). According to Rodríguez-Abitia et al. (2020), universities can be assessed for their digital maturity by assessing their IT infrastructure, how well they incorporate technology into teaching and learning, and the platforms they offer for collaboration and the organizational integration of processes and people. Contextual constraints in the political, social, and economic spheres make it very difficult for universities to achieve the above-mentioned goals. The emergence of educational digital transformation requires addressing the generational gaps between digital native students, as well as teachers who adopt ICT, requiring policies that support infrastructure and creative learning environments for Industry 4.0 and Society 5.0 (Balyer and Öz 2018).

3. RESEARCH METHODOLOGY AND RESULTS

Given the rapid development of digital technologies and their ubiquitous application in almost all aspects of life, the traditional definition of digital literacy, which mainly refers to the basic ability to use digital tools, is no longer sufficient. In today's digital environment, users, and especially those who are acquiring new knowledge and/or supplementing existing ones, face various challenges that relate not only to the technical use of tools, but also to the critical analysis, selection and ethical application of information. In this context, multiple digital literacy is becoming a key competence that encompasses not only technical skills, but also the ability to manage information, recognize disinformation, use digital tools for educational, professional and everyday purposes, as well as understanding the social and ethical aspects of the digital world. The research problem relates to the insufficient integration of the concept of multiple digital literacy into educational systems and everyday practice. Although digital literacy has become an integral part of modern education and professional life, many users – be it students, teachers, or the general public – are not fully equipped to effectively use advanced digital technologies. This problem is particularly pronounced in the context of higher education, where digital technologies are used in research, learning and communication, but students and professors are not always aware of the importance of developing a wider range of digital skills. The subject of the research is the analysis of multiple digital literacy, its application in higher education, as well as the factors that influence the level of literacy and development of digital skills among students and professors.

The main objective of this research is to examine the level of development of multiple digital literacy among students and professors at higher education institutions, as well as to identify key factors that influence its adoption and application, while the specific objectives are:

- to examine the level of development of different dimensions of multiple digital literacy (technical literacy, information literacy, media literacy, critical digital literacy, ethical literacy) among students and professors;
- to analyze the attitudes and perceptions of students and professors towards the importance of multiple digital literacy in their educational and professional lives, and its application in everyday contexts;
- to study the impact of digital tools and technologies on the quality of the educational process and on students' critical thinking and information analysis skills;
- develop recommendations for improving education programs and curricula in higher education institutions to increase the level of multiple digital literacy among students and teaching staff.

Following the above, the following hypotheses were set:

Hypothesis H1: A higher level of technological literacy among students and professors is a positive indicator of their ability to recognize and analyze digital disinformation.

Hypothesis H2: Increasing education on multiple digital literacy in higher education institutions contributes to better application of digital technologies in the teaching process and better preparation of students for digital challenges in the labor market.

Hypothesis H3: Students and professors who feel confident in using digital technologies show a higher level of engagement in online educational activities and digital research.

The research sample, conducted at universities in the Republic of Croatia, includes 1,200 participants, who are divided into two main groups: students and professors. This sample includes students from all three levels of study, and professors engaged at all these levels of education, which allows for a detailed and comprehensive research of the attitudes, experiences and perspectives of participants in Croatian higher education. The first group of the sample consists of 900 students, divided into three subgroups: 300 undergraduate students, 300 graduate students and 300 doctoral students. This structured sample allows for the exploration of students' experiences at different stages of their academic education. Undergraduate students represent the initial stage of higher education, when students are introduced to the basics of their chosen field, and often face the challenges of adapting to the higher education system and encounter critical digital literacy for the first time. On the other hand, graduate students already have a specific academic orientation and more developed critical thinking, while doctoral students reach the highest level of academic education, focusing on research and specialization in their field. Each of these groups offers a unique perspective on the education system, which makes the sample rich and diverse. Another important component of the sample is 300 professors, who teach at all three levels of study. Professors are a key link in the educational-teaching and guide students towards research and professional goals. Through their engagement in undergraduate, graduate, and doctoral studies, professors have a broad perspective on the challenges and benefits of each of these educational stages. Interestingly, this sample includes professors of different specializations and academic backgrounds, which explores how their experience at different levels of education influences their approach to teaching, interaction with students, and the academic community. The combination of students and professors in the sample allows for in-depth research from both aspects of the educational process. Students provide insight into their own experiences with curricula, learning methods, and the challenges they face, while professors, for their part, offer a broader picture of the academic system, educational policies, and trends in higher education. Also, a sample that includes students and professors from all levels of study helps to understand how access to education changes at different stages of study, and how this affects the quality of teaching, student engagement, and academic excellence. Given the diversity of students by study level, and the wide range of professors' experiences, this sample provides a deep understanding of the dynamics of the education system in Croatia. Additionally, the sample of 1200 participants provides exceptional representativeness for exploring attitudes and experiences within the academic community, making the research results useful for improving educational policies and teaching environments in the country. Finally, such a sample is crucial for drawing informed conclusions that can help shape future strategies for improving higher education in Croatia.

Given the inclusion of all levels of education and professors as key stakeholders in the educational process, the research offers a rich insight into the current situation and provides a foundation for further research and potential changes in the higher education system. When it comes to graduate students, the demographic picture becomes somewhat different. In graduate studies, which represent a higher level of education, students are usually older, have already acquired basic knowledge in their profession, and have been in the education system for several years. Among the 300 graduate students, 43% are men (130), while 57% are women (170), which confirms the somewhat lower, but still significant representation of women in this segment of education.

When it comes to the age structure, graduate students are mostly in their late twenties and early thirties. The largest number of students (47%) is in the age group of 23 to 25, which is common, since many graduate students start their studies immediately after completing their undergraduate studies. The next age group (26-28 years old) makes up 33% of the respondents, while a smaller percentage (13%) are students aged 29 to 31. Twelve per cent of graduate students are older (32 years and older), indicating that many graduate students already have professional or family commitments that may extend the time needed to complete their studies.

Doctoral studies, as the highest form of education, are characterized by a specific socio-demographic structure, which includes older and more experienced students. Among the 300 doctoral students, the gender distribution is balanced, with 50% men (150) and 50% women (150), which indicates a balance in gender representation among doctoral students. The age structure among doctoral students is, of course, older. The largest number of respondents (47%) falls into the age group of 26 to 30 years, which is common for doctoral studies, as many students begin doctoral studies after they have already gained experience in the profession or have completed a master's degree. The next age group (31-35 years) makes up 33% of students, while 13% are students aged 36 to 40. A smaller percentage (7%) are older students, aged 41 and over, which indicates the fact that many people decide to pursue a doctoral degree after a long period of professional life and seek additional training or reconsidering their career goals.

To prove the above variables, it is necessary to define specific items that will be used in the research instrument, the survey. The items are focused on different aspects of each variable and enable their quantification and analysis.

Table 1: Critical Digital Literacy Variables

Components of critical digital literacy	Variable
Level of technological literacy	knowledge in the use of basic digital tools (e.g. Microsoft Word, Excel, PowerPoint)
	confidence in your ability to recognize unreliable sources on the internet
	frequent use of digital tools (e.g. online databases, learning management systems) for academic activities
Ability to recognize and analyze misinformation	Credibility assessment
	Additional verification when you encounter suspicious content

	Ability to recognize manipulation on social networks
Education on multiple digital literacies	Academic programs focused on digital security
	Education about digital literacy
	The role of mentors in guiding the use of digital tools
Application of digital technologies in the teaching process	Frequency of use of digital tools – learning management systems
	Frequency of using the online database
	Implementation of interactive materials in the teaching approach
Preparing students for digital challenges in the labor market	Assessment of readiness to use digital tools only
	Familiarity with digital skills currently in demand in the job market
	Focusing education on the development of digital skills
Safety in the use of digital technologies	Safety in the use of digital tools for academic and professional activities
	Easy-to-use digital platforms
	Feeling secure in managing personal data and protecting privacy
Engagement in online educational activities and digital research	Only assessment of engagement in online educational activities
	Frequent participation in research
	The importance of using digital tools in research

The variables defined to measure engagement in online educational activities and digital research will provide a clear picture of how students and professors use digital resources, how engaged they are in online educational and research activities, and how digital tools affect their productivity and work organization. These variables will allow testing hypotheses related to engagement in the online environment and understanding the factors that influence the effectiveness of digital education and research.

Table 2: ANOVA test – Impact of critical digital literacy concerning education level

Table 2. Influence critical digital literacy skill to the level key education n				
Critical digital literacy	Undergraduate level of education	Graduate level of education	Doctoral level of education	ANOVA

		education		
Combined measure	13.84	13.92	14.27	F=1.70; p=0.18
Knowledge component	5.33	5.24	5.56	F=2.86; p=0.06
Attitudes and beliefs component	3.20	3.07	3.23	F=2.59; p=0.08
Behavioral component	5.39	5.44	5.43	F=0.07; p=0.93

The influence of the level of education of the respondents on critical digital literacy was tested by analysis of variance. Of the four analyzed measures of critical digital literacy, two measures (the knowledge component and the attitude and belief component) have statistically significant differences in values concerning the level of education of the respondents (at $p < 0.1$), while two measures (the combined measure and the behaviour component) have no statistically significant differences (Table 2). The highest level of critical digital literacy measured by the knowledge component is shown by doctoral study respondents who are more familiar with the concepts of Basic understanding of cyber threats, such as viruses, malicious software, identity theft, use of security tools such as antivirus programs, understanding the importance of personal data management, digital content management and creative tools. In the case of the attitude and belief component, the highest level of critical digital literacy is shown by doctoral and graduate study respondents and finally, undergraduate students, which means that they are more focused on planning the future and are more careful about the development of critical digital literacy. Through understanding and applying technological knowledge, developing responsible behaviour and critical thinking, students will become more aware, confident and effective users of digital tools. The various components of critical digital literacy, such as knowledge, attitudes and behaviour, enable students to better cope with the challenges of the digital era and use technology responsibly for educational and professional purposes.

Table 3: ANOVA test – Influence critical digital literacy as key indicator recognition and analyzing disinformation

Table 3.	Influence critical indicator	digital recognition	literacy as and analyzing disinformation	key
Critical digital literacy	Undergraduate level of education	Graduate level of education	Doctoral level of education	ANOVA
Combined measure	14.02	14.27	14.45	F=3.43; p=0.02
Knowledge	5.43	5.58	5.70	F=6.92; p=0.00

component				
Attitudes and beliefs component	3.14	3.11	3.21	F=0.51; p=0.80
Behavioral component	5.45	5.55	5.51	F=0.76; p=0.51

Table 2 presents the results of the analysis of variance that tested the hypotheses on the impact of critical indicators of disinformation recognition and analysis as key digital literacy. In the case of the combined measure and the knowledge component, there are statistically significant differences concerning disinformation recognition and analysis, in which respondents develop critical digital literacy concerning disinformation (at the significance level $p < 0.01$). In both of the above measures, critical digital literacy is higher with higher levels of education. A higher level of technological literacy among students and professors can be considered a positive indicator of their ability to recognize and analyze digital disinformation for several reasons. Technological literacy, which includes knowledge and skills in using digital tools and resources, also implies developed critical thinking regarding information found in digital media. Students and professors with higher levels of technological literacy tend to have better-developed skills in distinguishing credible sources from unreliable ones, as well as the ability to analyze and evaluate content that is disseminated via the Internet. Through developed knowledge, attitudes and behaviour regarding the digital environment, they become more responsible and critical consumers of digital information, which is crucial in today's information society. Although research results do not always show a significant difference between levels of education, there is a clear connection between technological literacy and the ability to recognize and analyse disinformation, which confirms the importance of technological literacy in the educational process.

Table 4: ANOVA test on the difference between students and professors on critical digital literacy as a key skill in higher education

Table 4.	Influence	critical digital	literacy
Critical digital literacy	Students	Professors	ANOVA
Combined measure	13.69	14.34	F=3.16; p=0.00
Knowledge component	5.15	5.61	F=4.01; p=0.00
Attitudes and beliefs component	3.16	3.17	F=0.23; p=0.23
Behavioral component	5.31	5.54	F=1.76; p=0.08

The result for the combined measure of critical digital literacy shows a statistically significant difference between students (13.69) and teachers (14.34), with a p-value less than 0.05 ($p = 0.00$). This indicates that teachers have a higher level of critical

digital literacy compared to students. This difference may be the result of different educational and professional experiences, given that teachers often have greater exposure and experience in applying digital tools and evaluating digital resources in their teaching. A similar statistical significance ($p = 0.00$) was recorded in the knowledge component, where teachers (5.61) show a higher level of technical and theoretical understanding of digital tools compared to students (5.15). This result can be expected because teachers have a greater responsibility for training students in the use of digital tools and resources, which requires a deeper and broader understanding of technology. Also, teachers may have access to more advanced tools and platforms in their daily work. There was no statistically significant difference ($p = 0.23$) between students (3.16) and professors (3.17). This means that attitudes and beliefs towards digital technologies and their application in the educational process are not significantly different between students and professors. Although attitudes towards digital tools may vary from person to person, in general, both groups seem to share similar beliefs about the value of digital technologies in education, with no major differences in their acceptance or negative attitudes towards these technologies. In the behavioural component (active use of digital tools in educational and research activities), there was also no significant difference ($p = 0.08$) between students (5.31) and professors (5.54). Although professors show a slightly higher level of engagement in the use of digital tools, this difference is not statistically significant, suggesting that both groups use digital tools for educational purposes, although professors may do so to a greater extent due to their role in the educational process.

3.1. Discussion of research results and conclusion

The results of the study show how different variables related to digital literacy, technological competence and engagement in online educational activities affect the educational and professional performance of the respondents. The analysis of the key results follows.

Respondents at the doctoral level of education demonstrate the highest level of knowledge in using basic digital tools, recognizing unreliable sources on the Internet and assessing the credibility of content. The knowledge component ($F=2.86$; $p=0.06$) shows statistical significance at the $p<0.1$ level, suggesting that higher levels of education lead to better technological literacy. This is expected given the greater exposure to digital tools in more advanced academic programs. The ability to recognize and analyze disinformation is also associated with the level of education. Statistically significant differences ($F=6.92$; $p=0.00$) in the knowledge component indicate that respondents at the doctoral level of education have a higher level of critical digital literacy. This confirms that a more advanced educational level contributes to the development of skills needed for critical thinking and evaluation of digital content.

The results show that digital security education, the role of mentors and the frequency of use of learning management systems have a positive impact on technological literacy. The integration of interactive materials and online databases into the teaching process allows students to better understand digital technologies. In this way, students become more confident in managing digital tools and develop responsible behaviour in the online environment.

Familiarity with digital skills that are currently in demand in the labour market is crucial for students' professional development. The results show that the safe use of digital tools for academic

and professional activities, with an education focus on the development of digital skills, contributes to their readiness for the labour market. Statistically significant differences ($F=3.43$; $p=0.02$) in the combined measure of misinformation recognition and analysis further confirm the value of digital literacy for future professional challenges. Professors show a higher level of safety and engagement in online educational activities compared to students ($F=3.16$; $p=0.00$ for the combined measure). This can be attributed to their professional experience and frequent use of digital tools in teaching. Nevertheless, differences in the components of attitudes and behaviour are not statistically significant, indicating a similar level of acceptance and use of digital technologies among both groups.

The results obtained emphasize the importance of continuous education on digital tools and safety, especially in higher education. The development of critical digital literacy should be a priority, with a special emphasis on the integration of digital technologies into the educational process and preparing students for the challenges of the labour market. Furthermore, systematic support for professors and students is needed to ensure greater engagement and safety in online educational activities.

Due to relatively simple access to information on the Internet and fast search results, there is an understanding that it is easy to get information today, easier than ever before in the history of civilization. The fact is that today, via the Internet, huge amounts of the most diverse information are available. However, it is only an abundance of information, but not knowledge. In practice, technology-assisted learning is not the automatic process of acquiring knowledge. Digital technology more often plays the role of an "information tool" than a "learning tool". To learn through technology, it is necessary to know strategies for turning information into knowledge.

This research has shown that the majority of students do not have advanced internet search skills, let alone evaluate the quality of collected information. The results indicate that finding relevant, high-quality information requires sophisticated literacy skills.

One of the main limitations of this study concerns the sample of respondents. Although the sample included students and professors from different levels of education, it may not reflect a sufficiently broad demographic and geographical diversity. A limitation was also observed in the data collection method, which relied on self-reports of respondents, which may lead to subjective biases. Furthermore, the study focused on a specific set of digital tools and skills, which may limit the generalizability of the results to the broader context of digital literacy. Finally, the study did not include a longitudinal approach, which would have allowed for monitoring changes in digital literacy over time.

Future research should include a larger and more diverse sample of respondents to ensure greater representativeness and generalizability of the results. In addition, the use of combined data collection methods is recommended, including objective measures such as knowledge tests or analysis of actual behaviour when using digital tools. Longitudinal studies would be useful to track the development of digital literacy over time and analyze the impact of different educational interventions. Also, future research could expand the focus to specific aspects of digital literacy, such as online safety, the ability to analyze disinformation, or the integration of advanced technologies such as artificial intelligence into educational processes. Finally, it is recommended to investigate the influence of cultural and social factors on the development of digital literacy to gain a deeper perspective on a global scale.

4. CONCLUSIONS

In recent years, the view that formal (traditional) education is unable to meet the needs of young people for "new literacies" that "arrived" with "new technology" has become increasingly prevalent. The need for "new pedagogical methods" stems from the fact that today's formal education (based on the industrial model) is inert, rigid, outdated, in a word, incompatible with "new technology". Incompatibilities between "new" technology and traditional education are evident: the possibility of adapting the teaching process to the individual needs of students - versus uniform learning, the availability of various sources of information - versus the understanding that the professor is an expert whose task is to transfer his knowledge to students, they rely on external resources - versus understanding that knowledge is in the student's head, mastering the methods and ways in which information is obtained - as opposed to acquiring the information itself, practical knowledge - as opposed to academic (factual) knowledge. In today's digital age, multiple digital literacy becomes a key competence that enables individuals to effectively use and analyze digital tools, resources and information. In the context of higher education, the development of these skills is not only useful but also necessary to prepare students and professors for the challenges of modern society and the labour market. The increasing availability of digital technologies, as well as their ubiquitous impact on the educational process, implies not only technical literacy, but also the ability to think critically, use online resources ethically, and recognize misinformation. These abilities form the basis of multiple digital literacy, which encompasses a wide range of skills, from technical to analytical and ethical. This research aimed to examine the current state of multiple digital literacy in higher education institutions, analyze the attitudes of students and professors towards the importance of these skills, and investigate the impact of digital tools on the quality of the educational process. Through the hypotheses set, the key dimensions of digital literacy were explored, including technical, information, media, critical and ethical literacy. Based on the data collected and analysis of attitudes, we have come to several key conclusions that can serve as guidelines for future initiatives and strategies within higher education institutions. The research showed that technical literacy, which encompasses the basic use of digital tools, computing, and the internet, is an important prerequisite for all other dimensions of digital literacy. However, many students and teachers do not pay enough attention to more advanced technical skills, such as data management and the use of specialized tools, for information analysis. This conclusion points to the need for additional training that would enable further development of these skills. The research results show that students and professors are aware of the importance of media literacy, which includes the ability to analyze and evaluate information sources on the Internet. Also, critical literacy, which implies the ability to recognize disinformation and manipulation, has become extremely relevant.

However, there is still significant room for improvement in this area, as many internet users do not always recognize false information or biased sources, which has a serious impact on the quality of the educational process. Ethical literacy is key to the responsible use of digital technologies. The research showed that although students and teachers are mostly familiar with the basics of ethical behaviour in the digital environment, there is a need for additional education regarding issues of privacy protection, data security and ethical behaviour on social networks. Strengthening ethical literacy can contribute to reducing the risk of misuse of digital tools and resources, as well as reducing problems such as

cyberbullying, plagiarism and online discrimination. Security and trust in the use of digital tools had a significant impact on the engagement of students and teachers in online educational activities. The research showed that those who feel secure in the use of digital technologies show a higher level of engagement in online teaching activities, as well as in digital research and projects. This conclusion indicates the need to strengthen digital security in educational institutions through educational programs that cover topics such as data protection and privacy protection. One of the key conclusions of the research is that students who develop multiple digital skills, not only technical but also critical and ethical, are better suited to the needs of the labor market. Although many students are highly educated in technical skills, there is a significant gap in developing critical and analytical skills, as well as the ability to make ethical decisions in a digital environment. This shows that higher education institutions need to integrate training on all dimensions of digital literacy into their curricula to a greater extent so that students are better prepared for the challenges of professional life. Professors, although often technically literate, are not always fully equipped to use advanced digital tools in education, nor to develop digital skills in their students. The research indicated the need for continuous professional development of professors in connection with new digital tools, as well as methods for integrating technology into teaching. This includes not only technical aspects but also pedagogical strategies that enable the efficient use of digital resources in the educational process. Although higher education institutions recognise the importance of digital literacy to a certain extent, research has shown that existing education on this topic is not sufficiently integrated into educational curricula. There is a clear need for a wider inclusion of multiple digital literacy topics in academic plans and curricula, to better prepare students and professors for the challenges and opportunities brought by the digital world. For future generations, it is important that higher education institutions not only develop technical skills but also strengthen the ability to analyse, evaluate and ethically use digital resources. The implementation of multiple digital literacies in educational curricula will enable students and professors to be better prepared for the dynamic challenges of digital society and the labour market.

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