CHAPTER 4
DIGITAL SECURITY AND ACADEMIC INTEGRITY IN THE STRUCTURE OF DIGITAL LITERACY OF PROFESSIONAL EDUCATION TEACHERS: THEORETICAL AND METHODOLOGICAL REVIEW

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Keywords: teachers, vocational education institutions, digital competence, digital literacy, digital security, development, innovative development, academic integrity.

The digital transformation of the education system causes significant changes in the professional activities of teachers of vocational education institutions, actualizing the need to expand and deepen their digital literacy. In modern conditions, digital literacy goes beyond technical skills and covers a set of cognitive, ethical, legal and security components that ensure responsible and safe activities in the digital educational and scientific environment. Digital security and academic integrity are of particular importance in this structure, as they are critical factors in ensuring the quality of education, personal data protection, copyright compliance, and prevention of academic misconduct.

The use of cloud services, distance and blended learning platforms, and artificial intelligence tools simultaneously expands the didactic capabilities of teachers and increases the risks of digital threats, information misuse, and ethical

violations. Under these conditions, the need for a theoretical understanding of digital security and academic integrity as systemic components of digital literacy of teachers of professional education is becoming more relevant.

Theoretical approaches to understanding digital literacy and related concepts are based on interdisciplinary studies of digital, information and cyberculture. In the works of O. Holovko, digital culture is viewed through the prism of human rights, responsibility and ethical behavior in the context of digital transformations, which directly correlates with the issues of academic integrity [1].

I. Devterov emphasizes the phenomenon of cyberculture as a socio-cultural environment within which new norms of interaction, communication and security are formed, which should be realized by teachers [3].

A professionally oriented approach to the digital competence of teachers of vocational (vocational-technical) education institutions is presented in the study by O. Humennyi, where digital security is defined as one of the key challenges of the digital age [2].

A criterion-based approach to assessing the professional digital literacy of higher education teachers is revealed by J. Zamora, who identifies security and ethical criteria as mandatory components of a teacher's digital maturity [4].

The regulatory and methodological basis of the study is the Framework for Digital Competence of Research and Teaching Staff [5] and the Framework for Digital Competence of Ukrainian Citizens [9], which define digital security and compliance with ethical standards as cross-cutting components of digital competence.

The issues of digital security in the educational environment are thoroughly covered in the works of L. Petrenko [6], L. Sultanova and M. Prokofieva [11], which analyze threats to information security, personal data protection and the formation of a teacher's security culture.

Academic integrity in the context of the use of digital technologies and artificial intelligence is disclosed in the works of S. Tolochko, N. Bordiuh, L.

Mironets [12], as well as in the study by S. Tolochko and A. Godunova, which focuses on the risks and opportunities of using AI services in scientific activities [13].

The work of L. Mironets and S. Tolochko on the theoretical and methodological foundations of the use of digital technologies in the formation of competencies that confirm the universality of the security and ethical dimensions of digital literacy is also important [14].

The purpose of the article is to theoretically analyze digital security and academic integrity as structural components of digital literacy of teachers of vocational education institutions based on the generalization of modern scientific and regulatory sources.

The analysis of regulatory documents in the field of education, digital transformation and development of teaching staff competencies shows that digital security and academic integrity are institutionalized as mandatory components of digital literacy of teachers in vocational education institutions. In modern conditions, they perform not an auxiliary, but a systemic function, ensuring the quality, safety and ethical balance of the educational process.

First of all, let's turn to the interpretation of the terms «digital competence», «digital literacy», «digital security» and the understanding of the interrelationships between them. For example, the Digital Competence Framework for Ukrainian Citizens provides a detailed explanation of the lexeme «digital competence» as «the confident, critical and responsible use and interaction with digital technologies for learning, working and participating in public life. It encompasses such concepts as information and media literacy, communication and collaboration, digital content creation (including programming), security (including protection of personal data in the digital environment and cybersecurity), as well as problem-solving and lifelong learning» [9].

The current document «Issues of the Unified State Web Portal of Digital Education «Diia. Digital Education» defines the term «digital literacy» as «a person's ability to use digital technologies in a modern digital society» [7].

Regulatory documents are consistent with scientific approaches, according to which digital security is seen as a multidimensional entity that includes technical, legal, psychological, pedagogical and value components [6; 11].

Therefore, in the modern scientific and pedagogical discourse, the concepts of «digital competence», «digital literacy» and «digital security», in our opinion, are in close conceptual relationship, forming a multi-level system of person's professional readiness to work in the digital environment. Their awareness as complementary rather than isolated categories is methodologically important for the formation of a holistic view of digital training of teachers of vocational education institutions.

Digital literacy in scientific research is mainly interpreted as a basic level of mastery of digital knowledge and skills that ensure the ability of an individual to effectively use digital technologies, search, analyze, process and create digital information, and communicate in a digital environment. It covers operational and technological, information and analytical, and communication components and serves as the foundation for further development of the digital qualities of a teacher [4; 9].

Digital competence is a broader, integrative formation that includes digital literacy as a component, but is not reduced to it. According to the conceptual and reference framework, digital competence combines knowledge, skills, abilities, values, motivation and responsibility that ensure individual's ability to apply digital technologies in professional, educational and social activities, taking into account legal, ethical and security requirements [5; 9]. For teachers of professional education, digital competence acquires a professionally specific character, as it is related to the organization of the educational process, assessment of learning outcomes, scientific and methodological activities

Digital security occupies a special place in this system, being both a separate component and a cross-cutting principle of digital competence. It covers the ability to ensure the protection of personal and educational data, safe use of digital services, digital identity management, countering cyber threats, as well as compliance with digital ethics and legal regulation [6; 11]. In the structure of digital literacy, digital security performs a regulatory function, defining the boundaries of acceptable and responsible use of digital technologies.

Awareness of the relationship between these concepts is based on a hierarchical structural approach, according to which digital literacy is considered as a basic level of digital training, digital security as a mandatory cross-cutting component and condition for its implementation, and digital competence as an integrated result of teacher's professional development in the digital environment. This logic is in line with modern regulatory documents and scientific approaches, in which the security dimension is considered not as an additional option, but as a necessary component of the digital maturity of the teacher [5; 7].

According to the Law of Ukraine «On Education» academic integrity is defined as a set of ethical principles and rules that should guide all participants in the educational process during learning, teaching, and research activities [8]. In the context of the digitalization of education, this norm is being expanded to cover not only traditional forms of academic misconduct, but also the latest risks associated with the use of digital platforms, electronic resources, artificial intelligence services, and automated content creation systems [12].

The Framework for Digital Competence of Teachers and Academic Staff clearly defines digital security as one of the basic areas of digital competence, including personal data protection, digital identity management, safe work with digital resources, awareness of cyber threats and compliance with legal and ethical norms in the digital environment [5]. These provisions are methodologically significant for the system of vocational education, where the teacher

simultaneously performs the functions of a mentor, expert and subject of digital interaction with different age groups of students.

The Framework of Digital Competence of Ukrainian Citizens complements the professional dimension, emphasizing the formation of a culture of safe behavior in the digital space, responsible use of information and critical attitude to digital content [9]. For teachers of vocational education institutions, this implies mastery of information security tools, the ability to predict potential risks of digital activities, and to form a responsible attitude towards the use of digital technologies and compliance with cybernetic norms in students. In addition, this means the need to integrate digital security into educational programs, disciplines and educational practices, which contributes to the formation of a digitally mature personality of the student.

A special place in the normative discourse is occupied by the problem of academic integrity in the context of digitalization and the use of artificial intelligence. In scientific publications, S. Tolochko, N. Bordiuh, and L. Mironets emphasize that modern digital tools significantly change the nature of educational and scientific activities, while creating new challenges for compliance with the principles of authorship, independence, and responsibility [12]. The regulatory framework is still under development, but today it requires a high level of digital reflection and ethical competence from the teacher.

The results of the analysis of conceptual and reference documents show that academic integrity in the structure of a teacher's digital literacy is cross-cutting and integrated into all areas of professional activity: educational, methodological, research and organizational [5; 8]. This means that a professional education teacher must not only adhere to the norms of academic integrity personally, but also be a carrier of the relevant culture, able to transmit it to students.

The regulations also emphasize the interconnection between digital security and academic integrity. Violation of security principles (unprotected data storage, use of unlicensed software, disregard for digital identification rules) creates

prerequisites for academic misconduct and undermines confidence in the results of educational and research activities [1; 3]. Thus, these components should be considered not in isolation, but as interconnected elements of a single structure of digital literacy.

Thus, the results of the analysis of regulatory documents confirm that the integration of digital security and academic integrity into the structure of digital literacy of professional education teachers is an objective requirement of the times and a prerequisite for the innovative development of the education sector. In practical terms, this actualizes the need for targeted updating of professional development programs, development of internal policies of educational institutions, and formation of a culture of responsible use of digital technologies.

Taking into account the regulatory framework, *digital literacy of teachers in vocational education institutions* can be interpreted as a comprehensive professional quality, within which digital security ensures the security and sustainability of the educational environment, and academic integrity ensures its value and ethical legitimacy. This approach is in line with current trends in the development of professional education focused on European standards of quality and responsibility.

In our interpretation, *the digital literacy of teachers of vocational education institutions* is considered as an integrative professional characteristic that reflects the readiness and ability of a teacher to effectively, safely and ethically carry out educational, methodological and scientific activities in the digital environment.

Its structure is multilevel and includes interrelated components: cognitive and knowledge, operational and technological, information and analytical, communicative and interactive, safety and ethical, reflective and value, each of which performs a specific function in the professional activity of the teacher.

1. Cognitive and knowledge component reflects the system of theoretical knowledge about digital technologies, information processes and the regulatory framework for digital activities. Its content characteristics are: understanding of

the essence of digital literacy, digital competence, digital security; knowledge of the principles of digital educational platforms and services functioning; awareness of copyright, academic integrity, personal data protection; knowledge of the possibilities and limitations of using artificial intelligence services in education. The function of the cognitive and knowledge component is worldview-oriented.

2.Ooperational and technological component characterizes teacher's ability to practically apply digital tools in professional activities and has the following content characteristics: ability to use digital educational resources and platforms (LMS, cloud services, online tools); creation, adaptation and use of digital learning content; organization of distance and blended learning; use of digital learning assessment tools. The function of the operational and technological component is practical.

3.Iinformation and analytical component reflects the ability to work effectively with information in the digital environment and represents the following content characteristics: search, selection and critical evaluation of digital information; analysis of the reliability of sources and digital content; interpretation of data and results of digital evaluation; countering disinformation and manipulative content. The function of the information and analytical component is analytical and critical.

4. Communicative and interactive component ensures effective pedagogical interaction in the digital environment and reveals the following content characteristics: digital communication with students and colleagues; organization of online collaboration, group and project activities; compliance with digital etiquette; formation of a safe and inclusive digital educational space. The function of the communicative and interactive component is social and communicative.

5 Security and ethical component is a cross-cutting one in the structure of digital literacy and defines the boundaries of responsible use of digital technologies. Its content characteristics are: ensuring digital security and cyber hygiene; protection of personal and educational data; adherence to the principles

of academic integrity; ethical use of digital and AI tools in educational and research activities. The function of the security and ethical component is regulatory and normative.

6. Reflective and value component characterizes teachers' ability to self-assess and realize their own digital activities and has the following content characteristics: reflection on the level of their own digital literacy; awareness of professional responsibility in the digital environment; readiness for continuous professional self-development; value attitude to digital culture and innovation. The function of the reflective and value component is motivational and developmental.

Thus, the digital literacy of professional education teachers has a hierarchical integrative structure, in which the cognitive and knowledge component forms the theoretical basis; operational, technological and information-analytical provide practical implementation; communicative and interactive provides pedagogical interaction; safety and ethical regulates the responsible use of digital technologies; reflective and value-based ensures the sustainability and development of digital literacy during professional activity.

We will present the developed system of scientifically based recommendations for the formation and development of digital literacy, digital security and academic integrity of teachers of vocational education institutions, consistent with regulatory documents and modern scientific approaches.

1. *Regulatory and organizational recommendations*

1.1. *Institutionalize digital literacy and digital security* as priority areas for teachers' professional development by including relevant provisions in the digital development strategies of vocational education institutions, internal regulations and provisions on professional development.

1.2. *Update local academic integrity policies* by providing separate sections on the use of digital resources and artificial intelligence services in educational and research activities in accordance with current legislation.

1.3. *Ensure consistency of internal documents* with the provisions of the Digital Competence Framework for Research and Teaching Staff and the Digital Competence Framework for Citizens of Ukraine in order to unify the requirements and criteria for assessing digital literacy.

2. *Content and methodological recommendations*

2.1. *Integrate digital security and academic integrity* into the content of professional training disciplines as cross-cutting topics implemented through case studies, problem tasks, analysis of real digital risks and pedagogical situations.

2.2. *Develop modular teacher training programs* focused on the formation of: basic and professionally oriented digital literacy; digital security and cyber hygiene skills; culture of academic integrity in the use of digital and AI tools.

2.3. *Ensure an interdisciplinary approach* to the formation of digital literacy by combining pedagogical, legal, informational and ethical knowledge.

3. *Organizational and pedagogical recommendations*

3.1. *Create a secure digital learning environment* in vocational education institutions, which involves the use of licensed software, secure educational platforms, and regulations for the storage and processing of personal data.

3.2. *Introduce mentoring and professional communities of practice* to share experience in the use of digital technologies, discuss digital security and academic integrity.

3.3. *Systematically conduct trainings and workshops* aimed at developing skills for safe work with digital resources, analyzing typical violations of academic integrity and ways to prevent them.

4. *Recommendations for evaluation and monitoring*

4.1 *Develop criteria and indicators for assessing teachers' levels of digital literacy,* in particular by components: information activity, digital communication, security, ethics and academic integrity.

4.2. *Introduce self-assessment and reflection* tools that allow teachers to realize their own level of digital competence and plan individual professional development trajectories.

4.3. *Regularly monitor compliance with the principles of academic integrity* in the digital context (checking papers, analyzing the use of AI tools, transparency of assessment).

5. *Prospective and innovative recommendations*

5.1. *Regulate the use of artificial intelligence* services in the educational and scientific activities of teachers of vocational education institutions, defining acceptable and unacceptable practices from the standpoint of academic integrity.

5.2. *Promote the development of teachers' digital culture* focused on the responsible, ethical and safe use of digital technologies as tools for professional growth.

5.3. *Initiate research projects* on digital security and academic integrity in vocational education to test innovative models and technologies for digital literacy.

The proposed recommendations provide a systematic approach to the development of digital literacy of teachers of vocational education institutions, in which digital security and academic integrity are not isolated requirements, but key factors in the quality and innovation of the educational process.

Summarizing the results of the theoretical analysis of scientific and regulatory sources, we established that the digital literacy of teachers of vocational education institutions appears as a multidimensional integrative formation that combines cognitive and knowledge, operational and technological, information and analytical, communicative and interactive, security and ethical, and reflective and value components, reflecting the level of readiness of the teacher for effective, safe and ethically responsible professional activity in the digital educational environment. It is proved that digital security and academic integrity are cross-cutting in the structure of digital literacy and perform a regulatory function,

defining the limits of acceptable use of digital and AI tools in the educational, methodological and scientific activities of the teacher.

It is established that the effective formation of digital literacy is possible only if the requirements of the current regulatory framework, the conceptual and reference framework of digital competence and the focus on continuous professional development are systematically taken into account, which together ensure the improvement of the quality of professional education, strengthening of teachers' digital culture and sustainable innovative development of vocational education institutions in the context of digital transformation.

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