

# Digital literacy is a necessary factor of modern education

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**Abstract**—The central concept addressed by the authors of the article is the concept of "digital literacy". In recent years, there have been many different approaches to this concept. The article studies the structure of the concept of "digital literacy" in terms of the formation of this phenomenon in the educational space and its role in the digital economy. Digital literacy is not only one of the most popular areas, but also one of the key factors contributing to the development and implementation of innovations, the development of modern education and society. The article also presents the structure of digital skills of students, identified pedagogical conditions for the formation of digital literacy.

**Keywords**—*digital literacy, digital skills, competence, information technologies, digital technologies, diagnostics*

## I. INTRODUCTION

Modern society is covered by unprecedented processes of transformation of all aspects of human activity, aimed at mastering the benefits of a new stage of world development, defined by the concept of digital economy. At the same time, not only the production sphere, but also science and education is undergoing digital transformation.

Currently, more and more people talk about the demand for the final results of educational, training processes – the so-called "skills", a significant proportion of which is digital. In the digital age, digital skills and digital literacy play a crucial role [1,2]. The article attempts to understand these concepts and their role in the digital economy.

In the course of scientific discussions in the era of rapid development of digital technologies there is the emergence and spread of new terms, which are often spontaneous and understandable for the initial period of such a process. Quite often there are cases when researchers use completely different terms to refer to essentially the same concepts, which does not contribute to the formation of a unified terminological base and the elimination of unnecessary conflicts in scientific communication.

In connection with this situation, there is a need to develop a common understanding of the basic terms that would reflect the degree of maturity of the scientific community in considering the theoretical issues of the use of

the Internet and other digital technologies, as well as tools to assess the quality of the use of digital technologies.

The central concept addressed by the authors of the article is the concept of "digital literacy". The concept of "literacy" arises when a social phenomenon of the cultural order with which it is associated appears and becomes widespread. Initially, literacy was based on the skills of three types – reading, writing, and counting. But since the middle of the XX century some types of literacy corresponding to certain types of information and communication processes and types of culture began to be formed. These types of literacy include media literacy, computer, electronic, visual, etc. According to A. Buckhorst [3], these types of literacy are closely interrelated and even often coincide.

These circumstances necessitate clarification of the concept of digital literacy. We will be interested in the structure of this concept from the point of view of the formation of this phenomenon in the educational space.

The purpose of this study is to clarify the content and structure of the concept of "digital literacy", as well as to identify the pedagogical conditions of its formation in students in the learning process.

The object of the study in this work is the digital literacy of students, and the subject of the study is the use of active teaching methods for the formation of digital literacy of students.

The authors solved the following problems: the concept of "digital literacy" is clarified, the structure of digital skills is presented, the pedagogical conditions of formation of digital literacy among students are revealed, and the diagnosis of the need for students to master the competencies of digital literacy is carried out.

## II. METHODS

This problem is solved on the basis of the Trinitarian methodology, which has recently been increasingly used in the post-non-classical worldview. In accordance with the Trinitarian methodology, three equal components should be considered in the object under study. The integrity of the object is achieved only with the dynamic balance of all components of this triad. The third element is necessary to

solve the problem of binary contradictions, as a measure of their compromise, as a condition of their existence. Also in the work *General theoretical methods of scientific knowledge* were used: interdisciplinary analysis and synthesis of scientific and methodical literature and advanced pedagogical experience; comparative historical methods; methods of empirical research: observation, conversation, examination, study of the results of students' activity; modeling.

#### A. *The concept of "digital literacy»*

The beginning of work on digital literacy is the work of P. Gilster [4], which largely determined the further direction of development of this concept. P. Gilster noted that digital literacy incorporates media literacy, which is characterized by the perception of different forms of information. Therefore, first of all, "digital literacy is the ability to understand and use the information presented in a variety of different formats from a wide range of sources using a computer." In addition, it is the possibility of their own creative actions, the ability to create their own information in different forms. A competent user should be able to quickly learn new computer and other tools and access them for a variety of purposes. Finally, the characteristic of digital literacy is the ability to critically refer to the information received, because it lurks and danger, therefore, "a key component of digital literacy is caution" [4].

Over the years, many different approaches to the concept of digital literacy emerged [5]. A significant part of the authors A. G. Savin, L. I. Mal'yavkin, L. I. Shmarkov [6] and others quite narrowly interpret digital literacy, taking as a basis only the first characteristic, highlighted by P. Gilster, associated with the development of new tools for using the computer and the Internet.

V. A. Sukhomlin [7] understands digital literacy as "the ability of a person to confidently own IT tools, to evaluate information obtained from several sources, to assess its reliability and usefulness with the help of independently established criteria, as well as to be able to solve problems that require finding information related to an unfamiliar context, in the presence of ambiguity and without explicit instructions." This understanding includes only the first two of the three components identified by P. Gilster, and does not include caution with the Internet.

Meanwhile, it is becoming increasingly clear that the Internet carries an increasing number of threats. The researchers say such negative phenomena as Internet addiction, online harassment (A. Bochvar [8], D. Alexan [9], E. Y. Alistratova [10]), the violation of ethical standards (B. Makani [11], R. Stuckey [12]).

Therefore, an increasing number of authors offer the skills and abilities of safe work on the Internet attributed to the mandatory requirement for digital literacy. In particular, M. V. Zheltyakov [13] under the digital literacy understands the totality of human knowledge and skills, allowing to use digital tools for their own purposes. The concept of digital literacy, in her opinion, includes three main components: digital consumption (knowledge and use of Internet services for work, education and entertainment); digital competence (skills of effective use of various information and communication technologies); digital security (basics of safe work on the Internet).

However, according to this definition, digital competence is understood quite narrowly, it is only one of the three components of digital literacy, while the other two components highlighted in this work have some digital competence. This view contradicts the opinion of most other authors: D. V. Denisov [14], N. N. Gavrilenko [15] and others who consider the concept of "digital competence" the result of the transformation and expansion of the concept of "digital literacy". Similarly, the concept of "computer literacy", as noted by M. P. Lapchik [16], transformed into the concept of "information and communication competence". The main difference between digital competence and digital literacy is the inclusion in this concept of characteristics of motivation and responsibility of the individual, which determine, first of all, the professional orientation of digital competence, the ability to act effectively in a digital society.

A.V. Sharikov [17] proposed a four-component model of digital literacy. In his opinion, these components are defined by two main oppositions: "technical-technological/socio-humanitarian" and "opportunities/threats". However, a closer look at these constructs shows that it is not the opposition: the development of one of the poles does not automatically lead to the oppression of the other, and may even lead to the opposite result. In addition, these two "oppositions" have directions that are not orthogonal to each other.

Thus, the analysis shows that we need another, more adequate model of digital literacy, suitable for use in its formation.

Let us now turn to the concept of "digital skills". Although the term "skills" has long been used in Russian science, but recently the interpretation of this term has become significantly different from its traditional understanding. In the Russian pedagogical science the whole theory of knowledge – abilities – skills was developed. The English term "skills", widely used in the West, does not fully correspond to the Russian term "skills". The term "digital skills" became common after the report in 2017. Joint Commission of UNESCO and the International telecommunication Union (ITU) on digital skills needed "for life and work" [18].

In this report, skills refer to "the ability of a particular or abstract employee to carry out a particular professional activity, generally in a particular job position and at a particular time". This understanding of this term is closer to the understanding of our term "professional skill", but in principle does not contradict the Russian didactics. The main thing is to understand that it is impossible to separate skills from knowledge, from the human world, that knowledge constitute and form the subject content of other types of educational content, including skills. Without knowledge, there are no skills, no creativity. Skills and standards without emotional attitude of the person turn a person from the creator to the function. Skills without knowledge can only be taught to robots [19].

Different authors identify different types of digital skills. We are closer to the approach that is reflected in the aforementioned report of UNESCO and ITU "Digital skills for life and work", in which modern digital skills are divided into three main groups depending on the level of depth of their use.

1. Basic or General digital skills. Such skills should be available to workers in a wide range of professions in order to be able to use information technology in their daily work. For example, these are skills that allow you to access information on the Internet, use office software, create application databases, use software for statistical analysis of experimental data, their graphical representation, documentation, etc.

2. Standard professional digital skills. These include "creative" skills that contribute to the conscious existence in a digital society and the effective use of online applications and services, the ability to assess the sources and relevance of the data, store and organize the information received, the ability to protect existing devices and information received from viruses and Internet attacks. These skills include understanding that the network is subject to copyright and state laws.

3. Advanced digital skills. They are needed to expand and "transform" the use of technology. Such skills relate more to digital professions: the ability to program, develop applications, administer networks, analyze data, etc. In addition to such purely technical skills, there are also "skills of the XXI century": the ability to work in a team, critical thinking, creativity, etc. [20].

#### *B. B. Diagnosis of the needs of the students' development of the competencies of digital literacy*

The purpose of the study is to identify the need for students in various areas of training and courses of development of digital literacy.

The study involved 55 students living in Vologda, Kazan. The sample included students of secondary special institutions, Universities, namely bachelors/specialists, as well as masters and graduate students (age 15-35 years).

Questions:

1) How much time do you usually spend in the online space per day?

- (a) 1 to 3 hours;
- (b) 3 to 5 hours;
- (c) 5 to 7 hours;
- (d) more time.

2) How often do you face up with the need to use information technology in the learning process?

- (a) often;
- (b) rarely;
- (c) sometimes;
- (d) do not encounter.

3) How do you usually master information technology?

- a) I have a special course (discipline);
- b) independently search for information on the Internet;
- c) looking for information in textbooks and teaching AIDS;
- (d) consult with classmates;

(e) I am not interested in this topic.

4) What competencies would you prefer to develop?

- (a) knowledge of Internet search technologies;
- (b) ability to critically perceive and verify information;
- c) the ability to create multimedia content for posting on the Internet;
- (d) willingness to use mobile communications;
- e) ability to perform financial transactions via the Internet;
- f) use online services to receive services and goods.

5) What is digital literacy? (open question)

6) If You were asked to improve your digital competencies in what format would you prefer to study?

- (a) short-term face-to-face sessions, small groups of 3 to 6 people;
- b) groups meet online or off-line;
- c) online conference or live broadcast;
- (d) webinar;
- (e) public lectures;
- (f) your answer (multiple choice).

7) How old are you?

78 % of respondents are often faced with the need to use information technology. But there are those who believe that they have never met with the need to use information technology (2 %).

A greater number of respondents are embracing information technology alone 80 %.

#### *C. Pedagogical conditions of formation of digital literacy of students*

In our study, under the pedagogical conditions we will understand the set of circumstances that contribute to the improvement of digital literacy of students.

These conditions include: organizational and methodological (the use of group forms of work, especially the use of the method of network projects); material and technical (the use of cloud services and distance learning environment for the implementation of the network project); personal (taking into account the individual characteristics of students, positive psychological atmosphere).

Compliance with these conditions will ensure the formation of a positive motivational basis: the formation of a positive need, persistent cognitive interest; the formation of a positive educational setting, cognitive skills associated with the mastery, processing and use of educational information; monitoring and didactic correction of the educational process.

We have identified a list of methodological techniques aimed at enhancing the educational process in the course of the basics of digital literacy: tasks of a creative nature (to come up with a problem for the opposing team), competitive

nature (to take part in a network project organized in the form of competitions between groups).

It is essential to create a favorable psychological climate in education – involvement in the learning process of all reserves of the psyche of each student, i.e. the integral personality of the student.

In active methods the task is to use in the learning process communication mechanisms as a catalyst for cognitive activity of students. The teacher's task is to involve all three areas of learners' personality (intellect, emotions and willing) in the learning process [21].

Digital literacy consists of practical competencies, i.e. knowledge, skills of using electronic information objects, devices that use media technologies. This means: to learn how to use a computer, the Internet, a mobile phone, a modern camera, a video camera, electronic plastic cards, payment technologies through the terminals of cellular communication companies, ATMs, shops, the ability to use interactive reference systems that are installed at stations and places of mass use, the formation of skills of interactive voting through election terminals, etc.

### III. RESULTS

Digital literacy can be studied from different points. We consider this concept from the point of view of its formation in the generation of digital society. Digital literacy refers to the basic set of knowledge, skills and attitudes that enable a person to manage, understand, integrate, share, evaluate, create and access information safely and appropriately through digital devices and networking technologies to participate in economic and social life.

As a result of the study, we came to the conclusion that students of secondary and higher educational institutions there is an urgent need to acquire computer literacy skills. There is a contradictory situation 40.6% of respondents spend on the Internet from 5 to 7 hours a day, but meanwhile, only 6 people out of 55 respondents gave an accurate definition of digital literacy. That is, students do not have a conscious understanding of what is included in this concept; there is no understanding of what is the intensive use of information technology, without understanding the basics of digital security.

Students of all courses demonstrate the highest digital competence in the knowledge component and the least high — in terms of motivation for further mastering the knowledge and skills of using the Internet. As for motivation, all 100% of respondents showed a stable attitude to self-improvement in the digital world. All surveyed students are ready to improve their digital literacy, but through classical methods, such as short-term lectures, offline meetings, 20% of respondents are ready to learn new skills through webinars or other forms of online meetings.

### IV. DISCUSSION

In accordance with the Trinitarian methodology, three equal components can be distinguished in the educational space:

1) information (the ability to receive, understand, use and transform information presented in many different formats from a wide range of sources using a computer);

2) developing (the ability to carry out their own creative actions on the basis of knowledge, the ability to create their own information in different forms, the ability to solve non-standard ambiguous problems associated with finding information with an unfamiliar context, the ability to quickly learn and use new computer and other tools);

3) educational (socio-psychological and ethical aspects of networking, in particular the ability to overcome the socio-psychological threats of working on the Internet).

This system triad plays a synthesizing role in education, in mastering digital literacy.

The development of this study can be the development and testing of a system of criteria and indicators of formation of digital literacy of students, as well as the creation of a model of formation of digital literacy of students. The task of developing the scientific basis of digital literacy of students based on the competence approach is also relevant.

### ACKNOWLEDGEMENTS

The authors are grateful to the students of Vologda and Kazan, who took part in the diagnosis of the development of digital literacy skills.

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