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Current issues of digital skills formation in modern education

The article talks about current problems of formation of a set of students' digital skills in a new learning format. The authors of the study, having studied European standards for teaching information skills at various levels, consider digital skills as necessary for mastering professional knowledge, managing modern and future life, techniques and technologies. The authors of the article analyze the conditions for their formation in the process of vocational education and make an attempt to define them within the framework of qualifications in five aspects: digital literacy and ability to organize information blocks, space for conversations and interaction; information security and search for solutions. The article also identifies and substantiates the need to design basic digital skills for students, updates the creation of a scientific and methodological basis for teaching digital skills during organized learning, and reveals the strategies of pedagogical approaches to blended learning. In addition, it is shown that digital didactics is the basis for creating modern methods and strategies for teaching a profession in a digital format, however, in order to implement all the principles and strategies of digital learning, it is necessary to eliminate the question of forming students' digital competencies and level digital skills.

Key words: modern education, digital skill, learning technology, digital literacy, information literacy, readiness for life and work, competence, digitalization.

Introduction

Modern vocational education is a complex integrated process based on the organization of digital learning online/offline with a focus on the post-industrial economy, with the systematic use of new technologies and open resources. Such a process is possible only if the necessary skills for working with large amounts of information, computer skills and the use of information technology are in place. It is also necessary to take into account the ability to search for information, transform it into a system, and structure it. Of course, this requires revision of methods and techniques of teaching these things to students and critical evaluation of the content of the teaching material. In foreign methodology this is methodologically justified on the basis of the development of standards of information skills and abilities, the so-called cross-border methodology of formation of digital competences has been created, with a high level of competition, in our higher educational system the process of the establishment of digital learning was abrupt and inevitable due to the current epidemic situation without the development of scientific methodology and approaches.

The principle of accessibility of education in highly developed countries such as the US, UK and Singapore has prompted the creation of a structured digital learning network. This has created the condition to acquire professional knowledge and skills at a distance, anywhere in the world where there is an Internet connection. The local development of such a network in the format of distance education is also typical for Kazakhstan; however, many specify more negative positions of such education than positive ones. It is necessary to formulate the principles of the digital format of activities for all subjects of the educational process, consider the degree of all factors influence and components on the educational process, the efficiency and effectiveness of training, and determine the list of necessary students for life in a digital society. The study aims to identify the basic digital skills of students and the technology for their formation and development for professional use as the Internet safety, netiquette, appropriate language for communication, critical understanding of information sources, compliance with privacy and copyright policies. They are general opportunities that they can use for any new and unfamiliar digital technologies in their profession and life.

The use of digital skills improves the appearance of students' products; they may be a word document, photo collage, animation or presentation, even a simple resume. Build processes require reading the right content. All of them require certain developed skills; the ability to analyze information resources (text,

graphic, modeling, multimedia environments, search engines) and identify their capabilities in solving problems of professional activity; using a computer and peripheral equipment, communication tools (e-mail, the Internet, Skype), graphic editors and user-level interfaces.

Our country went digital at the end of the last century, the pandemic of covida accelerated this process, as the transition to a remote form of life, work and study via the Internet was urgently needed. As it turned out, we were not fully prepared for it, but we quickly developed digital life. The scientists from far and near attempted to define the basic concepts of digitalization as a challenge of our time to systematize them; to give the main characteristics of digitalization technology They also summarized the methodology of digital culture [1, 2, 3] to determine standardization criteria in the field of modern technologies, information, communication and digital development of the university [4, 5]. The presented scientific report Global Education Futures Report (2018) on fundamental issues of education in the era of a complex world and digitalization provides a number of scientific and theoretical provisions on the formation of different types of student competencies, transformation of traditional and online training, practical recommendations for organizing digital learning [6]. This report emphasizes that «The forces shaping the future of our society are digital technologies, new modes of production; sustainable development practices will inevitably change the content of education and the ways in which we learn individually and collectively» [6: 114].

Didactic possibilities of using sources, algorithms of university education in digital form university education, their advantages and effectiveness were scientifically substantiated. The works of T.A. Akhromeeva, D.I. Dubrovsky, D.A. Macheret are devoted to the conditions, impact (including negative) of digitalization on the activities of the university, and development prospects [7, 8, 9]. The work of scientists in Kazakhstan touches on the issues of transformation of the higher education system in the digital economy [10]. It also provides an analysis impact level of digital transformation on the Kazakhstani model of distance learning, makes an attempt to develop online educational models of the university [11,12,13], and develops components of educational resources and their use in distance learning settings [14].

Methods and materials

Scientific methods were used to achieve the research goal as comparative, descriptive, deduction, induction, quantitative. Our research methods come from the relevance of the topic, the goal and objectives that need to be considered to create methodological developments for teaching students digital knowledge, techniques to determine the formation of such skills. These problems are still underdeveloped and need to be solved.

In modern theories of education, a student as a subject of educational activity must have digital skills among the main markers for life and work. The European Council has a «Digital Competence Framework» for Learners. After completing vocational education, the graduate will have these formed skills to be used in work and life in general, this will help to enter life and lifelong learning easily [15, 16]. Basic (user) information knowledge and skills are required to develop digital competences of all subjects of learning (students-teachers), it is worthwhile to establish the degree of formation, find out the level of general user information knowledge and skills use a computer and the Internet, analyze the results of learning achievements to gain practical experience. The said standard for Europeans emphasizes the presence and manifestation of creative skills necessary to rethink information, to work in a remote format, various applications and social networks, instant messengers, and information portals. It is relevant to make to develop information content, and generally have the skills to work with a database — collect, structure, check for accuracy, store and protect information. In this aspect, and following the example of the European framework, we have made an attempt to describe basic and special information skills and the digital skills derived from them (Table 1).

Table 1

Basic level information and digital literacy

Parameter 1 Name and the description of the competence	1.1. Information management, its search and selection of valuable information containing the actual. Selecting search tools, searching for data (information), organizing the digital environment (resources) and information access, studying information needs; selection of the most effective resources, collection, processing, creation of personal strategies for information management.		
Degree	A (Basic)	B (Intermediate)	C (Advanced)

	I can search for a certain one information, collect data for digital content on the web with the use of search engines. I acknowledge that my search results are dependent on the search tools I select.	I know what and how to find information on the Internet and view data for content. I can express my information needs in an organized manner. I can select information from a document, data for content in a digital environment.	I can use all available search tools, build search strategies, look at and select data for digital content. I know how to filter and manage information, data and digital content that I receive. I know how to monitor sites designed for sharing information online (for example, microblog).
Parameter 2			
Knowledge Examples	I understand how information is collected and generated and distributed on digital media. I know about the existence of various search engines. I know about search tools and data systems that meet your information needs. I understand how to explore searching across media and storing information in digital clouds. I understand how information systems classify search data.		
Skill Examples	Customize your search based on your specific needs. I can follow information presented through hyperlinks or non-linearly. I use filters and agents. I can find the necessary data by key words and thus limit the choice, quickly achieving results. I can specifically find the information I need based on the glossary that is specific to the search tool. I have strategic information management skills to drive targeted action. I can change how people search for information depending on how search algorithms are constructed.		
Relationships Examples	This shows an active attitude towards information search. I highly appreciate information technologies that help us in life and work. I have constant motivations to seek information for various aspects of my life. I'm curious about information storage, management and distribution systems and how they work.		

These models of students' digital competencies are necessary for modern education and further life activities. A framework description of the digital skills underlying competencies allows you to build correctly and effectively a learning strategy for each student. You can use computer science practice tests to establish the general and specific level of digital skills formation.

Results and discussion

A detailed analysis of sources on the research problem shows that digital education is a positive factor and solves many socio-financial issues, serves as a motive for the improvement of digital skills of students, teachers and staff, but methodologically this trend is still not justified for further development and all structure-forming tools have not yet been sufficiently developed. The study revealed that in the digital educational space at the university, digital skills of a higher order are also needed, the possession of which will help the graduate carry out professional or business activities. They must have the same framework characteristics as those indicated in Table — 1. Based on the results of the training course conducted, the following digital skills were identified (Table 2):

Table 2

Advanced information and digital literacy

Parameter 1 Area name	Information and digital literacy		
Parameter 2 Name and the description of the competence	1.2 Evaluation of digital information, data and content. Collection, processing, understanding and evaluation of information, data sources and digital content critical		
Parameter 3 - Degree	A (Basic)	B (Intermediate)	C (Advanced)
	I know that data available on the global web can contain errors and be incorrect, and for digital content, clarification is required.	I can conduct comparative analysis of received data, various resources, visual information, charts, etc.	I can critically analyse the validity of information and ensure my data is secure in a digital environment.
Knowledge examples	I can analyze the information received, evaluate and interpret. I can evaluate the content of digital media. I can evaluate the reliability of content on the global network or in the media, I can identify the heterogeneity of reliable sources of information. I understand that sources of information must be compared. I can transform information into knowledge.		

Skill examples	I can process information directed at the user. I evaluate the reliability, safety, accuracy of information. I learned to compare by collating and separating data from multiple resources. I was able to distinguish between reliable information coming from unreliable sources.
Relationships examples	I recognize the limits of the Internet as a source of information. I recognize that despite globalization, some countries have a greater online presence than others. I understand that the mechanisms and algorithms of operation search engines are not unbiased when presenting information.

As an equal subject of the educational process, a student must have communication and cooperation skills. According to the new conditions of teaching critical thinking to students, one of the points is to work in active interaction and communication through digital opportunities. This, of course, influences teaching methods and encourages students to acquire skills on their own. The developed basic digital skills can be represented in the diagram (Figure 1):

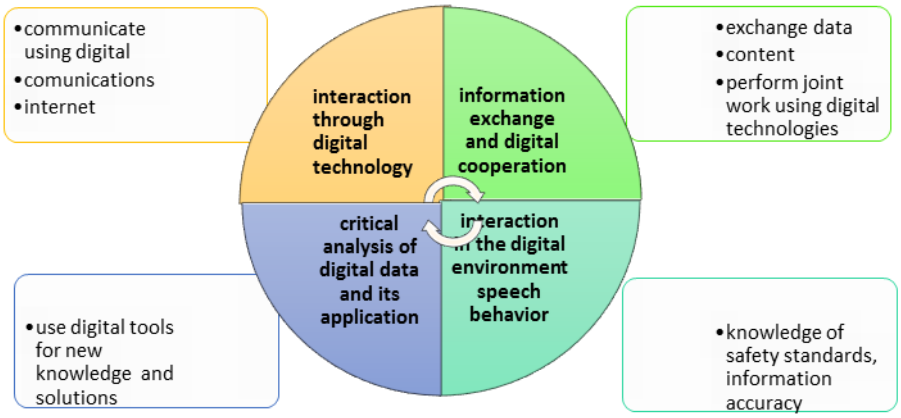

Figure 1. Basic digital skills of students

An open learning system in a digital environment shows, this environment is accessible to all participants and to all structures and materials, and this is a positive aspect of digital tools of the educational process. They are the possibility of a teacher to present educational materials during simultaneous broadcasting, locality of the audience, time flexibility (live broadcast, viewing a recording of a lesson), variety of types of classes as video conference, webinars, lectures, virtual excursions, animations, cyber games, creating a database on the topic. From a positive side, one can also note the reduction of paper versions, the widespread use of gadgets (smart boards, phones, tablets, and laptops), a reduction in the amount of routine work of the teacher, and time saving. There is also a benefit for the university in terms of economic benefits in such training (lack of classroom funds, expenses for utilities) and so on.

However, the most important result is the formation of digital skills that helps to satisfy the needs for obtaining a quality education (independent study of topics, search and selection of information, structuring knowledge and the formation of skills under the tutoring of a teacher), the reduction of the duration of training and personalization of education.

The study of foreign experience in the formation of digital skills led us to think about the importance of pedagogical approaches of blended learning [17]. Proponents of the constructive approach [18] believe that «students should build their knowledge independently, relying on the experience of the past, what they have already studied and know, but develop them further, transform their skills and thereby improve their level», working on their own consciousness and independent knowledge, working with teachers as consultants and using formative assessments to inform future training needs. Self-awareness includes the student's understanding that simply reading articles on the Internet does not solve learning problems, does not transform information into knowledge, a digital resource creates conditions for a wide selection of the necessary data and reduces the time for searching and collecting. Each student should be able to demonstrate their knowledge in a positive mood, show it in digital visual formats (poster, infographics, diagram, diagram, etc.). This is an indicator of his ability to structure knowledge, improve digital skills, and this is the path to advancement in learning and life. Students can find new sites, courses, employers, run their own platform of activity (blogging) in the process of working in the Internet space.

As we can see, modern education meets the challenges of time and the market, and is characterized as a complex integrated process based on the organization of digital learning online/offline, involving the organization of professional communication with the systematic use of computer technology, multimedia and other digital educational resources. It involves the implementation of principles connected with the use of computer technology and technology. Below are presented some of them (Figure 2):

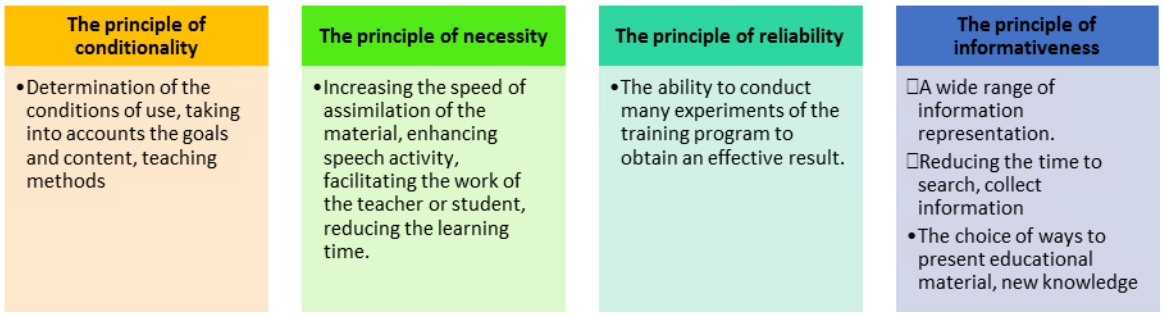

Figure 2. Principles related to the use of computer equipment and technology

In the digital format of education, the following principles are also distinguished: 1) dominance; 2) personalization and success; 3) flexibility and adaptation; 4) teamwork and mutual learning; 5) directed us to practice and rationality; 6) a great resource in organizing teaching and providing digital content; 7) assessment.

Many of these principles are of a general didactic nature and are characteristic of all types and forms of education. Personalization or collaborative learning are core tenets of teaching critical thinking to students. However, we dwell on those that are distinguished in the didactics of digital learning [19].

The principle of priority (dominance). Self-study for students becomes the main and basic skill in the digital education environment, which is created by the teacher. A prerequisite is reflection, when there is an understanding of how learning is progressing and a decision on the next step is made. The goal is to effectively organize the learning environment, provide students with the necessary content, consultation, support and assessment.

The principle of flexibility and adaptability creates conditions for personalizing the educational process with the ability to organize digital content in training. Many training activities can be aimed at implementing automatic skills in working with information data, taking into account work algorithms, pace and methods of assimilation and presentation of material. In this principle, the special role of the teacher is to motivate and support students.

The existing principle of fully filling the content states the presence of a large number of factual materials, which can cause difficulties in finding the specific required material and waste of a lot of time and errors in the selected material. However, this will allow you to make a broader overview of the information, find your own source of information for everyone, and enter into a discussion from different points of view and understanding of the problem. In many universities, each teacher creates electronic resources; however, it is not enough.

As for the training format, we will highlight some of them according to F. Hubbard's classification and present them schematically (Figure 3).

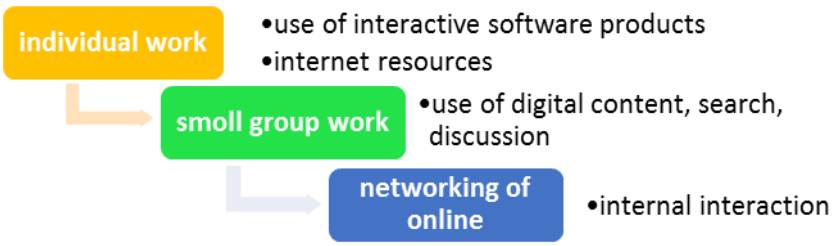

Figure 3. Form of organizing the educational process in digital format

Conclusions

The digital revolution in all areas of life has led to changes in education, the emergence of new trends and resources. Pedagogy, as a social science and practice that is significant for society, has begun to actively develop methodological foundations in relation to introduction of new technologies in teaching students. This led to the formation and development of digital didactics, which substantiates the principles, methods and techniques, means of organizing the educational process in new conditions and preparing modern people for life and work. It is necessary problems need to be solved of formation of students' digital competencies and level digital skills.

In Kazakhstan, we have to study and develop a model of digital competencies and skills and their comparability with the national framework of other world standards, a didactic description of models of digital skills in the teaching/learning of students and teachers. Recent research on methods for teaching these skills students shows their importance in social integration and in training specialists of the digital age. The authors state that digital skills will be vital in future. Specialists with a high level of digital competencies will provide a competitive advantage at different levels of the labor market.

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Қазіргі білім берудегі цифрлық дағдыларды қалыптастырудың өзекті мәселелері

Мақалада жаңа оқу форматындағы студенттердің цифрлық дағдыларының жиынтығын қалыптастырудың өзекті мәселелері туралы айтылады. Зерттеу авторлары әр түрлі деңгейдегі ақпараттық дағдыларды оқытудың Ғуропалық стандарттарын зерттей отырып, цифрлық дағдыларды кәсіби білімді игеру, қазіргі және болашақ өмірді, техникалар мен технологияларды басқару үшін қажет деп санайды. Мақала авторлары кәсіптік білім беру процесінде олардың қалыптасу жағдайларын талдайды және оларды біліктілік шеңберінде бес аспект бойынша анықтауға тырысады: цифрлық сауаттылық және ақпараттық блоктарды ұйымдастыру мүмкіндігі, әңгімелесу және өзара әрекеттесу кеңістігі; ақпаратты бір ресурсқа жинау; ақпараттық қауіпсіздік және шешімдерді іздеу. Мақалада сонымен қатар студенттердің негізгі цифрлық дағдыларын жобалау қажеттілігі анықталып, негізделеді, ұйымдастырылған оқыту кезінде цифрлық дағдыларды оқытудың ғылыми-әдістемелік негізін құру жаңартылады, аралас оқытудың педагогикалық тәсілдерінің стратегиялары ашылады. Сонымен қатар, цифрлық дидактика мамандықты цифрлық форматта оқытудың заманауи әдістері мен стратегияларын құрудың негізі болып табылатыны көрсетілген, алайда цифрлық оқытудың барлық принциптері мен стратегияларын жүзеге асыру мақсатында, студенттердің цифрлық құзыреттіліктерін қалыптастыру және цифрлық дағдыларды қалыптастыру мәселелерін шешу қажет.

Негізгі сөздер: қазіргі заманғы білім, цифрлық дағдылар, оқыту технологиясы, цифрлық сауаттылық, ақпараттық сауаттылық, өмір мен жұмысқа дайындық, құзыреттілік, цифрландыру.

Б.А. Абилова, К.М. Нагымжанова, К.А. Айдарбекова

Актуальные проблемы формирования цифровых навыков в современном образовании

Статья посвящена актуальным проблемам определения сформированности комплекса цифровых навыков студентов в новом формате обучения. Авторы исследования, изучив европейские стандарты обучения информационным навыкам на различных уровнях, рассматривают цифровые навыки как необходимые для овладения профессиональными знаниями, управления современной и будущей жизнью, приемами и технологиями. Авторы статьи анализируют условия их формирования в процессе профессионального образования и делает попытку определить их в рамках квалификации по пяти направлениям: цифровая грамотность и умение организовать информационные блоки, место для разговоров и общения; сбор информации в единую ресурсов; защиты информации и поиска решений. В статье также выявляется и обосновывается необходимость формирования базовых цифровых навыков у студентов, актуализируется создание научно-методической базы для обучения цифровым навыкам в ходе организованного обучения и раскрываются стратегии педагогических подходов к смешанному обучению. Кроме того, показано, что цифровая дидактика является основой для создания современных методов и стратегий обучения профессии в цифровом формате, однако для реализации всех принципов и стратегий цифрового обучения необходимо решить задачи формирования у студентов цифровых компетенций и повышения уровня цифровых навыков.

Ключевые слова: современное образование, цифровой навык, технология обучения, цифровая грамотность, информационная грамотность, готовность к жизни и работе, компетентность, цифровизация.

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