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DEVELOPMENT OF DIGITAL LITERACY OF STUDENTS WITH DISABILITIES

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Abstract. The article is devoted to the formation of digital literacy in teaching children with disabilities on the basis of two components: digital user component, digital correction-intellectual component, which are developed by the authors. Discussed the importance of the state program "Digital Kazakhstan" and one of these areas of human capital. Described by the authors created a course on computer science aimed at improving the digital literacy of students with disabilities. The main research methods are the theoretical analysis of educational and methodological, scientific literature and Internet content on digital literacy, and components of digital literacy, generalization of practical experience in the formation and development of digital literacy of students with disabilities. The content of digital literacy of students with disabilities was investigated, the thematic content of the educational sections of the course on the formation and development of digital literacy was substantiated, corresponding to the main components of digital literacy: digital user component, digital correction-intellectual component.

Keywords: education, digital literacy, computer science, students with disabilities, components of digital literacy.

Intoduction

Our world is moving to all new levels of technology development: electrification, informatization, and nowadays digitalization. A lot of analysis of research in the field of digitalization of education shows that the digitalization stage follows the computerization of education system. Digital literacy is a set of knowledge and skills that are necessary for the safe and effective use of digital technologies and Internet resources. Digital literacy is a necessary component of life skills of students in modern life. In modern conditions, information technology and digital transformation are the main factor of technological change and a condition for the provision of digital educational methodological complexes in education. In the Concept of modernization of Kazakhstani education, one of the main tasks of the educational process is the formation of a creative personality, independent in educational, artistic, labor, sports activities, the upbringing of a purposeful, hardworking student who strives for a healthy lifestyle, who knows how to plan his activities and independently acquire knowledge, ready to learning at all levels, with a new type of thinking. To implement this task, it is necessary to purposefully develop the cognitive interests, abilities and capabilities of the student, especially the student with disabilities, as well as develop their digital literacy.

Research

In Kazakhstan, the digitalization of education system is one of the leading trends in the process of its reform. In accordance with the State Program "Digital Kazakhstan" approved by the Decree of the Government of the Republic of Kazakhstan (December 12, 2017), a target indicator is provided to increase the level of digital literacy of the population by 2022 to 83% .2019 - 78.5% 2020 - 80 , 0% 2021 - 81.5%. According to the State Program "Digital Kazakhstan" digital literacy

consists of two group: basic and professional digital skills [1].

The first Basic digital skills include the following five competencies:

Basic digital skills, including confident use of a personal computer and laptop, mobile devices, the Internet, security and data protection;

Skills of using "e-government" and public services, including obtaining the necessary electronic government services "online" without leaving home;

Skills for using Open Government, which includes using the four components of Open Government;

"Electronic commerce" skills, which include the skills of purchasing, selling and promoting goods and services "online";

Information security skills, including the protection of personal data, protection of PCs, tablets, smartphones, etc., protection on the Internet, protection during financial transactions.

The second Professional digital skills include five basic digital skills competencies and:

Media skills - skills in using digital devices (digital cameras, camcorders, etc.);

Professional digital skills - the skills of using software and hardware solutions in professional activities.

One of the direction of development of the state program "Digital Kazakhstan" is the development of human capital. This means that the development of new competencies and digital literacy of the population will be possible thanks to innovations in education. Digital literacy should be developed in connection with the general tasks of education, if the use of ICT was a basic skill, now the formation of digital skills should be included in the school curriculum. It seems that digital literacy has a beneficial effect on the formation of other basic skills and competencies of students with disabilities. In all countries of the world and in all social groups of society, there are people with disabilities. Their number in the world is significant and continues to grow. For example, currently, 139,887 people in Kazakhstan have special educational needs. Of them 37970 - preschoolers, 95497 - students of secondary education, 2900 - recipients of POO, 3520 - students of universities [2]. In the traditional Kazakhstani education system for children with one form or another of disabilities, children with developmental disabilities receive education in special (correctional) educational institutions, at home or in special boarding schools.

In order to form and develop digital literacy of children with disabilities, we must determine the components of digital literacy, taking into account their psychological, pedagogical and physiological abilities. There are different criteria in the components of digital literacy development. For example, renowned media scientist Henry Jenkins believes that digital literacy includes the ability to work with a computer as "hardware", understanding the characteristics of the device and distribution of digital information, understanding the structure of the network community and the characteristics of social media. And also G. Jenkins et al. Believe that digital literacy depends on the formation of three types of skills:

• skills in interacting with a computer and any other devices with which you can go online or create digital artifacts;

• skills of interaction with software, which provide the ability to work with content;

• universal skills in working with digital technologies, including design, development of a digital online or offline environment [3].

Further in the research of the famous scientist in the field of education and in the field of digital literacy Doug Belshaw in his book called "Basic elements of digital literacy" [4], which testifies to the presence of various models of this digital literacy and made eight components as the basis for the qualitative interaction of a person with a digital:

Cultural component;

Cognitive component;

Constructive component;

Communicative component;

Confident use;

Creativity;

Using analytical skills and digital content assessment skills;

Civilian component

The authors of different concepts of digital literacy agree on only one understanding of how digital reality works, can teach a person to control the information environment and make interaction with digital technologies. In addition to the authors, we consider the components of digital literacy from the point of view of world organizations in the field of education (table 1).

Table 1. Comparison of the components of digital literacy according to the some World Organization

JISC - Joint Information Systems Committee	UNESCO - United Nations Educational, Scientific and Cultural Organization	AECT - Association for Educational Communications and Technology
1. Media literacy	1. Access to information	1. Search
2. Communication and collaboration	2. Information management	2. Placement
3. Career and personality management	3. Evaluation of information	3. Accessibility
4. ICT literacy	4. Integration	4. Management
5. Reading skills	5. Formation of new knowledge	5. Integration
6. Digital learning experience	6. Communication	6. Evaluation
7. Information literacy		7. Analysis
		8. Synthesis

Digital literacy: a conceptual framework.

JISC – (Joint Information Systems Committee) has identified that Digital literacy is the capabilities which fit an individual for living, learning and working in a digital society. Digital literacy looks beyond functional IT skills to describe a richer set of digital behaviors', practices and identities. What it means to be digitally literate changes over time and across contexts, so digital literacies are essentially a set of academic and professional situated practices supported by diverse and changing technologies [5].

UNESCO - According to the working definition, agreed at the UNESCO June 2003 Expert Meeting in Paris, "literacy is the ability to identify, understand, interpret, create, communicate, compute and use printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society." (UNESCO, 2004) [6].

AECT (Association for Educational Communications and Technology) - has identified that Digital literacy is the use of high technology in everyday life. A digitally literate person may use specific hardware such as a computer, a cell phone, or other digital resource in combination with

communication software, such as the Internet, to interact with society at large, thus becoming a digital citizen or e-citizen and improving social and economic opportunities [7].

Outcomes

In the course of the study, taking into account the author's recommendations of various scientists on the components of digital literacy, we formulated a separate approach to increasing digital literacy in computer science for students with hearing impairment:

Digital user component. In this component students will able to know the Engineering training (ex.: software installation, uninstallation, upgrade, cleaning, etc.);

Digital correction-intellectual component. Improving students' skills: cognitive, logical, critical, creative, systems thinking, memory, imagination, attention, speech, communication through various tasks and programs.

The integration of digital technologies into the educational process distinguishes four levels of such changes in accordance with the SAMR model: Substitution-Augmentation-Modification-Redefinition Model. Bridging the digital divide in education requires moving from digital technologies at the lower levels of the SAMR model (Substitution and Improvement) to digital technologies at the upper levels of this model (Change and Transformation).

In this regard, the strategy for the formation of digital literacy of students with disabilities should include work to reduce inequality in access to digital technologies by developing an information and educational environment.

In the school course, the task of forming and developing digital literacy of students was considered as part of the subject Informatics. The educational process, organized in informatics classes, should ensure the formation of students' readiness for creative self-development and the acquisition of new knowledge. For the development of digital literacy in the subject of computer science, it is important to organize additional courses. Therefore, the authors have compiled their courses in computer science that cover all of the above components of digital literacy. As part of the additional course in Informatics, special attention is paid to the study of issues related to computer graphics, the creation of a 3D model, the development of mobile applications, the creation of projects in the MS Project environment, as well as the configuration and settings of a computer, work in different programs, work with information resources of the network, application Internet services. So, our course was developed on the basis of modular technologies and is divided into four main modules (table 2).

Table 2. Course module

Module	Description	Teaching methods
1. Engineering and technical training	Installing, starting, removing, updating programs. Installing the operating system. Increase the speed of a computer. Working with drivers and peripheral devices. Remote computer control	method for solving engineering and design problems
2. Computer graphics and 3D modeling	Explanation of the concept of computer graphics. Types. Areas of application. Significance. Software for working with computer graphics. Description of 3D modeling. Examples.	Creation and design of objects
3. Creating a mobile application	Origin, history, interesting facts about mobile technologies and applications. Ways to create mobile applications.	Method of projects
4. Digital research project	Students use computer programs on a variety of topics and develop projects using different methods.	Individual, group work

Moreover, methodological support for the development of students' cognitive capabilities has been developed such as: collections of practical tasks, lesson materials, lesson scenes, presentations, videos, a set of materials for self-examination, guidelines for work and other materials. When developing the course, new educational methods and technologies were used: Information and communication technology, Project technology, Technology for the development of critical thinking.

For example using the Project technology students make practical creative tasks that require students to use them to solve problematic tasks, knowledge of the material at this stage.

The topics of this course are fully focused on the formation of the personal characteristics of a graduate who owns the basics of scientific methods of knowing the world around him, motivated to be creative and innovative, gaining new knowledge, willingness to cooperate in any situations, able to carry out educational research, design and information and cognitive activities ; realizing himself as a person, a socially active citizen of the country.

We use Marzano's taxonomy to describe and evaluate learning outcomes. Currently there are different types of taxonomy for assessing educational outcomes, such as Bloom, Marzano, Fink, SOLO etc. For example we will discuss the Taxonomy Robert Marzano, developed the "New Taxonomy of Educational Objectives". Designed specifically to overcome the shortcomings of the widely used Bloom's Taxonomy and the current state of teaching in accordance with educational standards, Marzano's Thinking Model includes a variety of factors that influence the way students think and is a scientifically based theory designed to educate students. Marzano's taxonomy includes three systems: 1) Self-system. 2) The system of metacognition. 3) The cognitive system. Several operations are presented in the cognitive system of Marzano. In a situation where a new opportunity arises, the self-system decides whether it needs to continue the current line of behavior or start a new activity. The metacognition system sets goals and tracks how they are achieved, the cognitive system processes all the necessary information, the Knowledge Area contains the necessary content[8]. Marzano's taxonomy usually focuses on how students begin to learn new materials, how they begin the process of understanding, learning. Marzano's taxonomy is very useful in the development of new educational programs of study and for setting achievable goals in the development of new knowledge. In general, the ideas of the New Taxonomy are based on theories of cognitive skills and are judged to be more reliable and consumable than the old taxonomies.

Conclusion

The results of this study can be understood as the formation of digital literacy in teaching children with disabilities based on two components: a digital user component, a digital correctional and intellectual component. With the help of an additional course in informatics, which were developed by the authors of the article, aimed at increasing the digital literacy of students with disabilities, the thematic content of the educational sections of the course is substantiated. In the Digital user component, students will be able to learn about engineering training. For example: software installation, uninstallation, upgrade, cleaning, etc. In the Digital correction-intellectual component students will be able to improve their skills: cognitive, logical, critical, creative, systems thinking, memory, imagination, attention, speech, communication through various tasks and programs. For the development of digital literacy in the subject of computer science, it is important to organize additional courses. Therefore, the authors have compiled their courses in computer science that cover all of the above components of digital literacy. As part of the additional course in Informatics, special attention is paid to the study of issues related to computer graphics, the creation of a 3D model, the development of mobile applications, the creation of projects in the MS Project environment, as well as the configuration and settings of a computer, work in different programs, work with information resources of the network, application Internet services. So, our course was developed on the basis of modular technologies and is divided into four main modules: engineering and technical training, computer graphics and 3D modeling, creating a mobile application, digital research project. Overall, our results demonstrate a strong impact on the development of digital literacy for students with disabilities.

Acknowledgements

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