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Regulating Current Strength Using A Rheostat In The Conditions Of Digitalization

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Annotation.

Introduction. Today, the issue of improving the digital literacy of the population is being actively raised. This primarily concerns pupils, who have the highest demand for the use of digital technologies and internet capabilities in learning and everyday life. Pupils who develop digital literacy as an integral part of their education are more effective in their studies and are more in demand when it comes to employment.

Methodology. The article proposes an analysis of pupils' digital literacy as a set of knowledge, skills, and abilities necessary for life in the modern world. Examples of safe and effective use of digital technologies and internet resources are provided within the framework of practical work in the electricity section.

Results. In this article, we conducted a virtual practical work on the topic "Regulating current strength using a rheostat" within the "Digital Virtual Laboratory for the Electricity Section" software, which is included in the "Digital Media Education Environment" that we developed in the Karakalpak language using the Latin script. This work is based on the electricity section of the 7th grade textbook written by K.Suyarov and other authors.

Conclusion. The research results showed that the development of digital literacy had a positive impact on the performance of pupils using the "Digital Virtual Laboratory for the Electricity Section" software for practical work. It was demonstrated that the natural setup for performing practical work is less practical and convenient to use compared to its digital virtual counterpart.

Keywords: digitalization of education, digital virtual laboratory, digital literacy, teaching the electricity section, practical work, electrical phenomena.

In the context of internet deployment, "digital literacy" is not only a technology but also a living environment, a source of development, new forms of activity, cultural practices, phenomena, knowledge and skills, a culture that generates critical and undeniable needs. With the adoption of Resolution No. PQ-162 of the President of the Republic of Uzbekistan on May 24, 2023, the concept of "digital literacy" is being particularly actively introduced, and today the issue of increasing the digital literacy of the population is being actively raised. This is especially relevant for pupils who have the highest demand for using SMART technologies and internet capabilities in education and everyday life [5; 9]. In terms of safe internet usage skills and responsibility for actions taken, it should be recognized that the "digital gap" between pupils and adults is quite large [10]. Digital literacy occupies a priority place in the list of basic skills required in the 21st century for almost any position. It is noted that digital literacy will be as in demand as the ability to write and read [12].

Author defined digital literacy as a set of knowledge, abilities, and skills that are necessary for life in the modern world, for the safe and effective use of digital technologies and internet resources [1].

From the World Economic Forum report: digital literacy is defined as the ability to use and create content based on digital technologies, including searching for and sharing information, answering questions, interacting with other people, and computer programming.

The digital literacy index of Uzbekistan's population has shown a significant growth trend in recent years, but it is still developing. Improving the digital skills of the population is one of the priorities within the framework of the "Digital Uzbekistan - 2030" strategy implemented by the government. According to statistics, as of 2021, the number of internet users in the country

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reached 27 million people, covering approximately 75 percent of the population. However, the level of digital literacy varies across regions, age groups, and between urban and rural populations. While the level of digital literacy is relatively high among youth and urban populations, this indicator is lower among older people and rural residents. Various programs and projects implemented in cooperation with the government and international organizations are working to improve digital literacy for all segments of the population, which lays the foundation for further growth of the country's digital literacy index in the future.

It is noted that digital literacy has been recognized as one of the eight key competencies for lifelong learning. This is the confident, critical, and creative use of ICT to achieve goals related to work, employment, education, leisure, and the social sphere. Learners who develop digital literacy as an integral part of their education are more effective in their studies, more in demand for employment, and educators who are proficient in digital information freely combine innovative pedagogical practices such as flipped learning, digital curation, mobile learning technologies, and use open educational resources to maximum benefit [2;11; 10-13].

Therefore, digitalization is the introduction of modern digital technologies into various spheres of life and production.

During the experimental work to identify the role of digital literacy among pupils, we conducted a survey among 7th-grade pupils in Karakalpak-language classes at Schools No. 35 and 41 in Nukus city (102 pupil participated in the survey). The analysis of pupils' responses to the survey questions is presented in Table 1.

Table 1
Analysis of pupils' responses to the survey questions

№	Sorawlar	Juwap tańlaw nátiyjeleri	%
1	Sanlı sawatxanlıq — bul...	Tekstti durıs teriw kónlikpesi	12,7
		Sanlı texnologiyalar hám internet resursların qáwipsiz hám nátiyjeli paydalanıw ushın zárúr bilim hám kónlikpeler jıyındısı	59,9
		Hár bir adamnıń ómirinde zárúr bolǵan bilim, kónlikpe hám mamanlıqlar	26,5
2	Úyińizde kompyuter bar ma?	Awa	24,6
		Yaq	75,4
3	Kompyuter menen islewde qanday kónlikpelerge iyesiz? Bir neshe varianttı tańlawıńız múmkin	Tekstti teriw	29,4
		Tekstti formatlaw	21,5
		Kesteler jaratıw	54,9
		Tekstke súwret qoyıw	41,1
		Excel de islew	56,8
		Sociallıq tarmaqlarda sáwbetlesiw	14,7
		Hawa rayı, ǵalaba xabar quralların oqıw	8,8
		Power Point da prezentaciya jaratıw	24,5
		Internette maǵlıwmat izlew	24,5
		Elektron pochtanı paydalanıw	26,4
		Brauzer de islew	8,8
		Kewil ashar filmlerdi kóriw	22,5
		HúJjetlerdi hár túrli elektron tasıǵıshlarǵa saqlaw	29,4
4	Siz qalay oylaysız, elektr bóliminde	Awa	75,4

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	sanlı mediatálim ortalıǵın paydalanıw zárúr me?		
		Yaq	24,6
5	Siz elektr bóliminde sanlı mediatálim ortalıǵın paydalananıwdı qáleysiz be?	Awa	63,8
		Yaq	36,2
6	Virtual laboratoriyalardı paydalanıw arqalı elektr bólimi boyınsha ámeliy jumıslar orınlaw sizge unaydı ma?	Awa	78,5
		Yaq	21,5
7	Testlerdi qanday kóriniste islegen sizge qolaylıraq?	Onlayn	73,6
		Qaǵaz	26,4
8	Sizge temanı qanday qural arqalı ótken túsiniklirek boladı?	Sabaqlıq	16,6
		Prezentaciya	83,4

Through analysis of the student survey results, we came to the following conclusions:

The majority of students do not own a computer (75.4%); school students have acquired computer skills such as: typing text (29.4%), inserting images into text (41.1%), searching for information on the internet (24.5%), communicating on social networks (14.7%), watching entertainment videos (22.5%). The development of digital literacy has a positive impact on the academic performance of students who use virtual laboratories to complete practical work on the "Electricity" unit (78.5%).

Practical works are a type of active independent work of students, which is conducted using various methods, materials, tools, devices, and other means [8].

Let's examine in more detail the examples of practical works in the context of digitalization for the electricity section in 7th grade (Fig. 1).

Based on the textbook for 7th grade of general secondary education schools that meets the new educational standards, authored by K.Suyarov and others [6], recommended for publication by the Ministry of Public Education of the Republic of Uzbekistan, a "Digital Virtual Laboratory for the Electricity Section" has been developed. This serves as an excellent supplement to paper-based textbooks, expanding their capabilities. In our opinion, it is considered the most convenient and modern digital educational-methodological complex, and through its analysis, we come to the following conclusions: The digital virtual laboratory is an important tool in teaching the electricity section, improving the quality of the learning process. This technology helps students visually understand electrical phenomena, creates opportunities for conducting experiments in a safe environment, and leads to efficient use of resources. Moreover, it increases students' interest in the subject and provides opportunities for individualized learning. It also ensures the continuity of the educational process in distance learning situations. Through this method, students have the opportunity to repeat multiple times, receive visual explanations, and develop analytical skills. In conclusion, the digital virtual laboratory, taking into account modern requirements, significantly increases the effectiveness of teaching physics, especially the electricity section [7].

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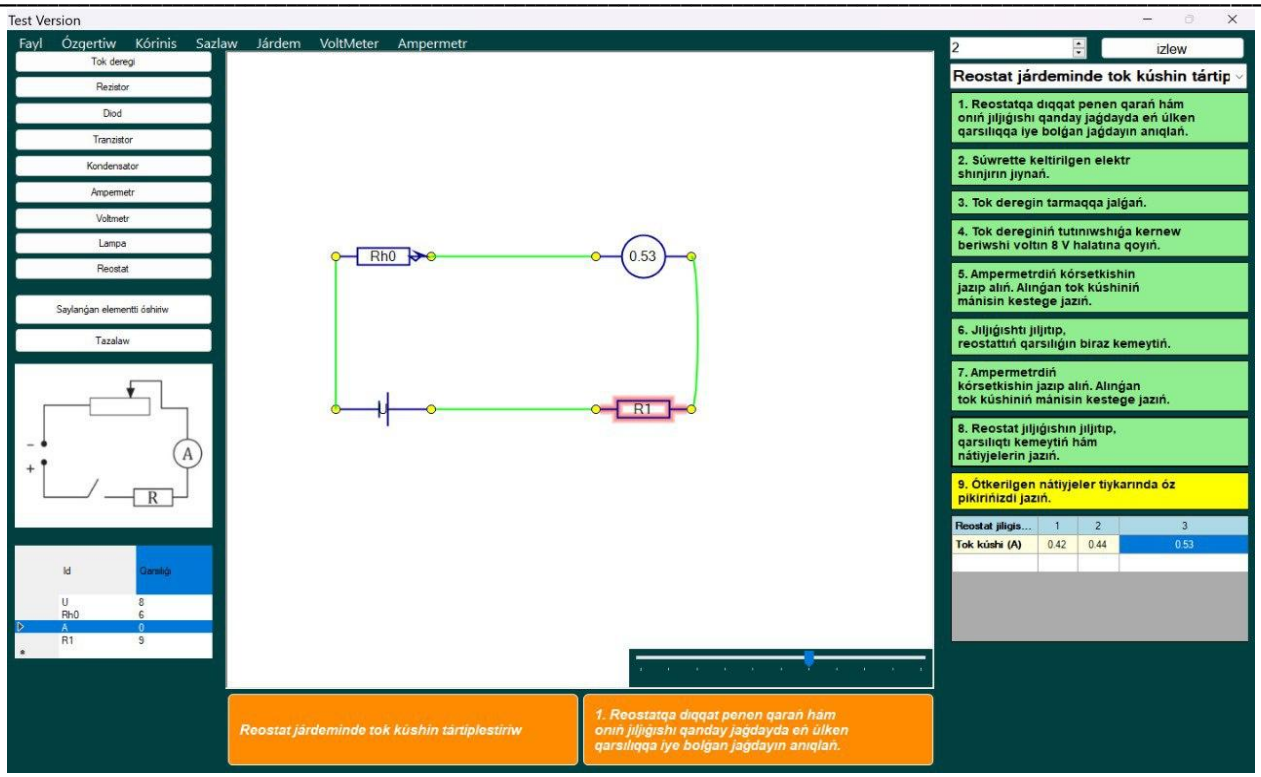

Fig. 1. Practical work on the electricity section in the context of digitalization

At present, there are two main approaches to creating virtual reality systems. Firstly, there is the virtual room, and secondly, wearable virtual reality devices. In the first case, a special room is constructed, surrounded by stereoscopic screens onto which the image of the virtual world is projected.

A person is placed in a kind of analogue of a circular stereoscopic cinema, beyond which the virtual world is located.

The main advantage of such a system is the possibility for a group of people to be present and interact in the same virtual world. All wearable virtual reality devices lack this advantage. Moreover, the absence of an additional device on the head and the unlimited field of view for a person in the virtual space are undeniable advantages of virtual room systems [4].

Table 2

List of virtual practical works during the study of the Electricity section in the physics textbook authored by K.Suyarov and others

№	Ámeliy jumıslar
1	Om nızamın úyreniw
2	Reostat járdeminde tok kúshin tártiplestiriw
3	Elektr shınjırında tok kúshi hám kernewdi ólshew
4	Ampermetr járdeminde tutınıwshıdan ótip atırǵan tok kúshin ólshew
5	Ommetr járdeminde rezistordıń qarsılıǵın ólshew
6	Elektr shınjırın jıynaw, onıń túrli bólimlerindegi tok kúshin hám kernewin ólshew

As an example, let's consider the digital physics laboratory from the company 'Scientific Entertainment'. It includes the following digital sensors: position sensor (recording four body positions); force sensor; absolute pressure sensor; angular velocity sensor; acceleration sensor; temperature sensor; humidity sensor; voltage sensor; current sensor; oscilloscopic voltage sensor with two measurement channels [3].

Table 2 presents the list of virtual practical works during the study of the “Electricity” section in the physics textbook authored by K.Suyarov and others [6].

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In this article, we examined the virtual practical work titled “Regulating current strength using a rheostat” from the “Electricity” section of the physics textbook for 7th grade secondary schools, authored by K.Suyarov and others.

Conclusion.

We determined the importance of students' digital literacy. For this purpose, we examined practical work in the context of digitalization of the electricity section for 7th grade classes. For example, in the "Digital Virtual Laboratory for the Electricity Section" that we created, we looked at the practical work "Regulating current strength using a rheostat".

Thus, practical work in the context of digitalization contributes to improving the digital literacy of students.

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March 2025

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