

A.O. ABDRAKHIMOVA¹, R.M. MUSSAKHAN¹, D.M. BORANKULOVA^{1*}

¹ Abai Kazakh National Pedagogical University (Almaty, Kazakhstan)

*Address of correspondence: Borankulova Dina, candidate of geographical sciences, Acting Associate Professor, Faculty of Natural Sciences and Geography, Abai Kazakh National Pedagogical University, Kazybek bi Str., 30, Almaty, 050010, Republic of Kazakhstan,
E-mail address: d.borankulova@abaiuniversity.edu.kz / Tel.: +77071845802

DIGITAL RESOURCES AS A MEANS OF SPATIAL EDUCATION

Abstract

Some of the outcomes of environmental management activities, while intended to address global issues, have contributed to new environmental challenges. This is particularly concerning for future generations. To address these problems, scientists have emphasized the importance of promoting environmental literacy. However, even before focusing on environmental literacy, it is crucial to foster responsible and sustainable use of natural resources, which are essential to daily life. Passing down this awareness through generations could help prevent future global environmental crises. Therefore, integrating geographical education into strategies for addressing humanity's challenges is essential. In the study, based on domestic and foreign works, the concepts of teaching environmental management, in particular, information about water sources through digital resources, were analyzed. In addition, in the course of the study of attempts to analyze approaches to teaching the topic «Types of Nature management», research was carried out on tasks in textbooks. The study used descriptive and comparison methods. It is proposed to implement a digital platform in the learning process to enhance the mastery and reinforcement of new lessons, a step that has become increasingly relevant. This platform will incorporate additional tasks and innovative approaches. The study analyzed the platform's capabilities, including how it facilitates information delivery across subjects, and examined its effectiveness, along with potential barriers to its application. Various studies on teaching approaches in environmental management were also reviewed and compared. The findings can contribute to improving methods and practices in geographic education.

Keywords: geographical education; nature management; digital resource; Environment, Water Resources; 3D technology platform.

Introduction. The effective use of Natural Resources is one of the main problems today. It is necessary to connect the solution and prevention of problems related to humanity and its way of life with the processes of geographical education. Many problems were identified during the survey. In addition, the analysis of the sequence of tasks and the presentation of the information provided in the textbooks was carried out. The course of additions to the sequence of tasks using digital resources was studied. The education system is going through a period of profound changes caused by the rapid development of digital innovation. Recently, special attention has been paid to the use of effective teaching methods and techniques to achieve the planned results of the educational process. The relevance of the study was determined by the Sustainable

Development Goal and based on domestic and foreign literature, and the results of the test work carried out using digital resources were determined. It is proposed that the senior class can be used in the teaching of geography and higher educational institutions within the framework of any topic. The use of digital tools in creating tasks for teaching geography enhances mutual understanding between teachers and students, fosters collaboration in the learning process, and improves the effective assimilation of material. It supports the development of a cohesive knowledge system, promotes the ability to work effectively with information, and aids in understanding the laws governing geographical phenomena in nature and the environment. This approach not only raises the quality of education but also enhances students' communication skills

and increases their motivation to engage with geography.

The sphere that forms a virtuous attitude, value, and consciousness in the younger generation is education. Nature-based solutions, apart from the educational process, are closely linked to global environmental, social, and economic problems (Iksan et al., 2020). Global issues, such as climate change, and biodiversity loss to prevent and reduce the knowledge of students about nature management is relevant today (Awewomom et al., 2024). It is common for attempts to change the environment to turn into environmental problems. Therefore, it is necessary to direct society to the efficient use of nature, prioritizing environmental tasks, and influencing young people's attitudes and behavior (Linhares & Reis, 2023). An important component of nature, a huge natural element is freshwater sources (Medeu et al., 2016). The researchers note that in recent years, the intensity of the use of freshwater by mankind has begun to increase. We can name the Sustainable Development Goals (SDGs), which were created for the effective use of Natural Resources and the solution of global problems, as well as for the protection and prosperity of the Earth. One of the main directions of Sustainable Development Goals is the planet, that is, the rational use of land ecosystems and Water Resources, Climate Change (Sustainable development goals, internet resources). For the 15th Sustainable Development Goal, the importance of efforts to preserve, protect, and restore terrestrial ecosystems is identified.

In the course of school geography in the textbooks of the 10th and 11th grades of the standard curriculum in secondary education (typical curriculum, internet resource) in the section «Nature Management and Geoecology» in the natural-mathematical (Tolepbekova et al., 2019; Kaimuldinova et al., 2020) and social-humanitarian direction (Kaimuldinova et al., 2019; Kaimuldinova et al., 2020). In the natural-mathematical and social-humanitarian areas of the 10th grade, the lessons on the topics «Types of Nature Management», «Assessment of the Impact of Types of Nature

Management on the Environment», «Principles of Effective Nature Management», in the natural-mathematical and social-humanitarian areas of the 11th grade, «Regulation of the process of Nature Management», «Management of the process of nature management in the economic and consumer spheres» are analyzed. The department works on the concepts of geographical environment, nature Management, Environment, Sustainable Development, Environmental Management, resource availability, and natural landscape, among others. The purpose of our research work is to provide effective ways of teaching with the help of digital resources, in addition to studying environmental management activities.

There are several approaches to the classification of types of nature management. They are closely related to each other, as they arise based on corresponding natural complexes.

The integrity of the image of nature management it is worth highlighting the transport and communication, of Water Reclamation Distribution Services, which combine the above-mentioned types of nature management into a single framework and give special importance to their spatial location. In the following contexts, the Russian engineer-physicist Zvorykin (1993) developed a classification in which he identified four main types of Environmental Management: Industrial, Spatial linker, Municipal, and Environmental.

According to the classification of the author of many works in the field of nature management, Doctor of Geographical Sciences Evseev (2004), it is divided into Background, Large-Focus, Focal, and Dispersion Environmental use.

Among the presented in research, the activities of water protection, water transport, and territorial nature management clarify the relevance of our research work. In addition, the formation of lakes in the country and attempts to use them are of great importance. The use and management of nature are presented in several contexts about water resources, which are important by type. Among the most important causes of environmental problems

is the excessive consumption of Natural Resources. Water is an indispensable natural resource for human life and existence. To make conscious use of water as a whole society and make it sustainable, it is necessary to be aware of Water Information. 97.5% of the available water is found in the oceans and seas as salt water and 2.5% as fresh water in rivers, lakes, groundwater, and glaciers. Since 30.1% of fresh water is in groundwater and 0.4% is surface and atmospheric water, it is impossible to easily access and use, and water resources are significantly limited (Er, 2023). Musabaeva and Abieva (2003) in their works formulated that the increase in the Types of Nature Management, as it occurs under the influence of human economic activity, leads to changes in natural complexes due to their importance for the life of mankind, calling for the frequent occurrence of pollution phenomena in water flows and the implementation of environmental educational work as a solution (Musabaeva & Abieva, 2023). In solving emerging problems in nature management, there are also opinions about the reduction of agricultural land and production facilities located in the water area (Jasinskij et al., 2019).

As a result of human attempts to dominate nature and make nature their good, the advancement of Science and technology has turned into environmental issues such as climate change. This is the biggest threat facing the biosphere in modern times. The most important substance associated with climate change is water, because climate change affects the water cycle, and the water cycle affects the climate. As a result of this

interaction, issues related to water resources, energy, food, health, and biodiversity arise for humans. More than two-thirds of the globe is occupied by water. The continent covers 29% of the Earth's surface. Water is very important for the continuation of human existence (Dikmenli et al., 2024).

The impact of human activity on lake ecosystems has varied significantly over time. Initially, the use of lake resources and human influence on natural complexes were minimal, primarily limited to fishing. As agriculture and animal husbandry developed, economic activity around lakes intensified, leading to practices such as deforestation and more extensive agricultural use. By the late 18th to early 20th centuries, the expansion of highly developed agriculture and large-scale land use was in full swing. This was followed by industrial activities, hydraulic engineering projects, and the growth of settlements around lakes. Over time, lakes became essential for water supply, irrigation, fishing, and fish farming (Vlasov, 1999). Most of the world's water consumption is used for economic needs. When assessing water consumption, it is necessary to distinguish two concepts: total and irrevocable water consumption. While total water consumption refers to the volume of freshwater taken from water bodies, non – non-refundable water consumption is the difference between the volume of water taken and the volume of water returned. According to scientists ' estimates and forecasts of water consumption indicators, the increase in the population leads to an increase in the indicator of water use (communal) (Table 1).

Table 1. *Indicators of water consumption in the world by sectors of the economy*

Description	Rating								Forecast			
	1900	1940	1950	1960	1970	1980	1990	2000	A		B	
									2010	2025	2010	2025
Population, million.	-	-	2542	3029	3603	4410	5285	6181	7113	7877	7113	7877
Area of irrigated land, million. hectares	47,3	75,9	101	142	169	148	243	264	288	329	286	306
Water consumption, km.cube / year	513	895	1080	1481	1743	2112	2425	2605	2817	3189	2646	2535
	321	586	722	1005	1186	1445	1691	1834	1987	2252	1867	1793

communal	21,5	58,9	86,7	118	160	219	305	384	472	607	422	456
	4,61	12,5	16,7	20,6	28,5	38,3	45,0	52,8	60,8	74,1	61,0	63,0
industrial	43,7	127	204	339	547	713	735	776	908	1170	731	673
	4,81	11,9	19,1	30,6	51,0	70,9	78,8	87,9	117	169	97,0	225
reservoirs	0,30	7,00	11,1	30,2	76,1	131	167	208	235	269	208	275
total (rounded value)	579	1088	1382	1968	2526	3175	3633	3973	4431	5235	4006	3889
	331	617	768	1086	1341	1686	1982	2182	2399	2764	2233	2194

Shiklomanov (2020) who made a forecast assessment of changes in water consumption in the world for 2010-2025, concluded that in two versions: «A» - it is assumed that the growth of water consumption in the world will be the same as in previous decades, while «B» – (sustainable development) Along with the population until 2025 (8 billion. 122 million. 565 thousand people) the number of irrigated land and the volume of water consumption is projected to increase (Statistical portal, Mihailov & Dobroliubov, 2017). Many water bodies in the country are often used for consumption, depending on the sectors of the economy. For example, the chemical composition of the waters of the Tobol River Basin has changed under the influence of natural and anthropogenic factors. The composition of rocks, the variety of properties, the presence of soils and karst, and the difference in the degree of natural flow regulation are influenced by factors. Given the specific geological conditions, it should be noted that the Tobol River is natural waters. This area is characterized by a high content of heavy metals. The water form originates from the height of the Ural plateau on the borders of the country of Kazakhstan (west of Kostanay region) and the Russian Federation (East of Orenburg region). Many large industrial centers have been built on the banks of the river, and the water source is also used for the production of the metallurgical industry, mechanical engineering, petrochemical, mining, food, light, and other industries, electricity.

Alongside industrial development, agriculture, particularly irrigated farming, has also expanded significantly (Kozlova, 2024). The most substantial changes in river flow have been driven by economic activities in

southern Kazakhstan. Domestic scientists have noted that anthropogenic activities in central and northern regions lead to a reduction in river water levels (Dostai et al., 2012). To address this, it is essential to incorporate lessons on water conservation into education, emphasizing environmental literacy and responsible water use. As society evolves, fostering an understanding of the sustainable use and preservation of natural resources is crucial. Additionally, cultivating environmental awareness and a sense of duty toward the homeland should be key educational goals, instilling patriotism and civic responsibility in students. As high school students are future professionals, educators must provide high-quality, well-rounded education, using thoughtful approaches to prepare them for responsible citizenship and environmental stewardship.

Digital technologies are developing at a high speed, storing unlimited data, which is an indispensable requirement for humanity in the acquisition of knowledge (Ozerbas, 2021). The process of digital transformation has already taken place in almost all sectors (Azevedo & Almeida, 2021). In the modern digital learning system, the teacher is a mentor, organizer, professional consultant, and knowledge expert (Tatarinov & Orlova, 2020). In geography lessons, we can offer several teaching methods related to the topics of nature management. For example, in *project-based learning*, learners work on specific projects related to the management of Natural Resources; This may include the development of solutions to improve sustainability, restore ecosystems, or implement sustainable practices (Masdarini et al., 2024). *Role-playing games in learning* help

learners understand complex natural resource management systems. For example, they can assume the roles of various stakeholders, such as government, business, and local communities, to negotiate and find compromise solutions. Thus, they can make common decisions and achieve the learning goal (Ruiz-Ezquerro, 2021). *Multimedia resources*, using videos, podcasts, and interactive maps to highlight environmental management issues and success stories can make the material more accessible and interesting (Lytovchenko et al., 2021). *Interdisciplinary courses* combine knowledge from biology, ecology, economics, and sociology to study environmental management. This helps learners see the complexity and interconnection of ecological systems (Chu & Waite, 2023). *Field research and excursions*: Organization of excursions to study local ecosystems, as well as identify problems and opportunities for their protection and Restoration (Bueno, 2023). *Case Discussion*: Analysis of real-life situations of successful or unsuccessful Environmental Management helps students understand practical aspects and apply theoretical knowledge in practice (Pinnelli & Chrystall, 2023). *Use of technology*: the introduction of geographic information systems (GIS), drones, and other technologies for the study and monitoring of Natural Resources (Al-Labadi & Sant, 2021; Fangqi et al., 2023; Wani et al., 2024). *Practical training*: involving students in volunteer projects or internships in environmental organizations (Cam, 2023). *Environmental monitoring*: learners can participate in the collection of environmental data, which helps develop data

analysis and interpretation skills (Keskin et al., 2020). *Teamwork and discussion* create conditions for discussing different approaches and approaches to environmental management that develop critical thinking and the ability to work in a team. The methods help students better understand the principles of sustainable environmental management and develop the skills necessary to solve current environmental problems (Gomez-Lanier, 2018). Of the above methods, we used the use of multimedia resources and methods of teamwork and discussion in our research.

Materials and methods. Based on the results of the analysis of the information and data presented in the study, teachers were interviewed to clarify several issues related to the study of Environmental Management using digital resources. The quantitative and descriptive results of the survey were analyzed. Depending on the relevance of the research topic in identifying identified problems and solutions, digital platform applications and models were presented. In the course of the study of the analysis of approaches to teaching the topic «Types of Nature Management», which is important based on the analyzed literature, research was carried out on tasks in textbooks. It was proposed to use a digital platform in the process of mastering a new lesson, which has become more relevant, adding additional tasks and approaches.

The answers to the questionnaire were sent by geography teachers in Almaty, Turkestan, and Kyzylorda regions of the country (n=108). The answers to the survey questions are depicted (Tables 2,3,4,5).

Table 2. *The answers to the survey questions*

What type is your comprehensive school where you work?		N	%
Valid	Rural school	85	78,7
	City School	23	21,3

Note: n=108

The geography teachers who answered the survey questions were offered descriptive calculations, and the publisher and authors of the

geography textbook used in general education schools were known.

Table 3. *The answers to the survey questions*

Mark the authors and publisher of the geography 10th-grade textbook used in the school			
		N	%
Valid	K. Kaymuldinova, S. Abilmazhinova. «Mektep» Publishing house	89	82,4
	S.Q. Tolepbekova, A.I. Amanzholova, A.M. Zhylkaidarova. «Almatykitap» Publishing house	19	17,6

Note: n=108

It was found that the 10th-grade Geography textbook, published by the publishing house «Mektep», compiled by the authors Kaimuldinova et al., (2019) is used by 82.4% of teachers, the 10th-grade Geography textbook, published by the publishing house «Almatykitap», compiled by the authors Tulepbekova et al., (2019) is used by 17.6%.

Table 4. *The answers to the survey questions*

Do you often use modern technologies in geography lessons?			
		N	%
Valid	low importance	2	1,9
	average importance	26	24,1
	high importance	80	74

Note: n=108

From the answers to the survey of respondents, the quantitative statistics of teachers using modern technologies in geography lessons are evident. 2 teachers (1.9%) noted the low importance of modern technologies for geography lessons, and 26 teachers (24.1%) determined the average answer. The remaining 80 teachers (74%) noted that they often use modern technologies.

Table 5. *The answers to the survey questions*

How do you combine experimental work on the topic «types of Nature management» in a geography lesson?

		N	%
Valid	engage in scientific research	28	25,9
	laboratory work	8	7,4
	travel to nature	72	66,7

Note: n=108

Due to the relevance of the research topic, the organization of practical work by teachers on the topic «Types of Nature Use» was analyzed in the analysis of quantitative statistical information of survey responses. In this regard, 28 teachers (25.9%) indicate that they give directions to engage in scientific research, 8 teachers (7.4%) do laboratory work, and 72 teachers (66.7%) say that they achieve the goal of the lesson through nature trips.

In the course of the research, the main problems were encountered. «How do you draw students' attention to the topic of «Use of natural resources»?.» They answered the question as follows: «using video materials and photos, statistics; use of nature while raising environmental issues; through practical work, to make students understand that the place of nature is important for human life; videos; through visualization; using statistical data;

with visuals; through additional information, gamification, group work; according to the map; connecting the topic with the environment; explaining that it is not just something written in a book, but a process that is happening now; by connecting with life; I show the role of natural resources; by using simple life examples; by showing videos about resources and how to use them; conservation of natural resources, recycling, use of new technologies; learn and apply new methods of using natural resources; by asking problematic questions; through visuals; simple use of the importance of nature, the richness of that nature; If a person does not use natural resources sparingly, the future will not be important, so I draw attention to the sparing use of nature to keep the balance; I draw their attention by giving an example of its use in life; through a digital program;» and other variants are often encountered.

Respondents asked «What Internet resources, digital platforms, educational sites do you use in your lessons?» to the question they answered: *www.geoman.ru; www.globalforestwatch.org; geo-site.ru; word wall; planet earth; smart college, bilimland; google maps, seterra, Mozaik3d.com - 3D illustrations; Kahoot*

quizzes; NISLab, ChatGPT, Google Earth, Landsat; Natgeo, stat.gov.kz, Youtube; Gamma.ap, quiz, flipping, learning apps; visuals Twig-bilim, Wikipedia, Daryn.online, Pictochart.com; arcgis.com; Kundelik.kz»

In the teaching of the topics of the «Usage of Nature and Geoecology» department, which is the relevance of the research work, the importance of conventional signs presented in the sequence of tasks found in the geography textbook is shown individually. Based on the requirements of using each type of task and the importance of the student’s activities in achieving the lesson goals, the types of tasks found and not found on the topic were analyzed. In addition, efforts were planned to supplement the missing tasks with digital applications. In this regard, a survey was also received from the respondents related to this research problem. All types of tasks found in the 10th-grade Geography textbook are presented in the answer versions. What tasks (in the textbook) can be transformed by the system of digital platforms in teaching the topics of the «Usage of Nature and Geoecology» section?» A special graphic expression was made according to the answers to the question.

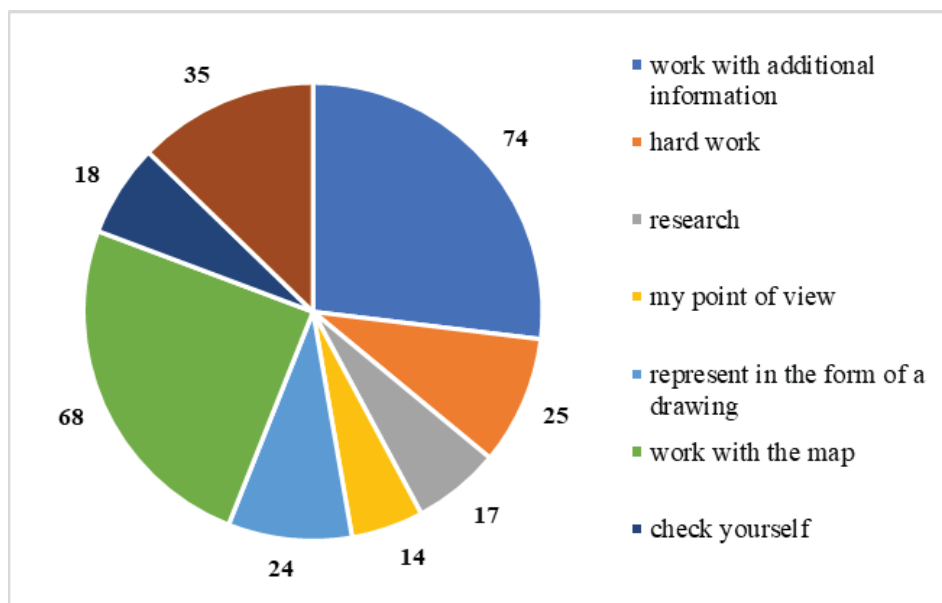


Figure 1: Indicator of multiple-choice responses to a survey question

The results are calculated by marking the answers to the survey question in Figure 1 as multiple-choice answers. The highest indicator

showed «working with maps» (68) and «working with additional information» (74). Therefore, it is concluded that the types and

methods of tasks in the two versions shown by a high indicated can be transformed with the help of digital resources. At the same time, «my point of view» (14), «research» (17), and «check yourself» (18) answers showed a relatively small value. However, a low score does not mean that it is not necessary to work within the given topic with digital resources,

looking at the identified answers. Due to the relevance of the research work, it is necessary to demonstrate the possibilities and effectiveness of using digital resources on the proposed topic. The survey questions asked about the problems encountered in teaching the topics of the «Usage of nature and geocology» section (Table 6).

Table 6. *The answers to the survey questions*

What are the problems in teaching the topics of the «Usage of Nature and Geocology» department?	N	%
other issues	4	3,7
low availability of resources	40	37,0
lack of time	19	17,6
lack of digital resource tools	45	41,7

Note: n=108

45 teachers (41.7%) stated that there is often a lack of digital resource tools when identifying the problems encountered in teaching the subjects of the «Usage of Nature and Geocology» department. In addition, 19 teachers (17.6%) proved that the problem of lack of time hinders the achievement of the learning goal on the proposed topic, while 40 teachers (37%) noted the lack of availability of educational resources. 4 teachers (3.7%) have identified that other problems occur. It is normal that many problems still occur in the education system. However, it would be possible to reduce the problems if attention was paid to the development of teaching methods and educational activities to find ways to solve the problems.

Results. In the 10th-grade geography textbook for the natural science-mathematics direction, the lesson topics and learning objectives of the «Usage of Nature and Geocology» section in the chapter «Usage of Nature» are: *Types of nature use* - 10.3.1.1. explain the need to use nature, identify types (from the economic point of view), and present them graphically; *Assessment of the impact of nature use on the environment* - 10.3.1.2. Determining and evaluating the environmental impact of the types of nature use (on the basis of the local, regional component); 10.3.1.3 Suggest ways to reduce the negative impact of nature use on the

environment (on the basis of the local, regional component); *Principles of efficient use of nature* - 10.3.1.4. Determination of the principles of efficient use of nature; 10.3.1.5. Development of proposals for increasing the efficiency of nature use (on the basis of the local, regional component). Concepts in topics: environment, resource supply, secondary nature, use of nature, geographical environment. The information in the textbook began with explanatory information on general terms. There are thought-provoking questions and interesting information in the texts.

The number of symbols containing the tasks given in the textbook is 8. All symbols describe the actions performed in their way. In addition, each conditional sign has its features and significance, depending on the complexity, number, level of information, and tasks presented. It is known that in the process of implementation, the student develops research, control, qualification, search abilities, and skills.

Each lesson offers a new stage. The reaction of teachers is caused by dynamic, constantly changing classroom situations (Maatta et al., 2021), and the fact that tasks are carried out in high-quality ways during the lesson brings positive results. *Figure 2 clearly shows attempts to use the help of digital resources to provide a new approach to the location of tasks that are not found on the topic in the research work.*

Educational materials play an important role in the formation of skills in general social studies. Educational material can be defined as a set of materials consisting of theory and practice. The teaching material consists of information data, and teaching approaches (Suryani et al.,2021). It is important to apply theoretical knowledge in practice, but tasks that develop skills in the process of mastering new lessons for students can also be performed using modern approaches. A suitable program for introducing processes in natural complexes: Mozaweb.com 3D technology platform. It is important to master the visual representation of the process of nature management. Wave power plants on the platform show the scheme of daily fluctuations in the water level for the production of electricity in the order of the natural process. The use of digital platforms is an important process in the modern education system. In current teaching, digital technologies are often used and digital technologies include applications that provide electronic capabilities.

With the help of the platform, the student can easily answer questions that develop logical

tasks and research abilities. In addition, the student's visual thinking will increase. The platform shows how the attempt to use the natural process of daily water fluctuations in obtaining electricity is fully realized. Entering the platform and working with resources is free. By registering with a personal email address, each student can easily and quickly enjoy the processes of any nature.

Given by Mozaweb.com, the start page of the 3D technology platform contains 3D views in all subject areas available to teachers and students. You can filter depending on the subject of study and depending on the subject area. In addition, an explanation of all natural processes is shown. After entering a special site, the mylearn button displays the personal data of the registered person, the directories they have worked with, and the statistics of their actions on the platform. Next in the «library» button is a collection of different exercises. For example, there are 3D scenes, tools and games (Figure 2), quizzes, video drawings and dictionaries, video clips, 3D encyclopedias, audio, digital lessons, books, and textbooks.

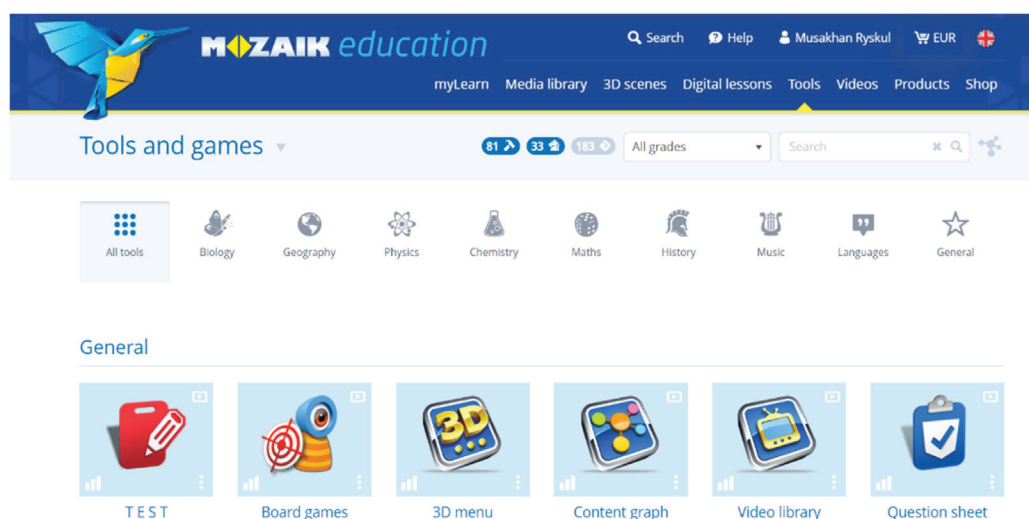


Figure 2: Toolbox and games window on the» Media library « button

By clicking on the next button «3D scenes», the student will be able to fully orient the object of study in the subject areas in 360°online 3D format. Develops visualization abilities, looking at the process of using a natural resource related to the topics of nature management and

management. The next Assistant button «Digital lessons» contains important information from one lesson in full, theoretical, and practical work. Therefore, the teacher can fully use this tool in the course of general classes. Some functions require paid registration. The «Tools»

button is used to use tools that are necessary in any part of the lesson. There are a bunch of methods that include entertainment tasks in all subjects. In addition, the platform's products button contains apps provided by the app company. For example, mozaweb, euler3D, mozaLog, marker, Euclid, and for students, the mozabook tablet, Laboratory camera, physics, Matek, and 3D encyclopedia applications will work. The conditional sign «practice work» in an unfulfilled task in our research problem, which has become relevant, can be implemented using the «Tools» button.

It is useful for the teacher to use the capabilities of the auxiliary buttons «Tools», «3D scenes» and «Digital lessons» to perform tasks indicating the symbol in the textbook called «Explore». Task actions «working with the map» can be viewed on the platform by subject areas and on the topic on the map of any object in The Shape of a Globe and cylinder. In the process of mastering a new lesson on the topic «Types of Nature Management», Mozaweb.com the 3D technology platform has many opportunities for updating tasks and teaching methods that require visualization of processes such as an overview of any natural objects of the Earth's surface, natural complexes and their interaction with humanity, efficient use and management of Natural Resources. The capabilities of this platform, which will be used in any section of the new lesson that will be conducted, are sufficiently covered within the entire discipline.

It is beneficial to use the learning process carried out in the education of digital resources, which is an indicator of achieving optimal learning outcomes.

Discussion. As a new stage in the development of mankind, the period of transition to digital resources has begun. In many areas of public life, including education, the main change is taking place. The issues of developing a methodology for the use of digital resources, principles, and rules of teaching in a digital environment, and revising optimal methods of digital learning in education also arise (Puniatmaja et al., 2024). In the process of practicing each statement, there can be no problems. However, the solution to the identified problems must be also corrected

in time. In the course of the experiment on the 3D technology platform of Mozaweb.com, along with effective points, obstacles were encountered. Effective points – registration is not difficult; convenient to use in the classroom; test, quiz and any other interactive task is created; visual memory; increase interest; assistant in carrying out research activities; Obstacles - a reliable internet source is required; only the first five lessons are free, after that there is a fee; It is inconvenient for individual and group lessons, but each student can register with his own page; a projector and an electronic board are mandatory.

It is easy to register on the 3D technology platform of Mozaweb.com. It is effective to use in the classroom. In individual, pair, and group work activities, it is difficult to navigate multiple objects that are not used by each student with their tool, because only five tests can be performed in the free version of the platform. It is mandatory to have a projector and an electronic board in the classroom. General Mozaweb.com the 3D technology platform develops students' visual memory, interest, as well as comprehensive search abilities and skills in performing research activities.

It has been compared to several studies in teaching environmental management and management activities. In the course of the analysis, it was concluded that the result of all nature management actions led to environmental, and global problems. The increase in the world's population leads to an endless increase in the demand for Natural Resources since the desire of a person to live comfortably prevails. This action entails an increase in production. In achieving a high level of industrial development, competition increases, the activities of which, in addition to the consequences for human health, pave the way for environmental destruction. This creates pollution problems that upset the balance of life and exacerbate the dangerous effects of global warming (Ali et al., 2023). In addressing environmental issues, many countries are conducting research and seeking solutions for preserving natural resources. However, a more sustainable approach involves educating people from a young age about the impact of

environmental problems and the importance of nature conservation. A prime example is Thailand's «Green Classroom Project», launched by the Electricity Generating Authority of Thailand in 1993. This program promotes environmental awareness by integrating comprehensive education across various subjects while enhancing students' communication skills. Focused on electricity and energy conservation, it fosters a culture of resource-saving among Thai youth. The project, which continues today, strengthens students' learning processes, self-concept, and teamwork through group-based research activities (Punatung, 2022).

The following similar studies examined approaches that taught the flora and fauna that are an important part of natural complexes and the importance of the natural reserves in which they live. The study emphasizes local biodiversity, incorporating it into educational programs at all grade levels. Natural science curricula include detailed information about the species and ecosystems within nearby nature reserves. Necessary permits were secured from both educational authorities and nature reserve administrations, allowing for the collection of comprehensive data and resources related to these protected areas. Research efforts were analyzed and evaluated to see how they could use the resources. In addition, attempts to turn flora and fauna into the main source of natural reserves and ways of its protection and conservation activities into educational material are identified. The methods used in this study are interviews, photo and video identification, and document analysis. As a result, studying the Wildlife Sanctuary as a teaching tool, proved that teaching the subject of natural science has great potential. Students learn in depth the concepts of natural complex, Living Things, ecosystems, flora and fauna, biodiversity, and evolution (Tupas, 2019).

In addition, several works on the process of teaching natural sciences with the help of digital resources were analyzed. For many people, digital transformation provides an excellent opportunity to keep up with the demands of this time, as digital transformation affects every part of human life, we find that it is important in many

areas of social science, including education. Therefore, the study examines the research carried out on digital transformation from an educational point of view, using data retrieval and analysis techniques. Digital transformation is not just a process in which we decorate the relevant ecosystem, rather, it is a change that involves strengthening and presenting the ecosystem with digital processes (Bozkurt & Sharma, 2022). In the next study, the methodology of teaching natural science according to the Kolb model showed that practical work prevails in the acquisition of theoretical knowledge. The materials of the work proved that it can be useful for obtaining theoretical and practical knowledge about the use of the Kolb model in the methodology of teaching Natural Sciences in the initial training of students, as well as for integrating this model into the initial training program of students (Mocinic et al., 2020). Consequently, most studies involve the consideration of all ways of practical implementation of theoretical knowledge in scientific works related to the use and management of nature. Practical work is easily mastered in any geographical lesson, compiled using digital resources by the results of our research.

Conclusion. The main aspects of modern education are didactic tools, teaching approaches, and digital resources. In addition to the formation of geographical knowledge, High School students should be guided by personal self-development and activity in society, given that they are future professionals. At the same time, as an element of natural complexes, it is important to create conditions for close contact with the environment and strong communication with other people in society, the development of environmental literacy. The main issues that became relevant in the research work were identified in the analysis of information and domestic and foreign works by the fifteenth goal of sustainable development. The main attention was paid to the provision of information on the training program of the 10th grade of Environmental Management and management activities.

In the study, an analysis of the given sequence of tasks in the textbook was carried out. As a result, comprehensive research was

carried out on the platform, which is performed using a digital resource as a complement to the tasks. The possibilities of the platform used in training have been identified. Several similar scientific papers were compared and the main attention was paid to the approaches and results of the study. The proposed platform can be used within the framework of any topics related to the subject of geography of the senior class and in higher educational institutions.

References

- Al-Labadi, L., & Sant, S. (2021). Enhance learning experience using technology in class. *JOTSE: Journal of Technology and Science Education*, 11(1), 44-52. <https://upcommons.upc.edu/handle/2117/345554>
- Ali, K., Kausar, N., & Amir, M. (2023). Impact of pollution prevention strategies on environment sustainability: role of environmental management accounting and environmental proactivity. *Environmental Science and Pollution Research*, 30(38), 88891-88904. <https://link.springer.com/article/10.1007/s11356-023-28724-1>
- Awewomom, J., Dzeble, F., Takyi, Y. D., Ashie, W. B., Ettey, E. N. Y. O., Afua, P. E., ... & Akoto, O. (2024). Addressing global environmental pollution using environmental control techniques: a focus on environmental policy and preventive environmental management. *Discover Environment*, 2(1), 8. <https://link.springer.com/article/10.1007/s44274-024-00033-5>
- Azevedo, A., & Almeida, A. H. (2021). Grasp the challenge of digital transition in SMEs-A training course geared towards decision-makers. *Education Sciences*, 11(4), 151. <https://www.mdpi.com/2227-7102/11/4/151>
- Bozkurt, A., & Sharma, R. C. (2022). Digital transformation and the way we (mis) interpret technology. *Asian Journal of Distance Education*, 17(1). <http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/630>
- Bueno, D. C. (2023). Empowering MAEd Students: The Impact of Faculty Mentorship on Research Skill Development. *Online Submission*, 4, 1-10. <https://eric.ed.gov/?id=ED631167>
- Cam, A. (2023). Examination of training on pre-service science teachers' views on socio-scientific issues and the nature of science. *Journal of Educational Research and Practice*, 13(1), 12. <https://scholarworks.waldenu.edu/jerap/vol13/iss1/12/>
- Chu, L., & Waite, C. (2023). Different Choices, Equal Chances: Helping High School Students Achieve Success on Their Terms. Case Studies in High School Redesign. *Center on Reinventing Public Education*. <https://eric.ed.gov/?id=ED626303>
- Dikmenli, M., Ozkan, V. K., Kilic, S., & Cardak, O. (2024). An Analysis of the Concept of Water in Secondary School Biology Textbooks. *Journal of Education in Science Environment and Health*, 10(1), 1-17. <https://dergipark.org.tr/en/pub/jeseh/article/1417888>
- Er, Z. (2023). Liquid-Volume Measurement Estimation Skills of Gifted Students and Suggestions for Saving Water. *International Journal on Social and Education Sciences*, 5(4), 833-846. <https://eric.ed.gov/?id=EJ1407422>
- Evseev, A. V. (2004). Theoretical aspects of nature. In: Geography, Society, and Environment. Volume 3 «Natural resources, their use and protection.» M. Ed. House Gorodets, 34-50.
- Fangqi, D., Irfan, M., & Baloch, Z. (2023). Revolutionizing quality performance through digitization, technology management, and environmental management: a cutting-edge PLS-SEM model analysis with organizational agility as mediator and culture as moderator. *Frontiers in Environmental Science*, 11, 1169145. <https://www.frontiersin.org/articles/10.3389/fenvs.2023.1169145/full>
- Gomez-Lanier, L. (2018). Building collaboration in the flipped classroom: A case study. *International Journal for the Scholarship of Teaching and Learning*, 12(2), 7. <https://eric.ed.gov/?id=EJ1186067>
- Iksan, Z. H., Basri, N. A., Noor, N. J. M., Rahim, F., Abdullah, W. N. W., Rambely, A. S., ... & Hanifah, S. A. (2020). Students' Reflection towards the Integration of Tawhidic Science in the "Pandang Alam" Camp. *Dinamika Ilmu*, 20(2), 343-356. https://journal.uinsi.ac.id/index.php/dinamika_ilmu/article/view/2549
- Keskin, C., Akcay, H., & Kapici, H. O. (2020). The Effects of Environmental Science e-Projects on Middle School Students' Behaviors and Attitudes. *International Journal of Technology in Education and Science*, 4(2), 160-167. <https://eric.ed.gov/?id=EJ1255547>
- Linhares, E., & Reis, P. (2023). Education for environmental citizenship and activism through the development of nature-based solutions with pre-service teachers. *JSSSE-Journal of Social Science Education*, 1-23. <https://repositorio.ipsantarem.pt/handle/10400.15/4647>
- Lytovchenko, I., Yamshynska, N., Kutsenok, N., & Filatova, V. (2021). Teaching Sustainability Online to University Students with the Use of Interactive Presentation Tools: A Case Study. *Advanced Education*, 17, 11-18. <https://eric.ed.gov/?id=EJ1305790>
- Määttä, O., McIntyre, N., Palomäki, J., Hannula, M. S., Scheinin, P., & Ithantola, P. (2021). Students in sight: Using mobile eye-tracking to investigate mathematics teachers' gaze behavior during task instruction-

giving. *Frontline Learning Research*, 9(4), 92-115. <https://researchportal.helsinki.fi/en/publications/students-in-sight-using-mobile-eye-tracking-to-investigate-mathem-2>

Masdarini, L., Candiasa, I. M., Agustini, K., & Sudatha, I. G. W. (2024). The Effect of Project-Based Learning and Self-Efficacy Towards Students' Entrepreneurial Readiness in Vocational High School. *Pegem Journal of Education and Instruction*, 14(2), 324-330. <https://eric.ed.gov/?id=EJ1420821>

Močinić, S., Tatković, N., & Tatković, S. (2020). The use of Kolb's model in science teaching methodology. *Propósitos y representaciones*, 8(2), 59. <https://dialnet.unirioja.es/servlet/articulo?codigo=8113537>

Mozaweb.com 3D technological platform URL: https://www.mozaweb.com/ru/lexikon.php?cmd=getlist&le t=3D&sid=FOL&book_content=&pg=5

Özerbaş, M. A. (2021). The Analysis of the Efficiency of Digital Education Platforms Based on Various Variables. *Participatory Educational Research*, 9(3), 383-402. <https://dergipark.org.tr/en/pub/per/article/999304>

Pinnelli, B. G., & Chrystall, F. H. (2023). Consequences of Contemplating on a Conference Session: Assessment Professional as Mediator: Nixing the Mystery and Myth and Supporting Narration. *Intersection: A Journal at the Intersection of Assessment and Learning*, 4(3). <https://aalhe.scholasticahq.com/article/87783.pdf>

Punatung, Y. (2022). *Developing a Green School Training Manual for high school students Pracharat Wittaya Serm School* (Doctoral dissertation, Mahasarakham University). <http://202.28.34.124/dspace/handle/123456789/1808>

Puniatmaja, G. A., Parwati, N. N., Tegeh, I. M., & Sudatha, I. G. W. (2024). The effect of e-learning and students' digital literacy towards their learning outcomes. *Pegem Journal of Education and Instruction*, 14(1), 348-356. <https://pegegog.net/index.php/pegegog/article/view/3101>

Ruiz-Ezquerro, A. (2021). Rolling Dice and Learning--Using Role-Playing Games as Pedagogy Tools. *Journal of Campus Activities Practice and Scholarship*, 3(2), 50-56. <https://eric.ed.gov/?id=EJ1330719>

Shiklomanov, I. A. (2000). Appraisal and assessment of world water resources. *Water International*, 25(1), 11-32. <https://www.tandfonline.com/doi/abs/10.1080/02508060008686794>

Statistical portal URL: <https://www.worldometers.info/>

Suryani, N., Sutimin, L. A., Abidin, N. F., & Akmal, A. (2021). The Effect of Digital Learning Material on Students' Social Skills in Social Studies Learning. *International Journal of Instruction*, 14(3), 417-432. <https://eric.ed.gov/?id=EJ1304708>

Sustainable development goals. URL: <https://kazstat.github.io/sdg-site-kazstat>

Tupas, F. P. (2019). Nature Feature: The Use of Local Biodiversity in Science Pedagogy. *African Educational Research Journal*, 7(3), 153-162. <https://eric.ed.gov/?id=EJ1228741>

Typical curriculum, internet resource. For grades 7-11 of basic secondary education. A typical curriculum for the subject «Geography» <https://adilet.zan.kz/kaz/docs/V1300008424>

Wani, A. K., Rahayu, F., Ben Amor, I., Quadir, M., Murianingrum, M., Parnidi, P., ... & Latifah, E. (2024). Environmental resilience through artificial intelligence: innovations in monitoring and management. *Environmental Science and Pollution Research*, 31(12), 18379-18395. <https://link.springer.com/article/10.1007/s11356-024-32404-z>

Zvorykin, K. V. (1993). Geographical concept of nature management. *Moscow University Bulletin. Geography*, 3, 3-15.

Avramenko A. A., Pitryuk A. V., Astaf'eva O. E. (2020) *Osnovy prirodopol'zovaniya* [Fundamentals of nature management]. Izdatel'stvo YUrajt, Moskva. [in Russian]

Vlasov, B. P. (1999). Hozyajstvennoe ispol'zovanie i antropogennye izmeneniya ozer Belarusi. [Economic use and anthropogenic changes in lakes of Belarus]. *Naturalne i antropogenne przemiany jezior. Warzshawa*, 277-284. [in Russian]

Dostaj, ZH. D., Gal'perin R.I., Davletgaliev S.K., Alimkulov S.A. (2012) *Prirodnye vody Kazakhstana: resursy, rezhim, kachestvo i prognoz*. [Natural waters of Kazakhstan: resources, regime, quality and forecast]. *Geografiya i vodnye resursy*, (4), 18-24. [in Russian]

Kaimuldinova K., Abdimanapov B., Äbilmäjinova S. (2020). *Geografia 11-synyp oqulyğy*, [Geography 11th grade textbook] jaratylystanu-matematikalyq bağyt, Mektep baspasy, Almaty [in Kazakh]

Kaimuldinova K., Äbilmäjinova S., Saipov A. (2019). *Geografia 10-synyp oqulyğy*, [Geography 10th grade textbook] qoğamdyq-gumanitarlyq bağyt, Mektep baspasy, Almaty [in Kazakh]

Kozlova, M.A. (2024). Osobennosti formirovaniya kachestva vody v bassejnah rek ural i tobol v predelah stepnoj zony. [Features of water quality formation in the Ural and Tobol river basins within the steppe zone]. *Stepi Severnoj Evrazii: materialy X mezhdunarodnogo simpoziuma*, (X), S. 574-582. [in Russian]

Medeu, A. R., Mal'kovskij, I. M., & Toleubaeva, L. S. (2016). Vodnaya bezopasnost'—global'naya problema XXI vek. [Water security is a global problem of the 21st century.]. *Geografiya i vodnye resursy*, (1), 3-13. [in Russian]

Musabaeva M., Abieva G. (2023) Analiz posledstviy prirodopol'zovaniya v bassejnah rek s pozicii sistemnogo podhoda (na primere reki Bol'shaya Bukpa). [Analysis of the consequences of nature management in river basins from the perspective of a systems approach (using the example of the Bolshaya Bukpa River)]. *Gidrometeorologiya i ekologiya*, (4), str. 29–42. <https://journal.kazgidromet.kz/index.php/kazgidro/article/view/980> [in Russian]

Mihajlov, V. N., & Dobrolyubov, S. A. (2017). *Gidrologiya* [Hydrology]. Izdatel'stvo Directmedia. Moskva [in Russian]

Tatarinov K.A., Orlova E.G. (2020) Modeli cifrovogo obucheniya [Digital learning models]. *Azimut nauchnyh issledovanij: pedagogika i psihologiya*, I (3 (32)), str. 204-207. [in Russian]

Tölepbekova S.Q., Amanjolov A.İ., Jylqaidarova A.M. (2019) *Geografia 10-synyp oqulyğy* [Geography 10th grade textbook]. jaratylystanu-matematikalyq bağyt, 1-bölim, «Almatıtap» baspasy, Almaty [in Kazakh]

Yasinskij S. V., Venicianov E. V., Vishnevskaya I. A. (2019). Diffuznoe zagryaznenie vodnyh ob'ektov i oценка vynosa biogennyh elementov pri razlichnyh scenariyah zemlepol'zovaniya na vodosbore [Diffuse pollution of water bodies and assessment of the removal of biogenic elements under different land use scenarios in the catchment area]. *Vodnye resursy*, 46(2), str. 232-244. [in Russian].

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G. IBRAGIMOV¹, A. MYNBAEVA¹, Q. SAPARBAYEVA^{1}*

*¹ South Kazakhstan Pedagogical University named after Ozbekali Zhanibekov,
(Shymkent, Kazakhstan)*

*Address of correspondence: Saparbayeva Qarlygash, NJSC South Kazakhstan Pedagogical University named after Ozbekali Zhanibekov, Baitursynov Str., 13, Shymkent, 160012, Republic of Kazakhstan, E-mail address: saparbayeva.karlygash@okmpu.kz / +7 702 762 4982

THE PSYCHO-PEDAGOGICAL ASPECTS OF TEACHING OF RHETORIC IN GRADES 8-9 OF A SECONDARY SCHOOL

Abstract

This research investigates the psycho-pedagogical aspects of teaching the art of rhetoric to adolescents in grades 8-9, focusing on students aged 13-16. Recognizing the unique developmental characteristics of this age group, the study aims to identify key criteria informed by psychological principles that can enhance instructional practices. Specifically, the research seeks to understand how factors such as the desire for independence, increased peer interactions, and the quest for identity influence the effectiveness of rhetoric education. By developing a comprehensive framework based on these characteristics, the study emphasizes the importance of adapting teaching methods to align with the cognitive and social needs of adolescents. To gather insights, a survey was administered to 54 students, equally divided between grades 8 and 9, using eight carefully crafted questions that reflect the identified criteria. The results will be analysed to determine the extent to which students' responses align with the proposed socio-psychological characteristics. This analysis aims to shed light on the significance of rhetoric education in promoting critical thinking, self-expression, and interpersonal skills among adolescents. Ultimately, the findings are expected to inform the development of elective courses that not only foster rhetorical abilities but also support students' overall personal and social growth, creating a more engaging and relevant educational experience.

Keywords: psycho-pedagogical aspects, adolescents, age characteristics, grades 8-9, the Art of Rhetoric.

Introduction. All subjects should be taught in accordance with the age of the students. The state mandatory standard of basic secondary education is also aimed at ensuring the gradual deepening of subject knowledge and skills by stages, considering pupils' age characteristics. The saying of sages: "Treat your son like your king until he is five years old, regard him as your servant until he is fifteen years old, and after fifteen years, consider him to be your friend"