

O. Amangeldi¹ *, K.D. Duisebaeva¹ , T. Kurt² 

¹Al-Farabi Kazakh National University, Almaty, Kazakhstan

²Gazi University, Ankara, Turkey

*e-mail: ozerke1990@gmail.com

PEDAGOGICAL TECHNOLOGIES OF TEACHING FIFTH AND SIXTH GRADE STUDENTS ECOLOGICAL CULTURE THROUGH THE LABORATORY WORK “SOCIOLOGICAL SURVEY “ME AND NATURE”

There are many experimental, laboratory, practical classes in natural science textbooks, which are taught to students of general education schools in the fifth and sixth grades. It is by teaching these lessons using effective pedagogical methods that it is possible to arouse students' interest in this subject. The article examines the use of laboratory work and sociological questionnaires as pedagogical technologies for teaching sixth grade students to ecological culture. The study aims to develop students' environmental awareness as well as their ability for sustainable behavior. The article presents the theoretical foundations of environmental culture, laboratory work and sociological surveys, as well as the practical implementation of the study. Students of the fifth and sixth grade of school-gymnasium No. 81 of Bostandyk District of Almaty took part in the research work. The study consisted of two parts. In the first part, students were divided into 3 groups, one took a questionnaire, the other answered, and the third processed and analyzed the answers. In the second part of the study, students took a survey of residents of the Koktem microdistrict of Bostandyk District of Almaty. Students, with the help of subject teacher, processed the answers, analyzed and built models. At the end of the laboratory lesson, feedback was received from students. 100% of the students answered that the lesson was “very interesting”. The results show that the use of laboratory work and sociological questionnaires is an effective way for students to form an environmental culture, as it allows them to actively engage and apply theoretical concepts in practice. The study ends with recommendations for further research and pedagogical practice.

Keywords: survey, natural Science subject, ecological culture, man and nature, laboratory lesson, analyzes, model construction, pedagogical methods.

О. Амангелди^{1*}, К.Д. Дуйсебаева¹, Т. Курт²

¹Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан

²Гази университеті, Анкара, Түркия

*e-mail: ozerke1990@gmail.com

«Мен және табиғат» әлеуметтік сауалнама» зертханалық жұмысы арқылы 5 және 6-сынып оқушыларын экологиялық мәдениетке оқытудың педагогикалық технологиялары

Жалпы білім беретін мектеп оқушыларына оқытылатын жаратылыстану оқулықтарында әртүрлі тәжірибелік, зертхана жұмыстарына арналған сабақтар және эксперимент жұмыстары қарастырылған. Оқулықта берілген тапсырмаларды педагогикалық әдіс-тәсілдерді қолданып, оқушылардың жаратылыстану пәніне қызығушылығын оятуға болады. Бұл жұмыста 6-шы сыныптың оқушыларына экологиялық мәдениетке оқытудың педагогикалық әдісі туралы жазылған, сондай-ақ зертханалық жұмысты әлеуметтану сауалнамаларын қолдану қарастырылған. Зерттеу жұмысы білім алушылардың экологиялық білімін және олардың экологиялық мінез-құлқын дамытуға арналған. Жұмыста жалпы экологиялық мәдениеттің теориясы, зертханалық сабақтар мен сауалнамалар, сонымен қатар тәжірибелік іске асуы туралы баяндалған. Эксперименттік сыныптар ретінде Алматы қаласы Бостандық ауданының №81 мектеп гимназия 5-ші және 6-шы сынып оқушылары қатысты. Тәжірибе жұмысының бірінші бөлімінде оқушылар 3 топқа бөлінді: 1-ші топ – сауалнама толтырумен айналысты; 2-ші топ – сауалнамаға жауап берді; ал 3-ші топ – жауаптарды талдап, қорытындысын шығарды. Екінші бөлімінде оқушылар №81 мектеп-гимназияның маңайында тұратын тұрғындардан, дәлірек айтқанда «Көктем ықшамауданы» тұрғындарынан, сауалнама алды. Зерттеудің 3-ші бөлімінде оқушылар мұғалімнің көмегімен сауалнама жауаптарын өңдеп, талдап, модельдер тұрғызды. Сабақтан кейін кері байланыс алынды. Зерттеуге қатысушы білім алушылар 100%-ы «өте жақсы» деген кері байланыс берген. Зерттеудің нәтижелері

зертханалық сабақтар мен сауалнамаларды талдау жұмыстары арқылы, оқушылардың экологиялық мәдениетті қалыптастырудың тиімді әдіс-тәсілдердің бірі екенін көрсетті. Сонымен қатар, бұл әдістер оқушыларды сабаққа белсен қатысып, теориялық тұжырымдарын өмірде қолданып, функционалдық ойлауларына көмектеседі. Мақала бұдан кейінгі зерттеулерге ұсыныстармен аяқталады.

Түйін сөздер: сауалнама, жаратылыстану пәні, экологиялық мәдениет, адам және табиғат, зертханалық сабақ, талдау, модель құру, педагогикалық әдістер.

О. Амангелди^{1*}, К.Д. Дуйсенбаева¹, Т. Курт²

¹Казахский национальный университет имени аль-Фараби, Алматы, Казахстан

²Университет Гази, г. Анкара, Турция

*e-mail: ozerke1990@gmail.com

**Педагогические технологии обучения экологической культуре учащихся
5-х и 6-х классов посредством лабораторной работы
«Социологический опрос «Я и природа»**

В учебниках естествознания есть много экспериментальных лабораторных, практических занятий, которые преподаются учащимся общеобразовательных школ в 5-м и 6-м классах. Именно проводя эти уроки с использованием эффективных педагогических методов, можно пробудить интерес учащихся к этому предмету. В статье рассматривается использование лабораторных работ и социологических опросников в качестве педагогических технологий для обучения экологической культуре учащихся 6-х классов. Исследование направлено на развитие экологической осведомленности учащихся, а также их способности к устойчивому поведению. В статье представлены теоретические основы экологической культуры лабораторные работы и социологические опросы, а также практическая реализация исследования. В исследовательской работе приняли участие учащиеся 5-го и 6-го классов школы-гимназии №81 Бостандыкского района Алматы. Исследование состояло из двух частей. В первой части студенты были разделены на 3 группы, одна заполняла анкету, а другая отвечала, а третья обрабатывала и анализировала ответы. Во второй части исследования ученики провели опрос жителей микрорайона Коктем Бостандыкского района Алматы. Учащиеся с помощью учителя-предметника обрабатывали ответы, анализировали и строили модели. В конце лабораторного занятия была получена обратная связь от школьников 100% учеников ответили, что лабораторное занятие было «очень интересным». Результаты показывают, что использование лабораторных работ и социологических опросников является эффективным способом формирования у учеников экологической культуры, поскольку позволяет им активно вовлекаться и применять теоретические концепции на практике. Исследование завершается рекомендациями по дальнейшим исследованиям и педагогической практике.

Ключевые слова: опрос, естественнонаучный предмет, экологическая культура, человек и природа, лабораторные занятия, анализ, построение модели, педагогические методы.

Introduction

In general education schools, natural science occupies a special place. This subject is taught at school from 1st to 6th grade. The roots of knowledge in Geography, Biology, Chemistry and Physics, studied by students from grade 7, are formed precisely in 6 years. Science in grades 5 and 6 includes topics on ecological culture. One of them is the laboratory work of the sociological survey “Man and nature”.

The generality of ecological accomplishment is a byzantine bone that extends to the focused gamut of mortal confederations with the ambient and permeates the exclusive individual building. It includes a alert, generalities that enjoy breathed continually deposit forward as self-dependent pretensions of environmental education. The target ambient defines

the being of the conception of “Environmental instruction (used in this case and further in a needle-like sense-as a purposeful pedagogical operation) (Kostsova, 2015: 51). The generality of ecological accomplishment becomes a problem of environmental instruction and schooling in the clearing of pedagogy. This requires the pedagogical problem to be considered, in accordance with its personal pedestal, a person as an integral part of nature, a subject of material and spiritual culture on earth, the development of the historical process. At the same time, due to the fact that the formation of an ecological culture of a person depends on its action in the system of local, regional, national, planetary environmental relations, it makes it necessary to use the tolls of folk pedagogy (Bektemisova, 2015:41).

In the study by D.U. Zakirov and J.K. Gulyamov “Excursion teaching methods for the develop-

ment of environmental education of schoolchildren in secondary schools” organized a scientific practice called “Chamomile” in the Tashkent region. To fulfill these tasks, a working group consisting of: Chirchik state pedagogical Institute of the Tashkent region has been created. Teachers of the Department of Biology “Natural Sciences”, students and undergraduates of the faculty, as well as employs of the garden center. As a result, he gained in-depth knowledge of natural science, including helping to develop the pedagogical experience of students of the Pedagogical Institute during the implementation of the project (Zakirov, 2020:37-44).

We have developed a program of teacher activities for environmental education of students in the classroom, extracurricular activities. The main attention is paid to the use of interactive methods and forms, the most effective of which are design and research activities, problem solving, experiment, excursion. The project activity was of a research and practice-oriented nature. Research results indicators of ecological education of schoolchildren rare species of flora and fauna, environmental problems of the native land, etc. He shows that his knowledge increased, expanded and significantly deepened.

Environmental thinking can be integrated into various subjects in schools to develop students’ critical thinking skills and promote sustainable behaviors (Orr, 1992). Environmental education should include an interdisciplinary approach, hands-on learning experiences, and opportunities for students to reflect on their actions and decisions (Stevenson, 2007). Teaching students about the interconnectedness of the environment and human systems can help foster a sense of environmental responsibility and empower them to take action (Sterling, 2001). In their article “Laboratory work as a means of motivating and activating students’ learning activities”, T.A. Shirshova and T.A. Poltava declaimed about laboratory classes “Laboratory composition as an education approach is constantly of a delving character and can be chalked up to the composition of forms that accelerate and amp educative and cognitive exercise. This isn’t casual, because in the course of their accomplishment, pupils are going partakers in the enlightening course and themselves build up new lore or centralize the developed science” (Shirshova, 2015. 199-201).

Kazakhstan has incorporated sustainable development education into its national curriculum, emphasizing the need for education on environmental

protection and resource management (Auelbecova et al., 2020).

An interdisciplinary approach to sustainable development education is recommended, involving multiple subjects and active learning methods (Koshim & Abisheva, 2021). The use of technology and digital resources can enhance student’s understanding and engagement in sustainable development education (Sokolova & Anuarova, 2021). Teacher training and professional development are crucial for successful implementation of sustainable development education in schools (Sarbasova & Kydyrova, 2021).

Community involvement and partnerships can help create a culture of sustainable development within schools and beyond (Nugumanova et al., 2021).

The assessment of sustainable development education should include both knowledge and skills, as well as students’ attitudes and behaviors towards sustainability (Moldasheva et al., 2021).

In Kazakhstan, the project-based learning approach is used to teach sustainable development education, allowing students to develop skills in critical thinking, problem-solving, and teamwork (Abisheva & Tleuova, 2021). The use of outdoor learning environments and experimental education can enhance students’ connection to nature and promote environmental attitudes and behaviors (Bolatkhan & Karibayeva, 2021). Eco-schools programs have been implemented in Kazakhstan, providing a framework for schools to engage in environmental management, education, and community involvement (Kosherbayeva & Nugumanova, 2019).

Collaborative learning activities, such as group projects and discussions, can facilitate knowledge-sharing and help students develop a sense of responsibility towards the environment (Moldashaeva & Abisheva, 2019).

Educating students about sustainable development is important because it can help them develop critical thinking skills and promote social and environmental responsibility (Chapman et al., 2019).

Sustainable development education can also contribute to the formation of a more sustainable society by fostering a culture of sustainability and encouraging positive behavior change (Buckler, 2019).

Teaching sustainable development in schools can help young people understand and address the challenges facing the world today, such as climate change, poverty, and social inequality (OECD, 2019).

Object of research: the research work was carried out in the 6th grades of the gymnasium school No. 81 of the Bostandyk district of Almaty. The laboratory work was related to the topic of the protection of sheet 6.3 of the section “Ecology and sustainable development” in the calendar-thematic discipline of natural science. The students were divided into 3 groups: the 1st group answered the questionnaire “Me and nature”, the 2nd group received a questionnaire from residents of the Koktem micro-district of the Bostandyk district of Almaty, and the 3rd group filled out an offer sheet for processing the questionnaire.

Literature review

The promotion of ecological literacy in schools can lead to more environmentally responsible behaviors and a better understanding of the interconnectedness of social, economic, and environmental systems (Orr, 1992). Teaching children about sustainability can empower them to make positive changes in their communities and contribute to a more sustainable future (Davies & Devine-Wright, 2014). By instilling values of environmental responsibility and sustainability in young people, schools can contribute to the creation of a more ecologically conscious society (McKenzie-Mohr & Smith, 1999). Educating students about sustainable practices, such as water conservation and recycling can help reduce waste and mitigate the impact of environmental disasters (Larsen, 2018). The incorporation of green spaces in urban areas can improve air quality, reduce urban heat island effects, and enhance the overall health and well-being of city residents (Louv, 2011). Ecological literacy can promote critical thinking and problem-solving skills, which are essential for addressing complex environmental challenges (Sauvé et al., 1996). Sustainable development learning be capable to support a feeling of accountability and compassion for other living creatures, and encourage ethical decision-making (Jucker & Mathar, 2015). Schools can play a crucial role in building a culture of sustainability by integrating sustainability principles and practices into the curriculum, as well as the physical design and operation of school buildings (UNESCO, 2014).

The former Minister of Education and Science of the Republic of Kazakhstan, Askhat Aimagambetov, addressed environmental education at an online conference on an open media platform on Facebook KUN.KZ, of education, of natural course, the issues of environmental education, environmental educa-

tion are relevant, so the head of state Kasym-Jomart Tokayev gave an assignment to introduce the subject of “Environmental education of children” in the school programme. Since the order was issued, work has begun. Other state bodies are also very actively involved in this work. Very good proposals are also coming from non-governmental organisations. This proves once again that this is a very topical issue (kaz.inform.kz). One should not underestimate the fact that such studies and the knowledge they provide make a student ecologically cultured, but for the sake of education a student must develop an attitude towards knowledge and education. This is the essence of teaching, the essence of the concept of modernising the system of geographical and environmental education (Abdrakhmanova, 2023)

Ecological culture involves dialectically inter-related elements: environmental education, environmental consciousness and environmental activity. Environmental education is the basis, the basis of adequate approach to environmental problems and includes socio-ecological and practical knowledges. Ecological activity includes activities related to the recognition, development, transformation and conservation of the natural environment. Ecological consciousness is considered as the highest level of mental manifestation of environmental natural and artificial environment, its inner world, reflection of the place and role of man in the biological, physical and chemical world (Kamenskaya, 2015). Ecological culture, first of all, is transferred to students with geographical knowledge and geographical culture.

Geographic culture entails a holistic understanding of biophysical reality when indigenous peoples make decisions about resource utilisation. However, there is no universal form of geographical knowledge, they are subjective and dependent on the local context. School geographic education has significant potential to transform “Environmental science” and decolonize institutions of education and environmental management (Duvall, 2020).

Pedagogical methods for the education of ecological culture in pupils at school include, among others:

- The use of interactive teaching methods, such as hands-on tasks and projects, to engage students and promote active learning (Nurishov, 2023);
- The implementation of an interdisciplinary and integrated approach to ecological education, including the use of modern technology and social media in teaching and learning (Nurishov, 2023) ;
- Emphasis on the axiological and cultural approaches to ecological education, which focus on

the development of ecological values, moral sentiments and a sense of responsibility towards nature (Sovhira & Dushechkina, 2018) ;

- The use of direct communication with nature, practical activities and artistic means to stimulate ecological awareness and balanced behaviour in pupils, especially those with special educational needs Melash, at al., 2022).

The promotion of professional development for teachers, the involvement of parents and the community, and the creation of a positive and supportive learning environment to enhance the effectiveness of ecological education (Nurishov, 2023).

In the work Robskih (2021) involves student research into the preparation of learners who are able to adapt quickly to changing conditions, apply environmental knowledge in practice, and actively master the learning material, all of which can be achieved through interdisciplinary subjects that contribute to the achievement of metacognitive outcomes, lessons, and experimentally confirm their high performance.

Ecological education – the formation of attitudes, views, beliefs and norms of behaviour that are charac-

terised by an emotional and moral, careful and responsible attitude towards nature. Ecological education is a continuous development of social consciousness of ecological type on the basis of strengthening, expansion and maintenance of interest in environmental problems in society. It is a process of dissemination of ecological knowledge and ecological information, improvement of ecological literacy of the population in the issues of ecological safety and protection of the environment (Abdrakhmanova, 2023). Based on the second point of view, the main goal of continuous environmental education is to form the environmental outlook of the public, legal positions, a set of scientific knowledge, the ability to translate knowledge into practice; to raise the level of culture of the individual and society as a whole, to improve the moral qualities of students.

Based on the works of Nurishov, D., (2023), Kurbatova, A., (2017), Shilova, V. S. (2015), Melash, V. D., & Varenychenko, A. B. (2020) and Aryabkina, I. (2021) at al, various scientists on pedagogical methods of teaching ecological culture to students at school, the following model was created by the authors (figure 1).

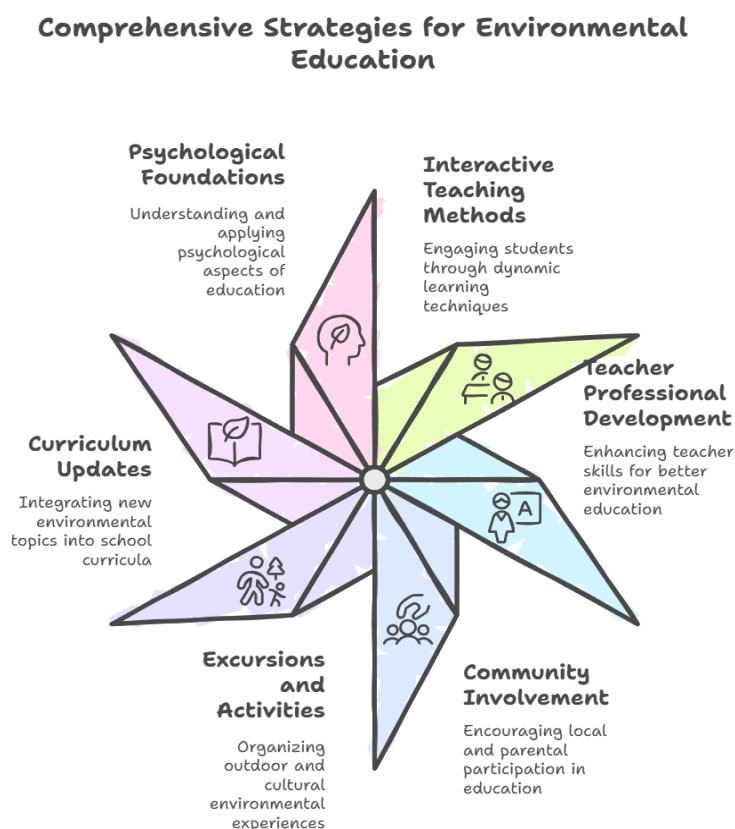


Figure 1 – Comprehensive Strategies for Environmental Education

Research methods and materials

Students of grades 5-6 of Gymnasium No. 81 took part in the research work. Since the participants were divided into 3 groups of participants, 3 different methods of dividing into groups were used. The first group used the respondent-interviewer method, the second group

used the survey method and the third group used the methods of analysis, design and modeling of conclusions. A total of 104 learners claimed role in the research.

Students can be taught environmental culture by interviewing and analysing other people using the formula of the following methods shown in the figures below:

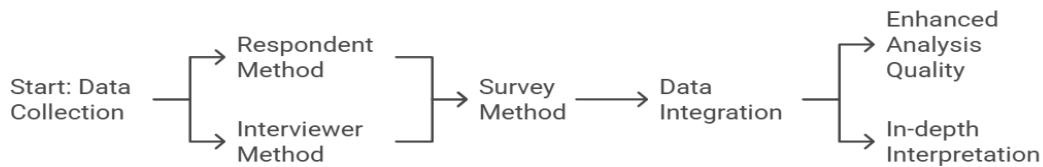


Figure 2 – Methodological formula for teaching ecoculture

The above formulas of the methods are as follows:

- The respondent-interviewer method can be used in science lessons to assess student understanding and improve the learning process (Berg, 2004);
- The survey method can be used in science lessons to collect data and gain insights into students' attitudes, beliefs, and knowledge about the topic being studied (Creswell, 2014):

- The analysis method can be used in science lessons when students build a model and analyze it to gain a deeper understanding of the underlying concepts (Gilbert & Boulter, 2000).

The design method contributes to the activation of students, that is, students and teachers in the formation of ecological culture. The formation of environmental knowledge and culture among school students can be carried out in such areas as shown in Figure 3 below (Sapanova & Kydyrova, 2021).

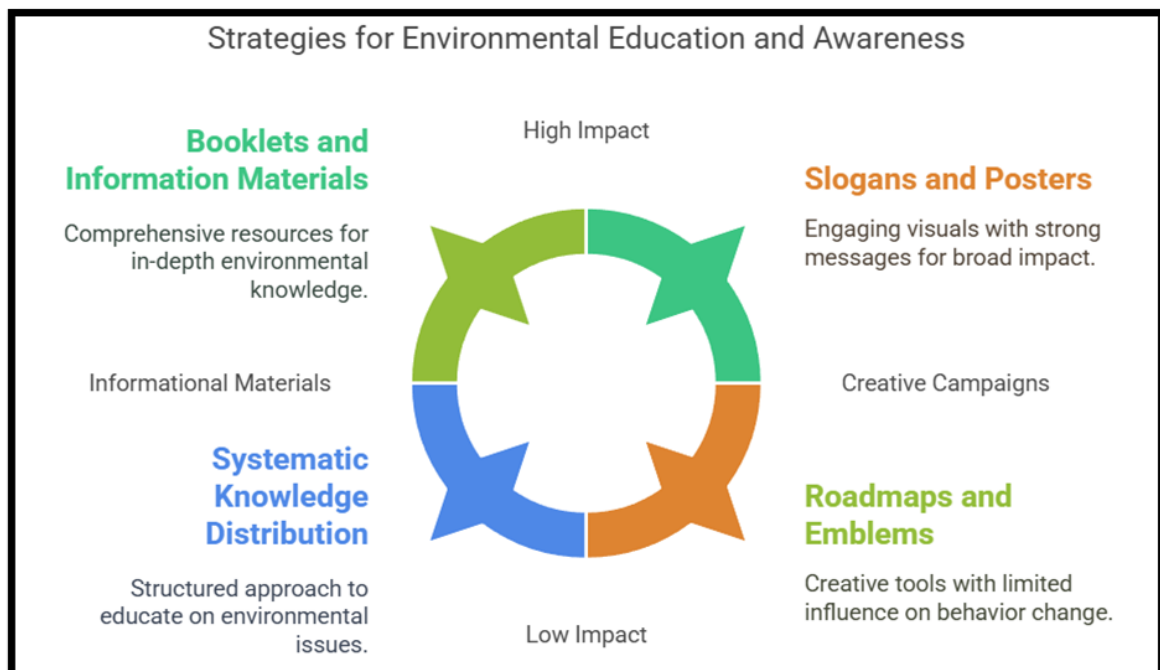


Figure 3 – Formation of environmental education and culture among schoolchildren

To divide the participants into 3 groups, the division into groups was used using the “mosaic” method within the group.

The questionnaire is presented on page 213 of natural science education for grades 6 (Abdimanapov et al, 2018. 2012-2014). Information about the data of the survey participants is presented in Table 1.

Before using the survey method, each student was provided with a survey sheet and other accessories. To ensure the safety of students on the street outside the school, auxiliary teachers were involved.

Table1 – Details of the participants

Participants	Details	
Age	12-18	
Gender	female	48
	male	56
Groups	1 st	30
	2 nd	36
	3 rd	38

The questionnaire consist of 15 questions, the respondent must answer on a scale of 1 to 5. The survey questions are shown in Table 2.

Table 2 – Survey “Me and nature” (Abdimanapov et al, 2018. 2012-214)

№	Questions	Respondents				
		1	2	3	4	5
1	What is your attitude to nature?	4	2	6	9	13
2	Can you distinguish the phenomena of habit from ordinary ones?	12	3	6	10	3
3	Are you constantly trying to preserve the beauty around you?	0	5	8	14	7
4	When you go to school, do you care about tab’s reflections surrounding your mirror?	10	1	5	2	16
5	Does your mood depend on nature?	5	4	2	4	19
6	Do you care about changing natural landscapes when you go to school or walk in the park?	3	0	4	5	22
7	Do you warn if your peers break a tree branch, pluck a flower and destroy a bird’s nest?	4	2	5	6	17
8	Do you like gardening?	1	6	2	11	14
9	When you read a book, do you carefully read descriptions of nature?	7	1	3	3	20
10	Do you like pictures with landscapes?	0	4	5	7	18
11	Do you know any pieces of music dedicated to nature?	3	6	3	8	16
12	Have you ever composed poems about nature?	7	2	4	5	16
13	How do you treat your pets?	0	2	6	9	17
14	Do you water indoor plants with water?	6	3	5	10	10
15	Do you like to draw nature, a tree, a flower or an animal?	0	4	2	5	23

The research was completed in 2 parts. 3 groups took part in the first part, 30 students of the 1st group were interviewed by 36 students of the 2nd group using the method of the respondent-interviewer. The remaining students of the 3rd group processed the results of 38 questionnaires. In the second part, 38 students of the second group interviewed residents of the Koktem microdistrict in Almaty. 66 students from the other two groups processed the survey results.

Thus, as a result of a survey of 38 students and residents of the Koktem microdistrict, the above

methods were applied and specific analyses and models were carried out with the help of a subject teacher. Questionnaires for the students were prepared by the teacher in advance and training was conducted in the school.

Results and discussion

Whereas before the experiment students only knew models, e.g. that a globe is a reduced model of the Earth, or that a map is a reduced model of the Earth on a flat surface, now they know that models

come in different forms, e.g. as a table or as a graph, and so on. Methods and approaches can be used to create geographic models in the form of diagrams and tables:

- Object-oriented geospatial models allow associating a specific subject value with primitive GIS elements like points, polylines and polygons;
- UML diagrams can be used to create and visualise geographic models, including the modelling of flows (environmental change, movement of people, materials or ideas) (Glennon, A., 2010).

The creation of geographic models in charts, diagrams and tables can thus be implemented using a variety of methods, including object-oriented data models, various diagrams and concept maps, depending on the specific tasks and requirements. This study presents an analysis of students' responses to a questionnaire taken from a science textbook de-

signed for Year 6 students. The questionnaire is designed to assess the level of students' understanding of key aspects of science and their relationship to the subject being studied. The questions in the questionnaire (shown in Table 2) were rated by the respondents on a scale of 1 to 5, where 1 is the minimum level of agreement and 5 is the maximum level of agreement.

Table 3 shows the number of students who chose one or the other rating for each question. The survey was carried out among 38 students, and the results obtained made it possible to identify certain trends in their perceptions of science courses. The results of the survey "Me and nature" of 38 students are presented in the table below. The students participating in the experiment, i.e. the interviewers, compiled the table themselves. As a result, they learned how to analyze research work.

Table 3 – Analysis of the questionnaire "Me and nature"

Question №	level of agreement				
	1 (minimum level)	2	3	4	5 (maximum level)
1	4	2	6	9	13
2	12	3	6	10	3
3	0	5	8	14	7
4	10	1	5	2	16
5	5	4	2	4	19
6	3	0	4	5	22
7	4	2	5	6	17
8	1	6	2	11	14
9	7	1	3	3	20
10	0	4	5	7	18
11	3	6	3	8	16
12	7	2	4	5	16
13	0	2	6	9	17
14	6	3	5	10	10
15	0	4	2	5	23
Average score	62	48	58	118	231

An analysis of the results of the "Me and nature" survey shows that the average score for all questions is 34, indicating a relatively high level of student awareness of the importance of nature in their lives.

The highest number of high scores (the answer is «5») were given to questions related to caring for nature and perceiving its beauty. For example, 19 respondents chose «5» for the question "Does

your mood depend on nature?" and 22 respondents chose «5» for the question "Is it important for you to change the natural landscape when you go to school or the park?" This suggests that most students are aware of the impact of the environment on their emotional state.

Interestingly, 20 respondents said that they carefully read descriptions of nature in books,

and 17 are prepared to warn their peers if they break a branch or destroy a bird's nest. At the same time, only 16 people responded positively when asked about their knowledge of musical works dedicated to nature, which may indicate a need to popularize nature themes in the arts among schoolchildren.

Thus, the results of the survey show that students show a high level of awareness and interest in nature, but some aspects need further attention in

the educational process. Using the information from Table 3.

In the second part of the study, 36 students analyzed the data, identified the gender and age of the respondents, and tabulated the results. In doing so, they learned to transform the information they heard into a structured model, which contributes to the development of analytical thinking and data systematization skills. The results can be seen in the following table.

Table 4 – Survey of students from residential district “Koktem”

Gender	Age	Number	Уровень вовлеченности (%)				
			1 (0-20%)	2 (20-40%)	3 (40-60%)	4 (60-80%)	5 (80-100%)
Female	18-30	119	13	24	10	36	36
	30-50	58	8	7	12	14	17
Male	18-30	63	4	8	11	22	18
	30-50	54	2	6	14	16	16
General		294	27	45	47	88	87

Analysis of the table shows that the highest levels of engagement (80-100%) were observed in 36 women aged 18-30 and 17 women aged 30-50. For men and women, this indicator was 18 and 16 respondents, respectively.

Overall, 87 respondents demonstrated a high level of engagement (80-100%), while 88 respondents demonstrated an average level of engagement (60-80%). The lowest level of engagement (0-20%) was reported by 27 respondents, indicating a possible need for further educational activities to increase the interest of this group.

Components of the Environmental Culture program in the American Education system:

- It is compulsory to clasp into chronicle the born, technological and colonial terrain, where the clothing includes fat, political, artistic and conscientious angels;

- The agenda should breathe coming-acquainted, establishing concern not only for moment's occupants of the Earth, but also for its coming denizens;

- The agenda is centered on regional, aboriginal, civil and adaptable cases;

- The agenda is lengthy-tenure, exploited by scholars in all educational arenas and at all echelons of reverie;

- The agenda should breathe interdisciplinary, clasping its content from all baronies – it is experi-

mentally accustomed, applying firsthand know-how where doable (Obidova, 2021. 251-256).

Conclusion

In conclusion, this study examined the utilization of laboratory work and sociological questionnaires as pedagogical technologies for teaching 6th-grade students about ecological culture. The research aimed to develop students' environmental awareness and foster sustainable behavior. The theoretical foundations of environmental culture, laboratory work, and sociological surveys were presented, followed by the practical implementation of the study involving students from school-gymnasium No. 81 in the Bostandyk District of Almaty.

The study consisted of two parts, where students were actively involved in questionnaire administration, data analysis, and model construction. Feedback received from the students indicated that the laboratory lesson was highly interesting, with a satisfaction rate of 100%. This demonstrates the effectiveness of utilizing laboratory work and sociological questionnaires as they provide students with opportunities to engage actively and apply theoretical concepts in practice.

The findings of this research propose that the use of laboratory lesson and sociological question-

naires positively contributes to the formation of students' environmental culture. Through hands-on activities and data analysis, students develop a deeper understanding of the relationship between humans and nature and gain practical skills for sustainable behavior. The active involvement of students in the process enhances their motivation and interest in the subject matter, leading to more effective learning outcomes.

Based on the results, it is recommended that educators continue to incorporate laboratory work and sociological questionnaires as pedagogical methods in teaching ecological culture. These methods not only create an engaging learning environment but also allow learners to create critical thinking, issue resolution, and analytical abilities. Additionally, educators should further explore and adapt these pedagogical technologies to address other aspects of environmental education and encourage sustainable practices among students.

Further research can focus on exploring the long-term impact of these pedagogical methods on students' environmental awareness and behavior beyond the immediate context of the study. Additionally, comparative studies can be conducted to analyze the effectiveness of different pedagogical methods in creating ecological culture among learners.

In summary, the combination of experimental work and sociological questionnaires demonstrates to be a successful approaches for promoting environmental culture in 6th-grade students. These pedagogical technologies provide an engaging and practical learning experience, facilitating students understanding of ecological concepts and fostering sustainable behavior. By continuing to utilize these methods, educators can contribute to the development of environmentally conscious individuals and pave the way for a more sustainable future.

References

1. Abisheva, G., & Tleuova, A. (2021). Project-based learning as a tool for sustainable development education in Kazakhstan. *European Journal of Contemporary Education*, 10(1), 177-184.
2. Aryabkina, I., Kudashova, T., Bulynin, A., Aliphanova, F., & Silantyeva, E. (2021, June 29). Cultural and aesthetic development of elementary school students in environmental education as a current pedagogical problem. *Revista Amazonia Investiga*, 41(5), 15. <http://doi.org/10.34069/ai/2021.41.05.15>
3. Auelbekova, A., Zhakupova, A., & Kalenova, M. (2020). Sustainable development education in Kazakhstan: Opportunities and challenges. *Journal of Cleaner Production*, 257, 120501. <http://doi.org/10.1016/j.jclepro.2020.120501>
4. Berg, B. L. (2004). *Qualitative research methods for the social sciences*. Allyn & Bacon.
5. Bolatkhan, A., & Karibayeva, D. (2021). The role of outdoor learning and experiential education in promoting sustainable development education in Kazakhstan. *European Journal of Sustainable Development*, 10(1), 214-226. <http://doi.org/10.14207/ejsd.2021.v10n1p214>
6. Buckler, C. (2019). The importance of education for sustainable development. In *Education for Sustainable Development* (pp. 7-18). Springer, Cham. http://doi.org/10.1007/978-3-030-22216-3_2
7. Chapman, D. W., Lujan, H. L., & Reinking, A. (2019). Sustainability and education: The importance of developing critical thinking skills. *Journal of Environmental Studies and Sciences*, 9(4), 509-517. <http://doi.org/10.1007/s13412-019-00576-z>
8. Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
9. Davies, N., & Devine-Wright, P. (2014). Enhancing learning and teaching for sustainable development: The role of university educators. *International Journal of Sustainability in Higher Education*, 15(2), 145-155. <http://doi.org/10.1108/IJSHE-01-2013-0001>
10. Duvall, C. S. (2020, November 29). Context matters. In *The Routledge Handbook of Indigenous Environmental Knowledge* (pp. 1-20). Routledge. <http://doi.org/10.4324/9781315270845-4>
11. Gilbert, J. K., & Boulter, C. J. (2000). *Developing models in science education*. Kluwer Academic.
12. Glennon, A. (2010, February). Creating and Validating Object-Oriented Geographic Data Models: Modeling Flow within GIS. *Transactions in GIS*. Wiley. <http://doi.org/10.1111/j.1467-9671.2009.01180.x>
13. Jucker, R., & Mathar, R. (2015). Education for sustainable development: An expert survey. *Journal of Cleaner Production*, 106, 27-36. <http://doi.org/10.1016/j.jclepro.2015.05.073>
14. Koshbayeva, G., & Nugumanova, L. (2019). Eco-schools as a tool for sustainable development education in Kazakhstan. *Journal of Teacher Education for Sustainability*, 21(2), 88-99. <http://doi.org/10.2478/jtes-2019-0013>
15. Koshim, A. S., & Abisheva, G. B. (2021). An interdisciplinary approach to teaching sustainable development in Kazakhstani schools. *Revista de la Educación Superior*, 50(1), 1-14. <http://doi.org/10.22201/iisue.24486167e.2021.50.21>
16. Larsen, K. (2018). Educating for sustainability: Perspectives and practices on water conservation and recycling in schools. *Journal of Environmental Education*, 49(4), 318-328. <http://doi.org/10.1080/00958964.2017.1417629>
17. Louv, R. (2011). *The nature principle: Human restoration and the end of nature-deficit disorder*. Algonquin Books.
18. McKenzie-Mohr, D., & Smith, W. F. (1999). Fostering sustainable behavior through community-based social marketing. *American Psychologist*, 54(5), 317-324. <http://doi.org/10.1037/0003-066X.54.5.317>

19. Moldasheva, A., & Abisheva, G. (2019). Collaborative learning in sustainable development education: A case study from Kazakhstan. *Journal of Cleaner Production*, 225, 353-361.
20. Moldasheva, A., Abisheva, G., & Kizatova, Z. (2021). Assessment of the sustainable development education in Kazakhstan: Issues and challenges. *European Journal of Contemporary Education*, 10(2), 363-370. <http://doi.org/10.13187/ejced.2021.2.363>
21. Nugumanova, L., Kosherbayeva, G., & Kozhanova, R. (2021). Community involvement in sustainable development education: A case study from Kazakhstan. *European Journal of Sustainable Development*, 10(2), 132-144. <http://doi.org/10.14207/ejsd.2021.v10n2p132>
22. OECD. (2019). *Teaching for Sustainable Development: A Policy Guide*. OECD Publishing. <http://doi.org/10.1787/cff5bd67-en>
23. Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. Albany: SUNY Press.
24. Sapanova, N. D., & Childibaev, D. B. (2021). Formation of ecological knowledge and culture of students on the basis of project activity. In Sarbasova M., Kydyrova N. *Teacher training and professional development for sustainable development education in Kazakhstan* (pp. 24-39). *Journal of Teacher Education for Sustainability*, 23(1). <http://doi.org/10.2478/jtes-2021-0002>
25. Sarbasova, M., & Kydyrova, N. (2021). Teacher training and professional development for sustainable development education in Kazakhstan. *Journal of Teacher Education for Sustainability*, 23(1), 24-39.
26. Sauvé, L., Desautels, S., & Michaud, G. (1996). *Environmental education: A response to the ecological crisis*. UNESCO.
27. Sokolova, M. V., & Anuarova, A. S. (2021). Digitalization of education as a factor of the development of sustainable development education in Kazakhstan. *European Journal of Contemporary Education*, 10(1), 274-280. <http://doi.org/10.13187/ejce.2021.1.274>
28. Sovhira, S., & Dushechkina, N. (2018). Methodological approaches to pupils' ecological culture education. *Journal of Landscape Ecology*. Walter de Gruyter GmbH. <http://doi.org/10.2478/jlecol-2018-0001>
29. Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Schumacher Briefings, Bristol: Green Books.
30. Stevenson, R. B. (2007). Schooling and environmental/sustainability education: From discourses of policy and practice to discourses of professional learning. *Environmental Education Research*, 13(2), 265-285. <http://doi.org/10.1080/13504620701285123>
31. UNESCO. (2014). *Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. UNESCO. <http://doi.org/10.18411/d-2020-130-en>
32. Абдрахманова, Г. М. (2023). Роль дополнительного образования в формировании экологической культуры и воспитании личности ребенка. В *Образование 2030. Учиться и действовать* (pp. 3-390). Неправительственный экологический фонд имени В.И. Вернадского.
33. Бектемісова, А. Ө. (2015). Бастауыш мектепте экологиялық мәдениетті қалыптастыру жолдары. *Манаш Қозыбаев атындағы Солтүстік Қазақстан мемлекеттік университетінің хабаршысы*, 2(27), 40-42.
34. Әбдіманапов, Б. Ш., Нүркенова, С. Е., Әбілғазиева, А. Ү., & Әуезова, А. Ү. (2018). Жаратылыстану. Жалпы білім беретін мектептің 6-сыныбына арналған оқулық. 214.
35. Закиров, Д. Ү., & Гулямов, Ж. Х. (2020). Жалпы білім беретін мектептерде оқушылардың экологиялық тәрбиесін дамыту бойынша экскурсиялық оқыту әдістемесі. *Science and Education*, 1, 37-44.
36. Казинформ. (2020). Экология. Пани 1: Қыркүйектен бастап жүйелі түрде басталады. https://kaz.inform.kz/news/ekologiya-pani-1-kyrkuyekten-bastap-zhuyeli-turde-bastalady-ashat-aymagambetov_a3684354/
37. Каменская, Е. Н. (2015). Экологическая культура и безопасность молодежи. *Инженерный вестник Дона*, 39(4-2), 31.
38. Косцова, С. А. (2015). Жобалау қызметі процесінде бастауыш сынып оқушыларының экологиялық мәдениетін қалыптастыру. *Ғылым, мәдениет, білім әлемі*, 3(52), 50-54.
39. Курбатова, А. С., & Горюнова, А. А. (2017). Экологическое образование учащихся начальной школы. *Начальное образование*, 6, 14-18. https://doi.org/10.12737/article_5a33d7bd437f04.83569706
40. Мелаш, В. Д., & Варениченко, А. Б. (2020, December 31). Теоретико-методическое обеспечение подготовки будущих учителей новой украинской начальной школы к формированию экологической культуры. *Журнал Житомирского государственного университета имени Ивана Франко*, 4(103), 96-108. [http://doi.org/10.35433/pedagogy.4\(103\).2020.96-108](http://doi.org/10.35433/pedagogy.4(103).2020.96-108)
41. Нуришов, Д. (2023). Педагогические условия воспитания экологической культуры у старшекласников. *Общество и инновации*, 4(3), 73-79. <https://doi.org/10.47689/2181-1415-vol4-iss3-pp73-79>
42. Обидова, Г. (2021). Развитие экологической культуры в образовательных моделях развитых стран мира. *Общество и инновации*, 10(S), 251-256. <https://doi.org/10.47689/2181-1415-vol2-iss10/S-pp251-256>
43. Робских, Е. А., Макарова, О. Б., & Галкина, Е. А. (2021). Методика реализации междисциплинарного предмета «Экология» в 5-9-х классах общеобразовательной школы. *Вестник Красноярского государственного педагогического университета им. В.П. Астафьева*, 2 (56)) 63-71.
44. Шилова, В. С., & Белгородский государственный национальный исследовательский университет. (2015). Методы социально-экологического воспитания студентов. Серия "Педагогика и психология образования". Белгородский Национальный Исследовательский Университет. <http://doi.org/10.18413/2313-8971-2015-1-4-29-32>
45. Ширшова, Т. А., & Полякова, Т. А. (2015). Лабораторные работы как средство стимулирования и активизации учебной деятельности учащихся. *Омский научный вестник*, 4(141), 198-201.

Әдебиеттер

- Äbdımanapov, B. Ş., Nürkenova, S. E., Äbilgäzieva, A. Ü., & Äuezova, A. Ü. (2018). Jaratylystanu. Jalpy bilim beretin mekteptiń 6-synybyna arnalǵan oqulyq [Natural science. Textbook for grade 6 of general education schools]. 214. (in Kazakh)
- Abdrahmanova, G. M. (2023). Rol' dopolnitel'nogo obrazovaniya v formirovaniy jekologicheskoy kul'tury i vospitaniy lichnosti rebenka [The role of additional education in forming ecological culture and educating the child's personality]. In *Obrazovanie 2030. Uchitsya i deystvovat'* [Education 2030. Learn and Act] (pp. 3-390). Nepravitel'stvennyy jekologicheskij fond imeni VI Vernadskogo. (in Russian)
- Abisheva, G., & Tleuova, A. (2021). Project-based learning as a tool for sustainable development education in Kazakhstan. *European Journal of Contemporary Education*, 10(1), 177-184.
- Aryabkina, I., Kudashova, T., Bulynin, A., Aliphanova, F., & Silantyeva, E. (2021, June 29). Cultural and aesthetic development of elementary school students in environmental education as a current pedagogical problem. *Revista Amazonia Investiga*, 41(5), 15. <http://doi.org/10.34069/ai/2021.41.05.15>
- Auelbekova, A., Zhakupova, A., & Kalenova, M. (2020). Sustainable development education in Kazakhstan: Opportunities and challenges. *Journal of Cleaner Production*, 257, 120501. <http://doi.org/10.1016/j.jclepro.2020.120501>
- Bektemisova, A. Ö. (2015). Bastauys mektepte ekologialyq mädenietti qalyptastyru joldary [Ways to form ecological culture in primary school]. *Manash Kozybaev atyndaǵy Soltüstik Qazaqstan memleketik universitetiniń habarşysy* [Bulletin of Manash Kozybaev North Kazakhstan State University], 2(27), 40-42. (in Kazakh)
- Berg, B. L. (2004). Qualitative research methods for the social sciences. Allyn & Bacon.
- Bolatkhana, A., & Karibayeva, D. (2021). The role of outdoor learning and experiential education in promoting sustainable development education in Kazakhstan. *European Journal of Sustainable Development*, 10(1), 214-226. <http://doi.org/10.14207/ejsd.2021.v10n1p214>
- Buckler, C. (2019). The importance of education for sustainable development. In *Education for Sustainable Development* (pp. 7-18). Springer, Cham. http://doi.org/10.1007/978-3-030-22216-3_2
- Chapman, D. W., Lujan, H. L., & Reinking, A. (2019). Sustainability and education: The importance of developing critical thinking skills. *Journal of Environmental Studies and Sciences*, 9(4), 509-517. <http://doi.org/10.1007/s13412-019-00576-z>
- Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.
- Davies, N., & Devine-Wright, P. (2014). Enhancing learning and teaching for sustainable development: The role of university educators. *International Journal of Sustainability in Higher Education*, 15(2), 145-155. <http://doi.org/10.1108/IJSHE-01-2013-0001>
- Duvall, C. S. (2020, November 29). Context matters. In *The Routledge Handbook of Indigenous Environmental Knowledge* (pp. 1-20). Routledge. <http://doi.org/10.4324/9781315270845-4>
- Gilbert, J. K., & Boulter, C. J. (2000). Developing models in science education. Kluwer Academic.
- Glennon, A. (2010, February). Creating and Validating Object-Oriented Geographic Data Models: Modeling Flow within GIS. *Transactions in GIS*. Wiley. <http://doi.org/10.1111/j.1467-9671.2009.01180.x>
- Jucker, R., & Mathar, R. (2015). Education for sustainable development: An expert survey. *Journal of Cleaner Production*, 106, 27-36. <http://doi.org/10.1016/j.jclepro.2015.05.073>
- Kamenskaja, E. N. (2015). Jekologicheskaja kul'tura i bezopasnost' molodezhi [Ecological culture and youth safety]. *Inzhenernyj vestnik Dona* [Engineering Bulletin of Don], 39(4-2), 31. (in Russian)
- Kazinform. (2020). Jekologija. Pani 1: Kyrkyjekten bastap zhyjeli tyrde bastalady [Ecology. Part 1: Systematic implementation begins in September]. https://kaz.inform.kz/news/ekologiya-pani-1-kyrkuyekten-bastap-zhuyeli-turde-bastalady-ashat-aymagambetov_a3684354/ (in Kazakh)
- Kosherbayeva, G., & Nugumanova, L. (2019). Eco-schools as a tool for sustainable development education in Kazakhstan. *Journal of Teacher Education for Sustainability*, 21(2), 88-99. <http://doi.org/10.2478/jtes-2019-0013>
- Koshim, A. S., & Abisheva, G. B. (2021). An interdisciplinary approach to teaching sustainable development in Kazakhstani schools. *Revista de la Educación Superior*, 50(1), 1-14. <http://doi.org/10.22201/issue.24486167e.2021.50.21>
- Kosova, S. A. (2015). Jobalau qyzmeti prosesinde bastauys synyp oquşylarynyń ekologialyq mädenietyń qalyptastyru [Formation of ecological culture of primary school students in the design process]. *Ğylym, mädeniet, bilim älemi* [Science, Culture, and Education World], 3(52), 50-54. (in Kazakh)
- Larsen, K. (2018). Educating for sustainability: Perspectives and practices on water conservation and recycling in schools. *Journal of Environmental Education*, 49(4), 318-328. <http://doi.org/10.1080/00958964.2017.1417629>
- Louv, R. (2011). The nature principle: Human restoration and the end of nature-deficit disorder. Algonquin Books.
- McKenzie-Mohr, D., & Smith, W. F. (1999). Fostering sustainable behavior through community-based social marketing. *American Psychologist*, 54(5), 317-324. <http://doi.org/10.1037/0003-066X.54.5.317>
- Moldasheva, A., & Abisheva, G. (2019). Collaborative learning in sustainable development education: A case study from Kazakhstan. *Journal of Cleaner Production*, 225, 353-361.
- Moldasheva, A., Abisheva, G., & Kizatova, Z. (2021). Assessment of the sustainable development education in Kazakhstan: Issues and challenges. *European Journal of Contemporary Education*, 10(2), 363-370. <http://doi.org/10.13187/ejced.2021.2.363>
- Nugumanova, L., Kosherbayeva, G., & Kozhanova, R. (2021). Community involvement in sustainable development education: A case study from Kazakhstan. *European Journal of Sustainable Development*, 10(2), 132-144. <http://doi.org/10.14207/ejsd.2021.v10n2p132>
- OECD. (2019). Teaching for Sustainable Development: A Policy Guide. OECD Publishing. <http://doi.org/10.1787/cff5bd67-en>
- Orr, D. W. (1992). Ecological literacy: Education and the transition to a postmodern world. Albany: SUNY Press.

Sapanova, N. D., & Childibaev, D. B. (2021). Formation of ecological knowledge and culture of students on the basis of project activity. In Sarbasova M., Kydyrova N. Teacher training and professional development for sustainable development education in Kazakhstan (pp. 24-39). Journal of Teacher Education for Sustainability, 23(1). <http://doi.org/10.2478/jtes-2021-0002>

Sarbasova, M., & Kydyrova, N. (2021). Teacher training and professional development for sustainable development education in Kazakhstan. Journal of Teacher Education for Sustainability, 23(1), 24-39.

Sauvé, L., Desautels, S., & Michaud, G. (1996). Environmental education: A response to the ecological crisis. UNESCO.

Sokolova, M. V., & Anuarova, A. S. (2021). Digitalization of education as a factor of the development of sustainable development education in Kazakhstan. European Journal of Contemporary Education, 10(1), 274-280. <http://doi.org/10.13187/ejce.2021.1.274>

Sovhira, S., & Dushechkina, N. (2018). Methodological approaches to pupils' ecological culture education. Journal of Landscape Ecology. Walter de Gruyter GmbH. <http://doi.org/10.2478/jlecol-2018-0001>

Sterling, S. (2001). Sustainable education: Re-visioning learning and change. Schumacher Briefings, Bristol: Green Books.

Stevenson, R. B. (2007). Schooling and environmental/sustainability education: From discourses of policy and practice to discourses of professional learning. Environmental Education Research, 13(2), 265-285. <http://doi.org/10.1080/13504620701285123>

UNESCO. (2014). Roadmap for Implementing the Global Action Programme on Education for Sustainable Development. UNESCO. <http://doi.org/10.18411/d-2020-130-en>

Zakirov, D. U., & Gulamov, J. H. (2020). Jalpy bilim беретін мектептерде оқушылардың экологиялық тәрбиесін дамыту бойынша экскурсиялық оқыту әдістемесі [Excursion teaching methodology for the development of ecological education in general education schools]. Science and Education, 1, 37-44. (in Kazakh)

Авторлар туралы мәлімет:

Амангелди Озерке (корреспондент автор) – «8D01503 – География» (география мұғалімдерін дайындау) білім беру бағдарламасының докторанты, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, эл.пошта: ozerke1990@gmail.com)

Дүйсебаева Кульзада Джумабековна – г.г.к., география, жерге орналастыру және табиғатты пайдалану кафедрасының қауымдастырылған профессоры, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, эл.пошта: kulzada.duisebayeva@gmail.com)

Туркер Курт – PhD, Білім Беру Факультетінің қауымдастырылған профессоры, Гази университеті (Анкара қ., Түркия, эл.пошта: turker@gazi.edu.tr)

Сведения об авторах:

Амангелди Озерке (корреспондент автор) – докторант образовательной программы «8D01503 – География» (подготовка учителей географии), Казахский национальный университет им. Аль-Фараби (г. Алматы, Казахстан, эл.почта: ozerke1990@gmail.com)

Дүйсебаева Кульзада Джумабековна – к.г.н., ассоциированный профессор кафедры географии, землеустройства и природопользования, Казахский Национальный университет им.Аль-Фараби (г. Алматы, Казахстан, эл.почта: kulzada.duisebayeva@gmail.com)

Туркер Курт – PhD, ассоциированный профессор факультета образования, Университет Гази (г. Анкара, Турция, эл.почта: turker@gazi.edu.tr)

Information about authors:

Amangeldi Ozerke (corresponding author) – doctoral student of the educational programme «8D01503 – Geography» (training of geography teachers), Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: ozerke1990@gmail.com)

Duisebayeva Kulzada Dzhumabekovna – Candidate of Geographical Sciences, Associate Professor, Department of Geography, Land Management and Nature Management, Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: kulzada.duisebayeva@gmail.com)

Turker Kurt – PhD, Associate Professor, Faculty of Education, Gazi University (Ankara, Turkey, e-mail: turker@gazi.edu.tr).

Received 28.10.2024

Accepted 01.03.2025