IRSTI 14.25.19
https://doi.org/10.53939/1560-5655_2025_3_143

Amantayeva A.K.[1], Seilkhan A.[1], Childibayev Zh.B.[1], Aksoy A.[2]

[1]Abai Kazakh National Pedagogical University, Almaty c., Kazakhstan
[2]Akdeniz University, Antalya c., Turkey

«GREEN SCHOOL» AS AN EFFECTIVE TOOL FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

Abstract. The concept of sustainable development has become one of the key and pressing issues of modern society. In particular, the interrelation between sustainable development and environmental culture is of special significance in the education system. In this regard, green schools play an important role in fostering environmental culture. Furthermore, the experience of green schools represents a significant step toward active participation in addressing environmental issues, developing nature conservation skills, and implementing sustainable development goals. This article explores the interconnection between sustainable development and environmental culture, analyzing the significance and role of green schools within the system of environmental education. Green schools act as a crucial factor in the implementation of sustainable development principles, as they foster environmental awareness, instill a sense of ecological responsibility, and encourage nature conservation. Within the framework of achieving sustainable development goals, a survey was conducted to introduce an elective course aimed at maintaining the balance between nature and ecosystems, enhancing ecological literacy, and engaging students in environmental protection activities. The content of this course is presented in the article.
Keywords: sustainable development, environmental education, environmental culture, ecological thinking, green school, teaching method, biodiversity conservation.

Introduction. The severity of the current environmental crisis, closely associated with adverse economic and social phenomena and driven by globalization processes, became evident in the late 20th century. This recognition led the global community to realize the need for joint international efforts to prevent global catastrophes, curb the deepening of crisis processes, and develop fundamental solutions for transformative change. Critical challenges emerged, including preventing future global crises and ensuring the economic, social, and cultural development of society within the ecological capacity of the biosphere.

In this context, the “Clean Kazakhstan” Concept for 2024-2029, aimed at developing the ecological culture of the Republic of Kazakhstan, provides a comprehensive approach to fostering environmental awareness (Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, 2024) [1]. This approach involves diverse methods and strategies, including environmental education, upbringing, literacy, eco-socialization, and self-directed learning, tailored to various social groups.

The Concept outlines key areas of activity, such as:

- promoting ecological thinking and behavior, including measures to encourage environmentally responsible practices;
- strengthening environmental education;
- enhancing environmental literacy and disseminating it through public information campaigns [2].

The development of ecological thinking and responsible behavior is determined by factors such as awareness of the environment’s value, a sense of responsibility for nature conservation, sustainable consumption habits, and a heightened understanding of ecological issues (Smith, 2023).

The formation of ecological culture includes the following core components:

- environmental literacy and willingness to adapt behavior;
- conscious consumption and waste-sorting practices;
- efficient use of energy and water resources;
- sustainable mobility habits;
- environmentally responsible business conduct;
- decision-making in government institutions that considers environmental impact;
- participation in environmental campaigns, including afforestation initiatives;
- incentives to promote and sustain environmentally responsible behavior.

The environmental education, upbringing, eco-socialization, and self-education strategies presented in the Concept align with the core principles of the green school model. Green schools are designed as eco-friendly, energy-efficient spaces that implement environmental projects and actively engage students and teachers in solving ecological problems. By fostering ecological culture and embedding sustainable development principles, these schools contribute to preparing future genera-

tions to protect nature and support the long-term sustainable development of society.

The aim of this article is to analyze the effectiveness of educational activities aimed at fostering environmental awareness, conserving biodiversity, and implementing the principles of sustainable development among students. Furthermore, it seeks to identify ways of enhancing young people's sense of responsibility towards nature through school-based environmental projects, research competitions, and tree-planting campaigns, as well as to define their role in environmental protection.

Research methods. There is a close interconnection between the "Clean Kazakhstan" Concept and the principles of green schools and sustainable development. A green school is an educational institution designed to foster ecological culture, where environmental issues and sustainable development principles are integrated as fundamental components of the learning process. Sustainable development implies a long-term societal pathway that maintains a balance between environmental, social, and economic aspects [3]. Thus, the "Clean Kazakhstan" Concept provides an integrated approach to developing ecological culture through green schools and implementing sustainable development principles.

In recent years, the green school initiative has become widespread in Kazakhstan, with several schools introducing ecological education and sustainable development principles. Green schools are characterized by eco-friendly environments, energy-saving practices, efficient resource use, and fostering a sense of environmental responsibility.

The establishment of green schools in Kazakhstan is guided by several key principles:

1. Energy conservation and efficient resource use – Green schools incorporate energy-efficient technologies, such as wind generators, solar panels, water-saving systems, and energy-efficient building designs, to optimize natural resource use.

2. Environmental protection and ecological projects – These schools engage students in environmental activities, including tree planting, waste recycling, and water and energy conservation measures, thereby fostering ecological culture and responsible behavior.

3. Environmental education – Green schools prioritize teaching students about ecology, sustainable development, climate change, and natural resource protection as core components of the curriculum.

Currently, the number of green schools in Kazakhstan is growing. Initiatives have been implemented in cities such as Almaty, Astana (Nur-Sul-

tan), Shymkent, and Kyzylorda, as well as in several regional schools [4].

Today, sustainable development represents a multidisciplinary issue encompassing philosophical, ecological, socio-political, economic, and technical dimensions. According to international research, the concept of sustainable development comprises 57 definitions, 19 principles, 12 criteria, 4 conceptual frameworks, 9 strategies, and a list of 28 indicators [5].

The Sustainable Development Goals (SDGs) represent a global strategy adopted by the United Nations in 2015, outlining 17 goals and 169 targets to be achieved by 2030. These goals provide a common development agenda for all countries and aim to ensure equal opportunities for all by respecting human rights, promoting social equity, ensuring economic stability, and protecting the environment [6].

The core ideas of sustainable development include:

• integrating three main dimensions of human thinking, worldview, and activity: economic, social, and environmental;

• acknowledging the interconnection and interdependence of these aspects, including:

a) environmental goals – preserving the integrity of natural ecosystems and improving environmental quality;

b) economic goals – ensuring economic growth and development;

c) social goals – improving living conditions, ensuring social justice, maintaining cultural identity, and enhancing quality of life;

• recognizing the primacy of natural laws. As Austrian philosopher Karl Popper noted, “Since the laws of nature remain unchanged, they cannot be violated or abolished.” Ignoring ecological laws inevitably leads to environmental crises;

• highlighting the leading role of culture – including science, education, and polyethnic traditions – in harmonizing human-nature relations;

• fostering ecological and project-oriented culture, emphasizing foresight, precaution, and “soft governance”;

• preserving natural and cultural heritage as a prerequisite for humanity’s survival;

• ensuring ecological safety across all types and spheres of human activity;

• taking into account national characteristics in implementing sustainable development strategies.

Results and Discussion. The implementation of sustainable development concepts relies on a range of mechanisms, including a system of treaty relations and obligations that facilitate the integrated realization

of existing and emerging programs and agreements between nations; advancements in science and innovative technologies; the promotion of a “Green Economy”; equitable distribution of benefits derived from natural resource utilization at both national and international levels; and the enhancement of environmental management based on the principle of “anticipation and prevention” rather than “reaction and correction”. Additionally, it requires the establishment of a state environmental assessment framework (ensuring mandatory public participation) that incorporates evaluation of potential ecological impacts of projects; strengthening of self-governance practices; and continuous improvement of environmental legislation to safeguard natural and cultural diversity, expand wildlife areas, and ensure long-term ecological stability [7, 8, 9]. A pivotal element in achieving sustainable development goals is the formation of a culture of sustainability through targeted education – Education for Sustainable Development (ESD). As N.N. Moiseev aptly noted: “At present, not only the future of civilization but also the survival of humanity on Earth depends upon the educator” [10].

The Sustainable Development Concept places particular emphasis on the following:

Goal 12 – Responsible Consumption and Production: promoting efficient resource use and minimizing waste;

Goal 13 – Climate Action: addressing climate change and adapting to its impacts;

Goal 14 – Life Below Water: safeguarding oceans, seas, and marine ecosystems;

Goal 15 – Life on Land: conserving terrestrial ecosystems, protecting forests, and preventing desertification.

These objectives are explicitly incorporated into the updated Biology curriculum for Grade 7 students, which highlights the following learning targets:

7.3.2.1 – Characterize the interactions between humans and ecosystems;

7.3.2.2 – Provide examples of human activities with negative ecological impacts;

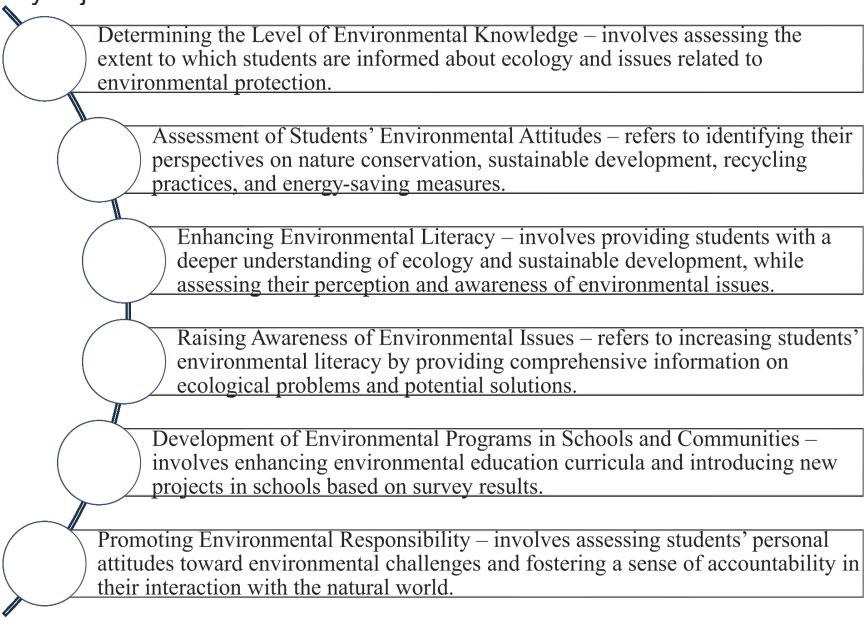
7.3.2.3 – Describe flora and fauna of specially protected natural areas in Kazakhstan;

7.3.2.4 – Identify local species included in the Red Data Book of Kazakhstan.

In alignment with these priorities, several initiatives have been imple-

mented, including the introduction of a specialized elective course entitled “Biodiversity Conservation” for Grade 7 learners [11].

Prior to embedding this course within the school curriculum, a survey was conducted to evaluate students’ knowledge, understanding, and attitudes regarding ecological issues, sustainable development principles, and environmental protection. The survey successfully addressed several key objectives.



Survey Questions:

1. What is biodiversity?
2. Name the most significant environmental issues in Kazakhstan.
3. Which ecosystems face the greatest threat to biodiversity?
4. What could be an example of environmentally responsible behavior?
5. On what principles is the concept of sustainable development based?
6. What is the primary goal of green schools?
7. Explain the concept of a green economy.
8. What ecological crises might result from climate change?
9. What actions are necessary to ensure biodiversity conservation?
10. What is the main objective of the “Clean Kazakhstan” initiative?

Based on the survey results, most participants consider environmental

protection, biodiversity conservation, the implementation of green schools, and the “Clean Kazakhstan” initiative to be crucial for fostering ecological culture. Numerous measures are required to enhance environmental education and ecological responsibility. The promotion of a green economy, sustainable development, and climate change mitigation is actively advancing in Kazakhstan, emphasizing the importance of strengthening the roles of both governmental bodies and individuals in addressing these challenges [12]. The “Clean Kazakhstan” initiative and the green school concept play a key role in cultivating students’ environmental awareness and culture.

The elective course aims to maintain the balance between nature and ecosystems, enhance environmental literacy, and engage students in nature conservation activities. It provides students with an in-depth understanding of the significance of biodiversity, its impact on human life and global ecosystems, as well as the threats to species extinction and measures to prevent it. The course also focuses on the rational use of natural resources, ecological balance, and the principles of sustainable development. Furthermore, it encourages research in biotechnology, ecology, and nature conservation, participation in environmental projects, and the protection of local ecosystems and flora [13].

Course on Biodiversity Conservation biodiversity conservation is conducted with consideration of the principles of sustainable development, as biodiversity represents a vital component of sustainability. Its significance is reflected in the following aspects:

1. Supporting Sustainable Development

• Ecological Balance: Biodiversity contributes to maintaining ecosystem stability, enabling the long-term use of natural resources.

• Social Stability: Biodiversity provides essential ecosystem services-such as clean water, air purification, food, and medicinal plants-improving the quality of human life.

• Economic Development: Natural resources serve as a foundation for agriculture, tourism, and various other sectors.

2. Conservation and Sustainable Use of Biodiversity

• Rational Use of Natural Resources: Utilizing resources efficiently without causing environmental harm.

• Preservation of Ecosystem Services: Maintaining nature’s services to humanity, including pollination, water regulation, and soil fertility.

3. Engaging Youth in Sustainable Development

• Encouraging students to implement sustainable development con-

cepts and actively participate in environmental projects.

• Promoting the search for long-term solutions in nature conservation.

4. Safeguarding the Needs of Future Generations

• Preserving natural resources not only for the current generation but also for future ones.

• Ensuring long-term human well-being by maintaining quality living conditions within the natural environment. Through this course, students will explore practical measures for biodiversity conservation, examine national and international ecological initiatives, and learn how to apply them in daily life. It fosters environmental responsibility and prepares students to actively address ecological challenges in the future.

Course Objective. To provide students with an understanding of the importance of biodiversity, the need for its conservation, and to cultivate a sense of responsibility toward nature protection.

Course Tasks

• Explain the concept and levels of biodiversity.

• Demonstrate the role of biodiversity within ecosystems.

• Familiarize students with the current state of biodiversity in Kazakhstan and globally.

• Teach methods and strategies for biodiversity conservation.

• Develop ecological culture by involving students in nature protection activities.

Teaching Methods

• Lectures and presentations.

• Group discussions and debates.

• Project-based learning.

• Field trips and outdoor research.

Assessment Criteria

• Class participation and engagement.

• Quality of project work.

• Final test performance.

In collaboration with the Almaty State Nature Reserve, the district organized the “Parade of Parks” tree-planting campaign, during which students regularly plant fruit trees in schoolyards. This initiative aims to foster environmental awareness among students and encourage a responsible attitude toward nature. Additionally, it contributes to improving the environment, purifying the air, regulating the climate, and preserving biodiversity. The event also promotes teamwork among students and helps them develop a sense of responsibility for the future of nature. The campaign

is aligned with the principles of sustainable development and seeks to improve ecological conditions by expanding green zones.

Under the supervision of the nature reserve, competitions on environmental protection, wildlife conservation, and plant care are organized among school students across the district. Furthermore, students from grades 2 to 7 participate in the national research and creative projects competition “Zerde,” where they have achieved awards at both district and regional levels. The participation in these competitions serves several key objectives:

1. Development of Research and Creative Skills

The competition fosters students’ abilities to conduct scientific research and design creative projects, enhancing their analytical and problem-solving skills.

2. Promotion of Scientific Interest

It encourages students to develop an interest in science, research, and innovation, fostering curiosity and motivation for academic exploration.

3. Experience Exchange

By presenting their research and projects, students gain an opportunity to learn from their peers’ work, broadening their knowledge and gaining valuable experience.

4. Recognition and Motivation

Winners and awardees receive certificates, diplomas, and special prizes, which serve as formal acknowledgment of their academic achievements.

5. Preparation for the Future

The competition equips students with skills in scientific writing, research methodology, and data analysis, preparing them for higher education and potential careers in research fields.

6. Development of Innovative Thinking and Creativity

It provides a platform for students to propose new ideas and innovative solutions.

This competition plays a crucial role in fostering students’ holistic development, promoting intellectual curiosity, and motivating them toward continuous learning.

In addition, a project defense competition titled “Let Us Cherish Mother Earth” is held among students of grades 7-9 within the school, aimed at promoting environmental protection. The competition pursues the following key objectives:

1. Formation of Environmental Awareness

Instilling a responsible attitude toward nature and fostering ecological consciousness among students.

2. Raising Attention to Environmental Issues

Encouraging students to focus on contemporary ecological challenges and guiding them toward seeking effective solutions.

3. Development of Practical Skills

Enhancing students' research abilities through the acquisition of skills in conducting investigations, analyzing data, and proposing practical solutions.

4. Introduction of New Ideas

Motivating students to develop innovative and creative approaches to address environmental problems.

5. Increasing Youth Engagement

Strengthening the role of young people in environmental protection and increasing their contribution to society.

6. Preparation for the Future

Supporting professional orientation through environmental education and fostering the development of future ecologists, biologists, and researchers.

7. Promotion of Social Responsibility

Encouraging students to take concrete actions toward preserving and improving their local environment, thereby fostering a sense of civic duty.

This competition represents an important initiative designed to expand students' knowledge, skills, and responsibility in the field of environmental protection.

The experiment was conducted in the 7 "A" and 7 "B" classes. Both classes were introduced to the elective course "Biodiversity Conservation". The purpose of the experiment was to assess students' ecological knowledge, understanding, and responsibility as a result of completing the elective course. Experimental Design: Classes: 7 "A" (15 students), 7 "B" (16 students), Assessment methods: pre- and post-tests (10-question survey), project work, and classroom participation observation. Pre-test results: 7 "A" class: average score 45%, 7 "B" class: average score 43%. Post-course test results: 7 "A" class: average score 62% (an increase of 37 percentage points in ecological knowledge). 7 "B" class: average score 48% (an increase of 25 percentage points). Project work results: 7 "A" class: all students actively participated and presented their projects; average score 68%, 7 "B" class: 50% of students actively participated; average score 52%. Qualitative observations

in 7 “A” class, students actively engaged in nature conservation activities, contributed to class discussions, and significantly improved their ecological culture. In 7 “B” class, student engagement was moderate, some groups did not fully complete project tasks, but overall ecological culture increased. The elective course significantly enhanced students’ ecological knowledge and responsibility. The 7 “A” class demonstrated higher results than the 7 “B” class (62% vs. 48%), which was associated with the level of classroom engagement and participation (Figure 1).

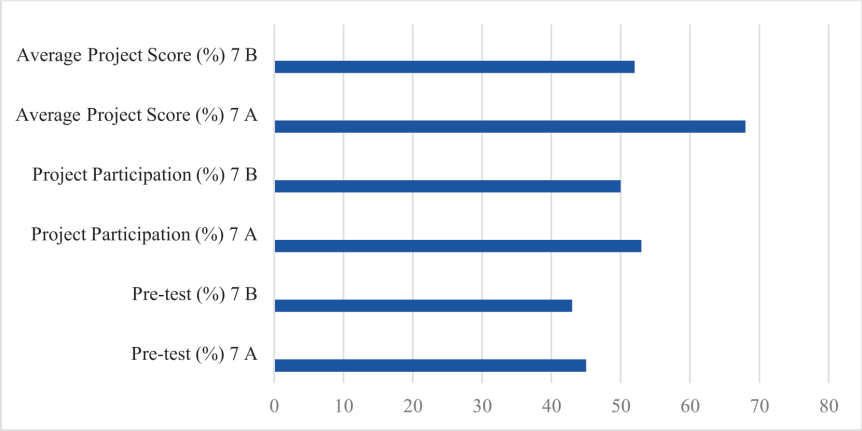


Figure 1 - Pre- and Post-Experiment Results of 7 “A” and 7 “B” Classes

The experiment confirmed the effectiveness of the elective course in improving the quality of environmental education and highlighted the importance of continuing its implementation.

Conclusion. The ongoing activities aimed at fostering sustainable development and cultivating ecological culture - particularly biodiversity conservation and participation in environmental projects - constitute significant steps toward improving ecological literacy in modern society. The “Clean Kazakhstan” concept and the Green School initiative are intended to promote environmental education and training, as well as to instill ecological responsibility, awareness, and culture through the organization of nature conservation events.

Through the implementation of various projects and programs across the country, essential measures are being undertaken to develop students’ research competencies, involve them in ecological initiatives, and stimulate the younger generation to engage actively in environmental pro-

tection. These systematic efforts contribute to enhancing the ecological culture of future generations and fostering a sense of responsibility for sustainable development.

Implementing environmental projects in Green Schools, involving students in nature conservation activities, conducting tree-planting campaigns, and organizing other initiatives aligned with the goals of sustainable development play a crucial role in shaping students' ecological outlook. Particular emphasis should be placed on biodiversity conservation, the rational use of natural resources, and the provision of education addressing climate change adaptation.

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Амантаева А.К.[1], Сейлхан А.[1], Чилдибаев Ж.Б.[1], Аксой А.[2]
[1]Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы қ., Қазақстан
[2] Акдениз Университеті, Анталия қ., Түркия

«ЖАСЫЛ МЕКТЕП» – ТҰРАҚТЫ ДАМУ МАҚСАТТАРЫНА ЖЕТУДІҢ ТИІМДІ ҚҰРАЛЫ

Түйіндеме. Тұрақты даму концепциясы қазіргі қоғам үшін маңызды әрі өзекті мәселе болып отыр. Білім беру жүйесінде тұрақты даму мен экологиялық мәдениеттің өзара байланысы ерекше мәнге ие. Осы тұрғыдан, жасыл мектептер экологиялық мәдениетті қалыптастыруда маңызды рөл атқарады. Сонымен қатар, жасыл мектептердің практикасы экологиялық мәселелерге белсенді қатысуға, табиғатты қорғау дағдыларын дамытуға және Тұрақты даму мақсаттарына жетуге бағытталған маңызды қадам болып табылады. Мақалада жасыл мектептердің экологиялық білім беру жүйесіндегі маңызы мен рөлі талданады, тұрақты даму мен экологиялық мәдениет арасындағы өзара байланысты зерттейді. Жасыл мектептер тұрақты даму принциптерін жүзеге асыруда шешуші фактор болып табылады, яғни оқушыларды экологиялық мәдениетпен тәрбиелейді, табиғатты қорғау және экологиялық жауапкершілікті саналы түрде түсінуге ықпал етеді. Табиғат пен экожүйелер арасындағы тепе-теңдікті сақтау, экологиялық сауаттылықты арттыру және оқушыларды табиғатты қорғау іс-шараларына тарту мақсатында Тұрақты даму мақсаттарын іске асыру барысында сауалнама нәтижесінде факультативтік курс енгізілгені және мақаланың мазмұны көрсетілген.

Түйінді сөздер: тұрақты даму, экологиялық білім беру, экологиялық мәдениет, экологиялық ойлау, Жасыл мектеп, оқыту әдісі, биоалуантүрлілікті сақтау.

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Амантаева А.К.[1], Сейлхан А.[1], Чилдибаев Ж.Б.[1], Аксой А.[2]
[1] Казахский национальный педагогический университет имени Абая, г. Алматы, Казахстан
[2] Университет Акдениз, г. Анталия, Турция

«ЗЕЛЕНАЯ ШКОЛА» - ЭФФЕКТИВНОЕ СРЕДСТВО ДОСТИЖЕНИЯ ЦЕЛЕЙ УСТОЙЧИВОГО РАЗВИТИЯ

Аннотация. Концепция устойчивого развития стала важной и актуальной проблемой современного общества. Особое значение в системе образования имеет взаимосвязь устойчивого развития и экологической культуры. В этом смысле зеленые школы играют важную роль в формировании экологической культуры. Кроме того, практика зеленых школ является важным шагом на пути к активному участию в экологических вопросах, развитию природоохранных навыков и достижению целей устойчивого развития. В статье анализируется важность и роль зеленых школ в системе экологического образования, исследуя взаимосвязь между устойчивым развитием и экологической культурой. Зеленые школы являются решающим фактором в реализации принципов устойчивого развития. т.е. воспитывает учащихся в экологической культуре, осознает природоохранную и экологическую ответственность. В целях сохранения баланса между природой и экосистемой, повышения экологической грамотности и вовлечения учащихся в природоохранные мероприятия в ходе реализации Целей устойчивого развития, в результате анкетирования внедрен элективный курс и приведено содержание статьи.
Ключевые слова: устойчивое развитие, экологическое образование, экологическая культура, экологическое мышление, Зеленая школа, метод обучения, сохранение биоразнообразия.

Information about authors

Amantayeva Araylym Kairatovna – PhD, Postdoctoral Researcher at Abai Kazakh National Pedagogical University, Almaty, Kazakhstan, e-mail: amantayeva2190@bk.ru

Seilkhan Ainur – postdoctor of KazNPU named after Abaya, PhD, Associate Professor, Researcher at G. Washington University, Almaty, Kazakhstan, ainura_seilkhan@mail.ru

Childibaev Jumadil Baydildayevich – Doctor of Pedagogical Sciences, Professor-Researcher at Abai Kazakh National Pedagogical University, Almaty, Kazakhstan, zhumadil_47@mail.ru

Ahmet Aksoy – PhD, Akdeniz University, Antalya, Turkey, aksoy@akdeniz.edu.tr

Авторлар туралы мәліметтер

Амантаева Арайлым Кайратовна – PhD, Абай атындағы Қазақ ұлттық пелагогикалық университеті постдокторанты, Алматы қ, Қазақстан, amantayeva2190@bk.ru

Сейлхан Айнур - Абай атындағы ҚазҰПУ постдокторы, PhD, қауымдастырылған профессор лауазымын атқарушысы, кафедра доценті, G.Washington университетінің зерттеушісі, Алматы қ, Қазақстан, ainura_seilkhan@mail.ru

Чилдибаев Жумадил Байдильдаевич – Педагогика ғылымдарының докторы, профессор-зерттеуші, Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы қ, Қазақстан, zhumadil_47@mail.ru

Ахмет Аксой – PhD, Акдениз университеті, Анталия, Түркия, *aksoy*@akdeniz.edu.tr

Сведения об авторах

Амантаева Арайлым Кайратовна – PhD, постдокторант Казахского национального педагогического университета имени Абая, Алматы қ., Казахстан, amantayeva2190@bk.ru

Сейлхан Айнур – постдоктор КазНПУ им. Абая, PhD, ассоциированный профессор, доцент кафедры, исследователь G. Washington University, г. Алматы, Казахстан, ainura_seilkhan@mail.ru

Чилдибаев Жумадил Байдильдаевич – доктор педагогических наук, профессор-исследователь Казахский национальный педагогический университет имени Абая г. Алматы, Казахстан, zhumadil_47@mail.ru

Ахмет Аксой – PhD, Университет Акдениз, Анталия, Турция, aksoy@akdeniz.edu.tr