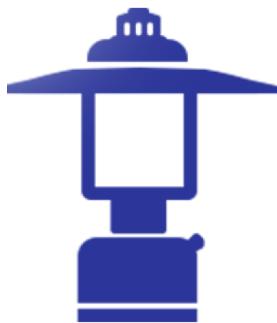# DEVELOPING STUDENTS' ENVIRONMENTAL COMPETENCE IN HIGHER EDUCATION CURRICULA THROUGH THE EFFECTIVE USE OF LEARNING OUTCOMES

DESARROLLO DE LA COMPETENCIA AMBIENTAL DE LOS ESTUDIANTES EN EDUCACIÓN SUPERIOR MEDIANTE LOS RESULTADOS DE APRENDIZAJE

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ABSTRACT

The purpose of this article is to analyze the role of higher education in the formation of environmental competence of future specialists in the Republic of Kazakhstan through the design of learning outcomes. The study is based on a qualitative analysis of higher education educational programs and regulatory documents, as well as a review of scholarly literature on environmental education and sustainable development. The methods included document analysis and comparative examination of learning outcomes across selected university programs in different fields of training. The results demonstrate that learning outcomes of most educational programs are primarily oriented toward professional and subject-specific competencies, while environmental competence and sustainability-oriented skills are insufficiently represented at the program level. At the same time, environmental knowledge and skills are more clearly reflected within individual course syllabi, indicating a lack of consistency between program-level outcomes and curricular content. It is concluded that higher education institutions have significant potential to contribute to the modernization of public consciousness and the development of environmental competence. Strengthening environmental competence as a mandatory learning outcome is necessary for the implementation of the "green university" concept and for aligning higher education with national and global sustainable development goals.

Keywords:

Education, Green universities, Environmental competence, Environmental knowledge, Learning outcome

RESUMEN

El propósito de este artículo es analizar el papel de la educación superior en la formación de la competencia ambiental de los futuros especialistas en la República de Kazajistán a través del diseño de resultados de aprendizaje. El estudio se basa en un análisis cualitativo de los programas educativos de educación superior y documentos normativos, así como en una revisión de la literatura académica sobre educación ambiental y desarrollo sostenible. Los métodos incluyeron el análisis de documentos y el análisis comparativo de los resultados de aprendizaje en programas universitarios seleccionados en diferentes áreas de formación. Los resultados demuestran que los resultados de aprendizaje de la mayoría de los programas educativos se orientan principalmente a las competencias profesionales y específicas de la materia, mientras

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que la competencia ambiental y las habilidades orientadas a la sostenibilidad están insuficientemente representadas a nivel de programa. Al mismo tiempo, los conocimientos y las habilidades ambientales se reflejan con mayor claridad en los programas de estudio individuales, lo que indica una falta de coherencia entre los resultados a nivel de programa y el contenido curricular. Se concluye que las instituciones de educación superior tienen un potencial significativo para contribuir a la modernización de la conciencia pública y al desarrollo de la competencia ambiental. Fortalecer la competencia ambiental como un resultado de aprendizaje obligatorio es necesario para la implementación del concepto de «universidad verde» y para alinear la educación superior con los objetivos nacionales y globales de desarrollo sostenible.

Palabras clave:

Educación, Universidades verdes, Competencia ambiental, Conocimiento ambiental, Resultados de aprendizaje

INTRODUCTION

Nowadays, a range of socially significant problems requires systematic study and responsible decision-making by future specialists, among which environmental issues have become one of the most pressing. Environmental problems continue to intensify, while the level of environmental awareness and responsibility demonstrated by graduates of higher education institutions often remains insufficient. As a result, environmental competence is formed inconsistently and is weakly connected with students' future professional activities and decision-making practices.

Within the higher education system of the Republic of Kazakhstan, this problem is especially relevant in the context of ongoing educational reforms and the declared priorities of sustainable development. Universities are expected to train specialists capable of understanding environmental risks and participating in the preservation of ecosystems; however, environmental competence is rarely fixed as a mandatory outcome at the level of educational programs. This creates a gap between the objectives of environmental education and the actual structure of university curricula, indicating the need for a more systematic integration of environmental competence into higher education learning outcomes (Akmatova et al., 2025).

The policy document "Proposal of the Open Working Group for Sustainable Development Goals" of the Division for Sustainable Development Goals (DSDG) of the United Nations Department of Economic and Social Affairs (UNDESA) states: "Planet Earth and its ecosystems are our home… 'Mother Earth' is a common expression in a number of countries and regions… some countries recognize the rights of nature in the context of promoting sustainable development… in order to achieve a just balance between the economic, social, and environmental needs of present and future generations, harmony with nature must be promoted... all cultures and civilizations can contribute to sustainable development" (International University of Information Technologies, 2020).

The last decades have been characterized as a period of reforming the education system of the Republic of Kazakhstan, including higher education. In particular, Kazakhstan's accession to the Bologna Process, the proclamation of the principles of academic freedom for universities, and the revision of the State Compulsory Educational Standards (SCES) of higher education should be noted. All these processes are natural for a society pursuing integration into the global educational space (Kasymova et al., 2025; Malikkyzy et al., 2025).

A number of scholars from Kazakhstan and from near and far abroad (Amirbekova et al., 2025; Khawaja et al., 2025; Xiong et al., 2025) have addressed various aspects of environmental education, including the development of environmental culture, educational strategies, and competency-based approaches (Khamzina et al., 2020; Khrolenko et al., 2022; Nikolenko et al., 2023). However, despite the growing body of research, these studies do not provide a comprehensive analysis of how environmental competence is systematically embedded in learning outcomes at the level of higher education educational programs. As a result, the question of aligning environmental education with program-level learning outcomes and institutional strategies of "green universities" remains insufficiently explored.

In analyzing the field of environmental education, we turned to the problem of defining its goal. Researchers identify the formation of an informed understanding among the younger generation of the importance of the "environmental problem" and awareness of responsibility in taking measures to prevent it as the goal of environmental education (Vasileva et al., 2025). Agreeing with this position, we additionally emphasize the need for environmental upbringing and environmental awareness-raising among all members of society.

The aim of this work is to analyze the process of training future specialists within the higher education system, oriented toward the formation of a rational attitude to the environment, by identifying the potential of environmental education. Achieving this aim requires solving a number of tasks, including identifying the features of the national system of environmental education under conditions of

humanization of the educational process, and examining ways to organize the formation of environmental competence within the higher education system.

MATERIALS AND METHODS

During the study, an important issue was the analysis of scientific works on the given topic. (Klybanivska, 2022; Valiullina et al., 2020) emphasize the importance of forming environmental culture. The scientific term "green university" has become widespread and entered scholarly discourse following the adoption of state policy aimed at the "green economy" (President of the Republic of Kazakhstan, 2013).

Of particular importance for this study was the examination of the process of formulating learning objectives and learning outcomes at the level of a higher education educational program and a specific module within it. A practice has emerged whereby each educational program contains a module that ensures environmental education. Thus, the scope of the study was outlined within specific learning outcomes defined in the module, whose structure includes traditional disciplines such as "Ecology" and "Ecology and Sustainable Development" (with possible variations).

In conducting the study, qualitative methods of educational research were employed, with primary emphasis on the analysis of scholarly literature and regulatory documents related to environmental education and sustainable development in higher education. The literature review made it possible to identify key theoretical approaches, dominant research directions, and unresolved problems in the formation of environmental competence. In addition, a document analysis of higher education educational programs was conducted. Educational programs were selected from publicly available university sources and analyzed in terms of stated learning outcomes related to environmental knowledge, skills, and values. The selection of programs was based on availability and representativeness of different fields of study, rather than probabilistic random sampling, which is appropriate for qualitative curriculum analysis.

The following educational programs were selected: 6B02103 Media Design; 6B01402 Training of a Physical Education Teacher and Instructor-Methodologist for Mass Physical Culture and Health-Improving Activities; 6B04103 Accounting and Auditing; 6B01211 Preschool Education and Upbringing.

RESULTS AND DISCUSSION

The process of developing educational programs is organized in accordance with the requirements of regulatory legal acts governing the higher education system. According to documents published on the official websites of universities, the procedure for developing and approving educational programs is carried out as follows: "Educational programs of higher and postgraduate education are developed and approved by the University independently in accordance with the requirements of the State Compulsory Educational Standards, the rules of credit-based learning technology, the classifier of training areas, and other regulatory legal acts in the field of higher and postgraduate education".

Table 1 presents the learning outcomes (LOs).

Table 1. Learning Outcomes of Selected Higher Education Programs of the Republic of Kazakhstan.

6B02103 Media Design	6B01402 Training of a Physical Education Teacher and Instructor-Methodologist for Mass Physical Culture and Health-Improving Activities	6B04103 Accounting and Auditing	6B01211 Preschool Education and Upbringing
LO1 Develop media design projects using the legal framework of intellectual property, fundamentals of entrepreneurship, the history of national and global mass media development, and the dynamic environment of the modern media space; LO2 Create motion design, including animation, visual and 3D effects, by designing moving objects, television programs, video films, clips for TV, advertising, games, and cinema;	LO1 Possess basic knowledge in selected natural, technical, and social-humanitarian sciences contributing to the formation of a comprehensively and harmoniously developed personality; LO2 Demonstrate communicative abilities and logically express thoughts and requirements to trainees for effective interpersonal interaction in the field of physical culture and mass health-improving activities;	LO1 Understand economic laws and forms of their manifestation; possess knowledge in organizing financial, accounting, and auditing activities at enterprises; LO2 Analyze economic objects and make scientifically grounded choices of appropriate management organization forms;	LO1 Form professional thinking and creative individuality through mastering methodological foundations of philosophical, legal, social-humanitarian, economic, and natural sciences using research methods; LO2 Analyze characteristics of preschool children within the educational environment and identify their needs to apply effective support methods;

LO3 Design printed media products—newspapers, magazines, books—using media design software for print layout and elements of constructing various formats of printed mass media; LO4 Develop websites, apply web design using various computer programs, and design websites according to the theme and profile of a publication or company; LO5 Create advertising products (commercials, booklets, posters), professionally using technologies for banner advertising, LED advertising, etc.; LO6 Produce multimedia media products—video films, texts, news, and information in various formats (infotainment, longreads, storytelling); LO7 Professionally apply color theory and typography techniques by classifying the functions of color, color tones, light and shade, contrasts, nuances, and color saturation; LO8 Apply modern methods and techniques of international media design and the experience of global trends in the development of media art, graphics, and animation; LO9 Create professionally processed photographs, demonstrating the art of photography and photojournalism, and the diversity of genres in presenting visual information; LO10 Create original authorial design layouts and corporate identity based on established technologies, using the latest computer programs in photo design, motion design, infographics, and animation; LO11 Disseminate information using digital marketing tools, psychology of visual perception, and communication technologies; LO12 Implement in practice qualitative changes and new trends in the field of modern visual communications	LO3 Solve professional tasks using innovative educational technologies and act in accordance with the main legal acts of the Republic of Kazakhstan and international legal documents in the field of physical culture and mass health-improving activities; LO4 Analyze and generalize knowledge about cultural heritage, spiritual values, traditions, and customs of the peoples of Kazakhstan and the world; identify key stages and patterns of historical development of physical culture and mass health-improving activities, tolerantly perceiving social, ethnic, confessional, and cultural differences; LO5 Determine anatomical, physiological, morphological, and individual characteristics of individuals engaged in physical culture and sports, and assess their impact on physical development with regard to sex and age; LO6 Possess psychological and pedagogical knowledge of physical culture and sports, master teaching methods for basic school sports, select effective means, methods, and organizational forms of curricular and extracurricular physical education and health activities, present educational material in an accessible form considering learners' abilities, and develop sports-pedagogical mastery; LO7 Conduct research activities in the field of physical culture and mass health-improving activities, demonstrate the ability to independently master new research methods, rely on sports metrology, interpret research results, and determine their theoretical and practical significance; LO8 Demonstrate knowledge in sports medicine and apply effective means, methods, and technologies for organizing adaptive and therapeutic physical education and sports aimed at rehabilitation and social adaptation of persons with disabilities; LO9 Determine the organizational potential of educational activities and conduct sports and educational events in physical education, national sports, and sports games using global achievements in sports training within the Olympic education system; LO10 Carry out professional instructor-methodological work in mass health-improving activities, master methods of teaching technical-tactical and special physical training using achievements of global sports training culture in Olympic and Paralympic education, taking into account principles of proper and rational sports nutrition; LO11 Identify athletic abilities of children, adolescents, and youth for specialization in a particular sport; scientifically manage the sports training process in the chosen sport; monitor compliance with hygienic norms and requirements in physical culture and health-improving activities	LO3 Use system analysis to build and apply models for describing and forecasting processes, phenomena, and situations, conducting qualitative and quantitative analysis and synthesis; LO4 Provide economic interpretation of development trends of market economy entities and objects, taking into account changes in regulatory frameworks, international practice, and internal factors; LO5 Use systematized theoretical and practical knowledge in informatics and operate computer equipment in professional activities; LO6 Understand the essence and significance of information, work with large volumes of scientific information, and independently use various information sources; LO7 Organize professional activities, use computer technologies to solve professional tasks, and adhere to principles of academic integrity; LO8 Organize and maintain financial, managerial, and tax accounting; assess the efficiency of resource and asset utilization; calculate key economic indicators characterizing the financial condition of an organization; LO9 Find solutions in standard professional situations based on critical analysis and plan personal professional activities; LO10 Demonstrate business management skills, achieve market success in a competitive environment, evaluate performance effectiveness, and show business and innovative initiative	LO3 Independently design lessons considering new achievements in preschool pedagogy, ethnopedagogy, psychology, patterns of development and socialization, and anatomical and physiological characteristics of preschool children; LO4 Determine methods and techniques for forming preschoolers' skills in natural and mathematical disciplines; LO5 Develop educational materials for organizing the educational process in sports and aesthetic disciplines; LO6 Know the fundamentals of defectology and speech therapy as sciences, their methods and objectives, development dynamics, mechanisms and structure of cognitive processes and personality development in children with speech disorders, and apply speech therapy methodologies in practice; LO7 Design an educational environment jointly with participants of the microsocium to create conditions for preschoolers' personality development, considering psychodiagnostic foundations, psychological readiness for school, and indicators of competency development in children aged 1–6 years; LO8 Provide methodological support for the educational process in humanities disciplines using modern educational technologies; LO9 Possess theoretical and practical foundations of management and organization of pedagogical activities in preschool institutions; LO10 Independently conduct educational activities using new teaching technologies to fulfill functional duties related to preschool education

The analysis of the content of the learning outcomes described in the selected educational programs showed that they are primarily aimed at the formation of professional competencies. The dimension of sustainable development, which is based on the formation of an environmental worldview, is virtually absent.

Based on the presented learning outcomes, it is not possible to assess the readiness of graduates of the educational programs to demonstrate environmental competence skills, which are expressed through the presence of personal

motivation for self-preservation and preservation of the environment.

The learning outcomes presented in this table indicate that the educational programs are focused on the formation of two main groups of competencies: (a) competencies related to the organization and conduct of scientific research (the ability to independently master new research methods, rely on the fundamentals of sports metrology, interpret the results of one's own scientific research, and determine their theoretical and practical significance; the formation of professional thinking and creative individuality through mastering the methodological foundations of philosophical, legal, socio-humanitarian, economic, and natural sciences using research methods; conducting research activities in the field of physical culture and mass health-improving activities, demonstrating the ability to independently master new research methods, rely on sports metrology, interpret research results, and determine their theoretical and practical significance); and (b) specialized subject-specific competencies. At the same time, a global objective—promoting sustainable development through the manifestation of competencies indicating the functional literacy of graduates, as reflected in the concepts of "green universities"—is not defined among the expected learning outcomes (Goldman et al., 2018).

We cannot claim that this competence is not formed during the process of mastering the educational programs. However, it is not specified in the learning outcomes.

As the study has shown, the desired learning outcome is indicated only in disciplines that ensure environmental education. This is reflected in the course syllabi. At the same time, courses aimed at forming environmental competence in Kazakhstan's higher education programs are presented both as standalone disciplines and as components of an integrated modular block within educational programs.

Thus, there is a lack of consistency between the learning outcomes presented at the level of the educational program and those specified in the course syllabi.

We consider it necessary to include, as mandatory learning outcomes of higher education programs, outcomes that would demonstrate the existence in the Republic of Kazakhstan of a real process of forming a system of "green universities" that address the development of environmental consciousness, which is aimed at developing environmental awareness and environmental education of young people. Learning outcomes should reflect the intention of educational program developers to train specialists who have an understanding of ecosystems, recognize their place and significance within them, and

are aware of their potential to exert a positive impact on maintaining sustainable environmental development.

Our proposal is justified by the fact that the formation of an environmental worldview among higher education students should become one of the key objectives of every Kazakhstani university. Graduates should be active participants in the process of greening society, and higher education must transition toward a system oriented to sustainable development. Sustainable development, in turn, encompasses the resolution of economic, environmental, and social problems of society. Specialists trained within higher education institutions should have a clear understanding of the objective world as a holistic, interconnected, and interdependent system, and should recognize the intrinsic value of the entire world. The primary goal, in this context, is the preservation of the human habitat. This constitutes the essence of the greening of worldview.

CONCLUSIONS

The higher education system of the Republic of Kazakhstan can make a significant contribution to increasing public awareness of issues that affect key areas of human life.

At the same time, the process of training specialists in universities should be aimed at implementing the state policy of the Republic of Kazakhstan on the modernization of public consciousness, particularly with regard to understanding the concept of the "green economy." To achieve this, the concept of "green universities" should be adopted and implemented within the higher education system.

Thus, the modernization of public consciousness in the Republic of Kazakhstan will make a substantial contribution to solving global challenges faced by the world community, including the formation of environmental competence among future specialists.

The analysis of the content of higher education educational programs clearly demonstrates the need to include, as mandatory learning outcomes (LOs), outcomes that would indicate the existence in the Republic of Kazakhstan of a real process of forming a system of "green universities" that address the development of environmental consciousness aimed at fostering environmental awareness and education among young people.

The novelty of this study consists not only in analyzing educational programs in terms of how learning outcomes that ensure the formation of environmental competence are reflected, but also in developing recommendations for designing new educational programs that include these basic global competencies when defining the model of a higher education graduate.

The theoretical and practical significance of the research lies in identifying optimal conditions for the formation of

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environmental competence of higher education graduates as a basic global competence of a member of the world community.

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