

THE IMPACT OF HIGHER EDUCATION ON IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT CONCEPT

O IMPACTO DO ENSINO SUPERIOR NA IMPLEMENTAÇÃO DO CONCEITO DE DESENVOLVIMENTO SUSTENTÁVEL

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ABSTRACT

Modern global challenges include growth of environmental tension, irrational use of finite resources, which is due to constantly growing needs of society and the need to use resources to meet them. The sustainable development concept is global strategy for overcoming many problems of humanity and the direction for achieving social, economic and ecological balance. Higher education plays an important role in shaping consciousness of humanity about relevance of effective and conscious use of resources and ecological culture of the population. It is possible to strengthen the impact of higher education by implementing the sustainable development concept by introducing socially and environmentally oriented competencies of students, which will contribute to implementation of sustainable development principles in their future professional activities and everyday life. The purpose of the study is to identify the impact of higher education on implementation of the sustainable development concept through formation of socially and environmentally oriented competencies of students of higher education institutions. In the article, the methodology of the system-process approach is used, which makes it possible to consider specific features of higher education and sustainable development as processes of different nature using various methods of scientific knowledge and to determine their systematicity and mutual influence. Shortcomings inherent in the content, composition and implementation of educational programs at the level of higher education institutions are identified, regarding intensification of formation of professional socio-ecologically oriented competencies in students of higher educational institutions to ensure implementation of the sustainable development concept. Using the integrated approach in higher education institutions is justified, which covers theoretical and practical training of students in acquiring socio-ecologically oriented competencies, which includes development and implementation of educational programs that contribute to formation of necessary technical skills for specific professions, interdisciplinary knowledge that supports broader understanding of environmental processes, and normative competencies related to environmental awareness and values of sustainable development. Stages of organizational support for professional development of young specialists to implement the sustainable development concept and stages of formation of students' socio-ecological competencies are identified.

Keywords: higher education, sustainable development concept, socially and environmentally oriented competencies, socio-economic and environmental development.

RESUMO

Os desafios globais modernos são o crescimento da tensão ambiental, a utilização irracional de recursos finitos, que se deve às necessidades cada vez maiores da sociedade e à necessidade de utilizar recursos para as satisfazer. O conceito de desenvolvimento sustentável é uma estratégia global para superar muitos problemas da humanidade e uma direção para alcançar o equilíbrio social, econômico e ecológico. O ensino superior desempenha um papel importante na formação da consciência da humanidade sobre a importância da utilização eficaz e consciente dos recursos e da cultura ecológica da população. É possível reforçar a influência do ensino superior na implementação do conceito de desenvolvimento sustentável através da introdução de competências dos estudantes de orientação social e ambiental, que contribuirão para a implementação dos princípios do desenvolvimento sustentável nas suas futuras atividades profissionais e na vida quotidiana. O objetivo do estudo é identificar a influência do ensino superior na implementação do conceito de desenvolvimento sustentável através da formação de competências de orientação social e ambiental em estudantes de instituições de ensino superior. O artigo utiliza a metodologia da abordagem sistema-processo, que permite ter em conta as especificidades do ensino superior e do desenvolvimento sustentável como processos de natureza diversa através de vários métodos de conhecimento científico e determinar a sua sistematicidade e influência mútua. Identificam-se as lacunas inerentes ao conteúdo, composição e processo de implementação dos programas educativos ao nível das instituições de ensino superior, no que diz respeito à intensificação da formação de competências profissionais de orientação sócio-ecológica nos estudantes das instituições de ensino superior para garantir a implementação do conceito de desenvolvimento sustentável. Justifica-se a utilização de uma abordagem integrada nas instituições de ensino superior, que abrange a formação teórica e prática dos estudantes na aquisição de competências de orientação socioecológica, o que inclui o desenvolvimento e implementação de programas educativos que contribuam para a formação das competências técnicas necessárias para profissões específicas, conhecimentos interdisciplinares que apoiem uma compreensão mais ampla dos processos ambientais, e competências normativas relacionadas com a consciência ambiental e os valores do desenvolvimento sustentável. São identificadas as etapas de apoio organizacional ao desenvolvimento profissional de jovens especialistas para a implementação do conceito de desenvolvimento sustentável e as etapas de formação das competências socioecológicas dos alunos.

Palavras-chave: ensino superior, conceito de desenvolvimento sustentável, competências de orientação social e ambiental, desenvolvimento socioeconómico e ambiental.

Introduction

Relevance of the topic of the impact of higher education on implementation of the sustainable development concept is due to rapid changes in the global economic and environmental contexts. Population growth, rapid urbanization, pollution and depletion of natural resources require more attention and implementation of the sustainable development concept. Introduction of sustainable development principles into everyday lives of ordinary citizens contributes to creation of new socio-economic opportunities, therefore the labor market needs qualified specialists who can work with innovative technologies and implement sustainable development principles, which includes both technical

knowledge, and understanding of economic, environmental and social aspects. In this context, higher education plays an important role in ensuring implementation of the sustainable development concept, since formation of socio-ecological competencies in young people will provide them with competitive advantages in the labor market as specialists and will contribute to implementation of the sustainable development concept. Sustainable development is a priority for many countries and international organizations. Formation of socio-ecological competencies in students in higher education will contribute to achievement of sustainable development goals, such as waste reduction, resource conservation, social orientation of economic development and improvement of quality of life. Thus, research on this topic is not only relevant, but also strategically important for ensuring a sustainable future.

The purpose of the study is to identify the impact of higher education on implementation of the sustainable development concept through formation of socially and environmentally oriented competencies in students of higher education institutions. To achieve this goal, the authors identified and solved many tasks, namely:

- substantiation of relevance and timeliness of the research, which is important not for a single state, but for society as a whole, since implementation of the sustainable development concept has planetary significance;
- identification of methodological basis of the study in the form of the system-process approach;
- conducting the analysis of existing developments regarding the impact of higher education on implementation of the sustainable development concept and proving the need for further research into the aforementioned issues;
- identifying shortcomings inherent in the content, composition and process of implementing educational programs at the level of higher education institutions, in terms of intensifying formation of professional socio-ecologically oriented competencies in students of higher education institutions to ensure implementation of the sustainable development concept;

- justification of the integrated approach that encompasses theoretical and practical training of students in acquiring socially and environmentally oriented competencies;
- identifying stages of organizational support for professional development of young specialists for implementation of the sustainable development concept and stages of forming students' socio-ecological competencies.

Methodology

Methodological basis of this study is the use of the system-process approach. It is impossible to cover all features of the object of study without using the system approach, which is the interdisciplinary methodology and involves the use of wide range of methods of scientific knowledge, including induction, deduction, synthesis, analysis and other methods. The system approach makes it possible to simultaneously combine specific features of the higher education system and the sustainable development concept, which is the system of economic, social and environmental levers of social development. It is thanks to the system approach that specific features of higher education and sustainable development as processes of different nature are taken into account and their systematicity and mutual influence are determined, which effectiveness is greater than the sum of individual results. It is the system approach in studying the impact of higher education on implementation of the sustainable development concept that makes it possible to comprehensively and comprehensively investigate vertical and horizontal connections and processes. At the same time, the process approach makes it possible to more accurately take into account interdependence of diverse factors that arise within the framework of the impact of higher education on implementation of the sustainable development concept, as well as directly by formation of professional socially and environmentally oriented competencies in students of higher educational institutions to ensure implementation of the sustainable development concept. Thus, the system-process approach is a sound

methodological basis for studying the impact of higher education on implementation of the sustainable development concept through formation of socially and environmentally oriented competencies in students of higher educational institutions.

Literature Review

The issue of developing higher education in the sustainable development context is relevant among modern domestic and international scientists. The paper (Handoyo E. et al., 2024) investigates integration of prospective students' global attitudes towards environmental conservation culture in higher education and its contribution to sustainable development. The authors believe that the study demonstrates current views of students on environmental conservation and supports the use of this tool in educational research and conservation policy.

Scientists (Göçoğlu Volkan, 2025) have investigated that most universities pay attention to sustainability from institutional and social aspects, with 45% or higher shares, environmental issues are considered low. Findings of the study reveal the priority of SDGs in Western countries, similarities and differences in determining priorities of SDGs in samples of different countries taking into account geographical and regional affinity. The authors are convinced of the need to promote and encourage activities to implement sustainability initiatives. The study (Chusniyah A. et al., 2025) analyzes intellectual structure that is being formed in educational management and provides guidelines for scholars in the context of ensuring sustainability. The authors propose the knowledge map for future research on sustainable development in higher education management.

The authors (Shevchuk N. et al., 2021; Popelo O. et al., 2024; Kholiavko N. et al., 2023) investigated features of transformation of industrial parks into eco-industrial ones in the sustainable development context, and considered current trends in digitalization of universities according to the sustainable development concept. The paper (Cubas A.L.V. et al., 2024) focuses on three key objectives: illustrating successful, replicable sustainability strategies, analyzing their

implementation and outcomes, and contributing to the discourse on sustainable practices in higher education. The scholars propose the model for higher education institutions around the world that seek to align their academic, research, and community engagement efforts with sustainable development goals.

The aim of the study (Ebekozién A. et al., 2025) is to develop measures to improve the infrastructure of public higher education institutions and achieve sustainable development related to Goal 4, focusing on the infrastructure through the developed framework. The research (Marhasova V. et al., 2023; Arefiev S. et al., 2022; Kholiavko N. et al., 2022) is based on an analysis of the impact of digitalization and war on development of higher education in the context of sustainability.

Researchers (Grunwald G. et al., 2025) proposed adapting the Kano model as a quality management tool to prioritize students' demands for sustainable transformation of higher education institutions. The results of the analysis showed that expectations for sustainable transformation and their priorities differ across countries. The study (Lopes Laura Mafalda Carvalho et al., 2025) demonstrates significant contribution of universities to achieving the SDGs, with a particular focus on health and education. The authors emphasize the institution's mission, which involves training competent and socially conscious professionals.

The research (Ferk Savec V. et al., 2025) demonstrates that integrating AI into higher education can contribute to progress towards 11 development goals and 28 targets by promoting innovation, equity, and digital literacy. The authors analyze synergies between digital and environmental transformations.

However, given global trends, including depletion of natural resources and increasing environmental burden, the need to implement principles of sustainable economic development is becoming increasingly obvious; accordingly, formation of relevant knowledge and skills in students will contribute both to their professional competitiveness, and increasing the ability of society to transition to sustainable models of production and consumption, which actualizes the need for further research into the above-mentioned issues regarding the impact of higher education on implementation of the sustainable development concept.

Results

It is worth noting that despite available wide range of objective prerequisites for intensified formation of professional socio-ecologically oriented competencies in students of higher educational institutions to ensure implementation of the sustainable development concept, today domestic educational system is characterized by many shortcomings inherent in the content, composition and process of implementing educational programs at the level of higher education institutions, which are reflected in the following phenomena:

First, the lack of the systematic approach to integrating socially and environmentally oriented professional competencies into the curricula of academic disciplines, which makes it impossible to comprehensively master relevant knowledge and skills in the sustainable development context of the economy, both from the perspective of implementing the main activity and individual functional areas of entrepreneurial education;

Second, the lack of coverage of theoretical and practical aspects of implementation of conceptual provisions of the sustainable development theory of economics within individual academic disciplines, which in turn limits functional application of the knowledge base of applicants within sustainable development;

Third, low level of coherence in the context of the interdisciplinary connection of individual training courses in terms of development of socially and environmentally oriented competencies, which, on the one hand, leads to unjustified repetition of previously mastered material, and on the other hand, limits possible acquiring of more progressive methods within the specific training course;

Fourth, limitations of control and certification procedures in terms of monitoring the mastery degree of competencies within sustainable development by higher education applicants;

Fifth, the lack of presentation of practice-oriented tasks in terms of developing competencies in the analysis, evaluation and application of sustainable development of economics tools in managing the business structure;

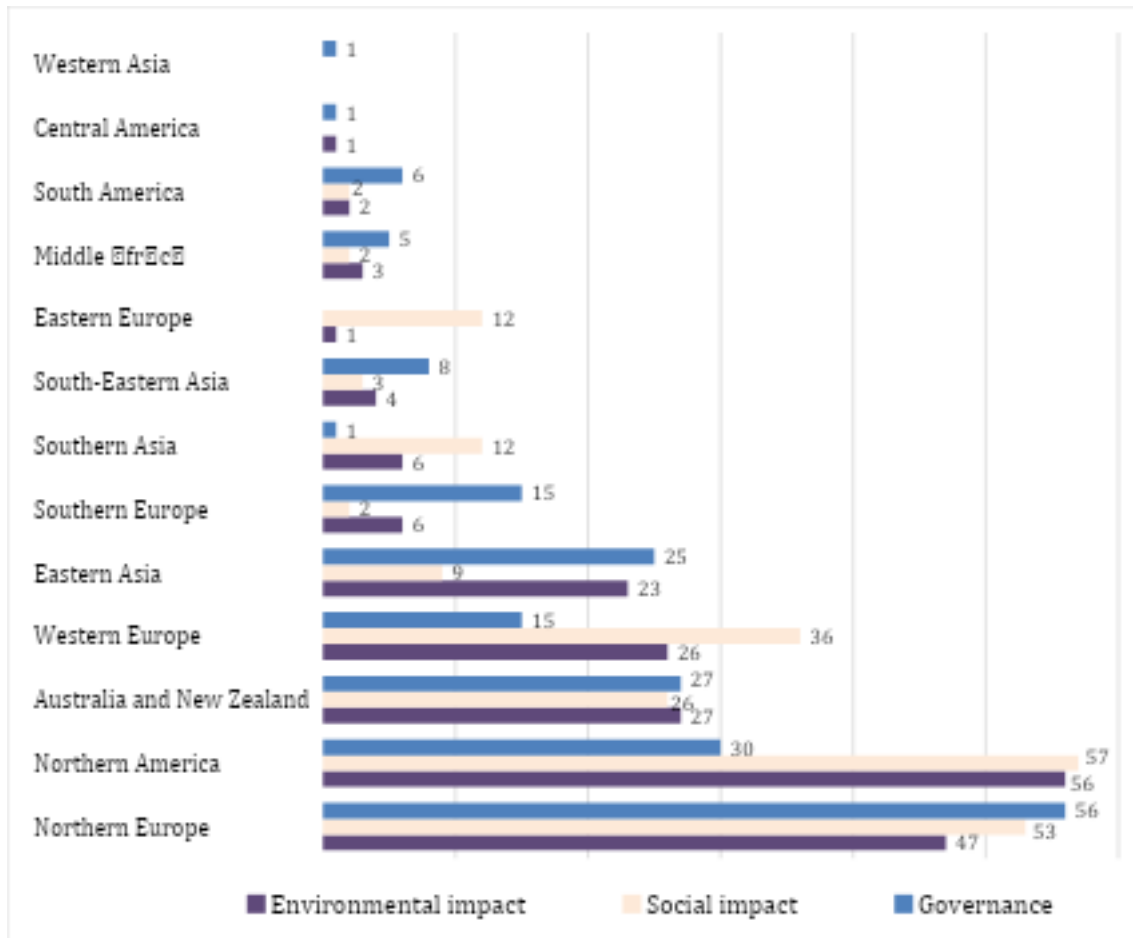
Sixth, formalized involvement of socio-ecologically oriented aspects in the course of teaching courses, which makes it impossible to develop in-depth understanding of the place and role of the economy of sustainable development among applicants within the framework of the specific disciplinary direction of organizing the educational process;

Seventh, excessive objectification of the educational process in terms of acquiring professional socio-ecologically oriented competencies in the sustainable development context, which limits philosophical and value aspect of this direction of modern social development.

Thus, based on the above justification of importance and relevance of the raised issue of formation of socially and environmentally oriented competencies of students of higher education institutions for implementation of the sustainable development concept, the issue of ensuring proper functionality of the educational process, i.e. its ability to integrate relevant competency elements and their successful mastery by applicants, integrated from the point of view of available spectrum of educational disciplines, and enriched in value from the position of subjective elements of relevant professional competence, acquires special importance.

In Fig. 1, trends in development of universities based on sustainable development are presented, with the highest indicators being Northern America and Northern Europe.

Figure 1 – QS World University Rankings: Sustainability 2025



Source: <https://www.qs.com/insights/articles/qs-world-university-rankings-sustainability-2025-now-live>.

Socio-ecological competence can be defined as the ability of specialists to perform their duties at high level, achieving significant results and realizing their personal potential. It is assessed by correspondence of the specialist's professional knowledge and skills to their professional position and psychological qualities, reflecting the degree of connection between objective standards of professional activity, defined by regulatory documents, and subjective capabilities of the individual.

Considering “competence” from the perspective of mobilizing one’s own resources (skills, attitudes, knowledge, experience and values) and those of the environment to effectively and responsibly address situations and tasks in diverse

contexts, it is necessary to define the structure of adapted and flexible skills that corresponds to the cross-cutting nature of the circular economy.

In broad sense, the concept of “sustainability competence” encompasses skills needed to make decisions in complex transition processes, including systems thinking, design and a multifaceted approach that integrate knowledge and innovation competences. More narrowly, this competence includes specific aspects that depend on particular profession.

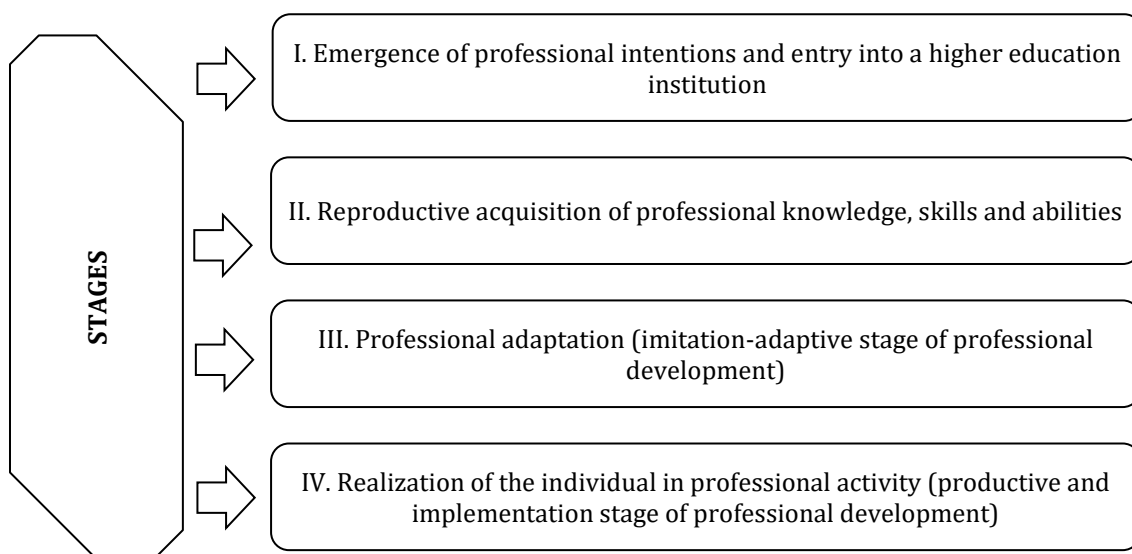
In general, three different areas are distinguished in the context of the development of competencies in higher education regarding implementation of the sustainable development concept, namely: technical, which are related to specific tasks in each profession, which are provided by specific educational components; general interdisciplinary - directly those that relate to some cross-cutting areas of knowledge necessary to support any profession; normative competencies - related to the vision and values necessary to implement the sustainable development concept. In turn, technical, general interdisciplinary and normative competencies provided by higher education institutions form in students such components as systems thinking, which makes it possible to look at certain problem in comprehensively; design, which consists in the ability to make effective decisions to solve problems and implement sustainable development principles; multi-perspective thinking, which makes it possible to evaluate a certain problem from different points of view and different levels of management.

Given the above, training in higher education of specialists for activities in the conditions of the sustainable economy is one of the key tasks of the modern higher education system, which determines the emphasis on this area, since the world community is increasingly aware of the need to transition to sustainable development models. The economy of sustainable development, based on principles of conservation and optimal use of resources, waste minimization and environmental responsibility, social orientation of economic development requires new knowledge and skills from future professionals. In this regard, public administration in higher education should be aimed at adapting educational

programs to requirements of the labor market, integrating the interdisciplinary approach that includes economic, environmental, technological and social aspects.

Higher education management should include organizational socio-economic support for professional development of young specialists in the context of sustainable development principles, which requires the integrated approach that encompasses both theoretical and practical training (Fig. 2). These training includes development and implementation of educational programs that contribute to formation of necessary technical skills for specific professions, interdisciplinary knowledge that supports a broader understanding of environmental processes, and normative competencies related to environmental awareness and sustainable development values.

Figure 2 – Stages of organizational support for professional development of young specialists for implementation of the sustainable development concept



Source: compiled by the authors.

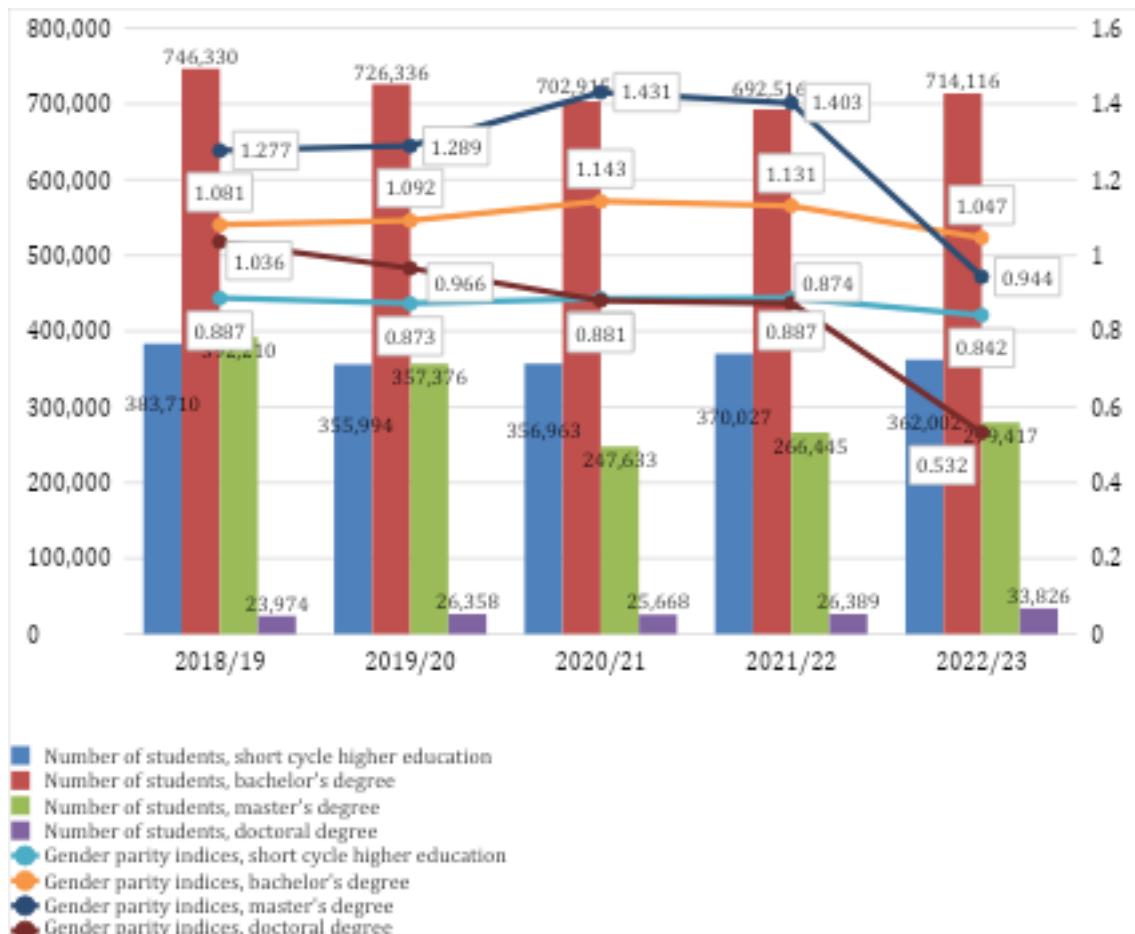
An important role is played by creation of learning environment in higher education that stimulates active involvement of students in solving real environmental problems, using modern technologies and methods, which not only prepares them for professional activity, but also forms in them strong desire for personal participation in practical solution of environmental problems and social development.

Thus, formation of socio-ecological competencies of students in higher education to ensure implementation of the sustainable development concept is a multifaceted process that requires careful approach and adaptation of educational programs to modern requirements. It is important to understand what specific skills should be formed in higher education in students for successful work in accordance with sustainable development principles.

An important component of higher education in training specialists for activities in the sustainable development context is development of environmental awareness and responsible attitude to resources. Students should not only understand principles of sustainable development, but also be prepared for their practical application in their professional activities, which will contribute to formation of new generation of specialists capable of promoting sustainable development and implementing innovative solutions in various sectors of the economy for practical implementation of the sustainable development concept.

Figure 3 presents current trends in development of higher education in Ukraine. Thus, in the 2022/23 academic year, 362,002 students studied in short-cycle higher education, 714,116 students studied in bachelor's degree programs, 279,417 students studied in master's degree programs, and 33,826 persons studied in doctoral programs, with gender parity indices of 0.842, 1.047, 0.944, and 0.532, respectively.

Figure 3 – Dynamics of the number of students in educational institutions of Ukraine and gender parity indices, 2018/2019-2022/2023



Source: compiled by the authors.

The process of forming students' socio-ecological competencies occurs gradually and goes through three stages, each of which corresponds to certain level of development of these competencies.

The first stage of forming socio-ecological competencies aims to arouse students' interest in modern socio-ecological problems and develop emotional and value-based attitude towards nature. On this basis, awareness of the need to preserve natural environment as an important value and understanding of the social significance of environmental activities are formed. Students begin to feel their involvement in solving problems that arise in interaction of society and nature. The result of this stage is positive attitude towards environmental activities and socially oriented social development.

The next stage of forming socio-ecological competencies includes formation of the system of environmental knowledge, which serves as an indicative basis for further environmental activities of students as graduates of higher education institutions. They develop ecological worldview, which encourages them to creative activity, self-development and self-realization. This stage is actualized through educational, self-educational activities and participation in practical environmental activities. Students gain experience in practical matters aimed at preserving and improving the state of the environment.

The third stage of forming socio-ecological competencies involves consolidating experience in environmental activities. Students analyze their role in solving environmental problems. The result of this stage is steady desire for personal participation in practical solution of environmental issues and awareness of importance of environmental knowledge and experience in sustainable development.

Based on the above, higher education and science should be focused on predicting future trends in the world's development, as well as on helping current and future generations adapt to irreversible changes in the way of life of people and society. Accordingly, innovative technologies are becoming particularly relevant in the context of formation of socio-ecological competencies of higher education students at the current stage of society's development, which includes feasibility and necessity of using online resources during training, using workshop opportunities and networking. Digitalization of the educational process, practice-oriented training, acquisition of specific applied skills and abilities, as well as the real focus of educational process are key aspects that contribute to effective formation of socio-ecological competencies in higher education students.

Management in higher education in the context of forming socio-ecological competencies of applicants in accordance with sustainable development principles and identifying general patterns of social development requires the integrated approach, which involves not only assessing the main parameters of training specialists in higher education, but also taking into account factors that influence its implementation.

Training of specialists in higher education is important step towards implementation of the sustainable development concept and efficient use of resources. Formation of socio-ecological competencies in students for activities in the conditions of sustainable development requires the integrated interdisciplinary approach that combines social and environmental aspects. Introduction of these approaches into the educational process creates the basis for training specialists who can work effectively and adapt to requirements of the sustainable economy formation.

Discussion

Supporting research (Abdelnaeim S. et al., 2025), it is appropriate to pay attention to studying the role of the quality of higher education services in influencing psychological state of students through the prism of sustainable development goals. The authors consider achieving the goal by studying the impact of the quality parameters of functional and technical services on six parameters of psychological well-being: mastery of the environment, autonomy, self-perception, positive relationships with others, personal growth and purpose in life. Scientific articles (Kholiavko N. et al., 2021; Tulchynska S. et al., 2021) demonstrate significant role of universities in development of eco-industrial parks from the perspective of sustainable development.

Considering relevance of the study (Sawani Y. et al., 2025), it is worth noting the analysis of factors that encourage higher education institutions to disclose their initiatives on Sustainable Development Goals. Researchers investigated that four main factors that encourage higher education institutions to disclose their practices in achieving Sustainable Development Goals are curriculum, research activities, human resource management, and collaboration in research and activities.

It is advisable to pay attention to the research (Djakona, A. et al., 2021; Kholiavko N. et al., 2021), which considers education as a dominant factor in development of the information economy and sustainable development, as well as

an integrated model of financing higher education according to the concept of four spirals.

Interestingly, results of the research (Rodríguez-Zurita D. et al., 2024) reveal two important trends: a significant shift from curriculum development to education for sustainable development, and effectiveness of experiential learning approaches, such as integrating SL with community engagement and using innovative research methods to promote acquisition of sustainable development competencies. The researchers concluded that stakeholders should incorporate experiential learning and innovative research approaches to improve education for sustainable development.

The analyzed achievements of scientists once again proved relevance of studying current trends in the impact of higher education on sustainable development.

Conclusions

Formation of socio-ecological competencies in students for activities in the sustainable development context is extremely urgent task, because in the context of global environmental challenges, such as climate change, depletion of natural resources and environmental pollution, the need to transition to the economy based on sustainable development principles is becoming increasingly obvious. Higher education plays a key role in training young specialists who can implement principles of sustainable development economics in their professional activities.

The socio-ecological aspect of competence development requires the integrated approach that includes both theoretical and practical training, as well as development of environmental awareness and responsible attitude towards nature. First of all, it is important to provide students with necessary technical knowledge and skills that will allow them to work effectively in the conditions of sustainable development, which includes studying technologies for recycling and reusing resources, developing sustainable production processes and implementing innovative solutions that reduce environmental impact. Theoretical training should

be complemented by practical classes that give students the opportunity to apply the acquired knowledge in practice, participating in real projects. No less important is development of general interdisciplinary skills that contribute to comprehensive development of students and increase their ability to adapt to changing labor market conditions, which includes knowledge from various fields such as economics, ecology, engineering, management and social sciences.

The integrated interdisciplinary approach allows students to gain comprehensive understanding of principles of sustainable development economics and understand their interrelationships, which contributes to more effective solving of complex problems. As a result, formation of socio-ecological competencies in students for activities in the conditions of formation of the sustainable development economy is a key task of modern higher education, which requires innovative approaches and close cooperation of all stakeholders, which will contribute not only to professional development of students, but also to formation of new generations of specialists capable of contributing to sustainable development and environmental friendliness.

The scientific novelty of the study lies in substantiation of the integrated approach that encompasses theoretical and practical training of students in acquiring socially and environmentally oriented competencies, identification of stages of organizational support for professional development of young specialists for implementation of the sustainable development concept and stages of formation of students' socio-ecological competencies based on identification of shortcomings inherent in the content, composition and process of implementing educational programs at the level of higher education institutions and determination of the causal nature of the processes of actualization of the impact of higher education information of professional socially and environmentally oriented competencies in students of higher education institutions for implementation of the sustainable development concept.

Further research is required to substantiate the set of socially and environmentally oriented competencies of students of higher education institutions

for implementation of the sustainable development concept, taking into account specifics of territorial development.

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