

DOI <https://doi.org/10.32405/2308-3778-2025-29-2-97-109>

УДК: 374.013.83

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IMPLEMENTATION OF DIDACTIC PRINCIPLES IN ENVIRONMENTAL EDUCATION

Abstract. *The article analyzes the current state of environmental education in the EU and, in particular, in Poland, as well as the main methods and principles for achieving the main goal of pro-environmental education.*

The purpose of the publication is to study the state of environmental education in Poland, which is an integral element of socio-economic programs aimed at implementing a new ecological era. Achieving the goal involves the implementation of the following tasks: studying the state of implementation of environmental disciplines in curricula and non-traditional educational activities, studying the process of pedagogical and educational influence on people to form their consciousness, personality and environmental attitudes, popularizing environmental problems among children and youth and forming environmental attitudes for the National Environmental Policy, improving environmental education as a component of the multifaceted development of the human personality, understanding threats, sensitivity to the destruction of the natural environment and reactions to its degradation.

The theoretical basis comprises international and domestic materials on the impact of environmental education on the formation of quality and lifestyle in Poland and worldwide, as well as scientific works by scholars devoted to the study of the formation of environmental consciousness and culture. To achieve the set goal, the following research methods were used: monographic (analysis of scientific publications, in particular the author's publications); abstract-logical (theoretical generalizations and the formulation of conclusions); analogies and comparisons, etc.

The importance of environmental knowledge in the formation of emotional-affective attitudes for the development of education seekers' personalities, and the importance of the teacher's role in achieving the depth of the listener's spiritual sphere, are proven. It is found that the goals of education serve as a reference point for everything to be compared and evaluated. They have a regulatory meaning (guarantee against excessive expansion of resources) and an organizational meaning (educational structures and programs, methods, and means of teaching), give human meaning to the knowledge transmitted, and, at the same time, motivate those who strive to gain knowledge. They have a coordinating nature, strengthen and stimulate enthusiasm, inspire, and lead to the future. The article demonstrates the validity of the ecocentric idea and the importance of the modernized view that the highest good is the harmonious development of man and nature (people are part of nature). The author gives practical examples of the implementation of didactic principles of environmental education. The project for the development of environmental education aimed to build an educational system and identify the skills that should be developed, and it is already demonstrating the effective consequences of changing Europeans' consciousness.

Keywords: *modern teaching methods, interdisciplinarity of education, environmental education, environmental awareness, environmental culture, formation of the spiritual sphere of the listener.*

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Introduction. Environmental education is top of the agenda, because what good is arithmetic and reading if there is no life on Earth?

Modern teaching methods emphasize the need for comprehensive, interdisciplinary education. To teach about the natural environment and the anthropogenic impact on its components, teachers must have broad subject knowledge and develop flexible pedagogical skills.

First of all, environmental education should shape students' emotional attitudes and reach the depths of their spiritual sphere. The best results are achieved when students learn about processes, the evaluation of phenomena occurring in nature, and ethical behavior in the environment. This offers hope of success and the expectation that these values will guide students in the future and encourage them to actively participate in activities aimed at shaping and protecting the environment. In turn, environmental education should be continuous, as it is a sign and requirement of our time. In this way, it will reveal to people their fundamental duty in life: the need for continuous education for self-realization and self-preservation in a qualitatively new way of life. A person is a person only to the extent that they are aware of the constant creation of oneself.

Education encompasses all people; it is an inevitable process and a strict obligation. The goals of education are the point of reference against which everything should be compared and evaluated. Goals have regulatory significance (a safeguard against the over-expansion of resources) and organizational significance (school structures and programs, teaching methods, and tools). Objectives give human meaning to the knowledge to be transmitted and, at the same time, motivate those who seek to acquire knowledge. They are coordinating: they provide a pinnacle to which everything is directed; they reinforce and stimulate enthusiasm; they inspire today and lead us into tomorrow.

Purpose and objectives. The purpose of the publication is to study the state of environmental education in Poland, which is an integral element of socio-economic programs aimed at implementing a new ecological era.

Achieving this goal involves the following tasks:

1. To study the state of implementation of environmental disciplines in curricula and change society's environmental awareness through non-traditional educational activities.
2. To study the process of pedagogical and educational influence on people to form their consciousness, personality, and environmental attitudes.
3. Popularization of environmental problems among children and youth and the formation of environmental attitudes is a leading principle of the National Environmental Policy.
4. Improvement of environmental education as a component of the multifaceted development of the human personality, understanding of threats, sensitivity to the destruction of the environment, and active response to its degradation.

Research methods. The theoretical basis of the work is international and domestic materials on the impact of environmental education on the formation of quality and lifestyle in Poland and worldwide, as well as scientific works by domestic scientists devoted to the study of the formation of environmental awareness and culture. To achieve this goal, the following research methods were used: monographic (study of scientific publications, including the author's publications); abstract

and logical (theoretical generalizations and formulation of conclusions); analogies and comparisons, etc. The method of information search in printed and electronic publications and in searchable scientific databases was used.

Research results. In the educational process, the teacher is an expert in teaching others. They cannot know everything, but they should know how to develop students' key skills, including

- ability to communicate and present their own point of view,
- ability to work in a team, negotiate and maintain contacts,
- ability to act, to use work techniques and tools, and to manage time [8, 11, 13].

The educational process is defined as the interaction between a teacher and students aimed at causing relatively lasting changes in the way students think and act. There are two processes in the educational process: learning by the student and teaching by the teacher. The main goals of education, which are a common good of a social nature, include [12]:

- ensuring intellectual development through familiarization with the basics of knowledge,
- development of cognitive abilities and interests,
- formation of a scientific view of the world,
- introduction of self-education,
- familiarization with the basics of production and work organization,
- acquisition of manual skills along with intellectual ones.

The goals of education and upbringing are related to the educational process in every field of science. In our case, it is environmental education, with a special emphasis on knowledge related to personal health [2, 7].

In 1870, E. Haeckel introduced this term into science and predicted that, in a hundred years, it would become commonplace. According to the commonly accepted meaning, ecology is the science of understanding the systems of living organisms and their relationship with the environment and other living organisms.

The ecological crisis, as a crisis of anthropocentric knowledge, is also known as a «crisis in the head. The technical paradigm of the twentieth century is so strong that humanity has been forced to control industrial technology and enact environmental protection laws. Since the ecological crisis arose from the technological crisis, it is necessary to correct and restore this process [19].

The realization that anthropocentric environmental behavior leads nowhere is at the heart of the psychological ecological crisis. This is a new ecological paradigm characterized by the following features:

- man, regardless of his unique nature, remains one of many living beings on Earth, within the entire global system;

- human activity is determined not only by social and cultural factors, but also by complex biophysical and ecological constraints (he lives in the natural environment);
- although man, as a thinking being, can solve problems, this does not mean that he can violate the laws of ecology [25].

The validity of the ecocentric idea is demonstrated by the idea that the highest good is the harmonious development of humans and nature (humans are part of nature). Although humans have reason, this does not mean they can control nature's benefits. On the contrary, reason is intended to help them understand and interact with nature. Therefore, we must abandon the hierarchical image of the world. The impact on nature can be limited to meeting human needs, but without violating the needs of the entire ecosystem. We should not forget that nature and all animals are full partners with humans, and the ethical norms that apply in human-animal interactions also apply between humans and the natural world [10, 14, 20]. The development of nature and humans should be understood as a process of co-evolution.

Similar to education in many fields of science [4, 20], the basic didactic principles can be applied to environmental disciplines, depending on the goal (Table 1).

The principle of demonstration involves associating words, things, and actions. It defines the proper place for the spoken and written word, but does not give it exclusivity in the learning process. Teachers often use this principle and allow students to achieve their goals through careful preparation of content material. It plays a special role in environmental studies due to its versatility. The principle of gradation of complexity, or the principle of accessibility in education, involves the transfer of material in order from the easiest to the most difficult, taking into account differences in the pace of work and the learning process. When defining objectives and tactical plans, care should be taken to convey the most essential points and determine the most effective methods. There is no need to justify the use of this principle in environmental subjects.

The principle of the learner's conscious and active mastery of knowledge is one of the principles of modern didactics. To implement this principle, the teacher should take a personal interest in the student to meet his needs and motivate him to learn. The teacher does not replace students' work with their own. He is aware of the student's goals, encourages active learning, self-control, and self-assessment of the results achieved.

The principle of systematicity is fundamental in the learning process. The main defining features of this principle are:

- determining the state of initial knowledge and building on this knowledge,
- establishing a meaningful center of gravity for lessons,
- using notes and repetition,
- paying special attention to the correct expression of ideas both orally and in writing.

The principle of regularity obliges the teacher, first of all, to prepare the lessons carefully and to use tests and quizzes frequently. My experience shows [3, 10] that the best results are achieved by rewarding rather than punishing. Excellent grades usually motivate students to work, while bad grades discourage them. It is necessary to check the student's preparation, the method used, and the degree of performance on the assigned work. Often, a teacher will give an assignment and then move on to the next topic without checking the results or evaluating the student's efforts. This is not the best way to foster a love of learning.

In ecology classes, a five-point system for evaluating student activity is used and checked with a short survey before the start of the class [20] (figure 1).

Due to its unique location and large number of industrial enterprises, Krakow faces several environmental threats. In winter, when large quantities of fossil fuels are burned, the atmosphere is polluted with chemical compounds such as:.....

This contributes to the formation of smog, which is characterized by

The most important industrial enterprise in the city is the T. Sendzimir Steel Plant. This source of anthropogenic emissions will pollute the air with compounds:.....

Fortunately, the plant is equipped with a number of dust collection devices. Dust collectors such as:.....

....., Fortunately, the plant is equipped with a number of dust collection devices. Dust collectors such as:.....), neither chemical nor biological.

In our country, only small plants use thermal (at a temperature of..... K) or catalytic (at a temperature of..... K) combustion. Catalytic afterburning is an expensive process due to the high price of the active ingredient, which can The requirements for catalysts are also high:

a.....

b.....

c.....

d.....

e.....

The release of toxic substances into the environment leads to the formation of acid rain with a pH of Acid rain causes a lot of damage to the environment and the human economy, in particular.....

The energy sector emits CO₂, a greenhouse gas whose share in the greenhouse effect is%. The second most important component of the greenhouse gas layer is methane, and the sources of its emissions are (at least 3 will disappear)

In the summer, Krakow is empty because the photochemical smog and urban heat island characteristic of become unbearable. Residents of Krakow get into their cars (equipped with catalytic converters and a probe) and head to the coast to expose their bodies to sunlight. Sunbathing can be enjoyable, but you should remember not to exceed your daily dose of ultraviolet radiation. MEDIUM (MEDIUM –). Otherwise, your skin may be exposed to and your eyes to

CFCs destroy the ozone layer, which lies at an altitude of km above the Earth's surface. The mechanism of ozone depletion by CFC molecules is as follows: Fortunately, the industrialized countries of the world limit the production of CFCs (CFCs are.....

.....), which were previously used on a massive scale in the:

a.....

b.....

c.....
d.....
Other ozone-depleting compounds include: halons (see above), solvents: trichloroethane (see above.....), carbon tetrachloride (see above.....).

Figure 1. An example of a test for crediting lecture classes in environmental protection and engineering

The principle of sustainability of knowledge is difficult to implement because of the different levels of students' interest in a particular problem. Therefore, it is necessary to take into account the teacher's activities, such as motivating students and encouraging active participation, frequent repetition of information, and the principles of systematicity and monitoring of learning outcomes.

The principle of the effectiveness of students' knowledge is among the most important. It is aimed at developing the ability to use knowledge in thinking and action. It requires the student to reason, draw conclusions, demonstrate, explain, and verify.

The principle of linking theory to practice involves the rational use of theoretical knowledge in both the classroom and extracurricular activities. People learn best when they do something, not when they listen to words and instructions.

Table 1

Basic didactic principles of environmental disciplines

<i>Didactic Principle</i>	<i>Essence</i>	<i>Application in Environmental Disciplines</i>
<i>Demonstration</i>	Association of words, things, and actions; the spoken and written word has an important but not exclusive role.	Plays a special role due to its versatility; it helps teachers achieve their goals through careful content preparation.
<i>Gradation of Complexity (Accessibility)</i>	Transfer of material from easy to difficult; considers differences in pace of work and learning.	Effective for structuring environmental content; ensures gradual progression and clarity of key objectives and methods.
<i>Conscious and Active Mastery of Knowledge</i>	Learner's awareness, motivation, self-control, and self-assessment are emphasized; the teacher encourages but does not replace the student's work.	Supports active learning and individual motivation in environmental studies; develops autonomy and responsibility.
<i>Systematicity</i>	Building on prior knowledge, establishing a central focus, using notes, repetition, and stressing correct oral and written expression.	Ensures coherence in environmental education; strengthens understanding through structured progression and communication.
<i>Regularity</i>	Careful lesson preparation; frequent testing and feedback; preference for rewards over punishment; consistent checking of student performance.	Enhances motivation through positive reinforcement; prevents neglect of tasks; fosters consistent engagement in environmental learning.
<i>Sustainability of Knowledge</i>	Challenging to implement due to varied student interests; requires motivation, encouragement, repetition, systematicity, and monitoring of outcomes.	Helps consolidate knowledge in environmental studies; ensures long-term retention through active participation and regular practice.
<i>Effectiveness of Knowledge</i>	Focuses on the ability to apply knowledge in thought and action; requires reasoning, drawing	Encourages practical application of environmental knowledge; develops analytical and problem-solving skills.

<i>Didactic Principle</i>	<i>Essence</i>	<i>Application in Environmental Disciplines</i>
	conclusions, demonstrating, explaining, and verifying.	
<i>Linking Theory to Practice</i>	Rational use of theoretical knowledge in the classroom and extracurricular activities; learning by doing is more effective than passive listening.	Strengthens practical orientation of environmental education; fosters experiential learning and real-world problem-solving.

The success of a teacher should also be evaluated in terms of the mental and physical activity they stimulate [2, 17, 20]. As we can see, there are several teaching principles that, when skillfully applied, can yield concrete results.

Discussion. As is well known, the goal of environmental education concerns the student and leads to specific psychological changes, thereby influencing knowledge and behavior. Fostering a spirit of purposefulness energizes the entire educational system. It supports the conviction of students and teachers not to take on something they do not understand the meaning or purpose of [20].

We fully share the opinion that the goal of environmental education concerns the student and leads to specific psychological changes, and therefore to changes in knowledge and behavior. E. Gozhlińska [p. 158] defines educational goals as a set of knowledge and skills adapted to the level of development of the specified discipline. General educational goals consist of tasks, intermediate goals, and ultimate goals. To achieve the ultimate goal, it is necessary to achieve intermediate goals, which should be developed, tested and experimented with at the level of the educational institution.

However, regardless of this division, the goals of education include: respect for work, formation of character and personality (the formation of a person), strengthening of national unity and loyalty, and equality of educational opportunities. They also include preparing young people for participation in social and cultural life, preparing them for professional work, and ensuring their all-round intellectual, moral, physical, and aesthetic development. The source of progress in education lies in the competencies and skills of a good teacher. A Chinese proverb says: «He who counts weeks sows grass, he who counts years plants trees, and he who counts centuries teaches people».

Environmental education provides a holistic picture of the relationship between man, society, and nature, shows the dependence of man on the environment, and teaches responsibility for changes in the natural environment [23, 25, 27]. The international strategy of environmental education provides for an open process through which society acquires knowledge, masters skills, gains experience, and forms the will to act to solve environmental problems. In environmental education, it is necessary to understand the interdependence between ecology and economy. Such education stimulates environmental awareness, forms environmental attitudes and influences the formation of behavior that corresponds to respect for the environment. As K. Gorka, B. Poskrobko

and V. Radetsky emphasize [7], the goals of environmental education can be achieved only through simultaneous environmental training and upbringing.

Given the material presented in the main part, we can state that there are several directions for the development of environmental education and upbringing.

The conservative direction, based on the Earth sciences, advocates the transfer of reliable knowledge about nature without delving into social and economic aspects. Supporters of the *radical direction* emphasize the role of direct contact between man and nature (deep ecology) to the detriment of thorough knowledge about the environment. The most common trend among the popularizers of environmental education is the *moderate one*, which connects knowledge with education and actions in accordance with the philosophy of eco-development [10]. According to this concept, «environmental education should provide reliable knowledge about the environment, appeal to our imagination, awaken in us ecological consciousness on the one hand, and sensitivity to the beauty and richness of nature on the other, as well as form the ability and willingness to act for the sake of the environment».

Environmental education emphasizes less on the transfer of theoretical knowledge to students and more on practical skills, actions, the formation of interests, and responsibility for one's own actions. The latest concept of educational work involves the implementation of programs within integrated subjects [18]. The teacher's skills and competencies play a special role here, while the substantive information he provides is relegated to the background. As can be seen, environmental education has a holistic character: knowledge of nature occurs through understanding one's own personality, revealing imagination and intellectual abilities, and stimulating creativity. Environmental education is a way of life, respect for nature, and personal participation in environmental issues [16, 17]. It also involves supporting a healthy lifestyle and transferring this model to others: family, students, colleagues, friends [11].

The two selected sources by S. Tolochko, N. Bordiug, L. Mironets, and colleagues complement each other by addressing the problem of environmental education from different yet interconnected perspectives: while the article in *Amazonia Investiga* [21] offers a conceptual framework for understanding ecological culture as a multidimensional construct shaped by values, knowledge, attitudes, and behaviors in the context of digitalized and modernized education, the monograph chapter [22] provides a more practice-oriented focus, presenting project technologies as effective tools for developing environmental competence among high school students, particularly in overcoming the severe ecological consequences of war; together, these works highlight both the theoretical foundations and methodological pathways for integrating ecological awareness into educational practice, though they also reveal certain limitations, such as the need for broader empirical validation and adaptation to diverse socio-cultural and crisis contexts.

Conclusions. In 1992, the Sejm (the lower house of parliament) approved a document titled «National Environmental Policy». This document paid considerable attention to environmental education. It was estimated that the effects of environmental education in society would become apparent in about twelve years, but the implementation of this course of action could not be postponed. The National Environmental Protection Fund is financed by investments in air, soil, and water protection, and support for educational activities is also mandatory.

The main goal of environmental education is to change society's mindset, influence changes in habits and attitudes towards nature, and foster appropriate relationships among people, nature, and the environment.

This goal will be achieved through multifaceted education. Both in terms of information dissemination and learning in the spirit of integration with nature. Attitude formation will occur through the development of sensitivity to environmental problems using all forms, methods, and means of influence.

The Environmental Education Development Project aimed to develop an education system and identify the skills that should be developed. National strategies take into account recommendations for core curricula, which recommend, first of all:

- explaining the concept of sustainable development;
- defining the goal of environmental protection;
- explaining the relationship between man and the environment;
- forming the belief that environmental protection, based on the principle of ecocentrism, contributes to better satisfaction of human needs;
- explaining to primitive societies the need for sustainable use of natural resources;
- explaining that the cause of environmental degradation is mainly the lack of environmental awareness and ethics.

The environmental education program should address the following key issues:

- quality of human life in the context of knowledge of the principles of hygiene. The importance of prevention. Human addictions. Human adaptation to new living conditions;
- the scientific significance of activities aimed at preserving nature;
- preserving the integrity and productivity of nature;
- human responsibility for the state of the natural environment;
- development of ecoethics and ecological philosophy;
- sustainable development of ecotourism as an educational component, etc.

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РЕАЛІЗАЦІЯ ДИДАКТИЧНИХ ПРИНЦИПІВ В ЕКОЛОГІЧНІЙ ОСВІТІ

Анотація. Стаття присвячена аналізу сучасного стану розвитку екологічної освіти в ЄС, зокрема в Польщі, а також представлено основні методи й принципи досягнення головної мети проєкту екологічної освіти.

Метою публікації є дослідження стану екологічної освіти в Польщі, яка є невід'ємним елементом соціально-економічних програм, спрямованих на пізнання нової екологічної ери. Досягнення мети передбачає виконання таких завдань: вивчення стану впровадження екологічних дисциплін у навчальні програми та нетрадиційні освітні заходи; дослідження процесу педагогічного й виховного впливу на людей з метою формування їхньої свідомості, особистості та екологічних настанов; популяризація екологічних проблем серед дітей і молоді та формування екологічних настанов для Національної екологічної політики; удосконалення екологічної освіти як складової багатогранного розвитку особистості, усвідомлення загроз, чутливості до руйнування природного середовища та реагування на його погіршення.

Проаналізовано теоретичну основу проблеми, яка включає міжнародні та вітчизняні матеріали щодо впливу екологічної освіти на формування якості та стилю життя в Польщі та світі, а також наукові праці вчених, присвячені проблематиці формування екологічної свідомості й культури. Для досягнення поставленої мети використано методи дослідження: монографічний (опрацювання наукових публікацій, зокрема авторських); абстрактно-логічний (теоретичні узагальнення й формулювання висновків); метод аналогій і порівнянь.

Доведено важливість екологічних знань у формуванні емоційно-афективних настанов для розвитку особистості здобувачів освіти та значущості ролі вчителя у досягненні глибини духовної сфери слухача. Встановлено, що цілі освіти є пріоритетним орієнтиром, з яким слід зіставляти та оцінювати всі дії. Вони мають регулятивне значення (запобігають надмірному розширенню ресурсів) та організаційне значення (освітні структури й програми, методи та засоби навчання), надають вагомий зміст знанням, що передаються, і водночас мотивують тих, хто прагне їх здобувати, надихають і спрямовують у майбутнє.

Обґрунтовано доцільність екоцентричної ідеї та продемонстровано важливість сучасної модернізованої концепції, згідно з якою найвищим благом є гармонійний розвиток людини й природи (люди є частиною природи). У статті запропоновано приклади реалізації дидактичних принципів екологічної освіти. Загалом, проєкт розвитку екологічної освіти, який був спрямований на створення освітньої системи та визначення навичок, які слід формувати, і надалі демонструвати ефективні наслідки зміни свідомості європейців.

Ключові слова: сучасні методи навчання, міждисциплінарність освіти, екологічна освіта, екологічна свідомість, екологічна культура, формування духовної сфери слухача.

Стаття надійшла до редакції 12.07.2025
Стаття прийнята до публікації 27.08.2025