ENVIRONMENTAL EDUCATION: PRINCIPLES, OBJECTIVES, TYPES AND IMPLEMENTING AT HIGHER EDUCATION INSTITUTIONS

ROMANOVA Anastasia,
PhD, Associate Professor,
Modern Languages Chair,
Academy of Economic Studies of Moldova
romanova.anastasia@ase.md
ORCID ID 0000-0003-2683-9827

Abstract: *In recent decades, the concept "sustainability" has transcended its origins in environmental science to become a focus across disciplines and sectors worldwide. As global challenges like climate change, resource depletion, and social inequity escalate, the role of education, particularly in universities, has evolved to prioritize equipping students with the knowledge, skills, and values necessary to address these complex issues. This article explores how universities are increasingly integrating Education for Sustainability (ES) into their curricula and teaching methodologies. It emphasizes the shift towards interactive, experiential learning approaches that aim not only to inform but to empower students as agents of positive change in creating a sustainable future.*
Environmental education aims to foster students who are both aware of and engaged with environmental challenges. These students should develop the knowledge, skills, attitudes, motivation, and dedication required to address existing issues and prevent future ones, both on their own and in collaboration with others. Universities and higher education institutions are key to this mission, contributing through research, teaching, campus practices, and leadership. Historically, these institutions have played a vital role in advancing society by promoting human welfare and progress. Teachers need to incorporate environmental issues into their teaching using both formal and informal methods. Informal environmental education is particularly important for achieving the goals of ecologically sustainable development. This is supported by several key global agreements related to the environment and education that recognize the value of informal education as a complement to formal education. We define and describe current theoretical frameworks related to popular and informal environmental education. Next, we argue for the need to sustain growing interest in this practice and research to evaluate its contributions to sustainability effectively.

Keywords: environmental education, sustainability, informal education, higher education institutions.

1 INTRODUCTION

One of the major challenges for higher education institutions in the last decade has been (and will continue to be) the integration of environmental issue into their curricula and the development of sustainability awareness in students. Environmental education can help prepare students to meet the challenges of making societies more sustainable (Idoiaga *et al.* 2023). However, as a first step toward this goal, teachers need to incorporate environmental issues into their teaching. In this regard, we are going to analyze if members of the teaching staff have started this integration and, if so, which sustainability-related topics have been introduced and which skills do they consider contribute to the development of future graduates.

2 THE ROOTS OF ENVIRONMENTAL EDUCATION

Environmental education is a concept that started gaining international attention at the end of the 1940s. However, it was not until 1972 that the term was first officially coined. A few years later, in 1975, UNESCO, in collaboration with UNEP (United Nations Environment Programme), organized the First International Conference on Environmental Education.

The Belgrade Charter, adopted by a United Nations conference in 1976, provides a widely accepted goal statement for environmental education:

"The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (UNESCO-UNEP, 1976)

The first intergovernmental conference on environmental education resulted in the adoption of the Tbilisi Declaration, which built upon the foundational principles of the Belgrade Charter and outlined three primary objectives for environmental education. Since 1978 such significant frameworks as the Brundtland Commission, the United Nations Conference on Environment and Development in Rio, the International Conference on Environment and Society in Thessaloniki, and the 2002 World Summit on Sustainable Development in Johannesburg have shaped the evolution of environmental education. These frameworks emphasized the need to contextualize environmental issues within the broader scope of human activities. As a result, environmental education has expanded its focus to include dimensions of social equity, economic systems, cultural influences, and political structures.

In September 2015, global leaders at the United Nations (UN) General Assembly unanimously adopted the "Transforming Our World: the 2030 Agenda for Sustainable Development," considered one of the most ambitious and impactful global frameworks in recent decades (see Agbedahin 2019). Central to this agenda are 17 Sustainable Development Goals (SDGs), organized into five core categories: Planet, People, Prosperity, Peace, and Partnerships. These goals, encompassing 169 specific targets, aim to guide nations in a collaborative effort to address the world's most pressing challenges by 2030. These challenges include eradicating poverty and hunger, conserving natural resources, protecting ecosystems from degradation, combating climate change, ensuring all individuals lead prosperous, healthy, and fulfilling lives, and fostering peaceful, just, and inclusive societies free from fear and violence.

3 THE ROLE OF UNIVERSITIES AND HIGHER EDUCATION INSTITUTIONS IN PROMOTING SDGS

Over time, concepts like environmental education (EE), education for sustainability (EfS), and education for sustainable development (ESD) have developed, focusing on transformative learning methods that equip individuals with the knowledge, skills, and values needed to create a sustainable future. These approaches extend beyond mere information transfer, highlighting active learning, critical thinking, and problem-solving skills. They help students grasp the complex connections among social, economic, and environmental factors, prompting them to consider the larger global systems that influence sustainability and society, regardless of their academic discipline.

Universities and higher education institutions have a unique role in advancing societal goals, such as the Sustainable Development Goals (SDGs), through their contributions to research, teaching, learning, campus operations, and leadership. Historically, these institutions have been vital in fostering humanism and prosperity within societies, driving positive social change.

Moreover, none of the SDGs will be fully achieved without the contribution of academia.

3.1 The Objectives of Environmental Education

One of the most important ways in which universities can contribute to SDGs is to provide Education for Sustainability (ES). The SDGs themselves recognize the importance of creating the knowledge, skills, and mindsets that can enable different sectors (and learners in general) to achieve the SDGs.

The objectives of environmental education can be scientifically articulated as follows:

- **Awareness**: Facilitate the development of an acute awareness and sensitivity among individuals and social groups regarding environmental systems and associated challenges.
- **Knowledge**: Provide foundational and comprehensive knowledge to individuals and social groups about environmental systems, the interrelated nature of environmental issues, and the critical role of humanity in influencing and maintaining ecological balance.
- **Attitude**: Promote the formation of environmental ethics and values in individuals and social groups, fostering concern for the environment and generating motivation for active engagement in environmental preservation and restoration.
- **Skills**: Develop technical and problem-solving competencies among individuals and social groups to effectively address and mitigate environmental issues.
- **Evaluation Capacity**: Enhance the ability of individuals and social groups to critically assess environmental policies, initiatives, and educational programs based on ecological, political, economic, social, aesthetic, and educational considerations.
- **Participation**: Instill a sense of accountability and urgency in individuals and social groups, encouraging proactive and informed participation in the formulation and implementation of solutions to environmental challenges.

3.2 The Benefits of Environmental Education

Young people today have an increased sense of environmental consciousness and are interested in ways to protect and save the planet (Sammalisto, Lindhqvist 2008). Here are the benefits of environmental education (EE) summarized:

The benefits of environmental education (EE) can be outlined as follows:

- **Enhancing Academic Achievement**: EE improves student performance across various subjects and grade levels by incorporating interactive, nature-based lessons that are integrated into the curriculum, resulting in higher test scores.
- **Countering Sedentary Lifestyles**: EE mitigates the indoor-oriented habits of today's youth by promoting engagement with natural environments. Exposure to diverse outdoor settings encourages physical activity, increases awareness of nutrition, stimulates creativity, and improves social behavior.
- **Promoting Student Health**: EE fosters outdoor activity, addressing critical health issues among children, such as obesity, attention deficit disorder (ADD), and depression, through increased interaction with nature.
- **Supporting STEM Education**: EE provides an innovative and experiential platform for the learning and application of concepts in science, technology, engineering, and mathematics (STEM), enhancing students' practical understanding of these fields.
- **Addressing 21st-Century Competencies**: EE focuses on the development of essential skills for the future, such as inquiry, investigation, problem identification, analysis, reasoning, evidence-based conclusions, and problem-solving.
- **Fostering Leadership Development**: EE encourages cooperative learning, critical thinking, and real-world, action-oriented strategies, which help cultivate leadership qualities in students.
- **Improving Focus and Cognitive Function**: EE enhances students' attention and cognitive abilities, with exposure to natural environments particularly benefiting children with attention-deficit disorder, as greener spaces are associated with improved symptom management.

4 TYPES OF EDUCATION FOR PROMOTING SUSTAINABLE DEVELOPMENT

Higher Education Institutions (HEIs) play a critical role in advancing sustainable development (SD) and supporting the achievement of the Sustainable Development Goals (SDGs) through multiple avenues:

- **Integration of Sustainability in Curriculum**: HEIs can embed sustainability principles across academic curricula, research programs, and educational activities in various disciplines, fostering a comprehensive understanding of sustainability among students.
- **Local Knowledge Hubs for Sustainability**: Universities can function as key centers for innovation and knowledge dissemination on sustainability issues, collaborating with local communities to address region-specific environmental, economic, and social challenges.
- **Sustainability in Institutional Operations**: HEIs can adopt sustainability as a core guiding principle in their operational strategies, including planning and administrative processes. By implementing sustainable practices in campus operations, such as energy use, waste management, and resource conservation, they can model leadership in sustainability.

All the above mentioned can be done through formal, non-formal or informal education.

Formal education is characterised by a defined curriculum and is often credentialed.

Non-formal education is characterised by systematic instruction but is mostly noncredentialed.

Informal education is characterised by "educators" planning and intentionally creating the conditions that facilitate informal learning, which may include some systematic instruction but which will rely on many other means.

Non-formal education is an integral component of lifelong learning and its aim is for young people and adults to acquire and maintain the skills and competencies necessary to adapt to a continuously changing environment (Paraskeva-Hadjichambi *et al.* 2020).

Non-formal education comprises various learning activities that supplement formal education, occurring outside but complementary to the formal educational system. Throughout the evolution of environmental education, non-formal education has been recognized as a critical framework for implementing Environmental Education and Education for Sustainability. At the secondary education level, non-formal settings can foster Education for Environmental Citizenship by providing opportunities for young people to acquire knowledge, skills, values, attitudes, and engage in pro-environmental actions. An Environmental Citizen, thus empowered, is motivated to actively participate in society, driving change towards solving current environmental issues, preventing new ones, and achieving sustainability while nurturing human-nature relationships.

Pedagogical approaches such as place-based education, civic ecology education, ecojustice pedagogy, action competence, and socio-scientific inquiry-based learning are instrumental in developing students' competencies for meaningful civic engagement essential for environmental and social transformations (Paraskeva-Hadjichambi *et al.,* 2020). However, the lack of a comprehensive pedagogical framework for Environmental Citizenship Education in non-formal settings remains a significant challenge due to the concept's relative novelty.

4.1 Non-formal activities in environmental education

Non-formal activities in environmental education play a crucial role in complementing formal educational approaches by engaging learners in practical, hands-on, and community-based experiences. These activities are designed to enhance environmental awareness, promote sustainable behaviors, and foster a deeper connection to nature outside the traditional classroom setting. Here's an expanded view of non-formal activities in environmental education:

Outdoor and Experiential Learning

- **Field Trips and Excursions**: Organizing visits to natural reserves, wildlife sanctuaries, botanical gardens, and environmental research centers provide students with direct experiences of ecosystems and conservation efforts. These trips can include guided tours, interactive sessions, and hands-on activities such as wildlife monitoring or plant identification.
- **Nature Camps**: Environmental education camps offer immersive experiences in nature, where participants engage in activities such as hiking, camping, and outdoor survival skills. These camps often include educational workshops on topics like ecology, conservation, and sustainable living.

- **Eco-Tours**: Eco-tours are guided visits to natural areas with a focus on educating participants about environmental issues, conservation practices, and sustainable tourism. These tours can be tailored to various age groups and educational levels, providing insights into local ecosystems and conservation efforts.

Community-Based Initiatives

- **Local Environmental Projects**: Involving community members in local environmental projects, such as tree planting, community gardens, and river clean-ups, fosters a sense of ownership and responsibility towards local environmental issues. These projects often provide practical learning experiences and promote community engagement.
- **Workshops and Seminars**: Hosting workshops and seminars on topics such as sustainable gardening, composting, recycling, and energy conservation can equip community members with practical skills and knowledge. These events can be organized by schools, community centers, or environmental organizations.
- **Citizen Science**: Engaging the public in citizen science projects, such as bird watching, water quality monitoring, or species tracking, allows individuals to contribute to scientific research while learning about environmental issues. Citizen science initiatives often involve collaboration with researchers and provide valuable data for conservation efforts.

Youth and Student Engagement

- **Environmental Clubs and Societies**: Establishing environmental clubs in schools or communities provides a platform for students to engage in environmental advocacy, organize events, and work on projects related to sustainability. These clubs often participate in campaigns, fundraising, and educational outreach.
- **Student-Led Initiatives**: Encouraging students to lead their environmental initiatives, such as recycling drives, awareness campaigns, or sustainability projects, fosters leadership skills and personal commitment to environmental issues. Support from educators and community members can enhance the impact of these initiatives.
- **Educational Competitions and Challenges**: Organizing competitions such as environmental quizzes, essay writing contests, or sustainability challenges can stimulate interest and engagement in environmental issues. These activities often involve creative problem-solving and can be integrated into school curricula or community programs.

Arts and Creative Expression

- **Environmental Art Projects**: Art projects that use recycled materials, nature-inspired themes, or environmental messages can raise awareness and encourage creative thinking about environmental issues. Art exhibitions, murals, and installations can be used to communicate environmental themes to a broader audience.
- **Theatrical Performances and Storytelling**: Theater productions, puppet shows, and storytelling sessions with environmental themes can effectively convey complex environmental concepts and inspire action. These performances can be tailored to different age groups and cultural contexts.
- **Music and Dance:** Integrating environmental themes into music and dance performances can emotionally and creatively connect with audiences. Events such as music festivals, dance workshops, and public performances can spotlight environmental challenges and encourage sustainable practices.

Digital and Virtual Engagement

- **Online Courses and Webinars**: Offering online courses, webinars, and virtual workshops on environmental topics provides accessible learning opportunities for a wide audience. These digital platforms can reach participants who may not have access to traditional educational resources.

- **Virtual Field Trips**: Using virtual reality (VR) or online platforms to conduct virtual field trips allows participants to explore natural environments and conservation projects remotely. These tools can provide immersive experiences and educational content without the need for physical travel.
- **Social Media Campaigns**: Leveraging social media platforms to share information, promote environmental initiatives, and engage with a broader audience can enhance awareness and mobilize community action. Social media campaigns can include educational posts, interactive content, and collaborative projects.

 Practical Skills Development
- **Sustainable Living Workshops**: Providing practical workshops on topics such as zero-waste living, DIY sustainable products, and eco-friendly home improvements equips individuals with skills to reduce their environmental footprint.
- **Green Technology and Innovations**: Educating participants about green technologies, such as solar power, water conservation systems, and energy-efficient appliances, can foster an understanding of sustainable innovations and their benefits.
- **Gardening and Agriculture**: Teaching sustainable gardening practices, organic farming techniques and permaculture principles helps individuals connect with food production systems and promotes environmentally friendly agricultural practices.
- By integrating these non-formal activities into environmental education programs, educators and organizations can create dynamic, engaging, and impactful learning experiences that complement formal education and inspire lifelong commitment to environmental stewardship.

5. IMPLEMENTING THE SUSTAINABLE DEVELOPMENT GOALS AND EMBEDDING SUSTAINABILITY INTO CURRICULA

Sustainability in education has shifted to emphasize the critical skills needed for individuals to tackle complex sustainability issues effectively. Rather than solely focusing on knowledge, these skills prioritize the application of insights in various contexts. Numerous frameworks outline key sustainability competencies, identifying eight core areas (for more details, see https://www.ahu.lu.se/en/educational-development/seminars/sustainable-teaching-learning-in-higher-education-principles-practices/sustainability-in-curriculum/):

- **Systems-Thinking Competence:** The skill to analyze complex systems and sustainability challenges across domains and scales, including understanding dynamics such as cascading effects, feedback loops, and inertia.
- **Futures-Thinking Competence:** The capacity to anticipate future dynamics in complex systems and understand potential outcomes of sustainability initiatives.
- **Values-Thinking Competence:** The ability to identify, balance, and apply sustainability values and goals when assessing present and future states of complex systems.
- **Strategies-Thinking Competence:** The capability to develop and test strategies for interventions, transitions, and transformations towards sustainability.
- **Implementation Competence:** The skill to execute sustainability strategies through design, implementation, adaptation, scaling, and transfer.
- **Interpersonal Competence:** The ability to work effectively within interdisciplinary teams and engage diverse stakeholders in sustainability efforts.
- **Intrapersonal Competence:** The focus on personal resilience and self-care to prevent health issues and burnout in sustainability work.
- **Integration Competence**: The ability to apply collective problem-solving procedures to complex sustainability problems, developing and implementing viable sustainability strategies.

Integrating sustainability into the curriculum requires a shift from traditional teaching methods to more innovative and participatory approaches. Emphasizing active learning, collaboration, and real-world problem-solving is crucial for effective sustainability education.

However, achieving this goal is not solely the responsibility of individual educators; it requires a comprehensive institutional approach. This entails involving not only faculty members but also administrators, staff, and students in a collective commitment to sustainability. The institution's policies, culture, and resources must align to facilitate the integration of sustainability principles throughout all facets of education, encompassing curriculum development, research endeavors, community engagement, and campus operations. Collaborative efforts among various departments and stakeholders can promote a unified and impactful approach to sustainability education, ensuring that it becomes intrinsic to the institution's ethos.

One of the significant barriers to the broad incorporation of sustainable education in the HEIs is the fact that sustainability is seldom systematically embedded in the curricula, and at the same time, it is absent from the HEIs strategy. Many HEIs still focus more on greening their campus than on incorporating and infusing sustainability into the curricula. For this reason, it is essential to establish social and environmental perspectives in the curricula of future graduates, also known as *sustainable curricula* or *courses that include sustainability* (see, for example Özkan, Mishra, 2015). These courses may

- focus on a topic that differs from sustainability but integrates a module or unit related to sustainability or addresses a sustainability challenge,
- include one or more sustainability-oriented activities or actions, or integrate sustainability issues throughout the course

In addition, institutions need to promote a sense of environmental responsibility and foster respect for social diversity. This can be achieved through a focus on interactive, student-centered learning processes and environments that facilitate exploratory, action-oriented, transformative, and environmentally conscious learning experiences.

Teachers play a vital role in preparing students to meet future challenges. Demonstrating a sustainable lifestyle and openly sharing your journey can profoundly inspire a new generation of environmental stewards and leaders.

Here you can find the outcomes of brainstorming sessions focused on integrating Education for Sustainability (ES) into university curricula. By exploring diverse perspectives and strategies from educators and experts, this data aims to illuminate the multifaceted approaches needed to embed sustainability principles effectively in higher education. It underscores the importance of interactive and inclusive teaching methodologies that not only educate but also empower students to become proactive contributors to global sustainability challenges. Through this exploration, we delve into how universities can adapt and evolve their educational frameworks to foster a generation of informed and engaged global citizens committed to sustainable practices and societal resilience.

Brainstorming results

(Cib 231, 17 April 2024)

- Hardware
- Software Communication and interaction
- Paperless office
- Practice professionalism and ethical aspects
- Sustainable finance
- Theoretical mathematics
- Green computing
- Social aspects

6 CONCLUSION

In the past decade, significant efforts have been made to develop competencies in higher education to better prepare students for the challenges of fostering sustainability in society (Kioupi and Voulvoulis, 2022). Despite these advancements, there remains substantial progress to be made. Research indicates (Idoiaga *et al.,* 2023) that it is crucial to assess whether university educators have begun integrating sustainability into their teaching. If so, it is important to determine which sustainability-related topics are being addressed. Additionally, it is essential to identify the Environmental Sustainability (ES) competencies that educators view as critical for equipping future graduates with the necessary skills for a sustainable future.

Universities should develop and tailor their educational models to incorporate Environmental Sustainability (ES) principles. It is essential to offer in-depth training and education to educators on key sustainability topics. This dissemination of knowledge among faculty members must be supported by well-structured training programs that equip them to seamlessly integrate ES into their teaching practices. Such training should be comprehensive, merging foundational sustainability concepts with practical strategies for applying ES through interactive, student-centered teaching methods that boost student involvement and engagement.

Our findings highlight the importance of comprehensively and integratively understanding the three dimensions of sustainability—environmental, economic, and sociocultural. To achieve this, encouraging collaborative teaching among experts from various fields could be advantageous. This method would involve comparing and exchanging different perspectives on the Sustainable Development Goals (SDGs), with the aim of addressing fragmented viewpoints associated with specific areas of expertise.

Universities should continue to support and promote the integration of Education for Sustainability (ES) into their teaching models, strategies, and curricula. This is crucial for preparing students—who will become future professionals and citizens—with the essential skills needed to tackle both present and future societal challenges.

In summary, embedding sustainability into the curriculum requires a comprehensive approach that goes beyond traditional lecture-based methods. It involves creating engaging, interactive, and reflective learning experiences that equip students with the skills, knowledge, and ethical values necessary for driving a sustainable future.

REFERENCES

1. Agbedahin, A. V., 2019. Sustainable development, education for sustainable development, and the 2030 agenda for sustainable development: emergence, efficacy, eminence, and future. *Sustainable Development,* 27, pp. 669–680.
2. Angelaki, M.E., Bersimis, F., and Karvounidis, T., 2024. Towards more sustainable higher education institutions: Implementing the sustainable development goals and embedding sustainability into the information and computer technology curricula. *Educational Information Technologies,* 29, p.5079
3. Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., et al., 2021. Key competencies in sustainability in higher education—toward an agreed-upon reference framework. *Sustainable Science*, 16, pp. 13–29.
4. Corres, A., Rieckmann, M., Espasa, A., and Ruiz-Mallén, I., 2020. *Educator competences in sustainability education: a systematic review of frameworks. Sustainability,* 12, p.9858.
5. English, L. M., and Carlsen A., 2019. Lifelong learning and the sustainable development goals (SDGs): probing the implications and the effects. *Int. Rev. Educ.,* 65, pp.205–211.
6. Idoiaga Mondragon N, Yarritu I, Saez de Cámara E, Beloki N and Vozmediano L., 2023. The challenge of education for sustainability in higher education: key themes and competences within the University of the Basque Country. *Front. Psychol.* 14:1158636.
7. Kioupi, V., and Voulvoulis, N., 2022. The contribution of higher education to sustainability: the development and assessment of sustainability competences in a university case study. *Educational Science.* 12, 406.
8. Özkan, B., and Mishra, A., 2015. A curriculum on sustainable information communication technology. *Problems of Sustainable Development,* 10(2), pp. 95–101.

9. Paraskeva-Hadjichambi, D. et al., 2020. Educating for Environmental Citizenship in Non-formal Frameworks for Secondary Level Youth. In: Hadjichambis, A.C., et al. *Conceptualizing Environmental Citizenship for 21st Century Education.* Environmental Discourses in Science Education, vol 4. Springer, Cham.

10. Sammalisto, K., and Lindhqvist T., 2008. Integration of sustainability in higher education: a study with international perspectives. *Innovative Higher Education,* 32, pp. 221–233.

11. United Nations . Transforming our world: the 2030 Agenda for Sustainable Development (2015). Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N15/291/89/PDF/N1529189.pdf?OpenElement

12. https://www.ahu.lu.se/en/educational-development/seminars/sustainable-teaching-learning-in-higher-education-principles-practices/sustainability-in-curriculum/

13. https://unesdoc.unesco.org/ark:/48223/pf0000087446