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Implementation of Energy Awareness and Environmental Education Programs in Hungarian Higher Education: Evaluation of a Pilot Program

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Abstract

Our study aims to evaluate the pilot training conducted in the framework of the project "Environmental education and sustainability - implementation of energy awareness and environmental education programs in Hungarian higher education" with the support of the Hungarian Energy and Public Utilities Regulatory Office. Our study includes the presentation of the four higher education institutions participating in the pilot program, the methodology of the research and the summary of the results obtained. An important result of the research is that among the students and teachers of the higher education institutions participating in the pilot project, interest in and commitment to environmental education and sustainability can be traced. The results highlight that current and future teachers are trying to do as much as possible in their respective fields so that the next generation will be prepared to deal with the currently visible and expected sustainability challenges.

Keywords: sustainability, energy awareness, education

Introduction

Our study aims to evaluate the pilot training courses conducted within the framework of the project "Environmental Education and Sustainability -

Implementation of Energy Awareness and Environmental Education Programmes in Hungarian Higher Education", supported by the Hungarian Energy and Public Utility Regulatory Office (MEKH). The background to the programme is that the University of Pécs - also with the support of MEKH - developed the sustainability module, its curricular themes and teaching materials for the kindergarten, teaching and curative education bachelor's degree courses and the master's degree course in education during the 2020/2021 academic year.

This was followed by a national consortium in the 2022 call for proposals, based on the curriculum elements developed. In addition to the University of Pécs Faculty of Cultural Sciences, Education and Rural Development, the Széchenyi István University Apáczai Csere János Faculty of Humanities, Education and Social Sciences, the St. John Paul Pope Research Centre for Christian Pedagogy and Psychology of the Faculty of Pedagogy, Humanities and Social Sciences of the Péter Pázmány Catholic University, in collaboration with the Vitéz János Teacher Training Centre of the Faculty of Humanities and Social Sciences of University of Pázmány Péter University and the Gál Ferenc University. The main elements of the project were:

- to provide trainers from the partner institutions in the consortium with the necessary skills to set up the pilot training courses (training of trainers),
- publishing the teaching materials in book form for students and trainers participating in the pilot training,
- start training based on the teaching materials, pilot training in the partner institutions of the consortium,
- evaluation and analysis of the pilot training courses in the form of a summary study,
- publishing the results of the pilot training courses in the journals Kultúratudományi Szemle and Acta Cultura et Paedagogie in Hungarian and English languages,
- exploring, based on experience, the possibilities for further development of the environmental education curriculum based on gamification through foundational and exploratory research,
- international dissemination of experiences in the Greenway School II. programme framework, with partner institutions abroad and consortium members.

Our study includes a presentation of the four higher education institutions involved in the analysis and the pilot programme, a summary of the research methodology and a summary analysis of the results.

Presentation of the higher education institutions participating in the pilot programme

The partner institutions participating in the pilot training courses have specific backgrounds and roots in environmental education and sustainability. These are briefly summarised below.

University of Pécs Faculty of Cultural Sciences, Education and Rural Development

The University of Pécs is one of Hungary's largest higher education institutions, with 22,000 students, 1,400 teachers, researchers and ten faculties. With its roots dating back to 1367, it was the first university in Hungary, and in 2017 it celebrated the 650th anniversary of the founding of the first Hungarian university. In 2022, the university was ranked for the seventh time in the UI GreenMetric World University Rankings. The University of Pécs was ranked 21st out of 1,050 universities in the world's green universities, and for the third time out of eleven Hungarian universities in the ranking, it was the best, earning the title of the greenest Hungarian university in 2022 (UnivPécs, 2022).

The Faculty of Cultural Sciences, Education and Rural Development (KPVK), which is involved in the pilot programme, is unique because it has a centre in Szekszárd and operates at training sites in Szekszárd and Pécs. Therefore, it is of particular importance that the PTE Green University programme and the university's sustainability programmes should impact Szekszárd and Tolna County in addition to Baranya County and Pécs.

For the faculty, sustainability can be understood in two dimensions:

- on the one hand, how can the institution operate sustainably, reducing as much as possible the organisation's ecological footprint,
- on the other hand, what kind of educational content and attitude-shaping activities will appear at the Faculty, as the generations of infant carers, nursery teachers, teachers, special education teachers, vocational teachers, nature educators, social workers, rural development agricultural engineers, viticulturists and wine-growers currently involved in the educational process will be the generations who will be confronted with the ever-increasing challenges more intensively in their later lives.

Programmes and activities of the KPVK and the Illyés Gyula Primary School, Primary Art School and Practical Kindergarten of the University of Pécs related to sustainability awareness raising:

- Participation in the "Pass it back, Bro" mobile phone collection campaign (March-November 2022)

- Participation in the "TeSzedd! - Volunteering for a Clean Hungary" programme
- "European Mobility Week on Car Free Day" (September 2022). The KPVK Practical School has been participating in the cycling challenge organised by the Green Companion Foundation and the Szekszárd Climate Club for several years and has won the inter-school challenge every year.
- The KPVK is involved in Planet Budapest 2021. the programme, so it would like to continue the cooperation in its continuation or the Planet Pécs 2022 programme

In addition to the awareness-raising programmes, the faculty's academic events also focus on sustainability. The KPVK Institute for Rural Development was a professional partner of the "II. International Conference on Rural Heritage", which took place in Orfù from 26-27 May 2022.

At the conference, the Institute for Rural Development chaired the session "From Value Creation to Sustainability". Traditional or innovative local products, artisanal products, terroir products and Hungarians are built on the values of a rich rural heritage. However, these products are not only about preserving values and their economic exploitation, but als about the added value of intellectual capital, community cohesion, environmental awareness, social responsibility or even education for sustainability. Today, there is a growing emphasis on value-creation solutions based on environmental awareness (e.g. eco-, bio-farms) and sustainability. The session also highlighted the diversity of value creation, local initiatives, good practices and specific market access solutions, challenges, opportunities for conscious consumer education, and economic actors' role in sustainability education.

The faculty organised the international conference "Rural Development Dimensions of the European Green Deal Programme". The international conference focused on the challenges and challenges related to the rural development dimensions of the European Green Deal Programme and the presentation of national and international good practices. Climate change and the increasingly visible sustainability challenges of the 21st century pose severe challenges for Hungary, Europe and the world. In addition to presenting possible steps to address these challenges, the conference also focused on new growth strategies that can transform the EU economy into a modern, resource-efficient and competitive economy capable of effectively addressing climate change challenges.

The introduction tot he study mentioned that the Greenway School was organised in September 2022, with the support of the MEKH, in the framework of the project "Environmental Education and Sustainability", and was a great success in December 2021. In addition to the Hungarian participants, students and teachers from Croatian, Serbian, Bulgarian and Romanian partner universities joined the one-week programme.

In addition to MEKH, the faculty has also partnered strategically with the Herman Ottó Institute. The cooperation between the two institutions will enable teachers to expand their up-to-date professional knowledge, thus enabling them to pass on to future generations the latest innovations and environmentally friendly solutions of the profession, which will also form the basis for higher education and the development of an adult education programme on environmentally friendly technologies in agriculture. In cooperation with the Herman Ottó Institute, the JRC is involved in the editorial board of the scientific journal "The Village".

Finally, it is essential to mention that the Research Group on Environmental Philosophy, Bioethics and Green Philosophy, which has been set up in the faculty, investigates theoretical and practical sustainability issues.

St. John Paul Pope Research Centre for Christian Pedagogy and Psychology of the Faculty of Pedagogy, Humanities and Social Sciences of the Pázmány Péter Catholic University

Pázmány Péter Catholic University is a Hungarian higher education institution founded in 1635 and has had continuous operation since then. Péter Pázmány, Archbishop of Esztergom, founded the university in 1635, during the most tragic years of the country's history, during the Turkish occupation, which was of epochal importance in the history of Hungarian education and church culture. He was convinced that academic education was the guarantee of the nation's survival and morality. The university he founded took on his name to acknowledge his intellectual heritage.

The university was moved from Nagyszombat to Buda by Maria Theresia in 1777. In the spirit of the reforms of 1848, the University of Pest became a modern, autonomous educational centre. After a temporary period of restriction, it regained its old rights in 1860, and at the beginning of the 20th century, it became one of the world's most prestigious universities. In 1921, it took the name of Peter Pázmány, the founder of the Royal Hungarian University of Budapest, which it bore until 1950.

The present Eötvös Loránd University was created after the separation of the Faculty of Medicine and the Faculty of Theology due to the communist government. The Faculty of Theology carried on Pázmány's legacy. Although the state recognised the diplomas awarded here, thus seemingly preserving its tolerance of religious education, theological education was almost completely erased from public consciousness.

However, with the change of regime, an old-new institution was born with the expansion of the Academy of Theology. On 30 January 1992, the Hungarian Catholic Bishops' Conference, with the permission of the Holy See, founded the Pázmány Péter Catholic University with the establishment of the Faculty of Humanities. In 1993 the Hungarian Parliament recognised the Faculty of Humanities and at the same time registered Pázmány Péter Catholic University among the state-recognised universities. Today, the University has five faculties, the Faculty of Theology, the Faculty of Humanities and Social Sciences, the Faculty of Law and Political Sciences, the Faculty of Information Technology, and the Postgraduate Institute of Canon Law, which has faculty status.

The Faculty of Humanities started its operation in 1992 in Budapest, in the convent of the Sisters of Mercy of the Ménesi Road convent. In September 1994, it moved to Piliscsaba-Klotildliget, near the capital, on the site of the former Perczel Mór, then Soviet barracks. During the construction works, the old buildings were partly reconstructed and renovated, and somewhat new ones were built based on plans by Imre Makovecz and the architects of the Makona Association led by him.

Starting from the 2012/2013 academic year, it started its training courses in 3 locations in Budapest, Piliscsaba and Esztergom. Some courses and departments have moved to the former Piarist building in the Palotanegyed and the IBS building on Tárogató street in the capital. In 2019, PPKE signed a lease contract with the Budapest University of Technology and Economics, so the courses on Tárogató street continued in the Z building on the Danube bank from the 2019/2020 academic year. At the end of 2020, the Faculty moved out of the Piliscsaba campus, so the Faculty currently operates training locations in Budapest at two sites: the Sophianum (Mikszáth square 1), the Danubianum (Bertalan Lajos street 2) and Esztergom (Majer István street 1-3).

The Faculty's Vitéz János Teacher Training Centre offers basic teacher training courses in Esztergom (full-time and part-time, with optional specialisations in German and Slovak language) and coordinates the teacher training courses in cooperation with other institutes of the Faculty. Specialised further education courses are prominent, including drama pedagogy and child protection. The

psychology department of the BTK is essential, and its links with the education courses are also relevant to the exploitation of the results of this programme. In response to the economic, social and environmental challenges of the 21st century, BTK's courses have already focused on sustainability and environmental education in several areas.

In this pilot project, supported by MEKH, the Christian Pedagogy and Psychology Research Group involved the teachers and students of the Vitéz János Teacher Training Centre of the Faculty of Education. Gábor Kozma, currently leading the PPKE Research Group, has been involved in the preparation and implementation of the research project initiated towards MEKH and awarded the grant from 2019 onwards,[1] which is mentioned in the section of this paper dealing with GFE. The current pilot project, which will be implemented in 2022-2023 with the participation of the PPKE, will build on the results published in the 2020 research programme and will take them further in the field of energy awareness and environmental education programmes, involving not only pre-school teachers and teachers but also teachers of all subjects.

For the Research Group of Christian Pedagogy and it is essential that the results of the present programme also contribute to the protection and preservation of the environment entrusted to us in our created world and to the prudent supply of the immeasurably increased energy needs of our technical civilisation (Kozma, 2021a: 7-11). Given the growing ecological dangers, the protection of creation must also be given a greater role, as the balance of nature is threatened by the exploitative management of industrial societies, and risk societies are emerging. Environmental protection is now a pressing challenge for everyone (Puskás, 2006, 305), to which pedagogy, education and training must provide direct responses and tools (Kozma, 2021b).

Science is therefore empowering when it calls attention to the role of knowledge, specifically the science of increasing man's knowledge of the world as given to him by his Creator. That the fundamental role of knowledge is to shape the future in the most total sense. The protection of creation in its fullest sense - and precisely in the sense of education - is also an essential task for man to find the existential meaning of his life, not only for survival but also for the sake of a meaningful life (Puskás, 2006: 310). The correct use of technology, which also protects creation, is man's moral duty, otherwise, technology can grow into a force that destroys man,

[1] The 2020 project "The environment of education - a pedagogical culture of energetics" was a pedagogical research programme aimed at establishing the practice of pedagogy of environmental awareness from kindergarten and school to the future teacher.

culture and nature (Puskás, 2006: 312). The pedagogical programmes of the PPKE must consider that, as a consequence of the individual-centredness of postmodernism, individual values are overtaking institutional and transcendental values (G. Németh, For PPKE, this is a significant task and a great opportunity in the field of environmental education, which focuses on sustainability, respect, love and protection of nature, and the responsibility of man, and prepares knowledge materials, tools and programmes for teacher training, public education and families. The impact of environmental education is directed at the individual as a community member and is therefore not achieved through individual development but through community programmes. Intense interpersonal relationships in communities force individuals to accept and adapt to social norms and expectations, thus helping their socialisation processes (Kozma, Petróczi & Nagyné, 2020: 34-35).

Széchenyi István University Apáczai Csere János Faculty of Humanities, Education and Social Sciences

The Széchenyi István University Apáczai Csere János Faculty of Humanities, Education and Social Sciences is a historically and culturally well-established institution in the city and region of Győr. The tradition of teacher training in Győr dates back to 1778.

At the same time, by the beginning of the 21st century, the faculty had a dynamically developing curriculum, which was opening up beyond the field of teacher education, primarily towards the social sciences and humanities. In 1978, on the 200th anniversary of the teacher training in Győr, the college took the name of the scholar and school organiser János Apáczai Csere János, which it later kept as a charter.

In response to the economic, social and environmental challenges of the 21st century, the faculty's pedagogical bachelor's and master's programmes (primarily the bachelor's programmes in Special Education, Community Organisation and Teaching, and the master's programmes in Community and Civic Studies and Human Resource Counselling) and its specialised further education programmes (Project-based Environmental Education and the Teaching programme in the additional field of Natural Science) have already focused on knowledge and knowledge elements related to sustainability and environmental education in several areas. In 2017, the faculty played a pioneering role in "greening" the operation of Hungarian universities by organising the Learning and Teaching Methodology - Knowledge Technology Section of the National Scientific Student

Conference in line with the requirements of sustainable event organisation (Halbritter & Lőrinc 2017). The faculty has also prioritised sustainability in developing its infrastructure: a forest school exercise area, a solar panel system, and the re-launch of its historic school garden (Halbritter et al., 2019). In the autumn of 2019, Széchenyi István University initiated a survey among first-year students to measure their knowledge and attitudes towards sustainability and their environmental behaviour (Kövecsesné et al., 2020).

Practising teachers and trainee teachers are key players in the process of educating for sustainability. This is also confirmed by the fact that in the section on the professional attitudes and behaviour of teachers in the teacher training and qualification requirements (KKK), it is expected that graduating teachers should have an environmentally aware attitude and a sense of responsibility (Szilágyi, 2021) for sustainable development To meet this expectation, the Apáczai Faculty of Széchenyi University aims to educate students in environmental education by transferring culture and shaping attitudes so that generations of teachers committed to environmental education and the pedagogy of sustainability will emerge from their training. Teachers who take responsibility for their environment and are aware of the methodological principles, tools and methods of environmental education (Kövecsesné & Lampert, 2018).

Shaping students into environmentally aware individuals is achieved at several levels. The university has recently implemented several curricular reforms. Table 1 illustrates the possibilities for involving student teachers in environmental education in the context of the courses and programmes of the Department of Educational Science and Psychology and the Department of Methodology (Kövecsesné & Lampert, 2018)

One of the most popular forms of environmental education based on experiential pedagogy is forest schooling, in which the faculty has been actively involved since 1996 with the Forest Pedagogy project (Kövecsesné et al., 2020)

Table 1: *The potential of environmental pedagogy in teacher education*
*(*A: Compulsory subject, B: Compulsory optional, V: Optional, T: Theory, P: Practice)*

Intracurricular/extracurricular activities	**Type ***	**Theory/ Practice**	**Related fieldwork/practical work**
Applied pedagogy	A	T/P	Researchers' Night interactive exhibition Győr, SZ AK
Education for sustainability, health education	A	T/P	Field exercise

Sustainability pedagogical block: (I.II. III.)			
I.Environmental and sustainability education	B	T/P	Researchers' Night interactive exhibition Győr, SZ AK
II. The forest school theory and practice of organisation of learning	B	T/P	Ravazdi Forest School, Green Days at the Faculty
III. School garden	B	T/P	Apáczai Faculty School Garden, Öveges Kálmán Practical School Garden
Educational opportunities in national parks	B	P	Field exercise
Environmental Health	V	T	Field exercise
Forest pedagogy (project week)	V	T/P	In Ravazd at the Training Centre
Herbal therapy	V	T/P	School gardens
School Garden	V	T/P	School gardens
Opportunities to shape the external environment	V	P	Field exercise
Birds Day, Trees Day	-	P	Ravazd/Art Garden Bácsa
Forests Week	-	P	Győr/Ravazd
World Environment Day	-	P	Ravazd, Győr
Advent activities	-	P	Győr Árkád
Summer camp in Ravazd	-	P	Ravazd
Forest school camps, excursions year during the year	-	P	Ravazd
Bird-friendly school programme	-	P	Győr, SZ AK
Conferences, events (Apáczai Methodological Afternoons)	-	T/P	Győr, SZ AK

A significant milestone in these professional and scientific activities is the Environmental Education and Sustainability project, which has made available online and printed teaching materials and trained colleagues involved in the project to transfer knowledge on environmental and sustainability challenges through the training provided by the faculty.

Gál Ferenc University

The Gál Ferenc University is located in the heart of the Diocese of Szeged-Csanád, in the Dóm Square of Szeged, and welcomes young people and graduates who are committed to theological studies, the ecclesiastical vocations, the teaching profession, the sciences and the service of communities. Bishop Gyula Glattfelder

founded the predecessor of the University in Szeged, in the centre of the diocese, after the Trianon borders were drawn and the first academic year started in 1930.

The Jesuits ran the seminary and college until 1950 when the monastic orders were forcibly suspended. In the early 1970s, theological education for the laity was first introduced in the country in Szeged, in secret, and in 1983 it became possible to admit correspondence students. The training of full-time secular students (theologians and religious teachers) started with the regime change.

In 2008, the institution took over the name of Ferenc Gál, former professor of dogmatics, who was the first rector of Pázmány Péter Catholic University, and whose exceptional personality still influences education, priestly formation and the Hungarian Catholic Church. The University's research groups, its Gerhardus Publishing House, thematic publications, scientific journals, conferences, developing international relations and cultural events serve the social mission of the institution and the diocese.

In keeping with the Catholic ecclesiastical nature of the University, the Grand Chancellor is the Bishop of the diocese that runs it, many of the lecturers are clergy, and the students include seminarians preparing for their vocations at the diocesan St Gellert's Seminary.

The university has four faculties: the Faculty of Theology in Szeged, the Faculty of Pedagogy in Sarva, the Faculty of Health and Social Sciences in Gyula, and the Faculty of Economics in Békéscsaba. The Institute of Agriculture and Rural Development in Mezőtúr and the Institute of Health Education and Sports in Szeged are also instituted alongside the faculties. As part of its mission, the latter investigates and applies the role of sport in health education , lifestyle, nd the general personality development components of sport, in its pedagogical and sports science training. The Bolberitz Pál Institute in Kecskemét offers training in mental health, social work and child protection.

The University maintains one public education and two vocational training institutions: the Gál Ferenc University Nursery School and Primary School in Szarvas; the Gál Ferenc University Technical, Vocational, Secondary and Secondary School in Békés; the Benedek Göndöcs Catholic Technical School in Gyula. There is also an adult education centre based in Békés, with activities covering the Diocese. The university courses also provide training for staff working in the large institutional systems of the Diocese. In addition to the training of priests and religious teachers, lay and ecclesiastical staff, the training of nursery school teachers, teachers and ethics teachers is also essential because

the Diocese maintains a significant public education system, with more than eighty nurseries, primary and secondary schools.

The University's educational and scientific links with the University of Szeged, one of the leading universities in Hungary with a high international reputation, are essential. Many students also study at the University of Szeged, and the courses and electives offered by the University of Szeged are also open to students. There is also close cooperation in developing higher education in the South-Eastern Hungarian region under the new model and in teacher training (Dudok, 2021a). The University has also signed cooperation agreements with several Hungarian higher education institutions. University of Gál Ferenc students can travel to foreign universities within the framework of the Erasmus Programme and the Church-related programme. Within the Faculty of Theology, there are several areas of study: in addition to theology, the University offers courses in ethics, pastoral counselling and organisational development, and the history of the Catholic Church and culture.

The University of Gál Ferenc is ready to offer the experience of spiritual enrichment to all its students, in addition to the enrichment of knowledge, the expansion and the deepening of professional skills. Christian values, which are integral to the University's mission, are present in its teaching, academic administration and student services, and it offers everyone the opportunity to be personally involved in the community's efforts to help one another.

The institution’s mission statement also includes elements of regional higher education: from theology and other faith-based courses, through teacher training, social and health education, to agricultural and technical training, and from helping the spiritual and spiritual renewal of the Hungarian countryside to strengthening communities along Christian values. The University regularly organises national and international conferences and scientific, professional and cultural events.

Gál Ferenc University launched a research programme on the practice of environmental pedagogy in 2021. Gerhardus Publishing House published a volume of studies summarising and presenting the research programme under the title ’Education and its Environment - the Pedagogical Culture of Energy’.

The Department of Social Pedagogy, under the direction of Dr. Gábor Kozma, former rector and head of the department, coordinated by GFE Marczell Mihály Special Pedagogical Research Group and in cooperation with the GFE Szarvas Practical Primary School and Practical Kindergarten and the GFE Faculty of

Pedagogy, in 2021, in the framework of a comprehensive research project, besides the topics of man and his environment, natural values and sustainability, the possibilities of energy development and its implementation in pedagogical practice were highlighted. The research aimed to provide recommendations, good practices and tools for developing pedagogical practice in public education, family education and teacher training.

Recent efforts in environmental education have pointed towards the practice of sustainability education. Gál Ferenc University, with its four faculties and its public education and vocational training institutions, is an active and recognised national participant in the development of environmental pedagogical practice, providing models for its practice in its institutions and in the continuous development of teacher training by coordinating pedagogical programmes and actions in the University's faculties, and by including in its toolbox unique pedagogy for all children and young people, regardless of their circumstances and circumstances.

The Primary School and Practical Kindergarten in Szarvas gives space to the Educational Methodology Centre of the 'Children's Garden', bringing together professional efforts to support the development of environmental awareness and sensitivity to the natural environment in the practice of public education, teacher training and further education.

The University's training institution is a Base Institution of the Ministry of Agriculture; it also provides professional coordination of the Green Kindergartens of Békés County, The institution, which has the title of Perpetual Green Kindergarten and Perpetual Eco-School, considers the support of professional-methodological research in environmental education and the networking of pedagogical practice in environmental education as a horizontal knowledge-sharing centre as its priority tasks.

Gál Ferenc University considers it a priority to provide academic support in this area to ensure that the pedagogical education of students (in the Bachelor's degree programmes in Kindergarten Teacher, Teacher and Infant and Early Childhood Education with optional specialisations in Roma / Slovak / Romanian / German languages) can be effectively implemented and further disseminated after their university studies.

As an ecclesiastical institution of higher education, the University of Gál Ferenc sees as an important part of its mission the scientific research of the contents and contemporary challenges of individual and communal responsibility towards the

created world and the development of educational practices, with particular regard to the energetic culture of modern society, and its application to the daily activities of individuals and communities, also in the form of essential services.

Methodology of the pilot evaluation questionnaire survey

Sustainability can be measured (Dudok, 2021b) in the framework of the project "Environmental Education and Sustainability - Implementation of Energy Awareness and Environmental Education Programmes in Hungarian Higher Education" a questionnaire survey was carried out to evaluate the pilot training courses. The questions focused on the already implemented and ongoing training programmes in environmental education and sustainability, as well as on the prior knowledge and experiences gained during the training.

The questionnaire contained a near-equal weighting of open and closed questions to get a more nuanced picture of the views, knowledge and expectations of the teachers, researchers and students involved in the project on environmental education and sustainability.

In addition to providing primary demographic data, the first main set of questions aimed to explore the interpretative framework of sustainability and sustainable development (questions 3-5). In addition to asking respondents to define their understanding of sustainability and sustainable development, the questions also asked how the teachers and students involved in the research perceived the link between educational processes and activities and sustainability. It is worth noting that environmental education, and later sustainability education, has been an issue of concern to researchers since the 1970s, and despite the many successful programmes and initiatives that have been reported worldwide in recent decades, it does not seem that this activity is changing the negative economic, social and environmental trends that humanity is facing with increasing intensity worldwide.

The second main set of questions (6-7) focused on Sustainable Development Goals. On 25 September 2015, the 193 Member States of the United Nations adopted 17 Sustainable Development Goals (SDGs) for the period up to 2030. In this context, the questionnaire included a question on the extent to which the global challenges and critical areas identified under the 17 SDGs are considered challenges in Hungary today and a scale allowing respondents to indicate the extent to which environmental education contributes to achieving and addressing the 17 SDGs.

Subsequent questions also asked respondents at which levels of education they considered environmental education to be the most important and how sustainability is presented at their university.

The questions follow the logic of the OVHR model developed by experts at the University of Pécs and Corvinus University of Budapest and first published in 2016. Of course, this is no coincidence, as the model developed by the experts is suitable for identifying the key areas that lead to the sustainable (better) operation of organisations and institutions in the longer term.

Even though the basic model examined the basic patterns of sustainability in the case of public service institutions, subsequent research also shows that the categories identified by the authors can be used for other types of organisations and institutions, which, taking into account the original model, are.

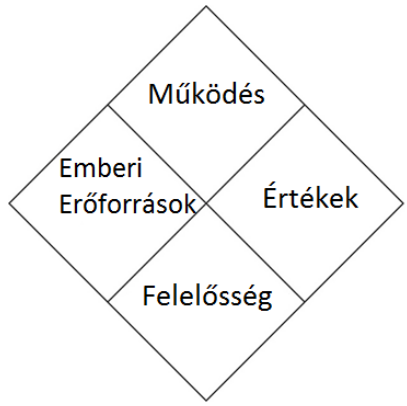

Figure 1. *Működés (Operations), Értékek (Values), Emberi Erőforrások (Human Resources), Felelősség (Responsibility) - a new model of sustainability*

1. **Operations:** public service institutions must manage their financial and human resources based on sustainable principles, developing operations capable of providing an adequate level of public services while maintaining sustainable activities.
2. **Values:** public service institutions should, in addition to providing good quality public services, communicate values through their daily operations that contribute to the development and widespread dissemination of good practices, sustainable use of resources and individual responsible choices, and the shaping of consumer attitudes towards sustainability.

3. **Human Resources:** public service institutions need to have a workforce with the right competencies, with employees who have specific knowledge, a high degree of flexibility and good adaptability (Rákosi, 2020, 2021), who can provide high-quality services and who can help achieve organisational and individual goals in the longer term.
4. **Responsibility:** in addition to the services provided by the public sector, there is a strong emphasis on the social responsibility of individual organisations and activities that, in addition to being sensitive to and helping to address social challenges, can contribute to shaping employees' attitudes towards sustainability.

The applicability of the model to higher education institutions is questionable. These institutions, which have moved somewhat away from the state and local government sector as a result of recent changes in the foundation and reorganisation process, cannot be considered as market or even purely non-profit organisations, and thus the public service character of their funding and provision of services is still present.

The last main set of questions in the questionnaire was directly related to project evaluation. On the one hand, the questions asked were related to the pilot training courses, and the curricula (Environmental Education and Sustainability) conducted or in progress at the universities involved in the practical implementation of the project, and on the other hand, the survey also included questions that sought to identify any shortcomings in the curricula that had been developed and shared with the trainers and students, so that the content of future training courses could be modified based on this feedback, comments and suggestions.

Analysis of the research questionnaires

The pilot training courses were evaluated in December 2022 for the four higher education institutions involved in the project. In Chapter 2, we saw that all the partner universities had made significant steps in the past to integrate environmental education and sustainability knowledge into their teaching and academic work.

In recent years, the focus on these subjects has been visible in the curricula of faculties with a profile primarily in teacher education and lower secondary teacher education in response to the increasing economic, social and environmental challenges. In addition to their educational programmes, these

institutions can be seen as crucial national think tanks on environmental education and sustainability.

The staff of the PTE KPVK coordinated the process of sharing the essential methodological foundations of the printed and electronic teaching material on environmental education and sustainability with the partner universities cooperating in the project and training the teaching staff of the institutions for the effective implementation of the educational activities related to the topic.

At PPKE BTK, the trained lecturers then met the students involved in the project in a special lecture series, while in the case of the other institutions, the colleagues involved in the development of the curriculum incorporated the content elements and topicalities related to the subject area in their courses on environmental education and sustainability in the autumn semester of the academic year 2022/2023.

The activities in the participating higher education institutions were evaluated through an online questionnaire praising the joint work of colleagues from the departments involved in the project. 79 people completed the questionnaire at PTE and 73 at Pázmány Péter Catholic University. The Széchenyi István University received 72 evaluable questionnaires, while the Gál Ferenc University received 75. In total, 299 questionnaire responses were analysed to formulate the research results.

Across all responses from the four institutions, more than half (64%) of respondents were women, and 36% were men. Looking separately at the universities included in the analysis, there is only a minimal difference of a few percentage points from the overall proportion: 69% of respondents at the PPKE BTK were female, compared to 71% at the PTE, two-thirds of respondents at the SZE and almost half at the GFE.

Regarding age, the vast majority of respondents (61%) were in the 25-45 age group, but there were also respondents younger and older than this for all universities. When looking at the university data separately, as with the gender ratio, no significant difference is observed.

The conceptual framework of sustainability and sustainable development

Following the questions on demographic information, the questionnaire asked about the understanding of sustainability and sustainable development. The majority of respondents were familiar with the meaning of sustainable development, with the most common definitions appearing to accurately or

partially reflect the relatively widely used definition published in the 1987 Brundtland Commission report, but also including Herman Daly's definition. It is worth noting, however, that there are also slightly different definitions from those given above: answers such as a better life, a pledge of the future, and 'development that does not affect our future', although not at all accurate, also refer to elements of content that are present in the classic definitions.

It is clear from the responses that a significant proportion of respondents in all the universities surveyed are aware of the meaning of the term, but at the same time, although a relatively small number of respondents understand sustainable development in terms of other elements than the original definition, and some responses also express critical views.

The differences between environmental education and education for sustainability are more heterogeneous. A significant proportion of respondents (around 70%) correctly consider that environmental education focuses primarily on the processes of learning and teaching the most essential knowledge about nature and the environment, while in the case of education for sustainability, in addition to environmental knowledge, there are also economic and social processes, without knowledge of which it is quite difficult to look objectively at the damage and problems in nature caused primarily by humanity.

There is also a relatively high proportion of responses (around 20%) that consider education for sustainability as a much broader and more useful interpretative framework because while environmental education primarily examines the problems and possible responses from the perspective of the natural environment, sustainability and sustainable development also include the human, social and economic dimensions in addition to the environmental elements. In addition, education for sustainability does not simply mean integrating knowledge of the other two areas into the educational and training processes, but also that the knowledge transfer activities must include an essential role in understanding the links and causal relationships between the natural/environmental, economic and social subsystems.

However, about 10% of respondents consider there is no substantive difference between environmental education and sustainability education, as they are the same educational process.

Also interesting are the answers to the question of the effectiveness of environmental education and education for sustainability. A proportion of respondents (around 40%) consider the process to be successful. The responses to

the open question also show that a significant proportion of teachers and students involved in the subject are convinced that environmental education in teacher education, especially in lower teacher education, is fully capable of moving the children in training towards the positive development of their awareness, commitment and responsibility towards environmental issues.

However, around a third of respondents are more critical. The responses show that not everyone is thoroughly convinced that environmental education and sustainability education, which is generally considered to be successful, will, in the longer term, lead to changes that will increase awareness and responsible attitudes towards the environment, and not everyone is sure that this form of learning and information transfer can change the negative trends caused by humanity.

For question 6 (*To what extent do you think that environmental education and education for sustainability contribute to sustainability*?), almost 90% of respondents from institutions consider that this contribution is significant, and several responses suggest that this process should start as early as possible in life. The other leading group of responses is also interesting: the central message of these responses is that this educational process contributes only moderately to later environmental awarenss, and that, in addition to socialisation in childhood, the opportunities, resources and life situation of the individual in adulthood lead to a more or less responsible relationship with the environment in adulthood. Moreover, that these educational processes will fundamentally change man-made problems globally and worldwide is far from certain.

This kind of dichotomy in terms of effectiveness can also be seen in other research results and studies, not to mention the fact that environmental education programmes, and the programmes that have been gaining considerable momentum since the second half of the 1980s, have been running successfully for more than 50 years, but it cannot be said that the negative trends that gave rise to these subject areas have changed significantly in recent decades. For these reasons, it is impossible to make a clear and objective assessment of the usefulness and added value of these activities, nor do we know where we would be without these programmes and educational activities.

Assessing the SDGs

The second main set of questions in the questionnaire dealt with priorities related to the SDGs. An essential finding of the research is that there is no significant difference in patterns when looking at the universities surveyed together or by

the institution. In the case of question 6 (*17 Sustainable Development Goals (SDGs) for the period up to 2030 adopted by the 193 Member States of the United Nations on 25 September 2015. To what extent are the global challenges and critical areas identified by these 17 goals considered a challenge in Hungary today?*) quality education is the most important priority, followed by climate change. Similar but lower importance is attached by respondents to the other goals, with the least important goal being the appropriate use of marine resources.

The responses reflect the current economic, social and environmental challenges, as the negative developments of recent years, the pandemic, the subsequent economic downturn and the economic and social impact of the Russian-Ukrainian conflict have significantly redefined the priorities, so it is not surprising that the importance of each target area varies mainly from the middle to the most important category (4-7).

Question 7 (*To what extent do you think that environmental education contributes to the achievement of 17 sustainable development goals and the management of these challenges?*) also reveals an interesting result. For all institutions, it is clear to respondents that environmental education is essential for healthy living, well-being and prosperity, responsible production and consumption, and the achievement of a peaceful and inclusive society (the highest absolute scores are observed in these categories when the total number of responses is aggregated), but there are also several elements where respondents believe that the goals can be achieved without environmental education. Examples include the re-emergence of hunger, global partnership, industrial development, and innovation.

The data thus show that respondents do not (realistically) consider environmental education as a universal tool sufficient to effectively address sustainability challenges, while its foundational nature is (also) undisputed based on the current results. It is a sad but realistic finding that respondents consider that environmental education contributes the least to poverty eradication.

Perception of environmental education

The next question in the questionnaire explores the level of training and education where environmental education is most needed. None of the respondents thinks that there is no need for environmental education in education, and two-thirds consider that there is a need for this form of education at all levels. The aggregate figures show that 42% of respondents think environmental education is needed

in nursery schools, 20% in primary schools and 19-19% in secondary and higher education.

Of course, there are differences between institutions: in the case of PTE, pre-primary and primary education is considered to be more prominent with all levels responding, while in the case of Pázmány Péter Catholic University, the pre-primary level is considered to be less prominent, but the important message is that respondents consider environmental education to be an important priority. For GFE, the importance of the kindergarten level is 44%, while for SZE, it is 38%, or higher education is more important for SZE (22%), compared to 16% for GFE.

Despite the differences in priorities between institutions, it can be concluded that for all universities, the pre-primary level is the most important, while the subsequent levels of education are of roughly similar importance, based on the responses, which reflects the foundational nature already mentioned in the sustainability goals: if environmental and sustainability values are considered with care and attention in the foundation of educational processes, these appropriate foundations need only to be strengthened and enriched with age-appropriate knowledge elements at later levels.

The responses also show that respondents do not expect success in the short term and that they see the value of measuring effectiveness not in individual performance but at the level of a given region or country, which of course can be strongly influenced by several other economic and social processes.

However, the measurement of the effectiveness and efficiency of environmental education is less clear to respondents. Some of the respondents consider the effectiveness of education and training processes to be assessed using various relatively widely known indices (the most frequently used index in the questionnaires is the HDI index developed by the New Economics Foundation in London - Happy Planet Index), but some respondents also consider the results of various ecological footprint measurements to be suitable for assessing effectiveness in the longer term.

At the same time, the responses also show that respondents are not entirely sure whether these results give a realistic picture of the extent to which children, pupils and students leaving education and training can apply the knowledge they have acquired in their adult lives.

Some responses, however, point out that an accurate picture of efficiency and effectiveness can only be obtained, precisely because of the above, if a selected sample is followed continuously, even for decades, but it is also obvious that as

time goes by, more and more economical, social and environmental impacts will influence the activities and actions of the sample, where, in addition, knowledge and knowledge elements acquired even several decades earlier will inevitably be eroded.

Examining some of the factors of the OVHR model

The next part of the questionnaire asked about the sustainability practices of the respondents' parent institutions. According to half of the respondents, sustainability is reflected in the organisational culture of the universities surveyed (this proportion is higher in the case of PTE, more than 60%, presumably due to the Green University programme, which has been running successfully for several years), another 40% believe that sustainability is partly reflected in the organisational culture of higher education institutions and only about 10% believe that the organisational culture does not include elements related to sustainability and sustainable development.

For the universities surveyed, energy efficiency programmes, measures to reduce paper-based bureaucracy and environmentally conscious behaviour were the most frequently cited elements of sustainability culture. Interestingly, selective waste management and using renewable energy are less important, and social responsibility (directly) is not present in any of the universities. The latter is presumably due to the scarcity of available financial resources, but at the same time, evident from the answers to subsequent questions, there are several initiatives at institutions that focus on environmental education and sustainability.

In the case of question 12 (*Are sustainability values, information, and knowledge elements in the training programmes of your university*?), respondents mentioned mainly teacher training (85%), which is, of course not a coincidence since the respondents were primarily students and teachers involved in teacher training.

Responsible, conscious behaviour (consumer and citizen), commitment to the environment, knowledge and respect for nature and environmental awareness are the most important sustainability values communicated by universities. The responses - somewhat in line with research on the topic (Vehrer 2016a, 2016b) - show that more conscious and responsible behaviour is essential for substantive change in sustainability in our country and globally. Another question is: to what extent do current economic and social processes facilitate these changes?

However, it is also worth noting that in the universities surveyed, it is far from being the case that sustainability values are only present in teacher training: it is

also clear from the responses that, in addition to these courses, other departments and training programmes at universities are increasingly incorporating knowledge and skills that contribute to the development of a more aware, environmentally engaged and responsible generation.

Other elements include the principles of the UN Sustainable Development Goals (SDGs), which have already been examined through the previous questions, knowledge of the links between global challenges and local actions, social and intercultural competencies, communication, digital literacy, civic competencies and responsibility, loyalty, modesty, humility, appreciation of the values of others, forward-thinking, a sense of purpose, attitudes related to environmental awareness, selective waste collection, openness, willingness and knowledge to learn, critical thinking, knowledge of the living world, and knowledge of ecosystems.

The answers to question 15 (*Does your university support external programmes and initiatives related to environmental education and sustainability?*) show that respondents' institutions support several "external" programmes, mainly professional and awareness-raising programmes, often based on the knowledge base and human resources of universities. Implementing these joint projects, mutual agreements, and joint programmes can strengthen the link between universities and their environment, but the responses also mention, in several cases, the link of their institution to regional and national initiatives.

Evaluation of pilot training and curricula

The last major group of questions in the questionnaire concerned the evaluation of the pilot programme. The results showed that the programme was well received by all the organisations involved in the pilot training. A significant proportion of respondents were satisfied with the quality and coverage of the training material.

Both students and trainers involved in the project were positive about the pilot training, the printed and electronic course material produced and the trainers' skills. Respondents considered the teaching material to be complete (92%), practice-oriented (85%), of sufficient quality and scope (87%), and well structured, with pictures and examples to facilitate the learning process (90%).

The methodological development of the curriculum (learnability - teachability) was considered by the respondents to be outstanding; the quality and content of the images, the topicality of the literature used, and the structure of the curriculum were also considered to be very good. However, the practical

exercises (research, reading, etc.) which complement the textual parts of the curriculum are not entirely positive, with the overall score, in this case, being slightly lower than in the other categories (74%).

This information may be necessary for authors and editors when designing further learning materials and books in the future, but it is worth pointing out that the data suggest that this type of approach is less critical among younger respondents. When evaluating the subject areas covered in the curriculum, unsurprisingly, the sections of the chapters relating to the preschool and primary school age groups are considered particularly important.

Overall, the pilot project has produced well-developed, well-structured and up-to-date material, which can be a good starting point for further training courses similar to the project's objectives.

However, two things should be pointed out based on the results: the economic and social processes and changes of recent years (the COVID pandemic mentioned by the respondents, or the current war situation and its economic, social and environmental impacts) receive relatively little attention in the material, so in the future, to provide up-to-date information and knowledge transfer, it may be worth updating the chapters and adding additional chapters or parts of chapters.

Another important criticism is that, in addition to the positive assessment of the presentation of practices in the nursery and primary schools, there is a lack of information on environmental education in secondary and higher education. In the future, therefore, if the authors wish to present all levels of education in total, it is essential to present the specific features, and good practices of environmental education at these levels, for which the Green University programme mentioned earlier can provide a basis in the case of the University of Pécs.

Instead of a summary: the importance of environmental education and sustainability in lower secondary teacher education

The role and importance of environmental education in teacher education and initial teacher education in the 21st century are unquestionable. Students in education today will be the ones who will be dealing with future generations in the various educational arenas, and these generations are likely to face sustainability challenges to a much greater extent in their lifetimes. The role that today's educational institutions can play is therefore important in helping to equip young people with the skills, knowledge and competencies that can make them more resilient, aware, sensitive and adaptable in the period ahead.

Higher education institutions can make a real contribution to sustainable development in three main areas. Firstly, they can integrate sustainability-related knowledge elements into their educational programmes, even if the programme is not directly related to the environmental dimension. On the other hand, institutions can, base on the OVHR model already highlighted, implement and strive for operations with a reduced environmental impact and ecological footprint. Thirdly, universities can support projects and knowledge-sharing processes that can lead to real sustainability outcomes and the sharing of good practices and experiences by redistributing their available resources.

An important result of the research is that the interest and commitment to environmental education and sustainability can be traced among the students and teachers of the higher education institutions participating in the pilot project. The results show that current and future educators are doing their utmost to ensure that the next generation of educators is prepared to meet the sustainability challenges that are already visible and those that are likely to arise.

Of course, education and training alone will not be enough to make all people change their use of resources, transform their consumption and sustainably organise their lives overnight. Without education and training, however, the chances of making these changes are likely to be significantly lower, so it is important to take a proactive approach to transfer the tools, knowledge elements, methods and good practices that we consider good and sustainable.

The most important finding of the empirical research is that, despite significant differences between the faculties in the sample, there are no significant differences in the perception of environmental education and sustainability. Across the four collaborating institutions, the project was well received, as was the high proportion of respondents who prioritised environmental education in pre-primary and lower-secondary teacher education.

These foundations can significantly influence subsequent patterns of behaviour, and, even though longer research results are not available or are only partially available, they certainly contribute to responsible citizenship behaviour committed to their environment.

Several good practices were observed in the training sites involved in the project. At the Apáczai Faculty of Széchenyi István University, which has been involved in teacher training for 245 years, a special effort was made to introduce students to the latest pedagogical trends, such as experiential education, reality-based learning, outdoor learning, and to introduce students to educational

opportunities in natural environments. By breaking out of the digital framework, students can also be introduced to developmental opportunities in the school garden, schoolyard, and the work of the related research group of the Department of Methodology of the Faculty of Social Sciences.

Finally, it is also worth pointing out that the application of the OVHR model presented in the study in teacher education could be another important research direction for the partner universities cooperating in the pilot project to address and that the extension of the curriculum, which has been evaluated favourably in principle, to a systematic, comprehensive study of all levels of education could be a meaningful direction.

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