

The Significance of Environmental Sustainability in Adult Environmental Education

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Abstract-In this paper, we would like to present the connection between sustainable development and adult education, which has been explored less in Hungary. In the framework of theoretical relations, we are going to touch upon technical development and its consequences, as well as the principles of sustainable development. The notion of ecological footprint has played an important role in environmental education and in the development of awareness. We examined the connection of sustainability from the conceptual-theoretical aspect, and we conducted empirical research in three field venues basically with two kinds of methods. We would also like to present the results of that in this lecture. We examined the adults visiting the educational paths with questionnaires. We interviewed the professionals of the nature school and the educational paths.

Keywords- Adult Education; Ecological Footprint; Educational Path; Environmental Awareness; Sustainable Development

I. INTRODUCTION

A. *The Justification of the Topic, the Significance of Sustainability and Adult Environmental Education*

It is noticeable almost worldwide that sustainability education is restricted mostly to schoolchildren. The professional, pedagogical and methodological solutions are elaborated the furthest here. The reason is probably that, in most societies, the future generation is regarded as the main source of hope for changes. [18] However, the communities of children and adults live together in a society and they have to meet the needs of the future and to implement the sustainability of the society. Consequently, adults' attitude to environment and their environmental education need to be dealt with as well. Adults' knowledge about sustainability must be explored so that they can change their outlook and actions. This paper deals with the connection between environmental sustainability and adult education on the basis of conceptual-theoretical issues and a specific empirical study. This topic is especially important in Hungary, as adults' organised or spontaneous environmental learning has not become general. [19] Research results prove that their knowledge concerning sustainability was enhanced after the visits to the educational paths. [10]

B. *Technical Development and Its Consequences*

Mankind has always strived to reduce the use of muscle force through the means of technology and to increase productivity mainly through mechanisation and automation. If the development of technology was modelled, it would result in exponential curves of the changes in the modes and means of production, as well as in productivity regarding the past 200 years, where the changes in muscle force and intellectual work are the most spectacular.

The picture will be finer, if the changes that took place in the last few decades are analysed in the main trends of technical development. In Lükő István's view, this development is discernible in three areas, namely [1]:

1. The use of energy. The massive use, or, spreading of electricity – including nuclear power – has produced radical changes in industry, agriculture, traffic, household and also in people's immediate residential environment and way of life.

2. Control engineering. These days, control engineering, or, automatics is inseparable from the human race. The difference between modern control engineering and earlier constructions or mechanisms is not the purpose but rather the flexibility of the available tools.

3. Informatics. This is the third technical trend, the development of which has always been present throughout the history of the human race. The gradual development of the tools created the possibility for the emergence and development of civilisation. Compared with the past centuries, the informatics of our age differs mainly regarding the speed and flexibility of the tools.

It is rather apparent that technology, technics and informatics are in a close and organic connection with one another. If one wanted to describe the essence of technology in a brief 'formula', it could be the following:

Technology = Raw material + Energy + Technics (Tools) + Knowledge + *Information*

Thus, the processing of the raw material requires not only energy and tools (machines, instruments, devices, etc.) but also

information, so that the string of operations results in optimal final product and minimal waste. As one can see, raw material and energy are two factors producing ‘a critical environmental problem’ and they in themselves focus on everything for the people and the societies of our age. That is, the depletion of the sources of raw material, the destruction of the natural environment or the slow change in the technology of energy production is the real challenge. Teaching the principles and physical basics of alternative and renewable energy production should be an area of reform in primary, vocational and higher education in science. [15]

The faster and faster development of technology has numerous consequences for the whole of the human race. [4] This environmental globalisation has disturbed the balance of humans and their natural environment. The balance is to be restored and a new notion, viz. sustainable development can provide a starting point. [3]

In order to come to the principles of sustainable development, it is practical to describe or present the cycles visualising also dimensions first.

One can refer to *Joseph Huber’s* theory, whose model visualises the consequences of technical development. Namely, the three large systems are: the industrial system (technosphere), the relation of individual and society (sociosphere), and nature (biosphere). [9] According to *Huber*, the balance between these has been impaired because of the preponderance of the industrial system. This means that disturbances have arisen in the cycles, and the troubles of the industrial system have to be repaired through ecological modernisation. Which are the cycles where the balance has been impaired? We depict that here in Figure 1:

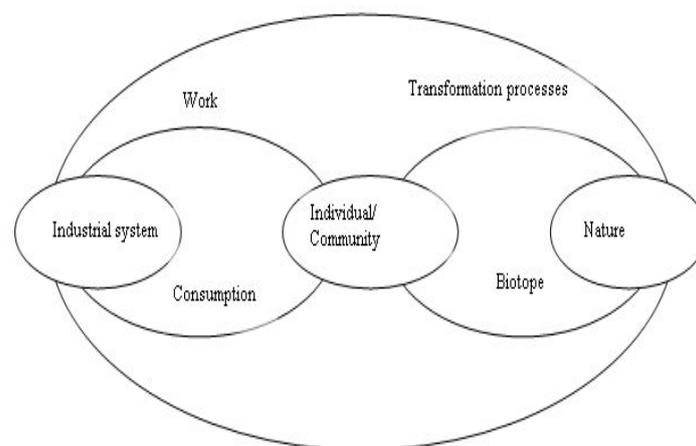


Figure 1 Basic cycles after Huber

II. THE PRINCIPLES OF SUSTAINABLE DEVELOPMENT AND ECOLOGICAL FOOTPRINT

A. *The Idea of Sustainable Development*

Today, there are many definitions and classification types, which, however, basically distinguish between sustainable growth and sustainable development.

The decisive ideas for us are those of sustainable village and sustainable city, which do not mean just a difference in the specific settlement size but also differences in all the areas of consumption and distribution. Thus, these factors influence, for example, the local system of alternative or renewable energy production as well. What does it mean to live in that particular settlement, to maintain its development and to involve the inhabitants in it? That is, the joint participation of young people and adults in solving the local problems.

Harmonious development is an idea applied neoclassical economics and it includes ‘dynamic balance’. The predecessor of this notion was appropriate technology, which defined the technics to be used and the technology to be applied for developing countries. Essentially, the character of subsistence economy is expressed also in a term dating from the same time, namely ‘self-reliant development’. The history of the term sustainable development itself began in 1980, when the IUCN (International Union for the Conservation of Nature) introduced the World Conservation Strategy. [11]

One of the definitions of sustainable development is the following: ‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’ [2]

An idea that is closely connected to the concept of sustainable development is ‘sustainable consumption’, defined by a Hungarian expert as follows: ‘Sustainable consumption is the term for the use of services and products in a way that corresponds to the basic needs, results in a better quality of life but, at the same time, it reduces the use of natural resources and

toxic materials to the minimum, as well as the emission of waste and pollutants during the specific service or whole lifecycle of the specific product in order not to jeopardise the needs of future generations.' [17]

As to the new theory of the growth critics, some principles have been formulated, which are listed here:

- The principle of holistic approach

This comprehensive, complex thinking requires most of all a systemic approach. Its slogan is already regarded as a commonplace now: 'Think globally, act locally'.

- The principle of integration
- The principle of durability
- The principle of prevention and precaution
- The principle of adding the local resources
- The principle of preserving stability and diversity

The ecological footprint

This concept, or, idea was published by Mathis Wackernagel and William E. Rees in their book *Our Ecological Footprint*. [20] The space occupied by people and society does not only include the 'production' space necessary for sustenance but also the space for the emitted waste. Thus, we do not only occupy that portion of our planet's surface of on which our life takes place but a much larger one. The population of a city uses the space where its resources come from, as well as the space where it can deposit the waste. If we look at all the areas that we use, the following components should be mentioned:

- The area used by energy industry (Fossil fuels)
- The built environment (Residential area)
- Production of foodstuffs (Agricultural area)
- Timber (Area of silviculture)

On a map, we could draw the area actually used next to each country. By means of this concept, or rather, also 'the quantum of sustainability' after Gyulai Iván, we can demonstrate that the more the used area was growing the more the amount of available or utilisable land was diminishing. The aforementioned authors introduced the concept of ecological deficit, which is nothing else than the difference of the available ecologically productive area and the ecological footprint[5]. The deficits and surpluses can be calculated also for the whole Earth and the individual continents or individual countries.

III. SUSTAINABILITY AND ADULT EDUCATION

A. *On Adult Education in General*

The topic of my thesis connects adult education with sustainability education. This connection can be regarded as a kind of lifelong learning, the theory and background of which we cannot present here in more depth and detail, we only refer to it. [12] In this process of 'lifelong learning' in adulthood, augmenting one's own professional and general knowledge has a decisive role. We can pick out only a few theoretical details related to adults' learning from the diversified and rich conceptual-theoretical background. First of all, we refer to the publications by *Koltai Dénes* and *Zrinszky László* among the works on adults' learning processes and motivations to learn [6].

B. *Adult Education and Environmental Education*

Adult education is an incredibly diversified and complex system, which satisfies both individual and societal demands, and is undergoing significant change in our time. This change is continuous and it is gaining more and more aspects. Besides the specialised trainings required by the labour market, competency development in adulthood is becoming more and more important. The development of the skills and attitudes that are necessary in everyday life as well as in self-education and in the development of the community is required both on the basis of European directives and, what is more important, with respect to the welfare of individuals and their communities, and to strengthening their ability to enforce interests. The forms of adult education within the school system are also continually changing, while its forms outside the school system show growing diversity. Among NGOs, whatever issue they deal with, education and training have become indispensable activities; each organisation holds its trainings, courses and study trips on the knowledge areas they focus on for those who come into contact with the respective organisation. Here, we would like to pick out the organisations dealing with environmental protection from the wide thematic variety of NGOs. A study on NPOs for adult education by *S. Arapovics Mária*, published in 2007, shows that 7 of the 135 examined NGOs declared that some form of education or training on environmental protection plays a part in their activity.

The changes and the more and more wide-ranging enrichment of the state of affairs imply also the reformation of the

content and methodology of adult education. This is reformation and renewal at the same time, since the implementation of the adult education law from 2001 urges both the implementers and the enforcers to innovate constantly, and only legislators are perhaps lagging a little. Hungarian adult education is still facing numerous challenges: fighting illiteracy, providing lifelong learning, problems concerning employment and labour market, improving the social situation, complex change of attitude in order to create a bourgeois lifestyle, low figures in the status of the key competencies of the society and, most of all, increasing the very small number of participants in adult education; we still have very much work to do. The questions of how, from what, where and whom are naturally complemented also with the question of 'What to teach', and also the social and environmental issues on local, national, regional and global level belong here.

The Hamburg Declaration on Adult Learning, which was adopted at the 5th International Conference on Adult Education in 1997, and which is going to be followed by the next international conference in Brazil in 2009, says the following about the connection between environmental education and adult education:

Education for environmental sustainability should be a lifelong learning process which recognizes that ecological problems exist within a socio-economic, political and cultural context. ... Adult environmental education can play an important role in sensitizing and mobilizing communities and decision-makers towards sustained environmental action[7].

IV. SURVEY OF SUSTAINABILITY EDUCATION AMONG ADULTS

A. *The Area, Aims and Tasks of the Survey, and the Hypotheses*

The primary objective in the survey of the connection between sustainability and adult education is to assess the adults' knowledge and experience on the basis of direct empirical data. One of the most expedient ways to do that is to ask the visitors of open-air nature exhibitions, that is, educational paths about their opinions. Compared with many other possibilities of collecting data, this appears to be the best, since these visits, which can also be viewed as excursions, can demonstrate also changes occurring within relatively short time. This means, what they know, what their opinions are concerning the environment, its protection and sustainability at the start of the visit, without the experience that can be gained there. Then, at the end of the visit, we ask for a self-evaluation on the basis of these input questions, that is, the preliminary knowledge survey.

The types of educational paths can differentiate this basic knowledge and its change adequately and therefore we have several questions on that.

A further objective is to make a recommendation based on the data and analyses as to the future course of action, that is, the changing of the situation. It is also our objective to assess the frequency of visits by adults and other organisational issues on the basis of interviews with the professionals of the educational paths.

The hypotheses of the survey/study:

- There are relatively few persons in the sample who have visited more than one educational path.
- The level of knowledge/experience changed after the visit.
- Everyone has heard about the idea of sustainability.
- The most of the participants have heard about or have knowledge about utilising solar energy and recycling.
- The locations of the educational paths differentiate the content areas.

B. *The Methods of the Surveys*

The following method was used in our study:

- Surveying and analysing the relevant literature on sustainability, its concept and its foundations in ecology and environmental pedagogy
- Studying the aspects regarding ecophilosophy and environmental sociology related to environmental education and the concept of ecological footprint in the relevant literature
- Studying the system and characteristics of adult education
- Exploring the concept of educational paths and their role in environmental education
- A questionnaire survey at three locations among adults visiting educational paths
- Interviews with the professionals of the nature school and the educational path about the adults' visit

The method of the empirical study

We carried out a survey by completing questionnaires at three locations. These were:

- Mókussuli Forest School of Forestry on Árpádtető
- Fertő-Hanság National Park, Csapody István Nature School
- Gemenc Wooded Property, Gemenc

At the three locations, altogether 94 questionnaires were completed by adult visitors. The questionnaire contains 25 questions, most of which are closed questions. The open questions refer to the experiences gained on the educational path.

The questionnaire includes 25 questions altogether. Five of these are open, the rest contain closed questions. Besides the respondents' statistical data (age, type of residence, occupation, educational level), they pertain to the idea and kinds of educational paths, as well as to the type and duration of the visit. Sustainability appears in the questions in two ways: firstly, if the respondents have heard about this concept and, secondly, where and in what way. The respondents' knowledge about six areas connected to sustainability before and after the visit is explored, where the respondents match one of three levels (the categories 'none', 'minimal' or 'quite much'; 'no change', 'medium level of change' or 'much change') with each of the contents. Besides enquiring about knowledge, two questions of the questionnaire (24. and 25.) measure attitude: in the last point, respondents were asked to mark their attitude to sustainability on a ten-grade scale. The entire questionnaire is attached below in Hungarian, and a part of it in English.

Questionnaire for the degree thesis titled Sustainability Education and Adult Education

Kollarics Tímea, PhD student [14]

Dear Respondent!

I am writing my thesis about the connection between sustainability and adult education. I would appreciate your help if you would answer the questions below by marking the appropriate boxes or filling in your answers in text form.

Thank you for your kind efforts!

1. Sex:

Male Female

2. Age:

16, 17, 18, 19, 20, 21, 22, 23, 24, 25,
26, 27, 28, 29, 30, 31-35, 36-40, 41-45,
46-50, 51-60, 61-65+

3. Residence:

City Small or medium-sized town
 Village Hamlet

4. Occupation:

Pupil, student Worker
 Pensioner Unemployed

5. How often do you walk / make excursions in the open countryside?

regularly, every week regularly, every month
 2-3 times a year occasionally

6. How do you go to the desired location in the above case?

on foot by bicycle by train by bus by car
 more than one of the above other:.....

7. Have you ever visited an educational path? ('Educational paths are places of outdoor exhibitions – set up primarily in order to enhance the visitors' environmental awareness –, which present the natural and cultural-historical characteristics and assets of a particular area, as well as the importance and the way of preserving them, by means of stations and signs placed along a tour route or with the help of a tour guide.'

yes no

If not, what is the reason?

17. What are the major fields of knowledge that can one find information about?

- flora fauna cultural-historical assets
 rocks, geology conservation of nature
 environmental protection local specialties: other:.....

18. Have you ever heard the term of sustainability anywhere?

- yes no

19. If yes, where?

- I read about it. I heard a public educational lecture.
 At a group excursion.

20. Can you mark the level of your knowledge about the following areas before starting your visit at this particular location?

<i>Topic</i>	<i>Level or mode of knowledge</i>		
Durable silviculture	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> quite much
Use of solar energy	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> much
Medicinal plants	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> I gather them.
Wild animals and their habitats	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> much
Recycling	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> much
The diversity of nature (biodiversity)	<input type="checkbox"/> none	<input type="checkbox"/> minimal	<input type="checkbox"/> much

25. Locate your attitude to sustainability before and after the visit on a 10-grade scale.

- Before the visit 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
After the visit 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,

Where the grades are

- 1, I am not interested at all
- 2, I show minimal interest
- 3, I show little interest
- 4, besides interest, I show orientation as well
- 5, medium level of interest, little orientation
- 6, a little more than medium level of interest and also action
- 7, more interest, and actions appear on local level
- 8, besides actions on local level, I am interested in the global level as well
- 9, continuous local actions and temporary global interest
- 10, active participation in local and global actions

C. The Questionnaire Survey and Its Results

Having sent out 112 questionnaires, we got 94 completed questionnaires back. In some cases, certain questions were not answered; we indicated that in the evaluating tables.

The gender distribution of the respondents is the following: 47% female and 53% male. Their age distribution is peculiar, since all age groups from 16 to over 65 appeared among the visitors, or, respondents. The age group of young people was represented the most strongly by 20 persons aged 28 years, 14 respondents were aged 31 to 35 years, and 19 of them were aged 51 to 60 while 18 respondents were aged 61 to 65 years.

56% of the respondents live in cities, 26% of them live in towns and 16% in villages.

The distribution of occupational categories is the following:

Pupil/Student	10%
Working	55%
Pensioner	29%
Unemployed	6%

Considering the regularity of the visits, an interestingly ‘balanced’ distribution appeared, since each of the answers ‘regularly’, ‘weekly’ and ‘occasionally’ was chosen by 30% of the respondents.

There was hardly any difference between the proportion of those visiting the locations individually or in groups, as these proportions were 54% and 46%.

What main knowledge areas did the participants encounter on the educational path? We can answer that with the following table:

TABLE I CONTENT ELEMENTS AT THE THREE LOCATIONS

	Content elements	FHNP	Gemenc	Árpádtető	Total
17	flora	27	16	35	78
	fauna	23	12	26	61
	cultural/historical asset	8	1	5	14
	rocks, geology	6	6	13	25
	conservation	14	5	13	32
	environmental protection	5	5	2	12
	local specialties	4	0	6	10
	other	1	0	3	4

The above table demonstrates that flora and fauna appear the most frequently at each of the three locations. They are followed by conservation and rocks.

Concerning the question ‘Have you ever encountered the concept of sustainability?’, 90% of the 90 respondents answered yes and 10% answered no.

At the end of our questionnaire, we intended to assess the change in the attitude with respect to sustainable development before and after the visit on a ten-degree scale. As the following results show, the attitude level 6 decreased significantly while the stronger values of 9 and 10 increased considerably. (Figure 2)

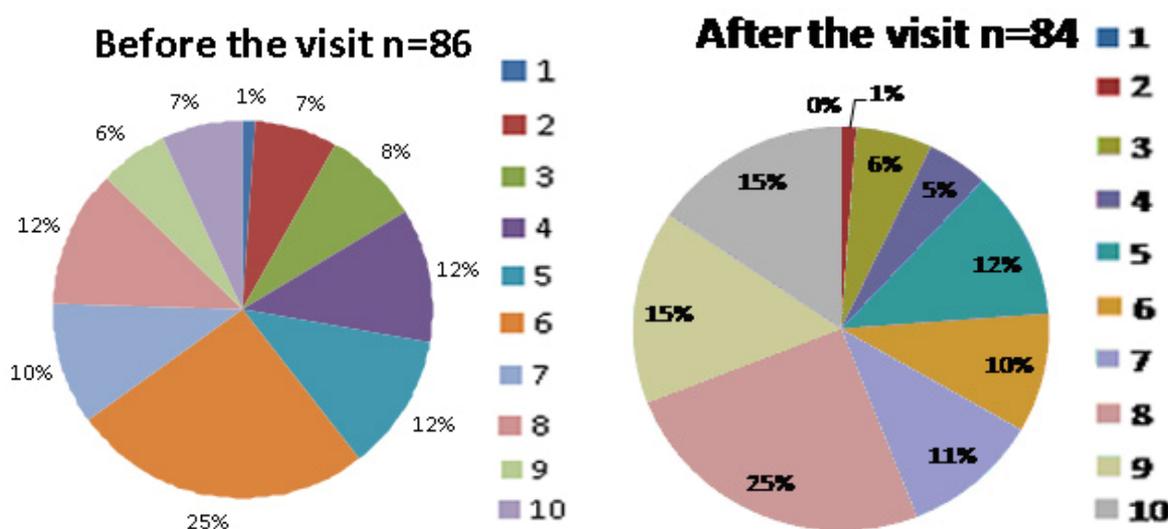


Figure 2 Change in the Attitude to Environmental Awareness

V. A SUMMARY OF THE RESULTS OF THE SURVEY

A. A Summary of the Results and the Proof of the Hypotheses

Firstly, the proof of the hypotheses is presented in the Table 2

TABLE II. HYPOTHESES AND PROOF

HYPOTHESES	PROOF
There are relatively few persons in the sample who have visited more than one educational path.	51% of the respondents went to more than one educational path before the visit. Thus, my hypothesis seems to prove false, as about half of the participants have visited more than 5 educational paths.
The level of knowledge/experience changed after the visit.	Regarding all topics except for one (utilising solar energy), most of the respondents who had been to educational paths earlier marked the answer saying that their knowledge changed to a medium extent after the visit. The respondents stated that there was a large change in their knowledge about the following topics after the visit: durable silviculture, wild animals and their habitats, diversity of nature. Accordingly, the hypothesis has proved true.
Everyone has heard about the idea of sustainability.	We have found that 86% of the respondents have heard the term 'sustainability' on the basis of their previous knowledge. Most of them have read or heard lectures about this idea. This suggests that the hypothesis proved almost entirely true.
The most of the participants have heard about or have knowledge about utilising solar energy and recycling.	It emerged during the study that the most of the participants have heard about the topic of wild animals and their habitats and a large proportion of them have knowledge about recycling. In terms of utilising solar energy, the respondents' knowledge was only in the second third. This shows that the hypothesis proved partially true.
The locations of the educational paths differentiate the content areas.	The tendency shows that the most of the visitors of all the three educational paths found new information on the topic of flora and fauna. The participants chose conservation as the topic that gave them the third most new knowledge unanimously. Consequently, the locations of the educational paths do not differentiate the content areas.

B. Summary

The connection between sustainability education and adult education has come to prominence recently and that is why we focus on it in our study.

We have found that 86% of the respondents have heard the term sustainability on the basis of their previous knowledge. Most of them have read or heard lectures about this idea.

About half of the respondents did not answer the question as to on which terrain/stretch they heard/got the most information about sustainability. This suggests that they may not have been given enough information about this term or they were not adequately motivated to complete the questionnaire. However, some positive shift towards raising the awareness about sustainability is discernible.

The visit did not depend on the intersections of age group, place of residence and occupation at all. Furthermore, we found that nearly all age groups appeared among the visitors, and persons aged 51 to 60 and 61 to 65 years participated the most numerously. According to the experience of visitors, the type of educational path with information signs is the most characteristic. The following types of educational paths are also frequent: those of footpath, display and natural history character. Regarding vehicles, the chosen category can be deemed favourable, as most visitors go along the educational path on foot, which is also environmentally sound.

C. Recommendations as to the Future Course of Action and Emphasis. Closing Remarks

The role of universities and higher education colleges in knowledge transfer should be intensified; environmental education and the shaping of consciousness should appear in their activity in all subjects and fields of study more prominently. There should be doctoral schools and programmes on environmental pedagogy. [15]

Secondly, we make a proposal regarding the field of adult education on the basis of the empirical survey and its results.

Concerning individual research, a recommendation for further development may be expanding the sample by at least 150 to 200 respondents. Additional methods could also be used in the empirical study, e.g. on-the-spot observation. Furthermore, it is important to choose other field locations besides the educational paths, such as events and cultural institutions in towns, where adults can encounter and participate in lectures, displays etc. on sustainability. Regarding environmental education, the augmentation of adults' knowledge about sustainability could be intensified in a non-formal learning format. We should utilise the potentials offered by NGOs. We could examine the co-operation of several generations within a settlement or a project.

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