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Lifelong Learning As A Part Of Training In The Field Of Civil Engineering

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Abstract

The contribution focuses on the issue of lifelong learning in the field of civil engineering. Current trends in architecture show that another systemic training of civil engineers is essential and necessary. Lifelong learning is currently focused on the area of sustainable development, which includes a number of aspects such as cultural and socio-economic aspects, structural design of buildings and the life cycle of buildings. Technical universities and professional chambers have their role in the process of lifelong learning. In connection with these two entities, special courses can be focused on lifelong learning that contribute to the extension of the knowledge of a civil engineer, on the one hand, and to increasing the supply of professional specialization in the labour market on the other hand.

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1. Introduction

Lifelong learning in the field of civil engineering is understood to be a continuous process of acquiring and developing knowledge and practical skills, also beyond the initial education that has been received in the field of higher education at Faculties of Civil Engineering. The Organization for Economic Co-operation and Development

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(OECD, 2000, 2004) defines lifelong learning as a systemic approach that focuses on standards of knowledge and skills that apply to all children from an early age for learning throughout life and coordinates efforts to ensure appropriate possibilities for all adults, regardless of whether they are the employed seeking to advance to a higher level of qualification or the unemployed who need to be retrained [1].

1.1. Sustainable Construction and Educational Process

Since the 2nd half of the last century, civil engineering has experienced great development, both in respect of theory, material, and technology and in respect of practice. However, positives of development have also brought negatives in the form of environmental stress [2]. The construction of new buildings and the reconstruction and subsequent operation of existing buildings form currently significant part of the impact of technology on the environment; the quality of the internal and external environments, which has an impact not only on the population, but also on all living things, on the whole nature, is determined at the same time. Building construction and operation belong among the main consumers of material and energy sources and at the same time among the main polluters of the environment. Every building and every building structure go through several phases during their lives, from the designer's idea through implementation to the end, i.e. demolition. Within their life cycle, buildings in the European Union countries consume approximately 40 % of all energy, produce approximately 40 % of all waste, and contribute to approximately 30 % of CO₂ emissions [3].

More than twenty years ago, the World Commission on Environment published the report named "Our Common Future" with a definition of sustainable development [4]. Aspects of the environment and sustainable construction have thus gradually come to the fore in technical and natural science disciplines; at the same time a need for further systematic education in this field has arisen.

The new concept of civil engineering in the context of sustainable construction includes the three basic areas:

- Quality of the environment (internal and external environments)
- Economics, development, and impacts
- Culture of an environment and social connections

The traditional approach in building construction and reconstruction has been based on the principle of the maximum economic profit of the building industry, where the environment was at the edge of investors and companies' interest. The new concept of civil engineering, summarized in the concept of sustainable construction, understands civil engineering as a sector in which negative influences and impacts on the environment must be eliminated, with taking account of economic, cultural, and sociological criteria at the same time [5]. We understand sustainable construction to be a continuous process that has an impact on the sustainable development of cities, towns, and villages.

As sustainable building construction principles are put into practice, both the requirement and the need for systematic training in this area have also arisen.

Further education in the field of sustainable construction has established itself in the course of development in:

- Higher education in the field of civil engineering and architecture
- Lifelong learning (accredited courses)
- Distance education using e-learning
- Information seminar

2. Case Study

Education in the field of sustainable construction can be demonstrated using a case study of a lifelong learning project intended for civil engineers. The project named "Educational program for civil engineers" (hereinafter referred to as the "project") was prepared in the Czech Republic in cooperation with a university, the Faculty of Civil Engineering of the VSB – Technical University of Ostrava, and the ČKAIT (Czech

Chamber of Authorized Engineers and Technicians in Construction) with the support of the Operational Programme Education for Competitiveness, a programme with the support of the European Union [6].

The project was focused on further education trainers who educate themselves, under the supervision of methodologists from among experts of the Czech Chamber of Accredited Engineers and Technicians in Construction, in current themes of civil engineering in the context of spreading sustainable construction principles and who will further share this information with another target groups, i.e. building engineers and architects as participants in lifelong learning.

The main objective of the project was to increase and deepen the qualification of trainers and subsequently building engineers and architects and to improve their competitiveness in the labour markets, both in the Czech Republic and in countries of the European Union. From the viewpoint of methodology and content, an absolutely new educational program of lifelong learning was created, within which methodologies were prepared, supported by printed teaching materials, including textbooks with e-learning elements, just with regard to innovative trends in sustainable construction.

2.1. Implementation and Results of the Pilot Project

Within the implementation of the project, the schedule was followed according to predetermined key activities that followed logically one by one and led to the set goal.

The key activities in the project included:

- Selecting excellence, this is selecting excellent trainers from civil engineering practice
- Educating university teachers in cooperation with selected excellent trainers who have been characterized as methodologists operating in practice
- Holding seminars and workshops with a panel discussion on the theme “Problems of sustainable construction”
- Defining 6 training modules that included the principles of sustainable construction
- Developing printed textbooks with a minimum range of 100 pages for individual training modules
- Developing training materials and texts with e-learning elements
- Pilot verification of the project using 6 modules listed in Table 1

There were 180 persons out of a total of 250 people contacted who participated in the pilot verification of the project. All persons contacted were authorized persons in accordance with the authorization rules of the ČKAIT and confirmed their interest in further learning in the field of sustainable construction.

It results from Table 1 that to ensure the excellence of the project, 13 experts operating in practice in total were involved in the project and then 25 university teachers were trained in the field of sustainable construction and they subsequently operated in individual training modules of lifelong learning.

Table 1 Training modules and the number of persons involved and trained

Module	Methodologist Operating in Practice (Persons)	Trained Teachers (Persons)	Graduates (Persons)
Land planning	2	5	30
Geotechnics	3	5	30
Preparation and execution of construction	2	6	30
Structural mechanics	3	3	30

Building diagnostics	2	3	30
Highway engineering	1	3	30
Total	13	25	180

Fig.1 documents the spread of the principles of sustainable development within the implemented pilot project. 52 women and 128 men out of 180 participants attended all six training modules, which is 29 % women and 71 % men out of a total of 180 graduates.

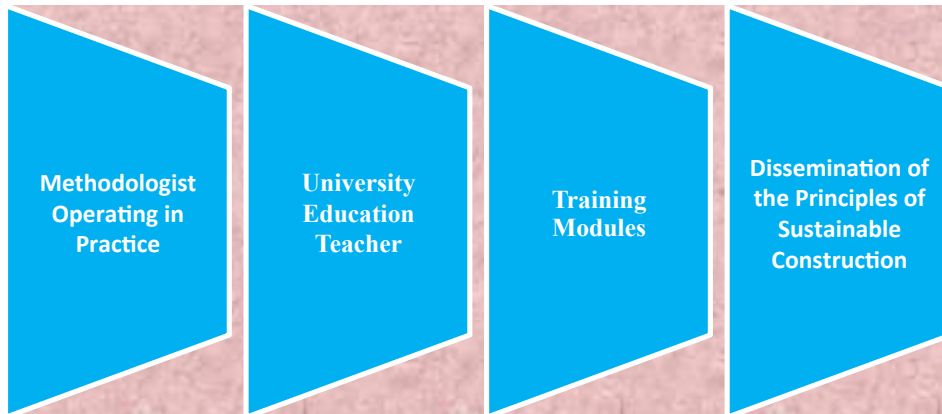


Fig. 1 Spread of the principles of sustainable development

3. Conclusion

The presented case study presented a selected lifelong learning project, focused on highly topical problems, which are sustainable construction. The pilot verification of the project proved interest in lifelong learning in the field of sustainable construction. It turned out that lifelong learning is generally in accordance with European educational trends in 2020 and that this activity is an integral part of the higher educational process. Benefit was also the fact that experts operating in practice and university teachers became interconnected in the educational process. Lifelong learning with relation to the problems of sustainable development can be regarded as not only an activity that contributes to better possibility of finding their place in labour market for trained persons but also an activity that contributes to the spreading of the principles of sustainable construction and the sustainable development of towns, cities and villages in the field of civil engineering and architecture. The need for lifelong learning in the field of sustainable construction is declared and considered to be necessary for further development of society.

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