

Lifelong Learning for Civil Engineers in Europe: An Overview

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Summary

In the last years the demand for the provision of various forms of lifelong learning has shown a remarkable increase worldwide. The European Union strongly supports the enhancement of relevant structures with a particular emphasis put on a more active involvement of universities. Within this sense, the present paper reviews the current situation of lifelong learning provision to civil engineers in Europe including: the historic development of European general policies, the specific purposes and target groups, the providers and types of provision as well as the teaching and learning methods, as regards lifelong learning practices in civil engineering. In this reporting the particularities of both educators and learners are highlighted and the emerging challenges for both groups are commented. The paper concludes by discussing the role of universities in this new field of action, which complements their traditional activities in research and formal education.

Keywords: Lifelong learning, civil engineering, strategies and implementation, role of universities.

1. Introduction

Lifelong learning - as an educational strategy – is a concept that emerged more than twenty five years ago through simultaneous efforts of the OECD, UNESCO and the Council of Europe. Nowadays lifelong learning is considered to encompass all learning endeavours over the lifespan and, therefore, it is given a high priority by all major political, economic and social forces in the world. In the European Union the challenges which demand a new approach to education and training (i.e. the basic operational forms of lifelong learning) include: the scale of current economic and social change, the increased pace of technological change, the ever transforming nature of work and the labour market, the rapid transition to a knowledge-based society, and the demographic pressures resulting from an ageing population in the continent.

Civil engineers constitute one of the very specific groups of today's society, as they need an active and constant engagement in lifelong learning activities, not only for the benefit of their personal and/or career development, but also because their profession is aiming to serve the modern world in a straightforward and global way. In our days a civil engineer is not only a designer, a planner or a constructor. He is also a producer, a decision-maker and most probably a leader. In order to succeed in such a multiform of professional tasks, the civil engineer should constantly acquire a planned combination of knowledge, experience and skills as well as develop his individual qualities and competences.

The present overview of lifelong learning for civil engineers in Europe is no more than an attempt to bring together in a concise way and from within a European perspective the basic issues that are

relevant to the participation of this professional group to lifelong learning activities. The paper was in fact produced during the preparatory phase of working out the Specific Project “Lifelong Learning in Civil Engineering”, an activity of the Socrates European Thematic Network EUCEET (“European Civil Engineering Education and Training”). In this manner it is mostly based on the author’s (the chairman of the Specific Projects’ Working Group) experience, built up by reviewing pertinent published information and, at the same time, contacting and interviewing European experts in this particular field.

2. Concepts and Definitions

On its Memorandum on lifelong learning [1] the European Union advanced the following definition of lifelong learning: “*All learning activity undertaken throughout life, with the aim of improving knowledge, skill and competences within a personal, civic, social and/or employment-related perspective*”. In parallel to the term ‘lifelong learning’, which draws attention to time, the newly-coined term ‘lifewide learning’ draws attention to the spread of learning. Hence it brings into focus the complementarities of formal, non-formal and informal learning.

‘Formal learning’ occurs in an organised and structured context, takes place in education and training institutions and is explicitly designated as learning. It leads to certification and is intentional from the learner’s point of view. ‘Non-formal learning’ takes place alongside the mainstream systems of education and training. It is embedded in planned activities not explicitly designated as learning, but contains an important learning element. It is intentional from the learner’s point of view and, typically, does not lead to certification. Finally, ‘informal learning’ results from daily, work-related, family or leisure activities. It is not organised or structured and it is not necessarily intentional from the learner’s perspective ([1], [2]).

Civil engineers are university degree-holders, their discipline being notably of a high technological character. This means that in relation to their professional career formal learning is well formulated and structured, still always depending on current local and global needs [3]. On the other hand, informal learning is an individual’s matter and, therefore, it can hardly relate to any particular professional attribute. Hence, the current interest of lifelong learning activities of civil engineers rests in the non-formal type of learning, and this is the issue that is examined in the present paper.

Among the various forms of learning that are normally classified as non-formal ones, the one that is of primary interest to civil engineers is ‘continuing education’. This refers to education or training after initial education or entry into working life, aimed at helping individuals to: (a) improve or update their knowledge and/or competences; (b) acquire new competences in the perspective of a career move or retraining; (c) continue their personal or professional development [2]. The last is in fact the key approach to all professionals seeking the full spectrum of lifewide learning options, as it can easily be conceived by its most accepted definition: ‘Continuing professional development’ is the systematic maintenance, improvement and broadening of knowledge, experience and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout one’s professional life.

3. Policies and Actions at the European Level

3.1 Strategies and Implementation by the European Union

Although the European Union’s policies and actions regarding lifelong learning span over a much broader spectrum of concepts, strategies and implementation methods than the ones discussed herein, a short historic overview of the European approach is quite necessary. This is because this approach constitutes the wider framework within which all relevant separate actions and policies can be classified and evaluated.

The European Union's active promotion of lifelong learning began in earnest in the mid-1990s, by officially establishing 1996 as the 'European Year of Lifelong Learning'. In operational terms it was then when the Community's programmes Socrates, Leonardo da Vinci and Youth shared the same preamble and were placed under a common umbrella of promoting lifelong learning. In strategic terms, the Lisbon European Council in March 2000 set the goal for the European Union to become the most dynamic and competitive knowledge-based society in the world. To this end the European Commission produced on November 2000 a Memorandum on Lifelong Learning [1], of which the conclusion and proposals became the subject of a major pan-European consultation process. A year later, and based on the consultation's conclusions, the Commission presented a Communication [4] which led to the adoption of a Council Resolution on lifelong learning in June 2002 [5].

Some more recent developments at European level include: (a) In March 2003 the Commission set up PLOTEUS, an internet Portal on Learning Opportunities Throughout Europe. (b) In April 2003 the R3L initiative was launched, linking 120 learning regions with a view to exchanging know-how and developing methods of promoting lifelong learning at regional level. (c) Several networks and projects dealing with lifelong learning issues were supported financially under various European education and training programmes. Among them these, which are more or less related to our current discussion, are presented in the following section. (d) Finally, in July 2004, the Commission proposed a Decision of the European Parliament and the Council to establish an integrated action programme in the field of lifelong learning. This integrated programme for education and training, proposed for implementation in the period 2007-2013, will comprise four specific programmes: Comenius, Erasmus, Leonardo da Vinci and Grundtvig.

The response of the European citizens and the member states to the above described decisions and plans have been so far positive (as expressed by various Eurobarometer and Cedefop surveys and studies). Still, the implementation process varies among individual member-states, particularly as far as the incorporation of the proposed policies and actions within national practices is concerned.

3.2 Associations, Networks and Projects

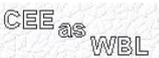
In this section a selection of some associations, networks and projects is presented (Table 1). Every one of these has a close relation with lifelong learning (LLL), civil engineering education (CEE) and higher education institutions (HEIs) actions and/or policies. The degree of connection with these three issues varies, but every body listed in the table is involved at least in two of them.

Most of the associations appearing in Table 1 are autonomous bodies, some of them with a rather long history, serving numerous members from the professional or academic areas (individuals and/or institutions). As such they have their own policies, which in general may have some connection with European Union policies in the respective fields of action. Moreover, and as their titles show, these associations are mostly engineering ones, covering a wide spectrum of formal and non-formal learning types.

On the other hand, the networks and projects that complete the list in Table 1 are based on diverse groups of partners, in principle from European countries, whose common task is to study and promote issues of education and training, mainly in engineering fields. For almost all groups from these two categories the connection with European Union policies is very strong, as their functions are being or have been wholly or partly funded under European education and training programmes.

Information about the whole range of activities of all the bodies shown in Table 1 can be obtained by browsing their websites. Finally, it should be noted that the projects H3E, EUCEET, E4, TREE and CEE as WBL are very much related to the issues discussed in the present paper.

Table 1. Associations (A), Networks (N) and Projects (P) related to LLL, CE, and HEIs.

Logo	Acronym	Full name	Type
	SEFI	European Society for Engineering Education	A
	ECCE	European Council of Civil Engineers	A
	CESAER	Conference of European Schools for Advanced Engineering Education & Research	A
	IACEE	International Association for Continuing Engineering Education	A
	FEANI	European Federation of National Engineering Associations	A
	IGIP	International Society for Engineering Education	A
	EFVET	European Forum of Technical and Vocational Education and Training	A
	EUCEN	European University Continuing Education Network	N
	EVTA	European Vocational Training Association	N
	H3E	Higher Engineering Education for Europe	P
	EUCEET	European Civil Engineering Education and Training	P
	E4	Enhancing Engineering Education in Europe	P
	TREE	Teaching and Research in Engineering in Europe	P
	CEE as WBL	Continuing Engineering Education as Work Based Learning	P
	THENUCE	Thematic Network Project in European University Continuing Education	P

4. Lifelong Learning in Civil Engineering

4.1 Purpose and Target Groups

Lifelong learning in civil engineering is becoming a vital activity worldwide, and, according to many, a commercial issue, due to the inevitable competition among its providers [6]. It is also a dynamic process, as new building techniques, design technologies and materials are the order of the day. Finally, it is more than a necessity due to the current enlargement of the profession's content and culture as: (a) traditional professional engagements have to be integrated within critical issues, like urban development and environmental protection; (b) changes taken place in the construction industry introduced new forms of contracts, ways of managing projects, environmental and planning legislation, and health and safety regulations; (c) information technology has been already established as a powerful tool in a civil engineer's everyday training and practice.

The prevailing contemporary view regarding the educational pathway of a civil engineer is that a major emphasis should be given to an initial broader training, followed by lifelong learning to enable him to update and learn effectively and efficiently, according to his personal and/or

professional needs. Lifelong learning, and more particularly, continuing professional development for an individual civil engineering should aim at: (a) acquiring current knowledge, skills and professional experience; (b) fulfilling personal career aspirations, both in the short and long term; (c) meeting successfully the employer's business objectives and opportunities; (d) above all, keeping himself posted about the continuous changes in industry, technology, society and the profession.

Formal (university) education admittedly suffers, at least for now, in that the teaching of technical subjects quite often fails to prepare the graduates to face all the problems encountered in practice as well as to allow them to develop self-sufficient learning skills. Particularly the second one is a distinct drawback, taking into account not only the rapid obsolescence of knowledge but also the uncomfortable fact that there is an increasing gap between the rate of learning and the rate of forgetting. This issue becomes more acute for graduates from traditional universities with heavy curriculum content, a practice based on the erroneous belief that the Diploma symbolises the end of the educational process. However, for almost every active engineer skills, competence and know-how needs are complementary to knowledge and understanding ones. As the latter are the major tasks in the agenda of higher education institutions, while the former are rarely given a priority, if any at all, it is in the arena of lifelong learning where these qualifications should be sought.

The interest in the pursuit of lifelong learning in civil engineering comes from many sources: individuals, private companies and the construction industry, governmental bodies, professional organisations and trade unions. The last group brings into focus another dimension of the lifelong learning issue, apart from the one discussed herein, which is indeed the continuing professional development of university-educated civil engineers. That other dimension relates to the vocational education and/or training of other professionals, technicians or workers, who are also involved within the whole range of activities of the civil engineering industry. Consequently, the target groups of lifelong learning provision in civil engineering related subjects should generally comprise: (a) professional 'theoretical' engineering degree holders (i.e. university graduates); (b) professional 'applied' engineering degree holders (i.e. the graduates from institutions like the Fachhochschule in Germany, the Hogeschool in the Netherlands, the Technological Education Institutes in Greece etc.); (c) engineering technicians (i.e. all these with an initial short-term education obtained from various types of technician schools); (d) workers, who are initially non-educated or even non-skilled individuals and who are employed – or tend to be - in the construction business.

As already shown so far, the issues discussed in this paper relate to the first two categories of the above mentioned total human potential involved in civil engineering, mainly because universities can be the essential source for their lifelong learning provision. However, the other two groups are of no less importance as far as their lifelong learning content and prospects are concerned. Still, relevant policies and implementation actions fall within the more general issue of adult learning, for which a broader, mostly political, involvement of all societal stakeholders is necessary [7].

4.2 Providers and Types of Provision

The number of continuing civil engineering education providers in the whole Europe is large. Their identification and, moreover, their classification is not an easy task on its own, even at the national level. This is because the professional associations, private companies and universities, which supply such educational services, vary in organisational structure and management, institutional attitudes, learning/teaching methods, financing forms, human potential and technical infrastructure, and type and size of activities. As a consequence, and despite the efforts of some of the associations shown in Table 1, preparing a complete inventory of European providers of lifelong learning, even in all fields of engineering, seems to be an unattainable task, at least for the present. However, a lot of progress is currently ongoing, from which we have to acknowledge the very interesting contribution of the relevant group of the thematic network 'E4' on the taxonomy and typology of

continuing engineering education suppliers in Europe [8]. Dedicated to the university-based provision, this specific report is a valuable reference and a guide, particularly in the issue of institutional management. On the other hand, the current work of the Group of EUCEET, mentioned in the 'Introduction' aims, among others, to the same direction, i.e. to identify and classify at least the major providers of lifelong learning specifically in civil engineering in Europe.

Currently, the prevailing types of provision of this specific education can be distinguished as: (a) short courses, usually of 1-3 days of duration; (b) longer training courses, spanning a learning period of a few weeks to some months; (c) non-degree postgraduate courses or part-time degree programmes, usually of a long duration, such as an annual one (these are based on short-time lecturing/coursework sessions, mainly during specific week-days or, preferably, week-ends); (d) other types of professionally-oriented or company-driven activities, such as attending specific conferences, seminars and workshops. Usually, all these types of provision are offered by the providers at their own premises, but in a way that allows learners to stay in a full time employment in their private companies or public services. On the other hand, a rapidly emerging alternative approach of lifelong learning is the work-based one, by which, not only the employment status remains undisturbed, but also additional benefits are gained, as presented in the next section.

Several issues are quite important, as related to all types of provision. Among them, investment in and financing these activities, educational standards, systems and needs, accreditation of courses and providers, qualification systems, recording professional achievement, and strategic partnerships between providers and industry are the prevailing ones. A comprehensive study on engineering continuing education, which was indeed the basic starting reference for the 'E4' study previously mentioned [8], is the position paper 'A Call to Action' produced by the thematic network H3E [9].

4.3 Teaching and Learning Methods

One of the most exciting and challenging issues along the provision of lifelong learning to civil engineers is the design and implementation of teaching and learning methods. Above all rests the change in pedagogical methods that is due to the rapid development of communication and information technologies [10]. Today, even published books include CD-ROMs storing valuable complementary information and/or software for specialised applications, as well as links to websites for the updating of reference documents and other useful elements. The Internet itself is a most valuable source for almost everything, provided that a method of efficient and effective browsing is used (this is indeed a subject of its own for 'teaching/learning how to learn'). In its contemporary form 'distance learning' is also becoming a model for the teaching/learning process, either alone or mixed with more traditional methods. Distance learning evolves as a very promising source of learning in continuing education because the flexibility and control that offers to the adult reader is highly attractive to him: learning is available as and when time is available, allowing thus the learner to work on his own pace and also repeat sections or whole courses at his wish.

On the other hand, traditional methods used in courses, lectures, workshops and seminars will continue to be important, as they provide the advantage of an in-person interaction between tutor and student. So does also the alternative models of work-based and workplace learning. These forms of off-campus learning, which can be implemented at both undergraduate and postgraduate levels, are becoming popular in several European countries ([11], [12]). By these models, academic supervisors become facilitators of a learning process that is integrated in the job task, does not require absence from work, ensures professional relevance and is adapted fully to the individual.

Both approaches (modern and traditional), as applied for continuing education purposes, are real challenges not only to the learner but also to the educator. Still, the specific demand for educational support from lifelong learners is labour intensive for educators within their new teaching duties. Because of the varying natures of courses the necessary coursework differs: educational material,

tutorials (problem-solving, project-supervision), workshops, laboratories etc. Whether all these generate a motivation or not is a question that cannot be answered but by every teacher himself.

5. The Role of Universities

Recent comparative studies on university continuing education in European countries ([13], [14], [15]) show that universities, although considered as major providers, have in average only a limited role in the post-degree development of professionals, including engineers. However, behind the European averages, one can detect convergences and divergences between individual countries but also between universities alone. The UK, Iceland, France, the Czech Republic, Slovakia and Romania have the highest percentages of universities involvement in lifelong learning strategies in general [13]. The Nordic countries also have a long tradition and show an increasing rate in the development of relevant activities. On the other hand, universities approaches taken to lifelong learning can be categorised into three basic types: (a) lifelong learning is separate and seen as marginal to the main business of the university; (b) lifelong learning is regarded as one of the 3 equal 'pillars' of university's activity along with research and formal education; (c) lifelong learning is seen as the 'basic concept' of the university. Evidence shows that many, especially older and more distinguished, European universities might fall in the first category, fewer in number, but entering dynamically in the field, belong in the second one, and much less, often lacking relative prestige, can be classified under the third one. The 'centres' (i.e. the structural units) of university-based provision of continuing engineering education also differ as far as the issues of their organisation and management are concerned [8].

The main reasons that slow down or even prevent universities to integrate continuing educational programmes into their system (i.e. in their general strategies, core processes and decision-making) are: (a) institutional and/or academic staff resistance (mainly driven by differing traditions regarding the university's strategic priorities and ethics and/or by the promotion of more useful for the individuals' academic careers advancement activities, like research); (b) lack of clear incentives (especially monetary); (c) national or European policies targeting on other strategic priorities (e.g. employment strategies and social agenda).

However, the 'market' is more than ever seeking for lifelong learning 'products' and, if these are not provided by universities, some other 'competitors' would surely benefit instead. In order to make a lifelong learning policy work, especially involving the higher education institutions, we can summarise here what is required by both sides, i.e. the learners and the educators. What is normally sought by the learners' side is: (a) adequate offers (i.e. learning opportunities for the diversity of potential learners); (b) motivation (learners have to be convinced that taking up learning offers is both possible and worthwhile); (c) recognition and accreditation (of knowledge, competencies and skills); (d) appropriate financial and labour conditions (financial assistance and flexibility at work).

On the other hand, universities, as 'mainstream' lifelong learning providers, should: (a) reconsider their approach and relationship to lifelong learning and integrate it into their overall strategy and mission; (b) adopt internal policies to promote the recognition of the types of lifelong learning that they offer; (c) develop mechanisms capable of assuring a continuous and adequate financing of these activities; (d) facilitate access to learning opportunities; (e) provide well defined and designed programmes; (f) make the whole process attractive to their teaching staff, mainly by balancing all teaching duties (typical and lifelong learning) and offering additional career advancement rewards; (g) above all, make lifelong learning a distinct and distinguished characteristic of their institution as well as a component that will add extra value to its overall pursuit of 'excellence'.

6. Conclusions

Lifelong learning in civil engineering is today not only a necessity for the respective workforce but

also a challenge for the providing institutions, particularly the universities. The issues presented and discussed in this paper are only the key factors of an activity that has already shown its vast potential as well as its high importance for the society. The main and common conclusion that is drawn from every single reference, study or opinion is that lifelong learning should be the primary target of all higher education institutions, which have to adapt their own strategic plans towards a wider and more effective participation in this type of activities.

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