

THE ROLE OF CLIL IN ENGINEERING EDUCATION IN BOSNIA AND HERZEGOVINA

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ABSTRACT

The most important mission for an engineering college is to prepare its students for their careers. Nowadays, in a rapidly evolving engineering landscape, traditional engineering education is being transformed towards the education which obtains a broader foundational experience for life-long success. CLIL (Content and Language Integrated Learning) is an approach that can definitely help in delivering such an education.

Keywords: education, CLIL, life long learning, internationalization, mobility

1. INTRODUCTION

Engineering is among the professions that have made the most important impact on human history so far. In fact, engineering has never ceased to be a generator of human progress. Although its significance remained constant, the engineering education has changed over the time. Thus, being a skillful engineer in 21 century means having competencies that go beyond the ones that can be gained only in the classroom and the laboratory, as was the case in the previous centuries. In order to meet requirements of a globalized world and its labour market a modern engineer needs a broad education and professional versatility. Therefore, it is desirable that engineers continue learning about new achievements and innovations many years after their formal education finishes. Considering the fact that technology and engineering applications are rapidly changing, engineers need to develop and update their professional knowledge on a continuous basis. Not only do they need to comprehend how new technologies work but they also need to communicate their knowledge, that is, to exchange ideas and expertise with their colleagues all over the world which is described by a syntagma - *global village*. The syntagma suggests, among many other things, that in the digitalized world of Internet and global labour market we cannot live isolated lives nor can we practice local engineering. Therefore, many engineering universities (not only the universities in developed Western European countries) are making huge efforts in internationalizing their engineering education. Obviously, such endeavours demand a work on eliminating language barriers. In other words, a successful internationalization demands adequate language skills of university staff and its students.

2. MODERN ENGINEERING EDUCATION

It is a well known fact, that the changing nature of the global market economy, development of new technologies and explosion of information technology made a huge and irreversible impact on engineering practice. However, in many countries, including Bosnia and Herzegovina, engineering schools and colleges (which are basic source of engineering training and skills) are not able to keep up with the growing changes in trade, science and technology. Obviously, as the world becomes more complex, engineers need more regular updates on professional issues. They also need to know how to communicate effectively, not only in terms of their professional expertise but cultural diversity as well. In short, they must be far more versatile and flexible than a traditional type of engineer. These facts should strongly influence the way a modern engineer is educated, that is, they should be seriously considered by the engineering education policy makers (University, Ministries, Deans, students, administrators etc.) if they wish to reduce the gap between the engineering training and the

growing market demands. Following the suggestions made by Lueny Morell [1], one of the most prominent experts in transforming the Higher Education institutions to better respond to the modern world challenges, there are five principle actions that modern engineering college or university should undertake.

Firstly, universities should regularly innovate their engineering curriculum and thus provide students with competencies which are in demand on the labour market. (In Bosnia and Herzegovina, prerequisites for employment of engineer are English language proficiency and IT skills.)

Bearing in mind the previously mentioned challenges, a lot of effort is constantly being made in many countries to internationalise their higher education institutions through innovative curricula and initiatives. A striking initiative of the sort emerged in the United States in late 80s when International Engineering Program (IEP) was designed at the Rhode Island University, Boston, to give their graduates a global marketplace edge by providing their students with a five-year dual bachelor programme in which engineering students complete a language major alongside the usual engineering curriculum requirements. [2] In order to reinforce nascent language skills, students embark on synchronous study of both disciplines in a country of their choice during the fourth year. Their knowledge is applied and tested while interning with engineering firms in the foreign language for six months.

On the other hand, in the United Kingdom, the Royal Academy of Engineering set up a working group to address the issue of educating engineers for 21 century. Again, internationalisation of universities is highlighted as the action which lies at the core of the education process and the mobility programmes are seen as a key tool in that respect. Although mobility programmes (Erasmus +, Mevlana, Coimbra Group Student Exchange Programme etc.) gain popularity throughout Europe, students in Bosnia and Herzegovina do not seem to be willing to apply to these programmes in a big number. This can, to certain extent, be justified with the fact that foreign language policy in Bosnia and Herzegovina has not yet been harmonized over the different educational levels. This affects students self-confidence, which is quite necessary for their embarkment on mobility programmes. Another reason is lack of education in cultural issues, so students often feel uncomfortable to leave the country and live abroad for some time.

Next important action that modern and higher education institutions are recommended to undertake is to focus their programmes and practices on learning experience (not on teaching). Good example is the already mentioned *internship* - when students actually get to use their technical, linguistic and cross-cultural skills in their attempts of becoming 'international engineers'. Universities with such programmes are able to deliver culturally flexible and mobile engineering professionals who can find their place in the global labour market, which is "something more valuable than just a piece of paper one receives after a period of studies". [3]

Fostering creativity and innovation as well as conducting continuous assessment and accreditation are another important actions to be seen in higher education institutions. All of them request investments which are to be put into adequate projects and accompanying equipment. One cannot imagine a competitive modern engineer without creativity and aptitude for inventing.

The last action, but not the least, includes so called 'diversification' which is closely linked to the flexibility, that is, to the ability of higher educational institutions to respond quickly to new demands. It is the diversified education that can provide freedom of choice for an individual and the conditions to better meet his cognitive needs [4]. Diversification of higher engineering education can also be extended to the training of engineers in a foreign language as a subsystem of engineering education [4]. Diversification is in a close relation with the concept of lifelong learning (LLL). It has been said that the "half-life" of engineering knowledge - the time in which half of what an engineer knows becomes obsolete - is in the range of two to eight years. This means that lifelong learning is essential to staying current throughout an engineering career, which usually lasts 40 years. Distance education, education at the workplace, and especially the new information and communication technologies, considerably extend higher education's opportunities to apply the concept of lifelong education. [5]

Unfortunately, higher education institutions in Bosnia and Herzegovina have no capacities to undertake most of the said actions in the appropriate and quality manner. This particularly refers to internationalisation. Some efforts in that respect are being made. However, they are far from the European standards and the appropriate reforms should be done.

Although the setting up of infrastructure necessary for internationalisation and diversification is quite demanding and expensive, some universities are still finding their way in that direction. Thus, the

efforts made at technical faculties of the University of Zenica present a nice "point of light". Having realised shortcomings in the educational process at the secondary level these technical faculties identified needs necessary for the internationalization process and did their best to introduce methods that can help overcoming the current situation. This, in particular, refers to English language training. Students enrolling these faculties go through an obligatory ESP training (English for Specific Purposes) at the third year of study which facilitates them to participate in Content and Language Integrated Learning (CLIL). The idea behind is creating conditions for proper internationalisation by simulating an environment for it.

3. THE ROLE OF CLIL

Teaching English for Engineering has proved to be a very complex task. It requires activities such as: setting specific and precise goals, developing appropriate content materials and teaching adequate language skills. All these activities have to be wrapped up in a best possible methodology. Quite often, the course designer is faced with different problems related to the scope of the content matter to be addressed, time allocated for the course, non-homogenous classes in terms of both proficiency level and fields of engineering study, etc. At the same time, the course is expected to reflect engineering language needs and communicative purposes (e.g. giving explanations, giving instructions, discussing technical requirements, describing properties of materials, analysing technical problems, etc.). It is also meant that the course will engage teaching methodologies responsive to the level of students' English language proficiency as well as the previous learning experience.

The long tradition in teaching engineering English at the technical faculties of the Zenica University facilitated the introduction of Content and Language Integrated Learning (CLIL) at the fourth year of study. The methodology in question assumes a dual focused approach where content of subject matter (in this case – engineering content) and English language are being studied at the same time. It is a complex and context sensitive approach. CLIL is an efficient way to engage students in activities from the real world, such as discussions, evaluations, writing term papers, reports, papers for student conference etc.

The four basic parameters that create a framework for any particular CLIL model are: Cognition, Culture, Content and Communication. In literature they are known under the term '4 Cs framework' [6]. In the classroom, CLIL starts with the content of the subject matter and then focuses on the interrelationship between content (topic, themes), communication (language), cognition (thinking) and culture (awareness of *Self* and *Otherness*), thus enabling their integrated development.

CLIL can be implemented in various ways. The one already adopted at the technical faculties in Zenica suggests that language teacher work in partnership with other subject teachers to deliver CLIL in different courses. Another envisaged type of CLIL implementation would rely on mobility programmes and internationalisation processes. It would attract visiting professors and researchers from European universities. In cooperation with the local language teacher they would use a foreign language to teach content of the courses to undergraduate, graduate or postgraduate students. Such model would improve the professional development of the local teaching and research staff, which is a form of Life Long Learning (LLL).

CLIL is of a paramount significance for engineering education, because it meets the most of the previously mentioned requirements (p.2) necessary for producing a successful 21st century engineer.

In the following lines we will get back to them, but this time from the CLIL perspective.

1. CLIL presents a significant *contribution to curriculum innovations*.
2. As recommended it puts its focus on *learning experience* via classroom discussions, students' presentations of their research results and activities related to student conferences which are held at the end of the IV year of study.
3. CLIL fosters *creativity and innovativeness* in students and encourages *life long learning (LLL)*.
4. It *supports internationalisation* (through encouraging international teaching staff to take part in CLIL) *fosters diversification* – not only by creating conditions that facilitate higher order thinking skills (cognition in 4Cs) but also by *providing a cultural dimension* to content and language teaching (culture in 4Cs), which helps students break the lack-of-self-confidence barrier that often prevent them from mobility programmes.
5. Similarly to 'dual bachelor programmes', as practiced in the USA, CLIL has a dual focus. Aims are the same.

6. Student CLIL conference is a means of alleviating a hard process of finding a job to young graduates. In all advertisements in Bosnia and Herzegovina, which are related to engineering vacancies, English language proficiency is a must.

For all these reasons, CLIL should be present at all technical colleges throughout the country. In order to create conditions necessary for CLIL, educational reforms are needed. But first of all, the notion that some stakeholders have on the role of foreign language in current engineering education should be changed.

4. REFERENCES

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