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Engineering Literacy Online - Teachers as Medium for Change

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IO1 – A3 Needs and Gap Report - Region

Czech Republic

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Project ELIC

Czech Republic

Needs and Gaps Report

These conclusions represent the step for identifying the general needs of future and potential students (graduates and recent graduates, who are the target of the project) and stakeholders (companies, employment agencies and training bodies). The main aims of this report are to identify the main gaps between the educational offer in terms of training courses and the main features of a possible education activities for target groups.

In a first step it was necessary to conduct a desk research. During the desk research the main aim was to identify the state of art with regards to educational offer in the Czech Republic in the field of STEM disciplines. Therefore we analysed competences in regional teaching plans at secondary schools, existing further education and trainings for secondary school teachers to teach interdisciplinary experiments and also planned initiatives related to teaching interdisciplinary experiments for secondary school teachers (focus to Electronics, Software, Mechanics, Mechatronics, Biochemistry, Renewable Energy etc.)

The analysis showed that the availability of existing further education/further training for secondary schools has its role at the universities that offer classical fields of study complemented by further up to date education in the form of courses and projects. But this process is not systematic, there are isolated projects that depend on external financing. Teachers point to the gap between the university teaching and the progress of the science and technology development practice.

Courses and projects in the field of Further Education are organized by Universities, Industrial Companies, Ministry of Education, Regional Educational Institutions, etc. Many projects and courses are designed for both students and teachers. The advantage of such education is that students and teachers spend this time together, perceiving and absorbing new information and stimuli in this way.

Yet there is a noticeable lack of the systematic and continuous education program in the field of technical literacy.

The crucial problem is that teachers have no general information about planned initiatives related to teaching interdisciplinary experiments for secondary school teachers focused on Electronics, Software, Mechanics, Mechatronics, Biochemistry, Renewable Energy etc.

Detailed view on the subjects and topics which are often taught in the secondary schools showed that there is a wide range of topics in all subjects, but there is a minimum activities focused on integration of the knowledge of Biology, Physics, Chemistry, and Mathematics, enabling a comprehensive understanding of the laws of natural processes and motivating pupils to study science subjects.

Needs and gaps in the implementation of engineering literacy

The main message from the analysis is, that the teachers carefully consider involvement in further education and voluntary courses. Active and motivated teachers want to be informed and use new educational resources. The main role has usually the director of the schools.

Needs identified:

Ensure the didactic support of the universities educating teachers - to define topics for the development of technical literacy and to integrate it continuously with the thematic units of STEM school subjects (creation of framework educational plans).

Emphasis on interdisciplinary education not only for pupils but also for teachers, creation of textbooks and teaching materials (web portals, currently supplemented electronic database of examples) elaborated for different forms and levels of education. Coordination with the needs of industry and technical disciplines taught at the universities.

The need for further, but coordinated and systematic teachers´ education, ideally centrally managed by the Ministry of Education or National Institutes of Further Education of Teachers. The curriculum of the faculties of pedagogy becomes quickly obsolete, that´s why it is necessary to complement the knowledge of the current, dynamically developing science and technology. Define „technical literacy“ in its framework curriculum, its content and objectives at different levels of education. Ensure that schools do not perceive and teach "technical literacy" as the kind of manual work in workshops or maximum IT literacy.

The inclusion of engineering topics in teaching through project teaching and optional subjects that will combine basic knowledge of STEM subjects and modern technologies. All of this is complemented by excursions in industrial enterprises and operations.

Gaps identified:

Apparently there is a wide range of courses and further training for STEM teachers. In most cases, however, it is unsystematic, it has unclear themes, content, outputs, and insufficient didactic support. The offer is time-consuming, often does not include the needs of all age groups and education at different levels and types of schools. Our research has shown that the largest offer is for primary school pupils.

The content of the courses is uncoordinated, incomplete, far from covering all topics of "technical literacy", they are just individual actions.

It is vaguely defined what kind of education is suitable especially for teachers and what kind of learning would be beneficial for joint action of teachers and students.

Not only the content, but also the form of offered courses and further education should be varied to cover the different needs and expectations of teachers, e.g. online courses for individual study, experience multi-day courses, common courses for teachers and students, etc.

In the Czech Republic is officially defined but practically not respected the Teachers Career Plan. Teachers are not enough supported to participate in further education (either financially or in terms of study or time), they do this on the basis of their own professional and individual motivation.