

European educational concept in environmental-nature- and climate protection to safeguard a cross border sustainable development

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Abstract. In cooperation of 5 partners from 4 counties (Germany, Hungary, Poland, Romania), among them 1 public and 1 private university, 2 NGOs, 1 public research institute there are under realization concept to design a European educational in the ERASMUS Funding Scheme. The main objectives of the research are: 1) creation a curriculum concept with the participating countries in the professional advanced education area, in the topics: environmental -, nature-, and climate protection, 2) assessment of scope of realized research based on a research about existing furthering education programs, experiences, needs and requirements in the participating countries; 3) design of innovative training methods and combination of theoretical knowledge with practical key skills; 4) works in a complex environment that requires an interdisciplinary approach; 5) preparation of first test run of the course by exchanging potential trainers and trainees within the participating countries. The paper presents the research issues in the field of geoengineering and the use of renewable energy sources. The idea of the project is to open new chances on a future-oriented segment of the labor market for unemployed academic graduates, university dropouts and unemployed professionals, who have gained a multidisciplinary and yet very specific knowledge.

Keywords: geoengineering, “green” jobs, education, training

1 Introduction

In contrast to the background of climate change, scarcity of resources, reduction of biodiversity and increasing environmental pollution, it is necessary to find transboundary and integrated solutions to incorporate the interaction and synergy between all sectors and policies [1-3]. Therefore information, education and qualification in this topics are essential preconditions to forward assembly strategies and to reach broad basis [4]. Also the use of

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existing human resources in Europe becomes an essential issue in this context. Underused human resources, affected by unemployment, can evolve into valuable protagonists of society and economy by qualification [5, 6].

Based on the fact of the development of a „Green Economy“ is expected to raises a new claim to an innovative oriented economy and effects employment with new requirements of qualification out of it is expected.

Project EUBILD-UNAKLIM (2016-1-DE02-KA204-003254) in the ERASMUS+ Scheme KA2 on Strategic Partnerships is implemented by a consortium of 5 partners from 4 countries (Germany, Poland, Hungary and Romania) since September 2016. Partners work on an international adult-learning furthering education course that will take place in the future, in the four participating countries with training languages in the four national languages and English.

The concept of the project is basing on the following objectives:

1. Create a curriculum concept with the participating countries in the professional advanced education area, in the topics: environmental-, nature-, and climate protection, based on a research about existing furthering education programs, experiences, needs and requirements in the participating countries.
2. Design of innovative training methods and the combination of theoretical knowledge with practical key skills.
3. Preparation of the first test run of the course by exchanging potential trainers and trainees with the participating countries.

The goals of the project are:

- To carry the curriculum concept into the institutions of the participating countries,
- To establish the curriculum in the countries' national educational structures in the long run,
- To opening new chances on a future-oriented segment of the labour market for unemployed academic graduates, university dropouts and unemployed professionals, who have gained a multidisciplinary and yet very specific knowledge.

The education course will be address to unemployed people with diverse background: long-term unemployed people of all ages, or working in inadequate positions compared to vocational training, people in orientation phase after vocational training, with different background grades, complementary work experience and interest for green jobs.

As part of the project, five tasks were carried out:

1. Study on national activities and funding opportunities of furthering education programs for unemployed academics in green jobs;
2. Curriculum to international course;
3. Model Training Letter on Topic - Geothermal Energy and Photovoltaic;
4. Online platform for e-learning tools and topics;
5. Experiments of model pilot plant to use as a field laboratory.

2 National studies on activities and funding opportunities in furthering education programs

Under the task comparative study of national activities and funding opportunities in furthering education programs for unemployed academics in green jobs have been conducted. Each partner conducted a labour market analysis in the field of green jobs, especially in field of geology, geophysics, environmental protection and renewable energy usage. Surveys were conducted using a specially created open-source platform run on SRH Hochschule Berlin surveys (Fig.1). The research included two main research methods to obtain necessary source

data and information: quantitative (questionnaire surveys), and qualitative – open opinion, structural interviews. The questionnaire surveys enabled to gain required information from a large number of appointed employers and financial body & educational institutions in an efficient and standardized manner. The employer survey consisted of 27 questions, and the financial body & educational institution survey of 45 questions. Qualitative methods were used to emphasize experts' personal experiences and interpretation over quantification in an efforts to understand the meaning of the quantified social responses; to place and interpret the investigations and understand their results. The structural interview (five in each country) was to objectively assess the state of national activities and funding opportunities of furthering education programs in green jobs. The structured interviews results were inserted into the statistics. The achieved reflux quota was 10%.

An online questionnaire was sent out in five languages: German, Hungarian, Polish, Romanian and in English. It was kept open from November 2016 until March 2017. A total of 1,866 targets were addressed, 400 in each consortium country was the goal. The total 112 questions were asked, there of 20 open questions, 23 closed questions (only “yes” and “no” as answer possible) and 69 questions that could be assessed by “1- totally unimportant” until “6 - very important”.



Fig. 1. SRH LimeSurvey Platform.

The objective of the questionnaires was to find if the curriculum would have to be adapted to the commercial and labour market environments. Significant country-specific differences and gaps between employer and furthering education provider / financing body respondents were found. According to that the course design could put more emphasis on the topics which were important for the employers also by adding new modules, if necessary. A long-term goal will be establishing official certificates, acknowledged in the partner states or on a European scale if possible.

The study of job titles in the job data bases revealed a job ranking in which planned course will give a contribution. Figure 2 shows the potential thematic course contributions with an adopted curriculum.

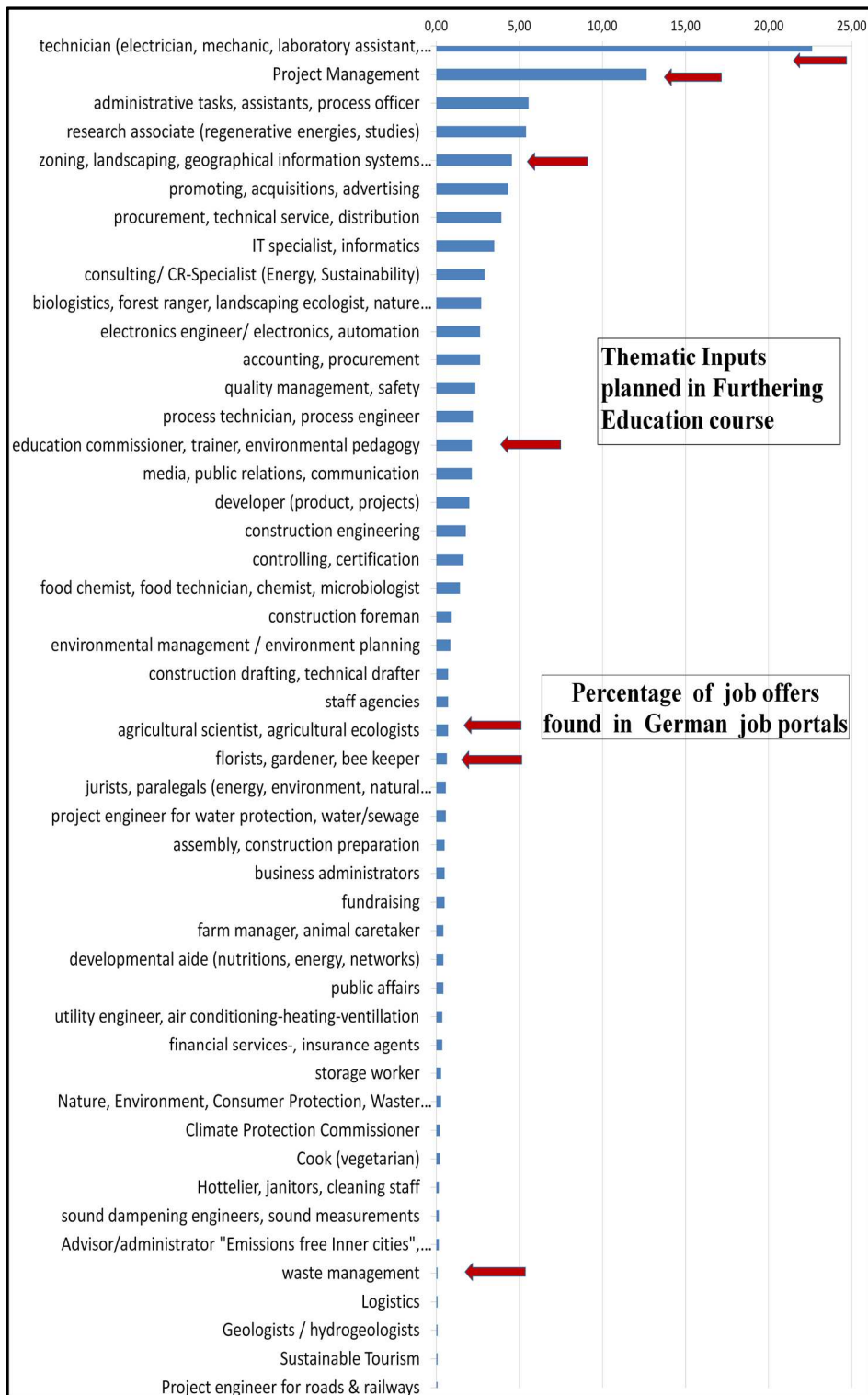


Fig. 2. Ranking of job offer titles found in the German data bases, and thematic input that the planned furthering education course will cover.

3 Curriculum to international course

The aim of the project is to develop a course to train and qualify professionals in climate-, environmental-, nature- protection and renewable energy are the charge of issues in the practical areas of these aspects. In assessment of plans in the field of environment, as well as strategic assessment of environmental impact to work in the area of environmental conservation, nature conservation and environmental protection in the respective of agencies, authorities and companies, research and educational institutions. As was suggested by Ocetkiewicz et al. [4] to let the world develop harmoniously, it is essential to propagate education for sustainable development. The role of teachers is crucial in this respect. Also wide aspect of environmental protection issues should be necessary to include in respected curricula.

The objective of the practically orientated specialty is also to diversify career options in the areas of policy, local, regional, national and international activities. Employment opportunities in the field include working for consultancies, local authorities, utility providers and contractors and organizations within the voluntary sector. Public and private organizations more and more are also looking for competent personnel capable of operating environmental management systems and skills that comply with national, EU-wide and international legislation, practical experience, and best-practice.

Elaborated under project curriculum concept based on research about existing furthering education programs, experiences, needs and requirements in the participating countries Germany, Hungary, Poland and Romania and respect to the future needs of an EU-wide approach. The design of the curriculum set up innovative training methods in combination of theoretical knowledge, case studies and practical key skills.

The Programme Structure is presented at Figure 3. The total length of the course will take 6 months. The course consists of 6 modules that covers 32 topics in total. The didactic methods provided in the courses includes lecturers, exercising (face-to-face to Learner), case studies and group working.

In the future curriculum will be tested and provided by exchanging potential European trainers and trainees within the participating countries.

4 Overview of the training letter on geothermal energy

As a part of task 3 the training letter on geothermal energy, district heating and cooling has been developed. The aim of the module is to introduce to the participants the fundamentals and potential of geothermal resources and system in the energy sectors and systems by building a general understanding of the resources use and technology approach participants are able to understand the economic and environmental impact of geothermal resources usage in projects with district heating and cooling (small, medium and big scale). The module covers information on the natural conditions, production, and utilization as well as the economic and environmental impact of geothermal energy. The purpose of the module is to provide a broad understanding of geothermal energy utilization which will prove useful in the practice. A detailed outline of the module includes four specific topics:

1. Introduction to geothermal energy:

- Geology and Earth heat
- Basics of geothermal systems
- Energy reservoirs and energy network
- Investments, operating costs, costs of current production, efficiency
- Case studies and reference installations
- National and international utilization potentials

EUBILD-UNAKLIM		Course Overview													Erasmus+	
		„Environmental-, Nature- and Klima Protection – Professional“														
Mod.No.	Module	ECTS	Month 21 days/m = 168 hrs/m					Workload = 1.512 hrs				Workload 40 Credits Credit = 30 hrs			contribution to final certificate	
			1.	2.	3.	4.	5.	6.	7.	8.	9.	on campus hours	group work in projects	self-study hours		
Section I – Fundamentals, Methods and Tools															21,7%	
M 01 – 01	Introduction to Sustainability in Environment, Renewable Energy and Growth	0	16										12		4	1,1%
M 01 – 02	Urban Sustainability Assessment Framework	1	32										20	4	8	2,1%
M 01 – 03	Green Marketing and Services in Environment and Renewable Energy	1	24										16	4	4	1,6%
M 01 – 04	Career Opportunity in Green Economy / Job Coaching		8	4		4							8	4	4	1,1%
M 01 – 05	Sustainability Finance and Funding in Urban, Environmental and Renewable Energy Projects	1	24			8							16	8	8	2,1%
M 02 – 01	Project Management in Environmental and Renewable Energy Projects	3	64	16									32	32	16	5,3%
M 03 – 01	GIS in Urban, Environmental and Renewable Energy Projects	4		64	32	32							48	48	32	8,5%
Gesamt		10	168	84	32	44	0	0	0	0	0	0	152	100	76	
Section II – Klima-, Environment and Nature Protection															22,8%	
M 04 – 01	Facts in Environment and Nature Protection (EU- and National Framework)	0		8									8			0,5%
M 04 – 02	Circular Economy – Act and Law	0,5		16									8	8		1,1%
M 04 – 03	Ecological footprint	0		8									8			0,5%
M 04 – 04	Water management, Protection and Law	0,5		16									16			1,1%
M 04 – 05	Waste Management, Separation and Recycling	1		32									20	8	4	2,1%
M 04 – 06	Soil Management, Protection and Law	1			32								8	16	8	2,1%
M 04 – 07	Emission and Pollutants in soil, air and water	1		4	28								24		8	2,1%
M 04 – 08	Environment in Logistic and Packaging	0			4								4			0,3%
M 04 – 09	Landfill – Management and Law	0			4								4			0,3%
M 04 – 10	Environmental criminal law	1				16								8	8	1,1%
M 04 – 11	Nature protection – Management and Law	1			32								16	8	8	2,1%
M 04 – 12	NATURA 2000 Directive, Water Framework and Stakeholders	2			36	28							32	32		4,2%
M 04 – 13	Project work in Environment and Nature Protection	2				80							8	40	32	5,3%
Gesamt		10	0	84	136	124	0	0	0	0	0	0	156	120	68	
Section III – Sustainability in Renewable Energy															21,2%	
M 05 – 01	Introduction to Energy Distribution, Smart Grid and Future Mobility	0				16	16						20	8	4	2,1%
M 05 – 02	Introduction to Photovoltaics and Storages	1				40							24	12	4	2,6%
M 05 – 03	Introduction to Solarthermal Energy and Storages	1				24	8						24	4	4	2,1%
M 05 – 04	Introduction to Wind Energy and Power – to – Gas	1				24	8						20	8	4	2,1%
M 05 – 05	Introduction to Bioenergy, Bio-Fuels and Storages	1				24	8						20	8	4	2,1%
M 05 – 06	Introduction to Water flow energy, Hydro Power and Storages	0					8						8			0,5%
M 05 – 07	Introduction to Geothermal Energy, District Heating, Climatization and Cooling	1				32	8						20	12	8	2,6%
M 05 – 08	Sustainability in green energy-efficient building	1				32							24	4	4	2,1%
M 05 – 09	Sustainability in energy-efficient production with energy management	1					32						24	4	4	2,1%
M 05 – 10	Study project in green energy and energy-efficiency	3					40						8	24	8	2,6%
Gesamt		10	0	0	0	0	160	160	0	0	0	0	192	84	44	
Section IV – Profile and Practice – Internship															33,3%	
M 06 – 01	Company Project / Internship	10							168	168	152		16		472	32,3%
M 06 – 02	Course Final / Project Kolloquium	0										16		16		1,1%
Gesamt		10	0	0	0	0	0	0	168	168	168		16	16	472	
Workload / month			168	168	168	168	160	160	168	168	168					98,9%

Fig. 3. Course overview.

2. Introduction to district heating:

- Concept and components of district heating and cooling systems
- Calculation of energy prices and cost effectiveness
- Case studies and reference installations
- Local and regional utilization potentials and impact

3. Introduction to air conditioning and cooling:
 - Heating pumps and air condition
 - Basics of air condition and cooling
 - Case studies and reference installations
 - Local and regional utilization potentials and impact
4. Best-practice and environmental impact of geothermal use in energy systems
 - Best practice
 - Environmental impact of geothermal exploration
 - Environmental impact of geothermal energy utilization
 - Environmental impact of district heating and cooling projects
 - Environmental impact of geothermal water utilization

Course participants will be expected to read and think about the material outside class, and take part actively in the discussions. These discussions will enhance the learning process, allow sharing of experiences, and make this course more interesting.

The learning goal is to teach the participants to understand and implement current technical concepts of the geothermal use in energy concepts and solutions. They will be able to achieve commerciality while meeting legal, social and environmental challenges from the aspect of geothermal resources and use it in the local and regional matter. The lectures want to build an understanding of:

- Basic concepts of exploration and use of geothermal resources, the characterization of geothermal reservoirs and the production of heat and power;
- Integrated management techniques to deliver a geothermal energy project;
- Present and future potential of geothermal energy in the global and regional energy resource portfolio;
- District heating and cooling concepts, projects and best-practice;
- Environmental aspects of geothermal water and energy utilization.

The planned duration of the module will be 5 days with the workload of total 40 hours, respectively 20 hours for lectures, 12 hours for workgroup and 8 hours for self-work. As a part of group exercises, participants will consider regional and local examples of the use of geothermal energy as well as to prepare a short characteristic on given topics. Also a virtual trip to geothermal heating plant and laboratory of heating pumps will be provided.

It was pointed by Ocetkiewicz et al. [4] that the change of energy policy and the overall energy consumption model presumes a holistic approach. It should consider and manage a series of parameters such as technology, the economy, politics, society and education. That is why our proposed curricula contain such wide aspects to cover all important elements to introduce the fundamentals of geothermal resources system in the energy sectors and to better understanding of the resources use and technology, economic and environmental impact. Renewable energy sources, i.e. solar, wind, biomass, hydropower and especially in our case - geothermal, are nowadays widely being recognised as an effective response to the global issue of climate change. In this manner, the teacher's job is very responsible and demanding, and therefore teachers will be supported in the process of introducing into the curricula the issues related to the use of renewable energy sources and sustainable consumption. In education process it will be necessary to develop relevant methodological studies, meetings with experts and scientists, who will help teachers understand the issues of renewable energy and sustainable consumption. This aspects will be the aim of the second, planned in future Erasmus + project.

5 Conclusion

The sustainable development of the countries presumes a holistic approach which should consider and manage a series of parameters such as technology, the economy, politics, society and education. Education is an essential element and crucial to any nation's development. For adult-learning furthering education course stimulates scientific endeavor, enhances livelihoods, and injects a skilled workforce into the resultant modern job market. Investigating the knowledge, perceptions, as well as attitudes of the public concerning various aspects of environmental issues is of great importance to sustainable development. The conducted survey allowed to identify differences and gaps in the approach of employers and financial body and educational institutions, which are significant for individual countries. Based on the survey, topics important for education in “green jobs” were selected. Based on the research, a methodology was adopted, the effectiveness of which will be verified in the continuation of this project.

The Erasmus + project presented designing an international adult-learning furthering education course. It will take place in the participating countries: German, Hungarian, Polish and Romanian. Training languages will be the national languages and also in English. What is more, environmental and cross-sector topics will be addressed, so it can help in exchange of experiences, the use of good practice and bilateral exchange the participants from the project partners. These activities contribute to development of the knowledge and improve teachers' collaboration.

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