

Environmental Education through Inquiry and Technology

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ABSTRACT: In the transformative world of today, the role of environmental education has become a much-debated issue. The experience from various EU countries shows lack of a concrete policy for the advancement of those strategic skills that correspond to the identified need for the connection of environmental education to green career choices. This paper discusses the process being currently followed by the GreeNET project for the promotion of innovative and engaging activities that underline the scientific aspect of environmental education, to provoke interest on green sciences among students, and thus contribute to the increased number of students choosing science-related subjects. The goal is to form a concrete framework for the collection and exchange of exceptional yet limited and non-associated good practices in the area of environmental education and green career counselling, and teacher training. For this reason, a European network of teachers is formed and trained to develop the competencies necessary to educate their students according to cutting-edge approaches in environmental education.

KEY WORDS: environmental education, inquiry, technology, GreeNET

INTRODUCTION

During the past years there has been an increasing comprehension of how the environmental challenges have a multidimensional effect on education, among other sectors. This effect needs to be addressed by the teachers of today, through specific training to render them fully equipped to effectively carry out environmental education, increase expertise and ensure sustainability, as is particularly stressed out by the European Commission (Stokes et al, 2001). This paper will discuss the approach of the GreeNET project, an ongoing initiative that aspires to enhance the students' interest in green sciences, and thus contribute to the increase of students choosing science-related subjects. Some such innovative educational activities exist in various EU regions but they are the exception and do not communicate with each other. The goal is to develop an appropriate scheme for identifying, gathering, exchanging and disseminating such exceptional good practices in the area of

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environmental education and green career counselling that exist in various EU countries, in accordance with the “Education and Training 2010” framework. To this end, a European network of teachers is being formed and motivated through specific educational actions, contests, and training sessions, to develop the competencies necessary to properly educate their students according to cutting-edge approaches in environmental education. This paper will explain the process of the network’s formation and motivation through specific educational actions to help develop the competencies necessary in order to properly educate their students according to cutting-edge approaches in environmental education, and finally able to operate in an independent way. The focus is on obtaining the skills needed to be actively involved in the green jobs market (United Nations Environment Programme, 2009). Ultimately, the work of GreenNET is in line with the European Commission’s High Level Expert Group on Science Education Renewal point that to render “teachers are key players... being part of a network allows them to improve the quality of their teaching and support their motivation”.

ANALYSING THE MAIN COMPONENTS

Environmental Education has been on the EU agenda since the late ‘80s (Binstock, 2006). During the past years emphasis in the EU has shifted from educating about nature to understanding the significance of sustainable development. Still, it was in 2006 that in-school environmental education was explicitly linked to more effective protection of the environment, as well as to choice of green careers and gender equality in the science sector (Schauer, 2006). The innovation of the GreenNET partnership is that it brings together the latest trends in environmental education, well-tested and documented inquiry-based learning practices and cutting-edge technology used for educational purposes, to achieve its objectives, which are the following:

- *To successfully and permanently link environmental education to career contexts, by properly training the next generation to correspond to major issues such as sustainable development and climate change, and make sound decisions for their future careers.*
- *To create an inventory of the most outstanding educational scenarios connecting the curricula of various EU countries to professions related to sustainable development, thus rendering students more active and personally and professionally responsible.*
- *To establish a constantly-expanding network of teachers and school communities informed on the necessity of ‘green living and teaching’ and trained in effective use of digital resources in science teaching.*

- *To circulate effective science teaching methods through networking with relevant projects, networks and initiatives, in a wide network across Europe, an abroad, in order to ensure constantly increasing access and re-usability of ‘green-jobs’ related lesson plans with use of inquiry-based science education.*

Before proceeding to a closer examination of the GreeNET methodology, this section offers an overview of GreeNET’s basic components.

Why environmental education and inquiry-based learning?

If you are thinking a year ahead, plant a seed.
If you are thinking a decade ahead, plant a tree.
If you are thinking a century ahead, educate the people.
(Chinese poem)

The increasing environmental challenges and the realization that humankind and nature are subject to common laws whose violation can lead to ecological disasters is closely linked with the advancement of environmental education from a single-subject on the comprehension of specific natural mechanisms to a multi-dimensional issue touching upon all aspects of life, including economy, health, education, development and many others (Orr, 1992). Besides, changing the curriculum design to incorporate education with real-life green scientific problems is linked to the current EU priorities to promote sustainable development (UNESCO, 2005) while ensuring the protection of the environment for future generations. Environmental education (EE) is now considered to be the most prominent instrument to influence human behaviour towards more environmentally sustainable patterns (Nicolae, 2005). In almost all states, the curriculum is by definition the very basis of teachers’ education and training programme. At the same time, there is an increasing tendency to connect school education to the world of work, and specifically a turn towards green professions, to serve the goal of sustainable development. The issue of green jobs has proven especially tricky for the educational community as the majority of the existing green jobs are hands-on and closely linked to blue-collar jobs, seen from an environment friendly point of view. It is therefore especially important to confront this misunderstanding through the development of a training scheme linked to sustainable development oriented jobs that call for an academic background. Besides, during the past years environmental education has been explicitly linked not just to better protection of the environment, but also to choice of green careers and gender equality in the science sector (Schauer, 2006). Of course, the hands-on factor is very important, and a consistent competence model must be grounded in the specific abilities,

such as active search for knowledge or understanding, to satisfy a curiosity. Inquiry-based learning engages students in the investigative nature of science (Sandoval & Bell, 2004). Research findings indicate that, "students are likely to begin to understand the natural world if they work directly with natural phenomena, using their senses to observe and using instruments to extend the power of their senses" (National Science Board, 1991). A focus on inquiry involves collection and interpretation of information. The GreeNET educational approach promotes the inquiry-based model, using it to transform the scientific findings of formal education to real-life accomplishment.

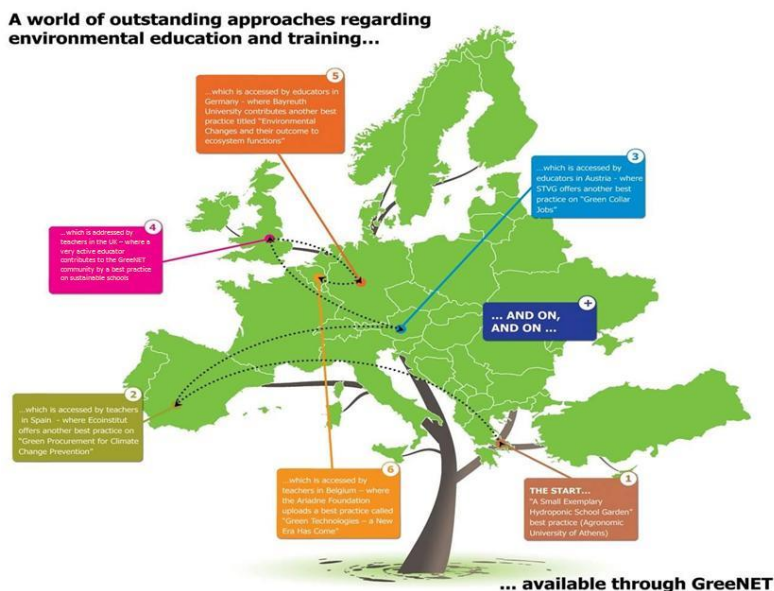


Figure 1. The GreeNET approach

THE GREENET METHODOLOGY

“Teachers are key players... being part of a network allows them to improve the quality of their teaching and support their motivation”
(European Commission’s High Level Expert Group on Science Education Renewal)

Considering environmental education as the most prominent instrument to influence human behaviour towards more environmentally sustainable patterns (Nicolae, 2005), GreeNET is forming a concrete policy in order to strengthen the connection between environmental sciences education

and the green labour market, to promote innovative and engaging activities that project the scientific aspect of environmental education, and to provoke interest on green sciences among students. Naturally, some such innovative educational activities exist in various EU regions but they are the exception and do not communicate with each other. The contribution of GreeNET is the development of an appropriate scheme for collecting and exchanging these existing exceptional good practices and their respective tools in the area of environmental education and green career counselling, in order to develop an integrative approach in collecting, certifying and providing training on best practices that promote environmental education using inquiry-based approaches. This is especially important for the advancement of teachers' and students' competences, which – next to advancements in knowledge and in people's enjoyable experiences in nature – involves knowledge integration and, thus, structural development. The innovation of the proposed network lies within the collection and presentation of best practices from various European countries on environmental education and the training on them, open to wide teacher communities who will then provide effective green career counselling. The focus is on obtaining the skills necessary to be actively involved in the green jobs market (United Nations Environment Programme, 2009). It is therefore apparent that the focus is on projecting environmental education and training as a respected and effective policy instrument to achieve sustainable development, as well as to increase interest among students on the green job sector.

At this level the project team aims to

- a. *clearly describe inquiry-related pedagogic models and environments, and identify best practices;* for this purpose the participating partners have worked intensely firstly to identify and agree upon the main criteria that the GreeNET best practices should meet. This process was based on extensive research on the available bibliography, expertise on the field and also from previous regional and European projects, and most importantly from the focus groups that were organized by the project partners. The result was a set of ten criteria and rules shown in Table 1. Based on these, the partners a considerable period of time to collect the best practices and to thoroughly describe them, based on specially made template. This process led to a report of over twenty best practices on environmental education, collected from five European countries. These best practices are currently being translated in the languages of the participating countries, and will be made available to all parties interested, in hard copy and online.
- b. *identify key competencies of teachers and others who contribute to designing, facilitating and supporting inquiry-based learning in formal and informal settings;*

Table 1. Criteria and Rules of the Best Practices

Criteria and rules of the Best Practices

1. Relation to a green topic and curriculum
2. Being interdisciplinary: drawing upon many academic disciplines and teaching methods
3. Relevance to the daily life of students
4. Based on accurate and factual professional expertise
5. Connection to professions in the green labour market
6. Learning by research and inquiry
7. Activation of the students by hands-on
8. Enhancement of students' ICT skills
9. Support of the development of social skills
10. Adaptability of the programme

c. *implement the GreeNET inquiry-based training framework that following its extended validation with user communities, it would be easily adopted in different national settings; to this end, a guide was developed, addressed to the participating organizations, to make sure that the trainers will have the guidelines and the information needed to carry out the implementation activities. Overall, in a ninth-month period and during this academic year 900 teachers and teacher educators are participating in such activities of various forms, and even more teachers are and will be partaking in other actions, such as contests, summer schools and online seminars. In this process they will be discussing, evaluating and modifying the selected best practices to fit their needs.*

THE GREENET PRESENT AND FUTURE

In order to achieve the GreeNET objectives, the GreeNET network of teachers, found in six different countries, participates in specific educational actions, contests, and training schemes of varying duration, to develop the competencies necessary in order to properly educate their students on all issues touching upon environmental education. At the same time, through the training-related events and through other communication channels with policy-makers, highly-acknowledged best practices are being collected and evaluated by the protagonists of this

procedure: the teachers and the educators. At the same time, the project inventory in the form of Moodle, will allow all interested parties to access ideas and best practices on 'green living and teaching' services. All these actions shall create a European trend of teachers discussing, testing, implementing and eventually even developing effective training practices.

Eventually, the findings of this implementation, which is to be carefully documented and evaluated, will produce a set of policy recommendations for environmental education and training addressed to policy makers and regional authorities in order to support the training of their citizens in taking advantage of ICT services. Along with an online database of digitized educational open activities and resources, these guidelines are to contribute to the advancement of existing practices, so that they can be certified and recognised and finally be used in a way that generates new ideas and innovative solutions, aiming at awareness-raising on environmental issues. This way, the GreeNET project will positively affect the educational community, by associating formal education with multiple aspects of everyday life and with the labour market, thus addressing two key goals under Europe 2020 for completing third grade education to acquire the skills and training needed to support and work in the green economy.

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