GreeNET

The Guide
for Bringing Green Science Education
Development
in European School Communities

Executive Summary

This "Guide of Bringing Green Science Education Development in European School Communities" outlines the main achievements, findings and conclusions of the GreeNET project. It focuses on the description of GreeNET Best Practices criteria, successful implementation and networking activities and the presentation of real "Success Stories" of environmental education. In particular the GreeNET consortium aims to demonstrate the proven value of the GreeNET methodology and innovative teaching approaches and thus support teachers as well as educational and political stakeholders to bring cutting-edge environmental education and green science to European schools.

The main idea of this EU project is to help teachers to design inquiry scenarios that raise students´ awareness and interest on green issues. The aim is to increase young peoples´ interest in science, environment and green issues. Another concern is the promotion of green careers and the initiation of networks between environmental science education and the so-called "green labour market". Thus the pillars of the GreeNET project are inquiry-based-science-education (IBSE), environmental education, the use of ICT tools and the green labour market.

This guide presents state-of-the-art criteria of best practice examples of environmental education developed in the GreeNET project, introduces useful GreeNET services to interested stakeholders and highlights the networking activities of the project. Interesting chapters for networkers might be the description of the "GreeNET Associated Partners Network" and for practitioners the "success stories" realized by the partners in this project. Finally the GreeNET consortium proposes specific actions for embedding the GreeNET approach by formulating recommendations for clustered target groups, namely the school environment, educational authorities and the "green labour market"

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Introduction

1.1 Scope

This guide aims to present the outcomes, findings and conclusions of the GreeNET project in order to support teachers as well as educational and political stakeholders to bring cutting-edge environmental education and green science to European schools.

The awareness that we live on a planet with limited resources is constantly growing around the world. Environmental education and training has been on the EU agenda since several years and the emphasis has shifted from educating about nature to understanding the significance of sustainable development. On the other side school students still often perceive science as uninteresting and non-related to everyday life. To counteract this several initiatives in Europe focus on effective teacher training and the dissemination of up-to-date and engaging best practice examples of science education.

The main idea of the GreeNET project is to help teachers to design inquiry scenarios that can raise students´ awareness on green issues. The European Commission considers environmental education as the most prominent instrument to influence human behavior towards more environmentally sustainable patterns. One superior aim is to increase young peoples´ interest in science, environmental concerns and green issues. Another important aspect is the promotion of green careers. Thus the importance of teacher training that enables teachers to effectively carry out environmental education, increases expertise and ensures sustainability is evident. Furthermore the experiences from various European countries show the need of networks that connect environmental science education and the respective "green labour market".

The GreeNET project promotes engaging and innovative learning activities of environmental education by using inquiry-based science education (IBSE) approaches combined with innovative e-learning components. All GreeNET partners are engaged to build up a network of teachers and to motivate them through specific educational actions, contests, trainings and summer schools to develop competences and skills to educate their students according to cutting-edge approaches in environmental education. The GreeNET project activities provide green career counselling and focus on the impartment of skills necessary to be actively involved in the green jobs market. Well-directed networking activities aim to build up and establish connections between environmental education and the respective labour market.

The purpose of this "Guide for Bringing Green Science Education Development in European School Communities" is to demonstrate the practical and didactical value of the GreeNET projects´ outcomes. The guide presents best practice examples and success stories of inquiry-based learning activities combined with the development of supporting digital content and demonstrate how students can be involved in such activities. They aim to inspire teachers to design IBSE activities that raise students´ interest in green careers and thus support this connection between the school and the working world.

1.2 Audience

This document is addressed to the general public. This guide will be widely distributed to all interested parties, first and foremost to teachers, teacher trainers and school communities but just as well to curriculum developers, policy makers, students and all interested individuals.

1.3 Definitions

Consortium: overall description of the joint partnership of the GreeNET parties

Dissemination: According to Wikipedia, to disseminate (from lat. disseminare „scattering seeds"), in terms of the field of communication, means to broadcast a message to the public without direct feedback from the audience[1].

European Commission (EC): refers to the monitoring and co-financing unit of the project in the context of the ICT Policy Support Programme, which is represented by the Project Officer (PO) and any other appointed personnel.

Guide, the: a document or textbook introducing the target audience to the information sources in a given field, such as green science education, green careers or green topics in general.

Implementation: is the realization or execution of a plan or a concept and its corresponding ideas, e.g. the diverse activities that have been executed by the GreeNET parties.

Project Coordinator: the organization that has formally committed to manage all the working activities of the GreeNET project.

Project Partner: any of the organizations (including the Project Coordinator) that have formally committed (through their accession to the Grant Agreement) to carry out the working activities of the GreeNET project.

Social Media: are online tools that allow people to create, share and exchange information, ideas, pictures, videos in virtual communities and networks such as Facebook or Twitter.

Inquiry Based Science Education (IBSE): IBSE approaches focus on student inquiry as the driving force for learning.

Environmental Education (EE) refers to approaches to teach how natural environments function and how human beings can manage behaviour and ecosystems to live sustainably.

1.4 Structure

Chapter 1: contains an overview of this document, providing its scope, audience, and structure.

Chapter 2: aims to illustrate how forward looking (educational) approaches have been integrated and used in the GreeNET project. It describes the projects´ methodology and gives insight to the European State – of – the - Art of environmental education, GreeNET Best Practices, the pedagogical approaches the community building activities of GreeNET.

Chapter 3: gives insight in the extended GreeNET net-

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1. http://en.wikipedia.org/wiki/Dissemination

work activities, including social media activities and the "Associated Partners Network". It aims to give helpful suggestions for the establishment of collaborative networks and encourage stakeholders to use social media for these purposes.

Chapter 4: presents „Success Stories" of green science education from GreeNET partners. They aim to bring outstanding best practice examples of environmental education to European school communities and to inspire and help teachers and teacher communities to design inquiry-based learning activities of environmental education.

Chapter 5: formulates recommendations and proposals for specific actions for embedding the GreeNET approach to educational systems of the partner countries.

2

The GreeNET Methology

One main goal of GreeNET is to develop a network that is going to strengthen the connection between environmental sciences education and the respective labour market. GreeNET focuses on the promotion of innovative and engaging learning activities to provoke students´ interest on green sciences and thus contributes to an increase of students that choose science related subjects and careers. In various EU countries exceptional good practices and tools of environmental education and green careers counseling already exist. GreeNET aimed to develop an appropriate scheme for collecting and exchanging these practices in order to promote environmental education by using inquiry based approaches and innovative e-learning tools.

To meet these goals of the GreeNET the project methodology is based on three phases:

• "**Good Practice Exchange" - phase**: During the first period good practice examples were collected from GreeNET partners and associated institutions in the field of environmental education and green jobs counseling. An extensive literature review has been carried out; further focus group discussions and a practice exchange forum have been organized in all partner countries in order to develop *quality criteria for best practice examples* of environmental education. The result of this work is a quality proved collection of case studies and best practices that effectively promote environmental education and training by using *inquiry-based learning approaches* combined with the *use of ICT-tools*.

• „**Implementation"- phase:** during this 18 month period a number of events, training sessions, contests, summer schools etc. have been organized by the consortium partners in order to exchange and evaluate the collected best practices. Simultaneously a *special web-based inventory* was developed that allows all interested parties to access and share best practices on "green living and teaching" services. The implementation process was accompanied by extensive social media activities in order to reach broader target groups. Further GreeNET partners started to build up an extended network of associated partner institutions in the field of environmental education to ensure the sustainability of the GreeNET outcomes after the lifetime of the project.

• "**Lessons learnt**" **– phase**: the last months of the project were dedicated to validation and exploitation. One outcome of this process is the elaboration of this guide for teachers for the use of GreeNET services including recommendations to educational and political authorities how to support the process of "Bringing Green Science Education to European School Communities". The presentation

of "Success Stories" demonstrates the feasibility and the pedagogical benefit of environment education by using inquiry-based approaches and innovative e-learning tools.

2.1 «State-of-the-Art» and criteria of GreeNET Best Practices

During the first period of the project each participating country carried out several activities to define criteria for GreeNET Best Practices of environmental education. The cornerstones are *environmental education*, *inquiry-based learning*, the *use of ICT tools* and the *"green labour market"*. Based on an extended literature research examinations concerning the above mentioned topics were carried out in each partner country. An important element was the performance of focus group discussions where teachers and environmental educators and stakeholders were asked about problems and needs in the field of environmental education. The most important findings of these research activities are essential aspects and characteristics of a good environmental education programme. Based on this the GreeNET partners formulated essential criteria and rules of GreeNET Best Practices.

Criteria and rules

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**

Figure 1: Criteria and rules of GreeNET Best Practices[2]

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2. taken from GreeNET Del.2.3. "State-of-the-Art and Needs Analysis"; Mona Schönfelder & Franz Bogner; University of Bayreuth, 2013 (confidential report)

2.2 Pedagogical approaches: Inquiry-based science education and e-learning

2.2.1 Inquiry-based science education (IBSE)

Since several years many studies pointed out a decline in young peoples´ interest for science studies and the origins of this declining interest were found in the way science is taught in schools. In consequence the science education community reasoned that teaching methods have to be changed and pedagogical methods based on inquiry-based-learning were assessed to be effective in raising students´ interest in science. **"Inquiry-based science education"** (IBSE) has proved its efficiency at both primary and secondary levels in increasing students´ interest for science. [3] The EU project "Pathway" describes IBSE as follows:[4]

IBSE approaches focus on student inquiry as the driving force for learning. Teaching is organised around questions and problems in a highly student-centred inquiry process. In IBSE, students learn through and about scientific inquiry rather than by teachers presenting scientific content knowledge.

According to Linn, Davis & Bell[5] the GreeNET project considers inquiry learning as "the intentional process of diagnosing problems, critiquing experiments, distinguishing alternatives, planning investigations, researching conjectures, searching for information, constructing models, debating with peers and forming coherent arguments" and defines key characteristics of inquiry learning that takes place in the GreeNET project:

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3. European Commission: Science Education Now: A Renewed Pedagogy for the Future of Europe; http://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf

4. Pathway UK – Science Education through inquiry in schools, museums and informal learning settings; http://www.pathwayuk.org.uk/what-is-ibse.html

5. Linn, Davis & Bell (2004): Internet environments for science education

- Learning through an emergent process of inquiry in response to a question or problem, often collaboratively with peers and using digital information and technologies;
- Applying principles and practices of academic or professional (e.g. scientific) inquiry and research;
- Engaging with questions and problems that may be open-ended;
- Exploring a knowledge base actively, critically and creatively;
- Participating, at more advanced levels, in building new meaning and knowledge in a domain;
- Developing process knowledge and skills in inquiry methods and in other areas including information literacy, reflection and group-work;
- Participating in sharing the results of enquiries with peers and wider audiences.

Figure 2: Characteristics of inquiry learning[6]

2.2.2 E-learning and the use of ICT-tools

E-learning is defined as the use of new multimedia technologies and the internet to improve the quality of learning by facilitating the access to resources and services. During the last decades the use of information and communication technology (ICT) rapidly increased all over the world. Thus one of the basic requirements of today's` education is to prepare students for participation in an information society. Using ICT tools requires a change in teaching styles, learning approaches and access to information. As new technologies have to be regarded as a great opportunity by teachers and learners the use of ICT tools and digital content is an important aspect in the GreeNET project.

GreeNET developed a specific Inventory that allows all interested parties to find, exchange and adapt Best Practices and related digital resources. During the implementation period of the GreeNET project several communities have been created on the OpenDiscoverySpace portal in order to discuss ideas on "green living and teaching" with interested parties and to share and distribute relevant digital content.

6. taken from GreeNET Del.2.3. "State-of-the-Art and Needs Analysis"; Mona Schön-felder & Franz Bogner; University of Bayreuth, 2013 (confidential report)

2.3 GreeNET Services

The outcomes of the project shall inspire teachers to design their own educational scenarios of environmental education based on inquiry and by the use of ICT tools.

One main objective of the GreeNET project was to create a collection of most outstanding educational scenarios of environmental education that are connected to school curriculas and professions related to sustainable development and environmental protection. The creation of the repository was started by collecting already existing good practice examples. Based on the criteria and rules for GreeNET Best Practices numerous educational scenarios were selected and integrated in the repository on the GreeNET website (http://greenet.ea.gr/).

The overall aim of the GreeNET is the creation of a self-sustainable community of users (e.g. teachers and students) that will exploit the project outcomes (e.g. the repository). To reach this goal GreeNET uses Web2.0 tools as social media integration, collaboration tools and online forums. The GreeNET inventory (http://greenet.ea.gr/content/greenet-inventory-collecting-green-best-practices) offers teachers to get involved to the project and make the best out of it in the own classroom.

2.3.1 The GreeNET Best Practices Repository

All participating institutions collected Best Practice examples according to the elaborated quality criteria. In order to have a comparable format with relevant information about the Best Practices a specific template was used and the resources were integrated in the Best Practice repository. The GreeNET Best Practices are collected in three main categories, which help the user to classify the use of the scenario.

- School-based effective environmental educational activities through inquiry-based learning
- Environmental educational activities connecting formal and informal learning settings
- Elaborated environmental education activities promoting the inquiry approach

The result of the collection process is the **GreeNET Best Practices Repository** (http://www.greenet-education.eu/greenet/) where resources are available in five languages (English, German, Dutch, Spanish and Greek). The resources contain general information about the scenario, educational material, supporting material, description of the learning cycle and activities, relevant links, relation to the green topic, relation to the curriculum etc.

This collection of educational resources in the field of environmental education was the basis for numerous GreeNET teacher training activities, events, contest, summer schools etc. in the implementation period of the project. The aim was to inspire teachers to design their own educational scenarios of environmental education.

Nr.	Category	Country	Name of the Best Practice
1	School based	Austria	RIO 92+
2	School based	Austria	Energy Tutors
3	School based	Germany	Energy – Today and Tomorrow
4	School-based	Germany	HOBOS – To Bee or not to Bee
5	School based	Greece	Agro- Web
6	School based	Greece	Experimental educational lessons on the testing of the germination rate of a range of vegetable seeds
7	School based	Greece	A small exemplary hydroponic school garden
8	School-based	Greece	Enhancement of biodiversity in school grounds
9	School-based	Greece	Students united for a sustainable school
10	School-based	Belgium	Thick sweaters day
11	School-based	Spain	Research Work
12	School-based	Spain	LESET: Lets save energy together
13	School-based	Spain	Education for Sustainability: The Barcelona School Agenda 21
14	Connecting formal & informal learning	Austria	Plastic bags – no thanks!
15	Connecting formal & informal learning	Austria	Consumaniac – Check your daily shopping
16	Connecting formal & informal learning	Austria	Walking works
17	Connecting formal & informal learning	Germany	Waste
18	Connecting formal & informal learning	Germany	Rain forest and climate change
19	Connecting formal & informal learning	Greece	Nature Europe
20	Connecting formal & informal learning	Greece	Green Ideas
21	Connecting formal & informal learning	Greece	The River of Life
22	Connecting formal & informal learning	Greece	My School Garden

Figure 3: GreeNET Best Practices

During several months the GreeNET Best Practices were presented to a broader audience in the **GreeNET facebook** (https://www.facebook.com/GreeNETproject) initiative "**Best Practice Friday**".

The implementation process was also accompanied by an extensive evaluation process. Although the comprehensive results of the evaluation of GreeNET Best Practices cannot be outlined in this guide[7] some aspects that might be interesting for practitioners should be mentioned:

− Most of best practices are rated high to the issue "relevance for daily life" of students which seems to be a very positive aspect from the personal and pedagogical point of view.

− Some practices show that at least the interaction with materials and "hands-on practice" could be a motivating aspect for students.

− Available feedback data concerning the "adaptability of the programme" show a positive estimation concerning the aspect of adaptation and transferability, addressing both educational aims as well as students' interests.

− Data that are available show a positive effect concerning on the enhancement of students´ ICT skills.

As a result of these implementation activities several partners created teacher or expert communities on the Open Discovery Space portal (http://www.opendiscoveryspace.eu/). In these communities more educational resources and best practice examples of environmental education can be found in diverse national languages, for example[8]:

• GreeNET: Sharing Environmental Educational Resources (English, Greek)

• GreeNET: Umweltbildung in Österreich (German)

• GreeNET Deutschland (German)

• Universität Bayreuth ISE-ODS-Community (German)

• GreeNET Best Practice: The Barcelona School Agenda 21 Programme (English, Spanish)

7. For details see: Michaela Marterer & Peter Härtel, GreeNET Del5.4: Evaluation Report on the 2nd implementation circle of GreeNET – public report (2015)
8. Search in the OpenDiscoverySpace portal à Communities à search communities by title: greenet http://www.opendiscoveryspace.eu/communities

The resources available in these communities are provided by instructors/ trainers for training and demonstration purposes or were uploaded by teachers as a result of training activities of environmental education. All members of the communities have also been given access and to all GreeNET tools.
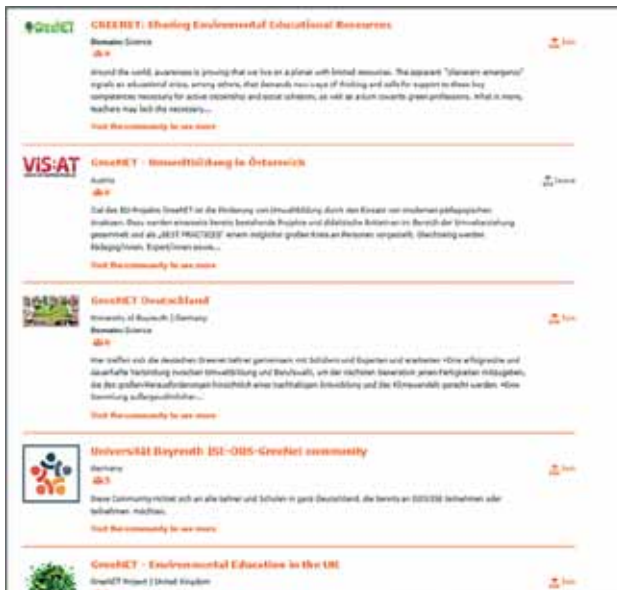

**Figure 4: GreeNET Communities
in the Open Discovery Space portal**

2.3.2 GreeNET inventory

 The GreeNET inventory (http://greenet.ea.gr/content/greenet-inventory-collecting-green-best-practices) offers a range of tools providing an integrated approach that is organized as a four step process:

Figure 5: GreeNET Inventory: four steps

1. **Search for online resources** in green issues: teachers and interested individuals are invited to discover green open educational resources in the Open Discovery Space portal.
2. **Generate ideas** through the organization of creative activities in your school with the Green Ideas concept.
3. **Design activities** and get guidance through the authoring process of inquiry-based scenarios in the Open Discovery Space portal
4. **Create your own school portal** with green open educational resources and share the outcomes of your work

2.3.3. Full GreeNET infrastructure
The GreeNET site (http://greenet.ea.gr/) provides a range of GreeNET tools the users can select from:

Figure 6: GreeNET tools

a) to search for Best Practices in environmental education through the **GreeNET Best Practices** repository;
b) to use the **GreeNET Inventory** to search for open green resources at the Open Discovery Space portal (ODS - http://portal.opendiscoveryspace.eu/), to get innovative ideas to design their own projects through a series of authoring tools that facilitate the introduction of inquiry process in the school practice and finally to create their school-based portal through the School Portal Generator Tool.
c.) Moodle users (numerous teachers are using moodle) have the option to use the **GreeNET Moodle** and perform these steps in a moodle environment that is directly connected with the GreeNET Best Practice repository and the Open Discovery Space search mechanism.

The GreeNET ecosystem

2.4 Successful GreeNET Training Activities and Implementation Actions

The implementation scheme of the GreeNET project included the following:

1. Implementation of a large number of inquiry-based training activities that introduced the use of inquiry methods in environmental education classes and professional development schemes. During the implementation process (2 series of implementation activities) the participating teachers and educators were given access to a large number of free and open educational activities connected with the environmental education of the participating countries' curricula, with proven educational efficiency that are overcoming the limitations of the classroom.

2. Validationevents and activities organization to further support the adoption of inquiry-based methods in environmental education, by demonstrating ways to reduce the various constraints and hesitation. The GreeNET project deployed a series of methods of effectively involving teachers in the inquiry instruction with the use of technology. In this Section we present a summary with quantitative and qualitative outcomes from the GreeNET implementation and validation events.

A. Summary of Quantitative data
– The project network (partners and associated partners) organised **96 events** (including e-events like ODS groups operation)
– The total number of audience reached was **5.387** persons (among them: 3.693 teachers and 1.694 from other categories which were: students, researchers, practitioners, representatives from Green companies, parents).

B. Main lessons learnt from the Implementation events
The first "connection" of teachers with the selected best cases through the organization of the implementation events gave the following main conclusions (in an effort to combine feedback from all events, and present only the most recurring conclusions):
– It is very important a best case must include **practical activities**
– Apart from practicality, a best case would be much more useful if it is directly **connected to specific lessons**
– Getting feedback and providing **motivation to students** is an important element towards the success of a best case usage. Teachers must be provided with practical **training on how to motivate students**.

C. Main lessons learnt from the validation events
As presented above, the main result of the implementation phase was that teachers feel that such activities like the GreeNET best cases have to be connected with practical tasks and specific lessons to assure students motivation.

The additional work done through validation events (connection and getting feedback also from other stakeholders, getting teachers deeper in the GreeNET scope and best cases interconnection and connection with hands-on activities) provided further and more specific conclusions which are summarised as follows:

Of **course the connection – in a practical way – with specific school based activities** is the main element to assure successful application but to make such initiatives more successful in a wider scope several additional considerations are important to be taken into account:
– Connection with **career pathways**. This has to be done in compatibility with **Green labour market needs**.
– It is of highly important to organize **interdisciplinary** activities and therefore connect a best case with several lessons and sciences or combine best cases to make a "new" interdisciplinary set.
– The enhancement of **ICT skills and Social skills** of students through the application of such activities is also an important issue to consider.
– **Community engagement** (e.g. parents) can provide an additional "push" for effective Green activities organization at schools.

2.5 European workshop and final conference

From 18th to 21st of September 2015 Ellinogermaniki Agogi hosted the "EDEN Open Classroom 2015" conference with around 160 participants from all over Europe. Within this conference, the GreeNET deliverable D6.4 "Proceedings of European Conference" was embedded. Six papers dealing with GreeNET project and environmental education have been accepted, successfully presented during the conference and were also included in the ISBN-identified Conference Proceedings published in printed and in electronic versions. A free web-based version of the conference proceedings can be found under this link: http://issuu.com/edensecretariat/docs/occ_2015_athens_proceedings_web

In the context of this sophisticated conference this year's "Green Ideas Fest" on 19th of September attracted nearly 30 international stakeholders, most of them headmasters, teachers and other education experts. The School Garden made the appropriate environment for this event. In a fruitful discussion the participants presented the requirements in skills, infrastructure, methods, all kinds of support headmasters and teachers need to offer modern education.

On the final day the 6th GreeNET project meeting and at the same time closing conference took place. The summary of the work done throughout three project years was very satisfying. Evaluation showed that the presented practices meet the need of teachers in a high level. Following the various statistics, GreeNET's facebook page, moodle and repository were very often visited and used. Most of the goals which the project partners have set themselves will be reached. Especially regarding the sustainability of the project, through the "Associated Partners Network" powerful and dedicated associations could be won.

2.6 Facebook Contest

The intention of the contest was that the whole GreeNET consortium wanted to encourage our facebook fans to worry about the topic green careers as well as the issues connected to this topic and therefore to present us their ideas or scenarios on how they would link environmental education to green career contexts. So we set up a special motto for this contest which was *"the future belongs to the young people who create it"*.

The task for participating in this contest was relatively easy. All participants had to write a short text (no more than 500 words) about the following question:

"How to shape environmental education for young people, so that their interest in the environmental sector of the economy rises?"

The answer to that could have been games for young people, excursions with students etc. - creativity had no limits here. Then the texts (and pictures) had to be uploaded to the GreeNET Facebook page. In the end, the contest received eight committed participations.

By running this contest the GreeNET consortium was able to gather further ideas concerning green career contexts which go beyond the already collected information on this. To make these ideas public and accessible to a broader audience all submissions were collected in the GreeNET inventory, the GreeNET moodle and within a special community in the ODS portal called "GreeNET Facebook Contest" (http://portal.opendiscoveryspace.eu/community/greenet-facebook-contest-834139). Additionally all the postings can still be seen on our GreeNET facebook page.

The GreeNET conference

3

Extended GreeNET networking activities

The GreeNET networking activities used several channels and available tools in order to reach all target groups of this project. The aim was to make the project and its outcomes known by a broader audience and to initiate cooperations to ensure the sustainability of the project results.

3.1 Overall dissemination activities

The consortium had set up an ambitious dissemination strategy, which focused on the one hand on the conventional methods, on the other hand worked out a demanding Social Media Strategy. Facebook, Twitter and other digital channels were used widely.

The major achievements of the GreeNET consortium are:
– having established a living social media structure
– having established an extensive network of partners that will be able to provide sustainability of the results
– having carried out a facebook contest within the Facebook-GreeNET-Community
– high number of workshops conducted
– very active participation of partners in national/international events and fairs

With the effort of the project partners in total more than 17.591 stakeholders have been reached and informed about GreeNET Project within three years and achieved highest expectations.

Events	Number of participants
Workshops	1.690
International Events	1.668
National Events	3.083
Exhibitions, Fairs, Web 2.0 connections	11.150
Total	17.591

Table 1: Numbers of participants in dissemination activities

3.2 Social Media Activities

Although the GreeNET Project website served as the main online tool for disseminating the project's developments, training activities and events, we also considered continuous dissemination through web2.0 activities (incl. social media) as important in order to reach as many target users as possible. This is why the GreeNET consortium set up a Facebook and Twitter channel.

• Facebook: https://www.facebook.com/GreeNETproject.
• Twitter: https://twitter.com/GreeNET_Project /
  "@GreeNET_Project"

One of the biggest advantages of these two tools is certainly the fact that they allow a many-to-many communication, meaning that the produced content allowed a permanent, unlimited exchange with our users and therefore perfectly complemented the GreeNET dissemination strategy.
The content strategy therefore included both the post of own project contributions (e.g. project news, workshops, conferences, etc.) and content to project-related issues such as environmental education, ICT and teaching, or green jobs. Three main priorities were set within the past months:

• **"GreeNET Best Practice Friday"**
  The GreeNET consortium has collected 26 case studies and best practices that effectively promote environmental education and training with use of inquiry-based learning methods. In spring 2014 the consideration developed to further spread these best practices. Back then the Facebook page statistics found that most GreeNET facebook fans were active on Fridays. The idea finally resulted in the creation of the "GreeNET Best Practice Friday". In the following weeks one out of the 26 best practices was posted each Friday on Facebook and Twitter.
• **Synergies with other EU projects and Associated Partners**
  GreeNET thought that content posted by its Associated Partners and other EU projects on Facebook or Twitter (such as GLN, ODS, etc.) also might be interesting for our GreeNET Facebook fans, which is why we introduced each of our GreeNET Associated Partners on social media and retweeted or shared postings by these partners and projects on our social media channels from time to time.
• **GreeNET Facebook Contest**

By running this contest the GreeNET consortium was able to gather ideas concerning green career contexts which go beyond the already collected information on this (more infos on this contest – see chapter 2.6)

3.3 The GreeNET Associated Partners Network

It was a superior goal of the GreeNET partners to pave the way for the sustainable use and exploitation of the GreeNET outcomes and products even after the project`s lifetime of 3 years. In this means the establishment of an "Associated Partners Network" was a central part of the exploitation efforts. The aim was to create a European-wide network of interested organizations/individuals to use the products developed by the GreeNET project, e.g. best practices of environmental education, training methods, the GreeNET inventory application and the community building concepts. A specific target was to form a productive community to mobilize stakeholders of all levels in society to share the GreeNET vision and form a coalition. This includes universities, schools, (teacher) training institutions as well as private and public organizations and individuals of all kinds. These groups represent diverse interests and resources for addressing "green living and teaching" issues. This associated partners´ network serves as instrument to effectively link school education to the green labour market.
In order to reach this goal project partners elaborated a procedure for building up and establishing such a network. A specific guide outlines very concrete descriptions of how to build up such a network, what GreeNET offers to and expects form associated institution and provides information material, sample texts for e.g. invitation emails and the mutual agreement.[9]. In spring 2014 project partners started

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9. See Marion Obermüller: GreeNET Sub-Deliverable: 7.2.1. – Associated Partners Network, 2014; (confidential report)

to invite respective institutions and organizations

3.3.1 How the network attracted associated partners during project duration

Since the beginning of the implementation period all GreeNET partners undertook considerable efforts to get in contact with relevant institutions and organisations on the national level and to acquire them for a stronger collaboration with the GreeNET project. They organised information and cooperation events and invited appropriate institutions and organisations. Based on national characteristic, the fields of work and the expertise of partners the affiliation process varied within the consortium but it can be summarized that a constant dialogue and exchange about the project developments and possible contributions of associated partners was important as well as a clear concept of the mutual support and co-operation. It has to be highlighted that all partners were successful in assuring partner organisations of the mutual benefit of the collaboration.

– The Austrian BMBF started the promotion process for the "GreeNET Associated Partner Network" with those institutions in the field of environmental education that have contributed to the Austrian GreeNET Best Practices collection. The ministry offered mutual cooperation in the field of disseminating good practice examples of environmental education and training offers.

The second Austrian partner STVG successfully used their contacts with the Federation of Industry (local and national level) and the area of teacher training in order to improve the contact between education and economics and attracted important partners.

– The Greek coordinator EA is involved in numerous international projects and successfully used its widespread networks of players on EU-level, of regional development, educational policymakers and institutions focusing on ICT in education to attract them for a strong collaboration with GreeNET.

The other Greek partner GRNET has over the last years established a diverse network consisting of stakeholders in green education. Through the lifetime of the GreeNET project, GRNET has approached the most relevant contacts that would be interested in the outcomes of the GreeNET project.

The third Greek partner AUA involved presumable associated partners from the beginning of the project, as to inform them and to get feedback from them on the projects developments. It was regarded as crucial point to frequently inform associated partners about the latest news of GreeNET project via email or telephone calls to establish a strong relationship.

– The Spanish partner Ecoinstitut opted from the start of the GreeNET project to collaborate closely with the Barcelona City Council, the Department for Environmental Education, which is responsible for the School Agenda21 Programme. It represents a network with 325 involved schools. A second collaboration was build up with a permanent training center of teachers of Elementary and Middle Schools in Catalonia that ensures for a sustainable use of GreeNET outcomes. Constant dialogue and exchange was and will be the basis for successful collaboration.

– In Belgium Eummena strongly collaborates with the Ariadne Foundation and national key multipliers that are very interested in a higher involvement of teachers in future activities related to best practices developed in GreeNET project

– UBT as university and teacher training institution is partner in diverse EU-projects. UBT successfully used fruitful collaborations in former international projects and additionally engaged national partners that are both institutions at the green labour market which have mutual experiences with educational projects and initiatives. Institutions/organisations that have passed the accession process and signed a mutual agreement[10] were published on the „Associated Partners" area on the project's website (http://greenet.ea.gr/content/associated-partners).

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10. See Annex of GreeNET Del.7.3. Final Exploitation Report (public report)

Figure 7: Associated Partners Area on GreeNET website

3.3.2 Associated partners' fields of work

Based on the efforts of partners described above within

20 months of work, 25 partner institutions joint the collaborative network. It has to be pointed out that the expertise and the fields of activities of the associated partner organisations of the GreeNET project are widely spread and cover a broad range of aspects of environmental and educational concerns. Environmental issues, pedagogy and training as well as project-based learning can be found in the scope of activities of these institutions/organizations.

Based on their respective fields of work associated partner organisations were and are involved in:

- Giving input, feedback and contributions to GreeNET Best Practices;
- Promoting the GreeNET project and its outcomes through their own dissemination channels and contact tools;
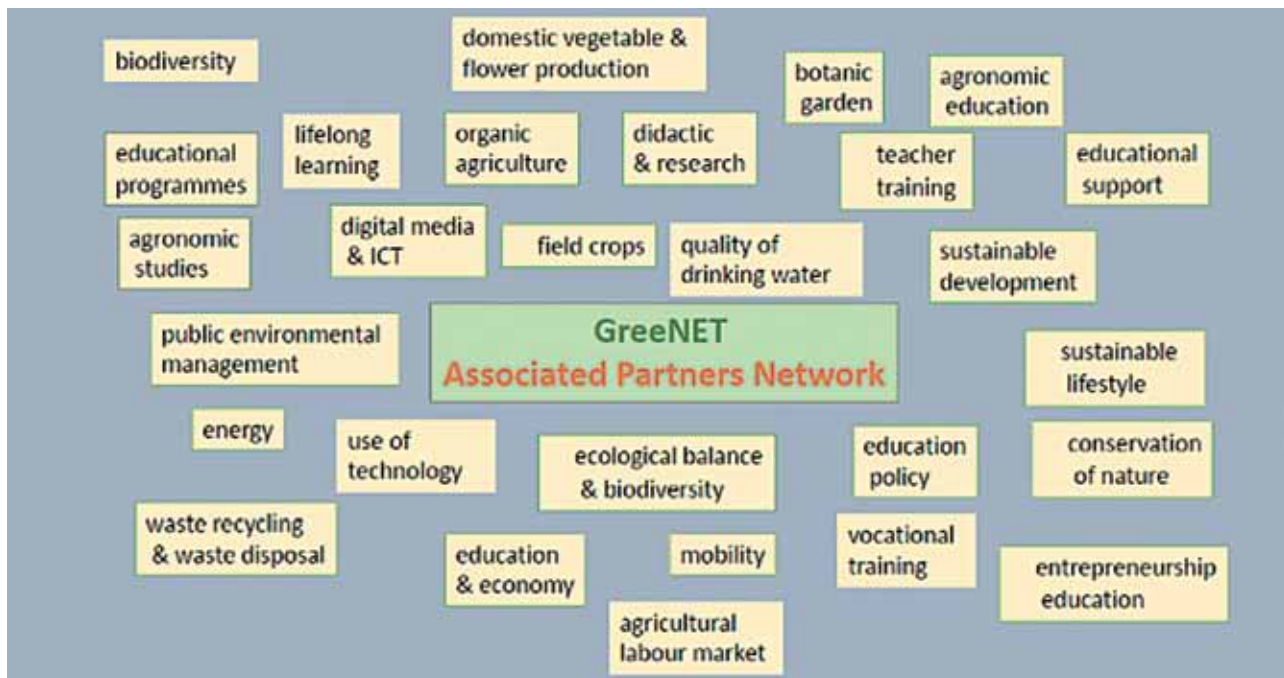- Inviting further relevant partners to join the GreeNET As-

Figure 8: Associated partners fields of work

sociated Partners Network;

– Publishing dates and invitations to GreeNET events (webinars, Summer School, training workshops) through own dissemination channels and contact tools;

– Supporting GreeNET training activities, events and conferences with its expertise according to prior agreements

– Using GreeNET services (portal) and content as well as ODS communities for own training activities

It was a main concern from the beginning of the process that associated partners are generally interested in using the outcomes of the project (e.g. GreeNET services) for their own fields of work, to take them up, use them in new contexts, customize and adapted them to specific needs, further developed them and take them to the next level.

3.3.3 How the associated partners were involved in the online dissemination activities

As previously mentioned the establishment of an "Associated Partners Network" was a central part of the exploitation efforts. The main aim was not just the creation of an European-wide network of interested organizations to use the products developed by the GreeNET project, but also the publication of this network on the

various GreeNET online dissemination channels – f.e. the GreeNET website or the social media pages on Facebook and Twitter. The GreeNET website contains a special section on this where all 25 associated partners are listed including a short description of them. But also Facebook and Twitter were used to further promote this network and its partners. When creating a posting on facebook it was also important to interlink this posting with the facebook pages of the respective associated partner to further increase the post reach.

4

Success Stories of environmental education

The main intention of this chapter is to introduce „success stories" of different kinds, all developed and carried out in the framework of the GreeNET project based on the outlined best practice criteria.

These success stories all focus on the main aspects of the GreeNET approach – environmental education, e-learning and use of ICT, inquiry-based science teaching and the "green labour market" – although in different extend. The success stories have been nominated by GreeNET partners because of the extraordinary positive feedback by participants.

4.1 Green Ideas
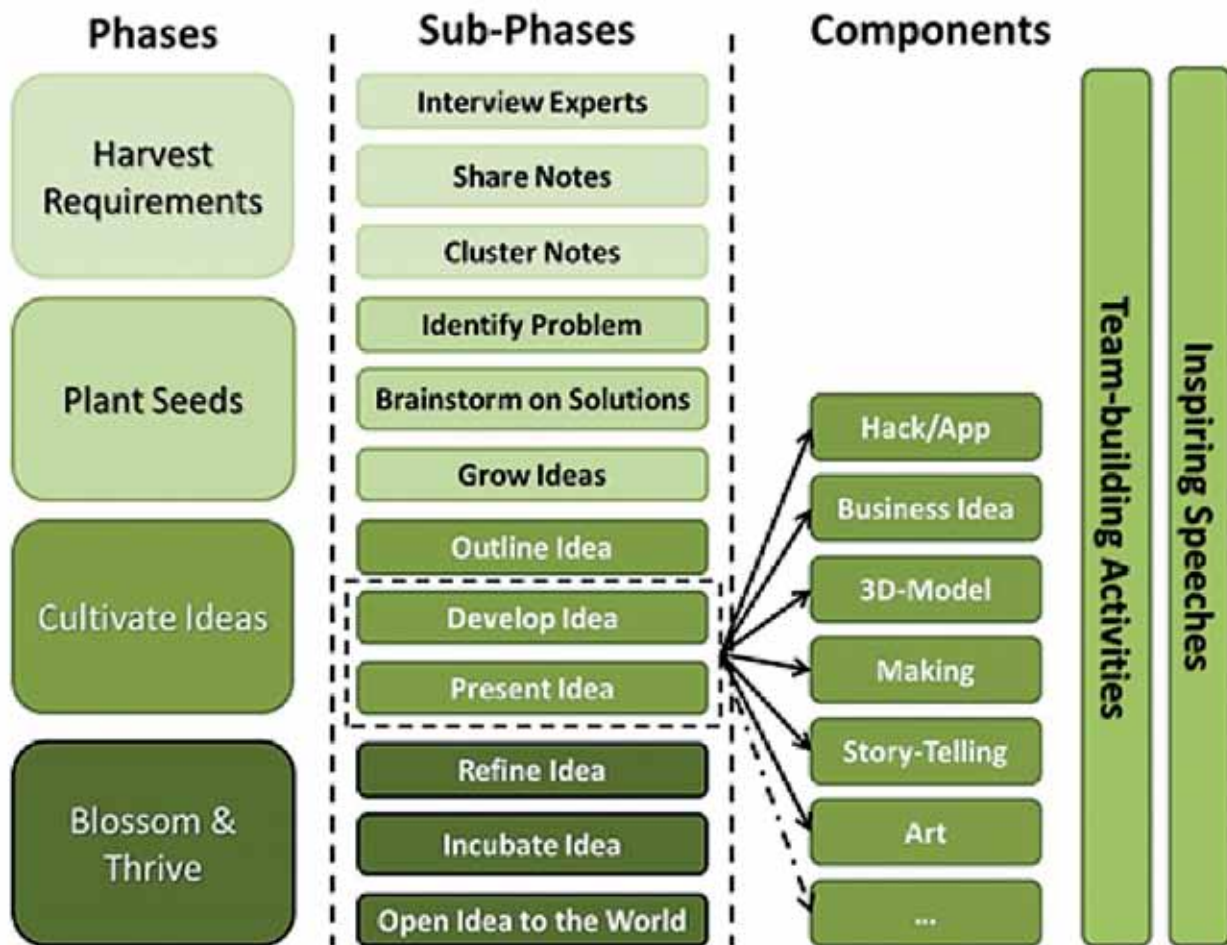### 4.1.1 Short Introduction

Green Ideas are interactive and engaging workshops that are held on an annual basis, based on the principles of design thinking and inquiry-based learning that aim at spurring creativity and fostering innovation on environmental issues. The aim of Green Ideas 2014 was to familiarize the participants with design thinking as part of this specific GreeNET Best Practice. The goal was to guide the participants through the Experimentation of Best Practices, help them understand the process of Green Ideas and in the end actively relate to the principles of inquiry-based learning.

Green Ideas 2014 was organized and facilitated by GRNET on Monday, July 14th, 2014 at the Golden Coast Hotel in Marathon, Attica within the context of the Environmental Protection & the World of Work Summer School. The Summer School was organized by EA as part of the educational activities of GreeNET. Its main scope was to connect two completely different worlds: education and the real world of work. More specifically, it aimed at connecting environmental education with the development of entrepreneurship skills and creativity.

4.1.2 Description of Target Groups, Audiences

Green Ideas 2014 was attended by twenty (20) people on top of the two interviewees that were invited to share their experiences on topics of interest to the specific event. The target groups of this event were mostly teachers and entrepreneurship experts, a fact aligned with the target groups of the GreeNET project. In this direction, the participants included environmental educators, practitioners, primary and secondary school teachers and school leaders as well as entrepreneurs and policy makers.

Phases

- Harvest Requirements
- Plant Seeds
- Cultivate Ideas
- Blossom & Thrive

Sub-Phases

- Interview Experts
- Share Notes
- Cluster Notes
- Identify Problem
- Brainstorm on Solutions
- Grow Ideas
- Outline Idea
- Develop Idea
- Present Idea
- Refine Idea
- Incubate Idea
- Open Idea to the World

Components

- Hack/App
- Business Idea
- 3D-Model
- Making
- Story-Telling
- Art
- ...

Team-building Activities

Inspiring Speeches

The creative engagement process of a Green Ideas event

The GreeNET ideas

4.1.3. Description of Activities, Implementation, Feedback

The Green Ideas workshop is a modular event that consists of four (4) different parts:

1. **Harvest Requirements:** During this phase, the participants draw upon the experience of professionals and invited experts by interviewing. Their purpose is to take notes related to the success stories being narrated in front of them and the experiences of the invited guests. These challenges were related to the fields of environmental education and entrepreneurship.

    i. "How might we combine the physical and virtual world(s) to promote "green" education?"

    ii. "How might we bring together educators and practitioners to co-design educational programs that will lead to the development of a new generation of "green" entrepreneurs?"

As a next step, the participants have the opportunity to interview the two experts participating in the workshop. Notes from these discussions are shared with the rest of the participants.

2. **Plant Seeds:** A brainstorming session where the participants are working on connecting the various notes taken during the previous step, in order to come up with ideas that might solve the problems described by the facilitators in the previous session. To this end, the participants created categories of ideas that used the same approach to solve the challenge (e.g. by means of content sharing, by social networks, by advanced applications etc.). This way the common elements of the several ideas emerged in order to lay the ground for the next session during which the final idea is formed.

3. **Cultivate Ideas:** During this phase the participants combined the proposed ideas and formed a solution. They were then asked to create a short description of their project and draw its sketch plan. In this process they were able to identify its weaknesses and gaps and gradually form it as a solid product with target audience, development timeline and potential investors.

4. **Blossom and Thrive:** This was the final session of the workshop during which the two groups presented their projects and got feedback from each other in order to enhance and further develop them. The main issue extensively discussed at this stage was the sustainability prospects of each project.

Through the course of these parts, the participants were invited to create ideas/ solutions for the specific challenges under the guidance of two experienced facilitators. Two groups were formed in order to increase engagement and create coherence according to the particular interests of the different teams. The presentations were documented and can be reviewed in the following links:

- **Green Way "Step by Step you go ahead..."**:
  https://www.youtube.com/watch?v=sy45EtxOzlU

- **Bazaarathon**:
  https://www.youtube.com/watch?v=lhdQrI8MaEU

It should be noted that due to the nature of the Green Ideas events, participants do not use typical educational resources; instead, starting from an idea, they describe it as clearly as possible, identifying a title and a description and then they model it into a coherent story, by using modeling material such as scissors, clay, paper, glue, rope, etc. and in general whatever they can find so that they can prepare a 3D model of their idea. However, their ideas can be based on their previous experience with edu-

cational resources that are available through any of the commonly used repositories, such as the ODS and the GreeNET inventory.

The uniqueness of Green Ideas lies on the unique nature of the environmental problems it attempts to address. The two predefined challenges of the specific event matched nicely the green educational context of Greece, since green education and entrepreneurship are hot topics in the Greek educational agenda.

As regards the feedback from the participants; Green Ideas are interactive and engaging workshops that explore ways in which green innovation may be empowered by education and technology. They are organized in the form of dynamic workshops that use a design-thinking and inquiry based approach to innovate new ideas with actionable next steps. By engaging the participants in these interactive and brainstorming sessions, they become excited for their active contribution and this was the case for the specific event.

4.1.4 Why Success Story?

Green Ideas events follow an innovative approach that is found really interesting by its participants; Green Ideas are interactive and engaging workshops that explore ways in which green innovation may be empowered by education and technology. They are organized in the form of dynamic workshops that use a design-thinking and inquiry-based approach to innovate new ideas with actionable next steps.

The modular approach of the Green Ideas events, as well their flexibility in terms of the challenges defined for the participants, allows them to be easily adapted to different contexts, in terms of age groups, educational and professional background and location. In this way, the Green Ideas events can be customized to meet the diverse needs of different communities all over the world.

Green Ideas events started in Greece back in 2011 and in the meantime they have evolved and reach much wider audiences. Greece is a country with various environmental

challenges and a constantly growing community of young entrepreneurs that need to make use of best practices in order to materialize their innovative ideas.

Thanks to their nature and approach, the Green Ideas workshops can be adapted in order to meet the diverse needs not only of projects working on green topics but also of user communities that operate outside such projects. Indeed, throughout the years, various stakeholder types, such as green teachers and educators, environmental agencies and NGOs, private schools and green entrepreneurs from all over the world have participated in the Green Ideas workshops and have enjoyed their participation. This allows for an alternative funding option for these events, which can be sustained through sponsorships of interested parties and the participation fees of the participants, allowing the organization of similar events in the next years. In this context, the exploitation of the Green Ideas Workshops can be further materialized through the collaboration with major organizations involved in green education, as well as through the collaboration with similar events, such as Green Hackathons.

4.2 School of Eating
4.2.1 Short Introduction

The project "School of Eating" was designed by FIBL Austria - an Associated Partner of the GreeNET project – and aims to integrate "eating" within the meaning of "sustainable food" to numerous Austrian schools. The topics are interdisciplinary and accordingly cross-curricular including health, environment, economy, social equality, culture, agriculture and eco-farming.

The whole project is structured in two phases: The first phase is a **teacher training** that includes workshops for teachers and supportive online instructions provided by FIBL experts in order to enable teachers to design the work stations, learning cycles and IBSE activities for the "School

of Eating" project days with their students. The second phase are the **school project days** where students are involved in learning cycles, hands on activities, IBSE and research activities, group works and presentations. Within this project days also follow up activities have to be designed by students. The experts act as coaches of teachers and students.

The project was run as a pre-pilot in March and April 2015 at the NMS Schopenhauerstraße in Vienna, a secondary I level school. All teachers and students of this school were directly involved in the project activities, besides the "School of eating" inspired the parents and audiences in the neighborhood of the school. For the school year 2015/2016 the involvement of 5 pilot schools is planned, the overall aim of this initiative is to anchor the "School of Eating" on a broad basis in the Austrian school system.

4.2.2 Description of target groups, audiences

The project activities were designed by FIBL experts. FIBL (Forschungsinstitut für Biologischen Landbau = Research Institute of Organic Agriculture) is an international independent, non-profit, research institute that works together with farmers to develop innovative and cost-effective solutions to boost agricultural productivity while never losing sight of environmental, health and socio-economic impacts.

All teachers of the NMS Schopenhauerstraße participated in the project "School of Eating". They were obligated to participate as the majority of the teachers voted for the conduction and implementation of this project in the whole school during a teacher´s conference. Therefore all 33 teachers and the head of the school were involved in the project. 165 students of secondary I level (10 – 14 years) were involved in numerous learning activities during the project days after Easter 2015.

Team members of the BMBF project team as representatives of the GreeNET project accompanied and supported FIBL experts at all stages of the project.

4.2.3 Description of Activities, Implementation, Feedback

The concept of the "School of Eating" was presented by FIBL experts to the GreeNET team of BMBF in autumn 2014. As the targets of this project completely matched the intentions of the GreeNET project the "School of Eating"

was selected as an upcoming Best Practice within the GreeNET project. During the preparation phase the implementation in the school (NMS Schopenhauerstraße) and the time schedule was determined.

The **teacher training** covered important topics as food production, organic agriculture, waste/recycling/upcycling, healthy food, "BIO-labels"- organic or not organic? etc. and was conducted by FIBl experts. BMBF contributed with the presentation of relevant (national, German language) BEST PRACTICES of environmental education provided by Austrian Associated Partners of the GreeNET project that are available on the ODS Portal (http://www.opendiscoveryspace.eu/search-resources-in-community/388487). The aim of the teacher training day on 16/03/2015 was to instruct teachers and to make them familiar with relevant "green topics" and the "School of eating". The training was organized in work stations. Teachers were instructed to design concepts for workshops and to prepare learning activities for their students. After the workshops teachers were provided with online support by FIBL and BMBF team members.

The **three project** days were run in the week after Easter 2015 and were very successful. Teachers organized ambitious learning activities and students seemed to enjoy learning about plants, cooking and saving the environment. An important aspect was that all classes had to create

proposals for follow- up activities and tasks for their colleagues (students of the other classes). So each class had to care for baby-plants, to create useful upcycling products for the school, to try out the recipes of "sustainable cooking" and to learn by playing "environmental games" within the next weeks. This is important for the sustainability of learning about environmental issues and green topics.

The feedback from teachers was very good, especially the knowledge transfer from experts/researchers to teachers to students was assessed very positive. Also the good time management of the whole project and the support of experts was appreciated. Even teachers and students of the neighbor school were impressed and decided to constructed and endow a greenhouse for the school garden of NMS Schopenhauerstraße to pave the way for future "green projects".

4.2.4 Why Success Story?

The "School of Eating" is assessed as a success story by the BMBF because of several reasons. First the concept of this project was designed by real experts and researchers who are experienced to work with teachers and schools. The teacher training gave substantial subject matter input and was organized in a way which helped and motivated teachers to design learning activities for their particular classes. As the interaction between experts/ researchers and teachers was at eye level the collaboration was very successful.

The project as a whole is interdisciplinary and hence cross curricular. It integrates topics as health, environment, economy, social equality, culture, agriculture and eco-farming. An important aspect is that the project was implemented in the whole school after a democratic decision of the whole teacher´s team. So every teacher of the school felt him- or herself responsible for the implementation and the success of the project. The teacher training and the online support enabled teachers to create useful learning activities for students. The learning activities addressed several aims of subject curricula and as they were designed as student-centered hands-on or IBSE activities they also matched the goals of competency based learning.

As the project was implemented in the whole school all students took part and participated in diverse learning activities. They had to design follow-up activities for their student colleagues and to care for their implementation, thus a positive effect on the sustainability of learning can be expected. The "sustainable products" of this project, the greenhouse and the adaptations in the schools garden are evident.

The school invited their "neighbours" (another school, a kinder garden) to visit the project activities with the result that a greenhouse was built for future "green projects" and the kinder garden children will care for fruits during the school holidays.

This "success story" can be adapted to other school settings. In Austria FIBL designs and tests concepts for diverse school types and time extents. So the project days vary between 2 and 5 days and can be modified according to the targets of the specific school. A very important precondition is an amicable cooperation between experts/ researchers and teachers because this motivates teachers to design extraordinary learning activities for their students. In Austria FIBL plans to bring this project in diverse extents to numerous schools. The BMBF GreeNET team integrated diverse learning activities of the "School of Eating" to the GreeNET community in the ODS portal which is especially used in teachers workshops and demonstrations. So the way is paved to make this successful project known by a high number of teachers, teacher trainers and school heads. In the NMS Schopenhauerstraße follow up projects in the greenhouse and the schools garden are planned for the next school years. This "role model" will be presented to other interested schools and propagated via all BMBF dissemination channels.

Relevant links:

Project overview (English language) "School of Eating":

http://www.opendiscoveryspace.eu/sites/default/files/uber-sicht_projektplan.pdf

Description teacher training " School of Eating" (German language):

http://www.opendiscoveryspace.eu/node/834057

Resources "School of Eating" (German language):

http://www.opendiscoveryspace.eu/search-resources-in-community/828328

Report on School homepage (German language):

http://www.schop79.at/index.php?option=com_content&view=article&id=245%3Aprojekttage-sinnesessen&catid=35%3Aprojekte&Itemid=103

Press report about "School of Eating" in NMS Schopenhau-erstraße:

http://diepresse.com/home/leben/ausgehen/4706204/Ei-genes-Schulfach-Ziemlich-alles-ubers-Essen?_vl_backlink=/home/leben/ausgehen/index.do

4.3 My School Garden
4.3.1 Short Introduction

The educational project 'My School Garden' links environmental education to real-life issues, connects formal and non-formal education, and uses the inquiry-based learning approach to underline the multidisciplinary character of in-school gardening. The students learn how to take responsibility for their environment and develop a strong sense of community and belonging.

4.3.2 Description of Target groups, Audiences
End user:
Students of all ages / grades (kindergarden, primary, secondary education).

Involved actors:
Teachers, gardeners or agriculturists.

4.3.3 Description of Activities, Implementation, Feedback

The My School Garden (http://portal.opendiscoveryspace.eu/beta/community/my-school-garden-o-sholikos-moy-kip-os-70514) case has been tested and validated by EA under the framework of the GreeNET project through several implementation and validation events.

Its educational scenario promotes inquiry-based learning through an interdisciplinary approach to gardening. The planned activities promote the values associated with curiosity, creativity and learning. They also contribute to the students' social and moral development through their participation in a programme related to real life issues and respect for the environment. These activities are:

Formation of a school garden

Decision on the vegetables / plants to plant

• Creation of small plant tags

• Development of a garden-caring schedule

• Planting and monitoring of the plants' growth

• Harvesting and promoting products

Apart from testing and validated the case through the organized events and Summer School, My School Garden was also the core of the Teachers Contest organized in Greece. Participating teachers had to prepare an educational scenario with the following core subject: "School gardens and flower raised beds: production and distribution of agricultural products".

The teachers with the selected educational scenarios presented their work under the framework of the Summer School organized by EA, from the 21st until the 25th of June 2015, in Rethymnon / Crete.

The selected scenarios utilized the best case of school gardens, providing important ideas for its further enhancement and development:

• Connections with the chemistry lesson Project development within a cross curricular subject area, interweaving science, language, mathematics, ICT, geography, arts &

design etc., in primary as well as in secondary education

- Inquiry-based science activities and experimentation from early ages to high school (Lyceum).
- Connections with a historical perspective of agriculture and school gardening, throughout the past century, linked with nowadays practices lesson (past agriculture vs. recent trends)
- Provision and cultivation of ideas relevant with to sustainability and sustainable development
- Customization and sensitization of small students young pupils of in early primary education and kindergarten
- Inclusion and application of contemporary gardening techniques, such as hydroponics and composting, conducted within a school teaching and learning environment

4.3.4 Why Success Story?

As it was proved from the teachers contest activity the My School Garden is an outstanding environmental education scenario, as it gives the opportunity to the teachers to customize it supporting their students to take on full responsibility for the activities' implementation and engage on small-scale and controlled agricultural practices. Learning about the methodology and the impacts of land cultivation, and understanding basic concepts such as the circle of life, they explore the interactions that sustain life.

The school garden educational scenario may be connected to different disciplines. It supports the development of the students' science-related skills such as observation, measurement, testing and concluding, as the students learn how to use seeds and tools, measure the temperature, and grow their plants using the appropriate amount of water. The language disciplines may be incorporated to the school garden scenario, as the students can choose to create a school garden magazine, thus further enhancing their skills related to writing, summarizing and restating. Math-related approaches can be used, as students can use their knowledge on geometry on the growing plants. Also, the skills learned in the art class may prove very useful here, as the students can create their own tags to tell their plants apart, they can sketch their plants, and they can learn about the dye produced by plants. Last but not least, the participating students' understanding of the importance of physical education is further enhanced through their interaction with natural elements, and the promotion of a healthy diet. Finally it is important to mention that this case illuminates the work of the agriculturists and of the farmers. The participating students learn about the processes, the steps followed, the potential dangers for a plantation and the ways to overcome them, and the advantages of working with nature. The students also comprehend how the technological advancements can support the farmers' and agriculturists work operating as valuable supporting tools.

4.4 Waste prevention plans in school
4.4.1 Short Introduction

The success story is about the elaboration of Waste Prevention Plans in schools, part of the Sustainable School Program of the Barcelona City Council. The activity is addressed to the teachers of eight centers of "The Barcelona School Agenda 21 Program", which are participating in a project for developing Waste Prevention Plans in schools.

Description of Target Groups, Audiences

The objective of this waste project is to give support at teachers by 4 training group activities and 16 individual implementation visits at schools (2 visits at each school, 2 x 8 = 16 visits). The aim of this first session was to inform teachers on the main value of a Waste Prevention Plan in schools, to introduce the methodology and to schedule the project.

GreeNET
http://greenet.ea.gr/

Η παγκόσμια περιβαλλοντική κρίση που όλοι βιώνουμε καταδεικνύει μεταξύ άλλων και μία σημαντική εκπαιδευτική κρίση που καθιστά επιτακτική τη δημιουργία ενός νέου τρόπου σκέψης και μίας κοινωνίας ενεργών πολιτών, την ενίσχυση δεξιοτήτων που σχετίζονται με την ενίσχυση των κοινωνικών δεσμών -και τελικά «ζητά» μία στροφή στα πράσινα επαγγέλματα. Όμως ενώ οι μαθητές δεν κατανοούν τη σύνδεση των θετικών επιστημών με την αγορά εργασίας, ταυτόχρονα οι εκπαιδευτικοί και οι σχολικοί σύμβουλοι δεν είναι καταρτισμένοι ή εξοπλισμένοι με τα εργαλεία που θα τους επιτρέψουν να έχουν πρόσβαση σε κατάλληλο εκπαιδευτικό και επιστημονικό υλικό και αδυνατούν να κατευθύνουν τους μαθητές. Το έργο GreeNET αποσκοπεί στη δημιουργία ενός σχήματος για τη συλλογή και αξιολόγηση καλών πρακτικών στον άξονα της περιβαλλοντικής εκπαίδευσης. Για το σκοπό αυτό θα δημιουργηθεί ένα πανευρωπαϊκό δίκτυο εκπαιδευτικών, οι οποίοι θα λάβουν κατάρτιση μέσα από εκπαιδευτικές δράσεις, διαγωνισμούς και προπαρασκευαστικά εργαστήρια, ώστε να αναπτύξουν τις δεξιότητες που θα τους επιτρέψουν να μεταφέρουν γνώση για καινοτόμες περιβαλλοντικές δράσεις στους μαθητές τους.

Inspiring Science Education
http://www.inspiring-science-education.net/
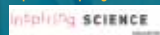
Το project Inspiring Science Education έχει ως σκοπό να παρέχει ψηφιακές πηγές και δυνατότητες σε εκπαιδευτικούς, προκειμένου να δώσουν στη Διδακτική της Επιστήμης έναν πιο ελκυστικό χαρακτήρα και σχετικό με την καθημερινότητα των μαθητών. Μέσα από την ιστοσελίδα του Inspiring Science Education και τις δραστηριότητες που διοργανώνονται από τους εταίρους, οι εκπαιδευτικοί μπορούν να ενθαρρύνουν τους μαθητές να κάνουν τις δικές τους επιστημονικές ανακαλύψεις, να παρακολουθούν και να κατανοούν τα φυσικά και επιστημονικά φαινόμενα και να αποκτούν πρόσβαση στα πιο σύγχρονα, διαδραστικά εργαλεία και σε ψηφιακές πηγές μέσα από την σχολική αίθουσα. Θα πραγματοποιηθούν πιλοτικές δράσεις σε 5.000 σχολεία πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης σε 14 ευρωπαϊκές χώρες. Κατά τη διάρκεια αυτών των πιλοτικών δράσεων, οι εκπαιδευτικοί θα έχουν πρόσβαση σε διαδραστικές προσομοιώσεις, εκπαιδευτικά παιχνίδια και eScience εφαρμογές που θα συνδυάζονται με εξωσχολικές δραστηριότητες, όπως εκδρομές σε κέντρα επιστήμης και πάρκα και εικονικές επισκέψεις σε ερευνητικά κέντρα.

Το Καλοκαιρινό Σχολείο χρηματοδοτείται από τα εκπαιδευτικά προγράμματα GREENET και INSPIRING SCIENCE.

Πρόγραμμα Καλοκαιρινού Σχολείου

0 Σχολικός
Κήπος

Μία Διαχρονική Διαθεματική Προσέγγιση για τα Ελληνικά Σχολεία

Εργαστήριο Φυσικών Επιστημών στο 9ο Δημοτικό Σχολείο Ρεθύμνου, Ρέθυμνο 21-25 Ιουνίου 2015

ΔΙΟΡΓΑΝΩΣΗ:

Εργαστήριο Φυσικών Επιστημών στο 9ο Δημοτικό Σχολείο Ρεθύμνου και Ελληνογερμανική Αγωγή

GreeNET summer school program

ΠΡΟΓΡΑΜΜΑ

	Κυριακή 21 Ιουνίου 2015	Δευτέρα 22 Ιουνίου 2015	Τρίτη 23 Ιουνίου 2015	Τετάρτη 24 Ιουνίου 2015	Πέμπτη 25 Ιουνίου 2015
10.00–13.00		Πρωινό	Πρωινό	Πρωινό	Πρωινό
	Αφίξεις Εκπαιδευτικών	**Εργαστήρια** Θερμά κουτιά: Από τους ηλιακούς φούρνους στους ηλιακούς αποξηραντήρες για το ψήσιμο και αποξήρανση προϊόντων του κήπου Νεκτάριος Τσαγλιώτης Παρουσίαση και κατασκευή παιχνιδιού για το σχολικό κήπο Φρίντα Κριτσωτάκη	**Εργαστήριο** Μελέτες μικροσκοπίου στα βήματα του Robert Hooke: Από τους σπόρους και τα φυτά, στα έντομα του σχολικού κήπου Νεκτάριος Τσαγλιώτης	**Εργαστήριο** Δημιουργώντας τα δικά μου εκπαιδευτικά σενάρια για τον σχολικό κήπο Σοφοκλής Σωτηρίου, Νίκος Μαριάνος	**Παρουσιάσεις Εκπαιδευτικών**
13.00–14.00	Γεύμα	Γεύμα	Γεύμα	Γεύμα	
18.00–20.00					
	18.00–22.00 Οι Ευρωπαϊκές Δράσεις GreeNET και INSPIRING SCIENCE Σοφοκλής Σωτηρίου Ο Σχολικός Κήπος (1909 –2015) Νεκτάριος Τσαγλιώτης	**Εργαστήριο** Κομποστοποίηση: Από τα μπουκάλια και τη στήλη αποσύνθεσης στην τάξη, στους κομποστοποιητές μέσα στο σχολικό κήπο Νεκτάριος Τσαγλιώτης	**Εργαστήριο** Βιολογική αντιμετώπιση ασθενειών των φυτών του σχολικού κήπου Νεκτάριος Τσαγλιώτης	**Εργαστήριο** Δημιουργώντας το δικό τους ψηφιακό αποθετήριο Νίκος Μαριάνος	
20.00–22.00	Δείπνο	Δείπνο	Δείπνο	Δείπνο	

Ο Σχολικός Κήπος: Μία Διαχρονική Διαθεματική Προσέγγιση για τα Ελληνικά Σχολεία

Από το σχολικό έτος 2006-2007 άρχισε να μας απασχολεί η ιδέα για την κατασκευή και ανάπτυξη ενός σχολικού κήπου, μέσα από μια σύγχρονη οπτική βιολογικής καλλιέργειας φυτικών ειδών, ενταγμένη στο διδακτικό και μαθησιακό περιεχόμενο μιας εκπαιδευτικής διαδικασίας με προσανατολισμό την έμπρακτη και βιωματική έκδοση των περιβαλλοντικών δράσεων. Ένας σχολικός κήπος, με κατάλληλη δομή και εκπαιδευτικό λειτουργία, μπορεί να αναδείξει μια προσέγγιση βιώσιμης ανάπτυξης με οικολογική ευαισθησία και ολιστική διαχείριση προϊόντων και ενεργειακών πόρων. Κάθε γωνιά του μπορεί να είναι ένα μικρό εργαστήρι μελέτης και συνειδητοποίησης των ευαισθήτων περιβαλλοντικών ισορροπιών και των επιπτώσεών τους στη ζωή του σύγχρονου ανθρώπου. Βασικός διαχρονικός σκοπός της λειτουργίας του σχολικού κήπου είναι να εισαχθούν/μυηθούν τα παιδιά στις σύγχρονες καλλιέργειες φυτικών ειδών τόσο μέσα από τη διερεύνηση και κατανόηση του εννοιολογικού περιεχομένου όσο και μέσα από δραστηριότητες με πρακτικο-βιωματικά αντίκρισμα, σε ένα περιβάλλον σχολικού κήπου, όπου τα ίδια θα έχουν τη χαρά της δημιουργίας και διαμόρφωσης του.

Επιμέρους ενδεικτικοί στόχοι που επιδιώκουμε με τα παιδιά είναι οι παρακάτω:

- να αποκτήσουν στοιχειώδεις γνώσεις για τη δομή και τη διαμόρφωση ενός σχολικού κήπου
- να αναγνωρίζουν βασικά είδη φυτών και να τα κατατάσσουν σε κατηγορίες όπως λαχανικά, αρωματικά φυτά, οπωροφόρα δένδρα, διακοσμητικά θάμνοι, λουλούδια κ.ά.
- να καλλιεργήσουν τα δικά τους φυτά σε κατάλληλα διαμορφωμένους χώρους στα υπεριυψωμένα παρτέρια του κήπου
- να παρατηρήσουν και να περιγράψουν την ανάπτυξη των φυτών τους
- να κατασκευάσουν μικρά θερμοκήπια με απλά υλικά και να φυτέψουν φυτά ή να τα λειτουργήσουν ως σπορεία
- να μπορούν να περιγράφουν τον τρόπο καλλιέργειας των φυτών του κήπου και τη φροντίδα που χρειάζονται ανάλογα με τις εποχές του έτους
- να αποκτήσουν βασικές γνώσεις για τις

ασθένειες των φυτών που θα καλλιεργήσουν και την καταπολέμησή τους χωρίς φυτοφάρμακα αλλά με σύγχρονους βιολογικούς τρόπους
- να γνωρίσουν τις βιοκαλλιέργειες και τις συγκαλλιέργειες λαχανικών και αρωματικών φυτών
- να γνωρίσουν τα χαρακτηριστικά και τα πλεονεκτήματα της βιολογικής λίπανσης
- να φτιάξουν το δικό τους βιολογικό λίπασμα μέσα από διαδικασίες κομποστοποίησης σε κατάλληλα διαμορφωμένους χώρους του κήπου
- να συζητήσουν και να ευαισθητοποιηθούν για το ρόλο των φυτών στις σύγχρονες διατροφικές συνήθειες
- να συγκεντρώσουν συνταγές και να μαγειρέψουν τα δικά τους λαχανικά με συμβατικό τρόπο αλλά και με ηλιακούς φούρνους
- να αποξηράνουν φρούτα, λαχανικά και βότανα σε ηλιακούς αποξηραντήρες κατασκευασμένους από χαρτόκουτες
- να συζητήσουν την ενεργειακή διαχείριση του κήπου τους καθώς και την εκμετάλ-

λευση των προϊόντων του ως ενεργειακών πόρων
- και να δημιουργήσουν έργα τέχνης με τις εντυπώσεις τους από το σχολικό κήπο

Ένας βιολογικός κήπος μέσα στο καθημερινό σχολικό περιβάλλον αποτελεί ένα πεδίο έμπρακτων καθημερινών διδακτικών και μαθησιακών δραστηριοτήτων για ολόκληρη την εκπαιδευτική κοινότητα και όχι μόνο. Μέσα σε μια δέσμη εκπαιδευτικών δραστηριοτήτων που πραγματεύονται και πραγματώνονται περιοδικά και εμπλουτίζονται διαχρονικά αναφέρουμε ενδεικτικά μερικές από αυτές.

Τα παιδιά ξεκινούν τα φυτά τους από σπόρους τα που καλλιεργούν στο θερμοκήπιο, το οποίο γνωρίζουν πως λειτουργεί μια που έχουν κατασκευάσει και μελετήσει μοντέλα θερμοκηπίων και μικρά θερμοκήπια. Στη συνέχεια τα μεταφυτεύουν με συγκαλλιέργειες στα υπερυψωμένα παρτέρια του σχολικού κήπου φτιάχνοντας τη δική τους φυτοκοινωνία που δένει αρμονικά με τα μόνιμα φυτά και δένδρα του κήπου. Μαθαίνουν ότι τίποτε δεν πάει καμένο και γεμίζουν τους χώρους κομποστοποίησης με τα κλαδέματα του χειμώνα αλλά και με τα υπολείμματα λαχανικών. Μαθαίνουν να καταπολεμούν βιολογικά τις ασθένειες από έντομα που προσβάλλουν τα φυτά τους όπως αφίδες (μελίγκρα), περίδες και νηματώδεις. Βλέπουν με άλλο μάτι έντομα όπως οι πασχαλίτσες και τα αλογάκια της παναγίας που έχουν για «γεύμα» τους άλλα έντομα που προκαλούν ασθένειες κρατώντας έτσι τις ισορροπίες στον κήπο. Ακόμα παρατηρούν από κοντά τα φυτά και τα έντομα σε αυτοσχέδια και άλλα μικροσκόπια. Φροντίζουν τα φυτά τους μέχρι να έρθει η εποχή που θα γευτούν τις σαλάτες τους, τα σπανάκι ή τις πατάτες ή ακόμα και τις φράουλες. Μαθαίνουν να φρόντίζουν τα αρωματικά φυτά, όπως επίσης τα τριανταφυλλιά και τα άλλα λουλούδια του κήπου. Μαθαίνουν να μύνουν τα λαχανικά τους με συμβατικό τρόπο, αλλά και με ηλιακούς φούρνους. Ακόμα αποξεραίνουν και συντηρούν τη σοδιά του από φρούτα, λαχανικά και βότανα με ηλιακούς αποξηραντήρες.

«Δεν ξέρω αν θα μπορούσαμε να έχουμε ένα κήπο μέσα σε κάθε σχολείο, αλλά σίγουρα υπάρχει ένα σχολείο μέσα σε κάθε κήπο!»

Ο ΛΑΧΑΝΟΚΗΠΟΣ, σχολικό εγχειρίδιο του 1909

GreeNET school garden community

Βιομηχανική Κάνναβη

Ένα φυτό - Χιλιάδες χρήσεις

Νεκτάριος Τσαγλιώτης
November 19 at 1:56pm

Η δράση "Κηπουρέματα" συνεχίζεται για 2η χρονιά σε 14 σχολεία του Ρεθύμνου με την υποστήριξη του "Rethymno Basketball Assist" από το κοινωνικό έργο και την ανάπτυξη του εθελοντισμού και της αλληλεγγύης της ΚΑΕ Ρέθυμνο Cretan Kings BC

Η πρεμιέρα του «RETHYMNO ASSIST»
Rethymno BC Aegean
RETHYMNOBC.GR

Like   Comment   Share

Eleftheria Kaloudi
November 8

France Announces All New Buildings Must Have Gardens or Solar Panels on the Roof

How would you like to look out the window of your office or home and see a city of roof covered with bright green foliage and landscaping? In France, something to...

EWAO.COM

Like   Comment   Share

4.4.2 Description of Activities, Implementation, Feedback

Short examples of activities carried out at the eight schools, all based on an inquiry-based approach:

Escola La Maquinista: The catering service of the La Maquinista School serves yogurt in large containers to reduce the total generated light packaging. This action represents a reduction of 9 kg of packaging waste throughout the year, equivalent to 11% of packaging waste.

Escola Pia Sarrià-Calassanç: The Pia Sarria-Calassanç School has undertaken the project of NESS classrooms (Clean, Educated and Sustainable) for primary school eaters. The project is based on counting the "tray zero", f.e. the number of empty food trays after eating. The result is that the action has increased the number of students with "zero bin" and has reduced food waste (organic waste) by 5.6%.

Escola Santa Teresa de Lisieux: St. Theresa of Lisieux School decided that they will drink tap water (using pots) instead of bottled water during dinner. This action is intended to eliminate water bottles in the dining room. The result is that 257.34 kg of plastic a year has been avoided, about 730 grams of plastic per student per year.

Escola Àngel Baixeras: The group of students "Supergreens" from the School Angel Baixeras has recorded a video giving advice to reduce consumption of hand dryer paper. To ascertain the effect of the video the hand dryer paper used before and after visioning the video was quantified. The results show that thanks to the advices and tips on average 299.3 g less hand dryer paper is spent per day, which represents a saving of about 60 kg per year, a 64% of the hand dryer paper consumption!

Col·legi Sant Ramon Nonat: Students from the environmental commission Escamot Verd of the College San Ramon Nonat conducted quantification of waste paper, bottles, glass, organic matter, rejecting the whole school. The students collect all the rubbish bags in the last hour of the afternoon and were ordered to photograph, weigh and write down all waste generated. The measurements were repeated three days of the week and the results were extrapolated to the entire year. More information: http://www.sostenibilitatbcn.cat/attachments/article/2227/Ex_S_Ramon_Nonat.pdf

Escola Pia Sant Antoni: Since the 2013-14 school year the school has hundreds of reusable glasses for use in various celebrations and events that are throughout the course. These glasses are used mostly by teachers but also serve small groups of students.

Escola Sant Josep-Teresianes: In the dining room of St. Joseph School-Teresianes 180 students use cloth napkins (kindergarten and primary school) instead of using paper. This action saves two packages of paper towels every day, which means a saving of 70 kg per year.

Institut Jaume Balmes: The Green Commission from Institute Jaume Balmes formed by students from Secondary 1 to High School have organized several actions to prevent waste: reuse dossiers cases, use of reusable glasses for school events, offering awards to encourage waste prevention (canteens, bock and roll, etc.).

More information can be found here:

http://www.sostenibilitatbcn.cat/index.php/programes-i-campanyes2/234-a21e-plaprevencioresidus/2222-a21e-plaprevencio-inici2

4.4.4 Why Success Story?

At the end of the project, in addition to an individual Waste Prevention Plan of each school, a guide on "How to develop a Waste Prevention Plan in schools", has be written with the experiences and inputs of these eight centers. The Project is ongoing, and new schools will participate during the next school year, building on the existing experiences.

4.5 Green Labs
4.5.1 Short Introduction

The success story of Green Labs contains two selected best practices that have been developed through GreeNET project. Green Labs is a complete environmental educational scenario that includes experimental educational lessons on the testing of the germination rate of vegetable seeds that provide basic knowledge on the first stage of plant life, the seed and the establishment of a hydroponic unit, a challenging way to cultivate vegetables, which help students to connect science and technology. The aim of this success story is students to become familiar with environment-friendly practices of plant growth and environmental factors involved in plant life cycle and at the same time develop critical thinking and run scientific investigation.

4.5.2 Description of Target Groups, Audiences
Green Labs took place twice during the implementation phase of GreeNET project. The first time was in an environmental NGO Organization Earth (project' associated partner) and the second one in a vocational senior high school in Athens with the collaboration of North Environmental Education Department of Greek Ministry of Education (also project' associated partner). The number of the participants on the events was 36 and 35 persons, respectively. In both cases, the participants of the activity were primary, secondary, as well as vocational school teachers, environmental program developers, environmental educators and policy makers.

4.5.3 Description of Activities, Implementation, Feedback
Green Labs success story is a combination of two selected GreeNET best practices; how to set up an exemplary hydroponic school garden and experimental educational lessons on the testing of the germination rate of a range of vegetable seeds. However, although these two best practices are different they can be integrated

in one complete environmental educational scenario that can be easily adapted by school teachers.

More specific, the first best practice refers to the establishment of a hydroponic school garden as the next technological step regarding the vegetable school gardens. Hydroponics is a new fascinating educational tool to demonstrate plant growth to students. The term 'hydroponic' is used to describe plant cultivation in a water solution of soluble fertilizers or in an inert growing media. Students are challenged by the prospect of growing plants without soil and are fully engaged by this activity. The establishment of an educational hydroponic unit provides a visible insight to the process of plant growth to students under real growing conditions. Moreover, hydroponics can be an important educational tool because of its flexibility and its approach to a plethora of subjects related to school curricula. There are a lot of different hydroponic systems that a school educator can adopt related to various of factors, such as the students 'age, the duration of the activity through the school year, the school subjects, the scientific hypotheses that need to be raised and of course the school budget. In all cases, students through their participation in the construction and afterwards in the maintenance of a school hydroponic unit will investigate, design technology, identify problems and implement solutions. School teachers have the opportunity to choose and approach among a large variety of school subjects when implement this activity as a significant number of scientific topic are going to be raised, e.g. photosynthesis, pH and EC, plant biology, interaction of various nutrients, light color spectrum effects, cost analysis etc. It has to be mentioned that a hydroponic school garden is a friendly

environmental way to cultivate vegetables, recycling fertilizers, water and saving natural resources. Thus, students learn simultaneously to connect science orientated questions with the preservation of the environment.

On the other hand, the second selected best practice (experimental educational lessons on the testing of the germination rate of a range of vegetable seeds) is such a simple and actually easily adapted environmental practice. Germination is defined as the emergence and development of the seedling to a stage where the aspect of its essential structures indicates whether or not it is able to develop further into a satisfactory plant under favorable conditions. The term 'germination rate' is a percentage of the seeds of a particular plant species, variety or seedlot that are likely to germinate over a given period and result in the formation of the seedling. Seed germination depends on both internal and external conditions, whereas various species require different variables for successful seed germination. This lab is a small scale activity in which school teachers can create their own educational scenarios according to their desirable learning outcomes. Students will discover and fully understand the meanings of terms as germination, photosynthesis, seed, and seed coat and be able to develop their own initial scientific investigation regarding the effects of a variable on the germination of a seed. Students can compare the growth of their variable to a control through the process of developing questions, observing, recording and analyzing data, and at the end drawing conclusions. Thus, it is an ideal preparatory activity to introduce to the students how plants come to life and develop their first green experiments, in order to be ready and qualified to establish a hydroponic vegetable school garden (previous best practice). School teachers can implement this activity at different ages increasing its difficulty depending on the grade level.

In our Green Labs events we implemented these two selected best practices as an integrated educational scenario that provides a great opportunity to build science and at the same time nature knowledge. As already mentioned these two practices can be also used separately. However, their combination is an efficient way for students to understand at first basic knowledge related to botany and biology (germination rate experiments), as well as the whole life cycle of plants (hydroponic unit). Participants supported with enthusiasm Green Labs as are interactive activities that can cover a large variability of green topics, which are connected with school curricula.

Useful educational resources:

http://portal.opendiscoveryspace.eu/el/search-resources-in-community/832678

http://www.greenet-education.eu/greenet/exhibits/show/a-small-exemplary-hydroponic-school-garden-en/to-begin-with

http://www.greenet-education.eu/greenet/exhibits/show/germination-rate-en/to-begin-with

4.5.4 Why Success Story?

Green Labs is a complete environmental educational scenario that introduces students to the whole life cycle of a plant (from the seed until the fruit). This activity can be characterized as a success story, since it presents a great flexibility and a huge variety of curricula' courses that is able to cover. As far as the flexibility of the activity concerned is a significant parameter for an educator in order to choose and follow a best practice. The proposed success story is a very attractive educational tool as it can be easily adapted and adjusted regarding the students' age, the period of time that the educator need to spend, the school budget and the desirable learning outcomes. It is vital to point out the importance of the introduction of students to hydroponics. Hydroponics engage students as an innovative, challenging way of cultivation that helps them design technology and understand science. Moreover, via hydroponics students have the opportunity to develop skills that

may even lead to classroom business opportunities or student career interests.

Green Labs have been already implemented during GreeNET project with great participation and have been also presented to interested parties through ODS community. Associated GreeNET partners, as in our case an NGO and Environmental Department of Greek Ministry, will play an important role to the exploitation and dissemination of our success story in every interested party.

4.6 HOBOS – To Be(e) or not to Be(e)
4.6.1 Short Introduction

One of GreeNET's most popular Best Practice is the learning scenario "To Be(e) or not to Be(e)" which is using a wired online-beehive connected to the interactive learning platform HOBOS (HOneyBee Online Studies, http://www.hobos.de/en). The learning scenario aims to fascinate students for the organism honeybee and to raise awareness for the conservation of pollinators. HOBOS provides the opportunity of inquiry-based learning through different tools, e.g. live and online data, information, etc. retrieved directly from the beehive.

The detected loss of biodiversity also comprises a decline of pollinators constituting a potential threat for nature. Especially the increased disappearance of honeybees is present in today's media. Therefore it is important to design effective learning units to educate students and engage them to participate in a socially relevant issue. As current topic which also affects students' daily life, it possibly enables students to find access to other environmental relevant issues by embedding the whole content into a broader context.

Through working with an eLearning platform the well-tried topic "Honeybee" meets the demands of today's society, dealing with modern technologies as well as the requirements of important educational methods like the inquiry-based learning approach in school.

4.6.2 Description of Target Groups and Audiences

The scenario "To Be(e) or not to Be(e)" was implemented by the University of Bayreuth with approximately 200 students in eight classes in Bavarian secondary schools ("Gymnasium"). The mean age of the students was 13.9 years.

The eLearning tool HOBOS is open to students, teachers, and parents as well as to researchers and beekeepers. HOBOS provides a variety of possibilities which can be assessed in different school settings dependent on the educational context. Therefore GreeNET also focused on disseminating HOBOS and training pre- and in-service teachers to use it multifariously and enable them to plan their own lessons with this tool. Within the project four training activities with 57 pre-service teachers and one professional development with ten teachers was carried out.

Furthermore, the University of Bayreuth cooperates with the University of Würzburg (http://www.didaktik.biologie. uni-wuerzburg.de) who hosts the HOBOS bee hive. The responsible institution also carries out teacher trainings and professional developments as well as implementations with secondary schools leading to a sustained use of HOBOS after the end of the project.

4.6.3 Description of Activities, Implementation, Feedback

The Best Practice "To Be(e) or not to Be(e)") is structured in a learning cycle including four interdisciplinary topics. Each topic contains two working stations with analogue and digital content. To solve the eLearning-exercises the students use different tools and data from the internet platform HOBOS. The topics do not build upon each other and can therefore be considered as independent learning modules. The overall aim of the programme is to promote appreciation of students for honeybees as they are important organism for our environment.

The educational content of this 4-hour-learning programme was compiled by the University of Bayreuth using newly designed material supplemented with already existing HOBOS material, as well as ideas from the GreeNET Best Practice Exchange Forum with international teachers.

For instance, in the module "economic & ecological importance of bees" the students first become familiar with the existence and production of different honeybee products (honey, propolis, wax, etc.). Afterwards the students focus on the pollination service using HOBOS. They are requested to analyse the outgoing rate of the prior day, calculating the amount of pollinated blossoms per day. Furthermore, the students learn about the importance of honeybees in ecological systems.

To assure the success of the programme the participation was empirically monitored concerning cognitive and affective achievement. Due to the scenario "To Be(e) or not to Be(e)" the participating students significantly gained new knowledge in short- and long-term of 6 weeks as well as more positive attitudes regarding the conservation of honeybees as pollinating animals. Furthermore, the students were asked to rate the Best Practice with school marks. The feedback was consistently excellent.

Beside the implementation of the programme, we focused on the dissemination and training of using HO-BOS. Pre-service teachers and in-service teachers were trained to use HOBOS in their own lessons. Within the GreeNET project we were able to evaluate and improve HOBOS and the learning scenario "To Be(e) or not to Be(e)" with valuable feedback from teachers and educational experts. The Best Practice was overall rated very positive and meets the ten essential criteria of the GreeNET project.

4.6.4 Why Success Story?

The Best Practice "To Be(e) or not to Be(e)" is not only a success story because of its marvellous implementation with school students and teachers. This scenario shows a perfect combination of modern technology with a well-tried topic. Additionally we show that this important issue can be taught in school by a student-active inquiry-based learning approach. The topic is also has a prominent position in today's media because of the Colony Collapse Disorder, the increased dying of bees, making it even more interesting within the public discourse.

The core of the Best Practice is the online platform HOBOS. This excellent tool can be used in an uncountable variety of ways and provides opportunities for almost every kind of teaching. The website is available in English and German and can be used from all over the world. Beside the provided measurement data, HOBOS includes many texts and information about honeybees and their life.

As HOBOS offers so many possibilities, it is necessary to train teachers to use the tool most effectively. They need to know how to apply the platform in their own school lessons and how to adapt it to their own teaching needs. The collaborating Universities of Bayreuth and Würzburg, together with the HOBOS team, are currently working on a methodology for future professional developments, considering the experiences of the GreeNET project.

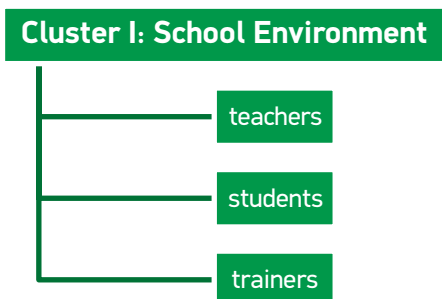**Figure 9: Impressions of «Success Stories» in different countries**

5

Recommendations

This chapter aims to demonstrate the proven value of the innovative approach of the GreeNET project and will therefore propose specific actions (recommendations) for embedding this approach within the environment of the following clusters (target groups).

5.1 Cluster I: School Environment

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┌──────────────────────────────────────┐
│   Cluster I: School Environment       │
└──────────────────────────────────────┘
           │
           ├──────────┤ teachers │
           │
           ├──────────┤ students │
           │
           └──────────┤ trainers │
```

• **Quick access to quality learning resources:** Teachers, trainers and other educators are in need of quality learning resources that they can use in their educational context, as part of their courses. Due to obvious lack of time, they need to have quick access to them and a cus-

tom finder of Open Educational Resources that provides access to quality content as well as the appropriate filters to help educators retrieve the most appropriate resources for their purposes. The GreeNET finder is an example of such a tool.

• **Customized content finders:** In case educators have specific needs in terms of content sources, then they need a custom and easy-to-use solution; GreeNET; however, they don't want to be experts on setting up a custom finder. GreeNET allows its users to create their own portal aggregating content from their selected sources in just a few clicks.

• **Integration of tools in existing infrastructure already used by them:** Despite the fact that teachers may need new tools that will better serve their specific teaching needs or help them integrate new techniques in their teaching context, they often feel overwhelmed when they need to learn how to use these new tools or where to find them and be able to integrated them in their routines. In this context, the best way for introducing them to new tools is to integrate these tools in existing infrastructure already used by them. For example, a new finder can be easily integrated in the existing website of a school, thus minimizing the need for teachers

to find and access yet another external tool. In addition, social sharing buttons can help teachers share content of interest with their existing Facebook and Twitter communities without leaving the finder or the website, where the content is located.

- **Reusing existing and established communities:** Creating new user communities and inviting teachers to be members would lead to struggling to achieve a critical mass of members, failing to create any real impact. In order to address these issues, GreeNET adopts and encourages the reuse of existing ones. More specifically, through its affiliation with the Open Discovery Space project (ODS), GreeNET users are invited to join one of the more than 900 ODS Communities of about 9,000 registered teachers. In this way, the new users are introduced to active and responsive communities that have their own ways of ensuring their activities and sustainability.

- **Interchange between students in Europe:** In order to **motivate, prepare and qualify students for the green economy**, it would be interesting to develop future projects similar to the GreeNET project with a clear focus on the interchange between school communities, to give students an opportunity to explain their projects, their sustainable ideas, etc. other students from other countries and share their different realities.

- **Availability of educational resources:** Best Practices of the GreeNET project must be integrated in existing repositories, portals and databases at national, regional or local level. In order to make knowledge transferable, materials must be adapted to the curriculum in each course and each educational level (primary, secondary, etc.), to make them more rewarding for schools of all countries.

- **Importance of networking between Schools and Greening of Institutions**: The experience of Barcelona's School Agenda 21 Programme shows that the collaboration between teachers and schools is crucial in the promotion of sustainability knowledge, values and attitudes to students through the curriculum and applied in a transversal way. This should include projects and actions for greening the institutions (like the elaboration of waste prevention projects, sustainable catering, energy audits for the school building and similar actions).

- **Supporting environmental knowledge and attitudes:** The deliberate choice of a green career often depends on a person's pro-environmental attitude; also the way of doing a job in general is influenced by knowledge and attitudinal preferences. Supporting a sustainable and ‚green' way in any job sector requires fostering students' development of an ecological understanding and pro-environmental attitudes.

- **Exchange of already existing outstanding good scenarios:** In all European countries, there is already a plethora of outstanding good scenarios connecting environmental education and the green labour market. Following GreeNET's strategy these proofed best practices must be made available and exchanged on local, national and international level. Offering these materials as open educational resources, schools and educational institutions may open up the possibility of a mutual benefit and make knowledge transferable.

- It is important to maintain and constantly update an inventory of the most outstanding educational scenarios linking creativity and sciences related to sustainable development and environmental protection. These shall render students more environmental friendly, active and personally and professionally responsible and make them reflective problem solvers on issues relevant with "Green sciences". To achieve this it is needed to maintain and promote also the GreeNET communities of teachers already established

- **Low-threshold access necessary**. Teachers more and more refer to the fact that they are running out of time and resources. A "one-stop-shop" would support them in searching for, developing and sharing innovative learning materials. To satisfy the needs it must be

low-threshold, easy accessible, easy to use, self explaining. GreeNET has shown that all over Europe there are already plenty of good practices available. Yet we have learned that language is still an obstacle. Providing resources in different languages therefore could also be a means for low-threshold access. ODS, to which GreeNET is closely connected, could act as such a one-stop-shop, also in countries that already have implemented plethora of repositories. Moreover, ODS invites students as well as parents to engage in education and share their opinions. The GreeNET facebook contest has shown that students are involved in environmental issues and have their own and very interesting ideas and approaches for green issues.

5.2 Cluster II: Educational Authorities

Cluster II: Educational Authorities

- Curriculum developers
- Policy makers
- National and EU-level authorities
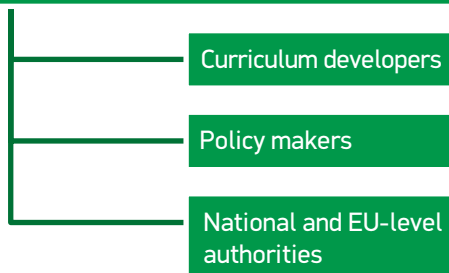
- **Coherence between policy development at European level and new teaching models:** The outcomes of the GreeNET project begin to develop a new and changing model (to motivate, data availability, etc.) in order to contribute to the aims of the EU2020 Policy framework. But this is not enough, there must be a clear political priority that integrates the approach of the green economy within all curriculums, especially in the last level of education: the University. Because these future citizens will be the future leaders that will determine the environmental behavior of the organizations in the society. It is evident that the aims of the EU2020 should be also included in all other areas of the society (Economy, Culture, etc.), not only Education.

- **Opportunities for transnational collaboration for teachers in Europe:** In order to meet the interests of the concerned teachers in the GreeNET projects and other similar international projects, teachers reclaim more opportunities to directly interchange with their respective colleagues from other countries. Transnational collaboration between teachers (in Summer Schools or European Transnational Workshops) in times of budget constraints requires sufficient European funding opportunities.

- **Promoting and connecting already existing platforms of open educational resources:** Current technologies offer possibilities to make educational resources available for teachers, educators and students. Meanwhile, there are plenty of platforms offering learning materials. However, there is a need to promote and develop these platforms as well as connect them among each other to make it more user-friendly.

- The formation of a set of recommendations to policy makers and educational authorities shall examine the ways European policy making specialists can use the investigated best practices in order to support the training of students in taking advantage of careers on Green sciences.

- **Common approach all over Europe is desirable.** As technologies develop in high speed it is a challenge for all participants in education to stay up-to-date. For the sustainability of successful projects like GreeNET it is necessary to set up a common approach all over Europe in order to keep the results and repositories in a state-of-the-art-technology. Sustainability also means to find ways how to further cover financial issues.

5.3 Cluster III: Green Labour Market

Cluster III: Green Labour Market
Human Resources Manager
Chambers of commerce
Public Employment Services

- **Companies working in the area of green labour market and they are the only one who can inform authentically about green labour market.** Green Labour Market is growing. Companies need graduates out of school and universities who are interested, educated and competent in green topics. From whom should school, teachers, students learn about needs and demands of "green labour market" if not from concerned companies?

Human resources manager are forced to organize contact and communication between school and companies concerning "green topics" as personal perspective for young people in career and companies.

- **Schools are willing and able to educate their students in a "green way".** To combine that with personal professional perspectives of students contact and communication with companies is essential

Schools need concrete information which knowledge, skills and competences are required in various areas of labour market and world of work, as base and background for schools, headmasters, teachers to teach relevant topics in a way, that support students, companies and society concerning "green" labour market developments.

Companies can do that with own staff, going in schools, inviting schools with "open doors" in their working places,

ore in co-operation with intermediate organizations and partners.

- **The most important criterion for attractiveness of employers is a fair attitude concerning employees, economy and environment**.

"Green thinking" is not only a topic of "green labour market". "Green" is required more and more in all areas of working life, avoiding waste, save energy, reduce pollution, increase work and live quality of workers. Companies can learn from students in school how they think and deal with such topics: this is a prerequisite for recruiting competitive young employees for the future, because young people today much more respect and requires aspects of equity, fair economy and environment.

Human resource managers and staff of companies are the "business cards" of a company. Personal trust and reliable communication attract young people more than expensive image campaigns.

- **Chambers and unions have a broad overview about the landscape of world of work.** They are indispensable key actors at the interface between education and economics concerning environment.

Chambers and unions cover more than single aspects out of special areas in the world of work and the labour market. They, and only they, can transport information about common needs and demands in knowledge, skills and competences, as general background for personal professional pathways of students and job applicants. To focus that on environmental skills and spirit is a responsibility, against the members of chambers and unions, the society and the employees of the future.

Chambers and unions can take over this responsibility by offensive communication, contact, co-operation with schools, teachers, students, motivate their members to "open the doors" quite early for orientation and insight into world of work and perspectives for career pathways.

- **No organization should have a deeper insight into needs and demands of the labour market, and in**

trends and perspectives for the future than PES. Environmental aspects must be an essential element.

Not only quantity of counselling and placement processes are criteria for effective employment strategies and policies. Also quality is relevant for sustainable effects of individual and societal developments. Environmental aspects are crucial for that more and more. Beside the responsibility for immediate and measurable effects of labour market policy in PES, the qualitative and long-term focus has to be considered continuously.

- **The connection between school and the green labour market:** Innovative actions in environmental education for the students (contents and knowledge in each educational level) must be completed with an orientation towards the professions specifically inside the green economy. For example: knowing and explaining to students, which studies exist for current professions (employability studies) and which ones belong to the green economy inside each country, etc. There must be a harmony between the school and the labour market.

- **Collaboration between schools and green companies:** Students need to get more insight in the world of work. Through 'opening their doors' green enterprises should come up to opportunities inspire the young generation choosing green careers.

- Design and implement specific activities to link best cases with future green based careers of the students. To address future skills' needs, the focus must be on tackling major challenges 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.

6

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