E-Learning from Nature: Irish Experience and Results of an Erasmus+ Project Collaboration

WALSH Marie (1)

Limerick Institute of Technology, Ireland (1)

Abstract

E-learning from Nature was a project funded by the European Commission and the Italian National Agency for Erasmus+ programme. The project involved collaboration between eight partners from seven countries to promote learning in Science, Technology, Engineering and Maths (STEM) subjects and innovative teaching methods.

A website was developed to compile, collate and disseminate the results of the project. This is still accessible and includes: a database of local areas of natural interest in each country that might lend themselves to triggers for STEM teaching and learning; a collection of E-learning video lessons related to the local areas; a Teachers' Guide to promote various pedagogies for active learning. The Teachers' Guide included useful toolkits for implementing the pedagogies. These included teaching using real-life scenarios, actively involving students in the learning process, making use of new technologies and promoting transnational collaboration.

This paper will summarise both the results of the project, and the experiences of the Irish teachers who took part in the project. It will also describe current interactions with the website and the Facebook page associated with dissemination of the project.

Keywords: *STEM teaching and learning, E-resources, collaborative projects;*

1. Introduction

The European Union's Erasmus+ programme is a funding scheme to support activities in the fields of Education, Training, Youth and Sport.[1] The Programme is made up of three so-called "Key Actions" and two additional actions. They are managed partly at the national level by National Agencies and partly at the European level by the EACEA. The European Commission is responsible for Erasmus+ policies and oversees the overall programme implementation.

The E-Learning from Nature project (Project Number: 2015-1-IT02-KA201-015133) was funded by the European Commission and the Italian National Agency for the Erasmus+ Programme Key Action 2 - Cooperation for innovation and the exchange of good practices. The project aims were: to promote a proactive students' approach to learning scientific subjects and to produce innovative teaching methodologies for science teachers.[2]

2. Project partnership

The project was a collaboration between eight partners from seven countries as shown in Table 1.

Organisation	Country	Role
I.I.S. "F. Enriques"	Italy	Project Scientific Co-ordinator
PIXEL	Italy	Project Managers
Epimorfotiki Kilkis SM LLC	Greece	Partner
Trakai Educational Assistance Authority	Lithuania	Partner
Inforef	Belgium	Partner
Instituto Politécnico de Bragança	Portugal	Partner
Fundația EuroEd	Romania	Partner
Limerick Institute of Technology	Ireland	Partner

Table 1: E-Learning from Nature Project Partnership

Each partner organisation, apart from Pixel – the technical managers of the project – had a project manager and researchers. Each also recruited teachers and students from five schools to research and develop the E-lessons that were a key Intellectual Output of the project.

2.1 Partnership in Ireland

The Irish partner in the project was Limerick Institute of Technology [3] and the secondary schools' partnership developed in Ireland is shown in Table 2.

Partner Organisation	Location	Geographical Area of Interest
St Caimin's Community School	Shannon	River Shannon
Glenstal Abbey School	Limerick	Glenstal Abbey Estate
St Joseph's College	Tipperary	Devil's Bit and North Tipperary
Tallaght Community School	Dublin	Dublin Bay
St Mary's Holy Faith Convent	Dublin	Tolka River at Glasnevin

Table 2: Irish schools in project partnership

In addition, seven Associate Partners agreed to help with promotion of the project. These included centres for teaching and learning, teachers' representative associations, environmental organisations and a primary school. These associations are important for the sustainability of the project and exploitation of the project outputs.

2.2 Intellectual Outputs from Schools in Ireland

Each school produced five video E-lessons with accompanying teachers' notes. Some of them were relevant to more than one subject, e.g. Physics and Chemistry, but the majority were Biology related. The most appealing featured the students using this as a tool for peer teaching and learning. The introductory notes provide background information for teachers, with ideas for placement of the E-lesson in the curriculum. They also give guidance to appropriate age groups and subjects.

The tools used to produce the E-lessons depended on the teacher. Some opted for *Screen-Castomatic* [4] but majority used *Microsoft Movie Maker*. [5] The advantage of *Movie Maker* is easier editing and ability to layer images, film, music and commentary.

Picture	Title of the lesson	Thematic Areas	Target Age Group	Geographical Area
	E-learning from nature; life on the rocky shoreline	Geography, Biology, Geology	16, 15	Malahide and Portmarnock Dublin Bay *Ireland*
	E-learning from Nature: Air Resistance	Physics	16, 15	Devil\'s Bit and North Tipperary *Ireland*
	E-learning from Nature: Changes in physical factors between ground level and the top of the Devil's Bit mountain	Chemistry, Physics	17, 16	Devil\'s Bit and North Tipperary *Ireland*
	E-Learning from Nature: Chloroplasts and Photosynthesis	Biology	16, 15, 14	Glenstal Abbey Estate *Ireland*
	E-learning from Nature: Comparison of soil samples from two sites in County Tipperary which are reputed to be linked	Geography, Chemistry, Geology	17, 16	Devil\'s Bit and North Tipperary *Ireland*
	E-learning from Nature: Copters - Investigating flight and seed dispersal	Math, Biology, Physics	16, 15	River Shannon and Wetlands at Shannon Town *Ireland*
	E-learning from Nature: Does intervention impact on animal and plant life on the banks of the River Tolka?	Geography, Biology	16, 15	Tolka River and adjacent banks at Glasnevin Dublin *Ireland*
	E-learning from Nature: experiencing the scientific method and the nature of science	Geography, Biology	14	River Shannon and Wetlands at Shannon Town *Ireland*
	E-Learning from Nature: Feeding Relationships in Ecosystems	Biology	16, 15, 14	Glenstal Abbey Estate

Figure 1 captures some of the topics addressed by Irish schools

2.3 Irish contribution to Teachers' Guide

The Teachers' Guide for science teachers focuses on innovative methods to enhance students' motivation towards the study of science subjects and improve their basic skills in science. The spirit of the Chapter and indeed the project, can be summarised in the Learning Pyramid (Figure 2)

Figure 2: The Learning Pyramid [6]

This is adapted from an original produced by the National Training Laboratories in the US. The goal of the E-lessons is that in producing them the students have taught others and practised by doing so they are more likely to retain the information on the topics.

The guide is organized in 4 chapters:

1. Teaching scientific subjects through problem based and real life case scenarios.
2. Enhance students' scientific basic skills through their active involvement in the learning process.
3. Effective use of new technologies to promote the scientific knowledge
4. Transnational cooperation to promote scientific knowledge in school education.

The Irish and Portuguese partners collaborated in the production of Chapter 2. The chapter had a general introduction and then was further sub-divided:

Chapter 1 - Peer-learning education

Chapter 2 - Methodologies for peer-learning education

Chapter 3 - Other methodologies for students' active involvement

Chapter 4 - Case studies

Each of the sub-divisions includes reference notes and links to on-line resources. For example, in sub-chapter 2 on Methodologies for peer-learning the following tools are described:

Randomisers: This can be as traditional as picking names out of a hat, or assigning numbers and then making matches, or have the students pick up a colour-coded lollipop stick and matching colours to make groups. There are also a number of 'apps' that allow randomization of groups. [7]

The Jigsaw method: This is a method of organizing classroom activity that makes students dependent on each other to succeed. It breaks classes into groups and breaks assignments into pieces that the group assembles to complete the (jigsaw) puzzle (Figure 1). Each member of a group learns a particular piece of information and then the group shares the information until everyone has learned all of the necessary material. [8]

Think-Pair-Share: The think, pair, share strategy is a cooperative learning technique that encourages individual participation and is applicable in any class grouping. Students think through questions using three distinct steps: Think: Students think independently about the question that has been posed, forming ideas of their own; Pair: Students are grouped in pairs to discuss their thoughts. This step allows students to articulate their ideas and to consider those of others; Share: Student pairs share their ideas with a larger group, such as the whole class. Often, students are more comfortable presenting ideas to a group with the support of a partner. In addition, students' ideas have become more refined through this three-step process. [9]

Buzz groups: This method known as “buzz groups” was first used by J Donald Phillips at Michigan State University. He divided large classes into six-member clusters asking them to discuss a certain problem for six minutes. (The “Phillips 66” technique) Each group nominates a leader and a note-taker. Students are less inhibited about sharing information in small groups, and are also more likely to speak out in large group discussions. [10]
Each chapter was developed and evaluated by other project partners on the Partnership Forum. Feedback from other partners informed the final contents of the chapters. It is hoped to publish this guide as an E-book to ensure it is more widely accessible.

3. Project Results

All of the outputs from the project are recorded on the Project Portal. [2] The partnership is described and contact information provided. There is access to the E-lessons and Teachers’ Notes from each partner. There is also access to the Teachers’ Guide and links to Conferences and Focus Groups associated with the project. There is a Facebook page associated with the project that is still active and has almost three hundred followers. [11]

3.1 Project Portal

The Project Portal is accessible at this link and the homepage is shown in Figure 2.

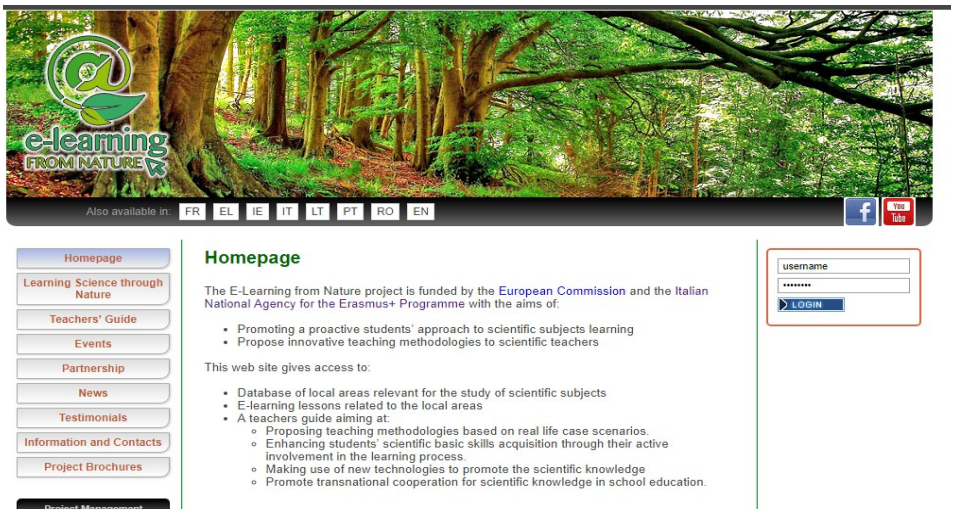

Figure 2: E-Learning from Nature Homepage [2]

3.2 Focus Group in Ireland

The final activity in each partner organication was a Focus Group looking at the outputs of the project. The teachers involved were all teaching in secondary schools in the mid-west of Ireland. The focus age for the event was 11– 15 years, which is Junior Cycle in Irish secondary schools. [12] The students in that age group are studying a new Junior Cycle Science Curriculum. This focus was chosen as it was felt that if the students are engaged in science at the junior cycle age group they are more likely to study it at senior level. At the very least they will become more aware of the value of science to everyday life. The course is activity-based in its design and emphasises practical experience of science for each individual student.
The importance of the processes of science as well as knowledge and understanding is reflected in the syllabus structure. Through a variety of investigations and experiments, students attain the specified learning outcomes, developing appropriate science process skills and a knowledge of underlying science concepts. In the junior cycle, the study of science contributes to a broad and balanced educational experience for students. It is concerned with the development of scientific literacy and associated science process skills, together with an appreciation of the impact that science has on our lives and environment. The study of science is fundamental to the development of the confidence required to deal with the opportunities and challenges that such change presents in a wide variety of personal and social contexts. The teachers present at the event are involved in presenting this curriculum to the students and encouraging them to meet the learning outcomes through a variety

of methods. They concurred that the Outputs of E-Learning from Nature were a useful addition to their Resource Banks.

3.3 Testimonials

There is a collection of testimonials that summarise the project experience from the viewpoint of participating teachers across the partnership:

> 'The points of strength of the project are: the extramural emphasis on how topics related to nature are taught; the international information visible on interesting projects in other countries; work being done on teaching and learning in our own school; the fact that it forces out teaching team to reflect and adapt how we convey the importance of nature to our students; this emphasizes the links between biology and nature.'
>
> *Enda Carr*

> 'Fantastic to see what others are doing in this project. Our students have enjoyed participating in this project and have been delighted to get the opportunity to explore the local habitats and nature hotspots'
>
> *Maria Sheehan*

4. Conclusion

The project received an overall score of 98% from the evaluator for the Italian National Agency. With such a value placed on the project outputs, it is hoped that there will be a legacy effect on the partnership and that the project outputs will continue to be used in lessons in the participating countries.

References

All web references accessed January 2019
[1] https://eacea.ec.europa.eu/erasmus-plus_en
[2] https://enature.pixel-online.org/index.php
[3] Limerick Institute of Technology www.lit.ie
[4] Screencastomatic https://screencast-o-matic.com/
[5] Movie maker https://www.topwin-movie-maker.com/
[6] The Learning Pyramid https://www.educationcorner.com/the-learning-pyramid.html
[7] Randomisers:
[8] The Jigsaw Method https://www.jigsaw.org/
[9] Think-pair-share https://faculty.washington.edu/kate1/ewExternalFiles/SageOnTheStage.pdf
King, 1993, From Sage on the Stage to Guide on the Side, College Teaching v. 41 no. 1 p. 30-35
[10] Buzz Groups: Denton, K., 1999, The toolbox for the mind, ASQ Quality Press
[11] https://www.facebook.com/enatureproject/
[12] Junior Cycle Science https://www.curriculumonline.ie/Junior-cycle/Junior-Cycle-Subjects/Science