New Perspectives in Science Education
International Conference
NEW PERSPECTIVES in SCIENCE EDUCATION


E-Learning from Nature Project: an Effective Way of Enhancing Students' Motivation

Anca Cristina Colibaba[1], Irina Gheorghiu[2], Stefan Colibaba[3], Rodica Gardikiotis[4]

Abstract

The article focuses on the E-Learning from Nature project (Project Number: 2015-1-IT02-KA201-015133) which is funded by the European Commission for the Erasmus+ Programme. Its main outputs aim at providing teachers of science with innovative teaching methodologies and creative materials meant to enhance students' motivation to learn science. The project also encourages transnational cooperation to promote scientific knowledge in school education. The materials created by teachers are authentic and stem from direct sources (photos, videos, drawings etc. available in digital format) about the flora, the fauna, the natural elements and any other human intervention of scientific interest in a specific environmental area. They form the basis of short video lessons which bring them closer to school scientific curricular activities. Thus, the project outputs appeal to all types of learning styles, stir students' curiosity about natural phenomena and encourage critical thinking. The teacher's guide organized in 4 chapters helps teachers with information and practical activities on how to teach scientific subjects through problem based and real life case scenarios to enhance students' motivation towards the study of scientific subjects.

1. The European context and the E-learning from nature project (objectives, target groups and outputs)

The project rationale is deeply rooted in the long-lasting efforts of the European Union to address students' underachievement in basic skills as far as scientific issues are concerned as reflected by students' results in Pissa tests [1]. Nowadays a basic understanding of science is considered a necessary skill for every European citizen. European countries face a paradox: in spite of the unprecedented advance of science and technology students are not interested in science. The results most students got in Pissa science tests are alarming. No wonder that there is serious concern about students' low performance in basic science skills; this is in tune with the EU-wide benchmark which states that 'by 2020 the share of 15-year-olds with insufficient abilities in reading, mathematics and science should be less than 15 %'[1]. The efforts made so far in this respect are not enough. We need to join all our endeavours across Europe and find the most effective approaches to modernise science teaching in school, raise students' motivation and interest in science, recruit and educate future scientists and improve the gender imbalance (as men prevail in this sector). The project strategy stresses the need for an innovative approach related to science teaching and learning. Our project is in line with the initiatives encouraged by the European Union and our country's educational strategy.

The main objectives of the project are centred on improving students' low achievement in scientific subjects, motivating secondary school students to learn science and consolidating student knowledge of science subjects [2]. The direct target groups of the E-learning from Nature project are: Science and

[1] Universitatea Gr.T.Popa Iasi/ Fundatia EuroEd, Romania, *acolib@euroed.ro*
[2] Albert Ludwigs University Freiburg , Germany, *irina_gheorghiu16@yahoo.com*
[3] Universitatea Al. I. Cuza Iasi, Romania, *stefan.colibaba@euroed.ro*
[4] Universitatea Gr.T.Popa, Romania, *bartisro@yahoo.gr*

English teachers in secondary schools (students aged 14 to 19) as well as secondary school students. The project main outputs are:

- a collection of information sheets, direct sources (photos, videos, drawings etc. available in digital format) about the flora, the fauna, the natural elements and any other human intervention of scientific interest of a specific environmental area;
- related small lessons aiming at identifying the connection between the above mentioned natural elements and school scientific curricular activities and the related basic skills to be acquired;
- the guide for science teachers which focuses on the subject of innovative methods to enhance students' motivation towards the study of scientific subjects and improve their basic skills in science [2].

2. The project methodology

Technically centred jobs based on STEM education (Science, Technology, Engineering, and Mathematics) have been the new tendency in recent years. Education is required to equip students with the necessary knowledge and skills in these fields and teachers need to promote and find the most adequate means to motivate students to have a good performance in science [1]. The project aims at developing a few strategies that will help teachers to motivate students to enjoy science, and highlight the relevance that science has on our students' lives. One essential way of stirring students' curiosity and engaging them is by connecting science to nature, with the natural elements as the most important resources in teaching and learning. Thus, students start from what is familiar and known, at which stage they are asked to observe and examine the main elements they have found around them and their interrelations. Once they have identified and defined them they are guided to the next level where the focus is on exploring the scientific phenomena that happen behind the known appearance and surface. Teachers stir students' interest in science in a natural way by appealing to their innate curiosity and connecting science to what they know: their everyday lives. To help students develop an even deeper understanding (and form questions of their own), teachers can go further and create new explorative and creative opportunities to ensure that students will keep their interest in science even after they have completed their school studies.

Science becomes fun and interesting because it is supported by hands-on experiments and programmes. Science becomes accessible as students are shown how it is used in their daily lives. Students realize that science is always behind the explanation not only of complicated natural phenomena but also of the functioning of their own gadgets. The project provides teachers with the necessary tools to get students explore and understand how science is more involved in their activities than they think. Another strategy which teachers use to increase their students' motivation is the incorporation of technology in the learning process. Videos promote and spark interest in science and keep students captivated and engaged in the learning process.

The project also takes into account students' different learning styles. It is known that students do not all learn in the same manner. They need experiences to help make connections and cement learning. By using a multi-sensory approach the project helps students focus on the material at hand and make meaningful connections that are so important for learning. By incorporating various methods the project is able to reach each type of learner. Students with a visual learning style and a preference for seen or observed things have pictures, diagrams, handout, drawings, maps or videos. Someone with an auditory learning style and a preference for the transfer of information through listening can listen to videos. Those with a kinaesthetic learning style and a preference for physical experience can benefit from practical hands-on experiences.

3. E-learning from nature (geographical areas and e-lessons)

Information sheets and direct sources available in digital format (photos, videos, drawings etc.) about the flora, the fauna or any other interesting natural element of the region has been collected by each partner and uploaded on the project site. At the next stage teachers have used the collected materials to create e-lessons (small video lessons) identifying the connection between the above mentioned natural elements and school scientific activities.

For instance, the complicated process through which water is treated and purified for drinking water production starts from the description of a common lake, Chirita Lake, which is part of the landscape for anyone living in Iasi, Romania. Chirita Lake is the city's main water resource. Chiriţa Lake is considered a reserve and a natural monument due to its beautiful surroundings and rare species of fish. To begin with, the information given is supported by photos and drawings and focuses on its geographical description and features as well as on important details about its flora and fauna [3]. Once the students are familiarized with the geographical and biological details of the lake, they are introduced to the water treatment plant Chirita and the main stages of the fully automated technological process through which the water of the lake becomes drinkable. The plant is equipped with treatment facilities according to the Romanian and European standards in force. The presentation of each stage and process the water goes through (filtration, ozonisation, chlorination, water storage and distribution) is accompanied by explanatory videos which demonstrate how the Chirita Water Treatment Plant works, presenting the long journey of the water from the first stage when it enters the plant until it leaves the station to reach the population of the city. A drawing summarises all the stages of the urban water cycle.

4. The guide for science teachers

The guide is organised in four chapters [2]:

- teaching scientific subjects through problem based and real life case scenarios;
- enhancing students' scientific basic skills through their active involvement in the learning process;
- effective use of new technologies to promote the scientific knowledge;
- transnational cooperation to promote scientific knowledge in school education.

The guide presents new methods as well as new technologies used in science education, meant to enhance students' motivation to learn science. The materials look at what makes teaching science effective and highlights the main learning theories which can be used. The guide also focuses on current teaching trends which benefit from state of the art technology: Flipped Classrooms, Social Media in the Classroom, Mobile Learning. Cloud Computing, MOOCs, Wearable Technology etc. One subchapter deals with gamification of education, which can help students be more motivated and engaged. Gamification can work with education as it can intensify the user's experience by introducing a high degree of interactivity and practice. Enthusiastic teachers have started using game-based learning techniques in their classrooms, which provides lots of learning opportunities online for students who prefer an experiential way of learning.

Another chapter provides the reader with successful stories about making science accessible and attractive to students: the European projects, which have worked on issues related to information and communication technologies in school education, environmental and science education. Many projects have developed web sites, which are accessible and can be used by those who are interested. They have also developed initial or in-service teacher training courses which have also been devised within projects, enabling both student teachers and experienced teachers from different countries to improve their teaching skills in specific areas. European projects on science suggest new methods and techniques which can make science more appealing to students. They create solid communities of teachers and students who work together across Europe in order to identify common challenges and find solutions to problems.

5. Conclusions

Connecting science to other subjects and particularly connecting science with nature is an innovative approach. This will stimulate students' interest in science as it provides them with a concrete familiar context which facilitates studying science and its comprehension. It is in tune with the recommendations of the European Commission which state that science should be taught in context, highlighting the application of scientific achievements to daily life. The project is based on various forms of active, participatory and inquiry approaches to science learning from primary level onwards, whose impact on students is increased by the use of state-of-the-art technology in the classroom. This innovative approach increases interest even in common tasks; it provides purpose for learning; it can attach meaning to an ongoing lesson; it provides opportunities to perceive knowledge as being

related, not isolated fragments; it allows for individual student differences; it can affect students' attitudes towards learning; it increases students' interactivity and awareness; it keeps science relevant and makes clear its relevance to students' lives.

References

[1] http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/133en.pdf (10November2016)
[2] http://enature.pixel-online.org/ (20November2016)
[3] Thornburg, D. "Five Challenges in Science Education", http://www.tcse-k12.org/pages/science.pdf (2December2016)
[4] https://ro.wikipedia.org/wiki/Lacul_Chiri%C8%9Ba (10December2016)
[5] „E-Learning Industry, 5 Killer Examples Of Gamified eLearning", https://elearningindustry.com/5-killer-examples-gamified-elearning (15 December 2016)