Goerudio: an innovative solution to enhance motivation to teach and learn science

Authors:

Anca Cristina COLIBABA - Gr.T.Popa University of Medicine and Pharmacy, Iasi, Romania and Fundatia EuroEd - acolib@euroed.ro

Ștefan COLIBABA - Al.I.Cuza University of Iasi and Fundatia EuroEd Iasi - stefan.colibaba@euroed.ro

Cintia Lucia COLIBABA - Gheorghe Asachi Technical University Iasi, Romania - cintia.colibaba@gmail.com

Irina GHEORGHIU - Albert Ludwigs Freiburg University of Germany - irina_gheorghiu16@yahoo.com

Abstract

The article is a study based on an innovative method which is being applied by EuroEd Foundation Iasi Romania, within the Goerudio European project. The project encourages both teachers of science and their students across Europe to work together in order to identify and share innovative practices to make science more appealing to students. The e-learning project platform also enables teachers to cope with the major challenges they face as a result of the increasing speed of the development of scientific knowledge. By exploring the online materials developed as part of other projects on the promotion of scientific knowledge and of innovative practices and methods aiming at learner-centeredness, teachers and trainers update their teaching methods in order to enhance the interest of their students towards science. Exchanges of ideas at a European level help teachers make students reconsider the role sciences should play in their life: as part of their future personal development rather than a set of information to be memorised for school.

The project also encourages the development of a strong learning community where students and teachers have the opportunity to discuss and find solutions in order to stimulate science learning. They work together to collect, review and share experiences related to the most effective and interactive approaches to the teaching and learning of scientific issues.

Key words: *science, innovative, collaborative work, teachers, students, European projects*

Introduction

The article is a study based on the Goerudio project, which has been funded by the European Commission in the framework of the Lifelong Learning Programme – Transversal Programme – Key Activity 4 Multilateral Project. The innovative method which is being applied by EuroEd Foundation Iasi, Romania, encourages both teachers of science and their students

across Europe to work together in order to identify, select and share innovative practices to make science more appealing to students.

The strategies to motivate students to learn science are in line with current trends and research-based best practices in science education (Gallenstein, 2005; Mantzicopoulos, Patrick, & Samarapungavan, 2008). Research on motivation to learn science shows that children/ teenagers are intrinsically interested in nature, the environment and how things work (Eshach & Fried, 2005). There are several reasons why teaching science in schools is necessary. Regardless of one's profession, science plays an important role in everyone's life and has lately touched nearly every aspect of our daily lives. Science is an inspiring process of discovery that helps quench our innate curiosity. Scientific discoveries shape the way we perceive the world and influence our decisions. Science teaches people how to think critically about any subject. It is an integral part of our lives—even if it is not our career.

Science can help teenagers understand the world, collect and organize, apply and test information and ideas (Eshach & Fried, 2005). Science provides a solid foundation for developing scientific concepts and learning abstract ideas throughout students' academic lives (Eshach & Fried, 2005). Science activities support children's/ teenagers' developmental areas. Challenging science activities enable the deveolpment of scientific thinking (Eshach & Fried, 2005), which in turn develops thinking skills that teenagers can transfer to other academic fields; as a result, science may enhance students' academic achievement and their sense of fulfilment (Kuhn & Pearsall, 2000).

The successful learning of science is also important in addressing gaps in enrollment for science colleges and career choices. Difficulties in studying science at school (due to poor instruction, obsolete material and methods) are often associated with students' negative attitudes towards science, poor performance and decisions not to pursue degrees and careers in science. Eshach and Fried (2005) suggest that positive science experiences and attractive teaching methods help teenagers develop scientific concepts and reasoning, as well as positive attitudes towards science.

Scholars have agreed that science teaching should be anchored in students' reality. Science experiences should be real, relevant and rigorous. Young children/ teenagers are actively engaged with their environment and they are deeply interested in understanding the phenomena they observe and experience. Children/ teenagers typically have an affinity for both nature and science and a natural tendency to enjoy experiences in nature. Connecting the science to be learned to the reality of their lives, to their age-appropriate experiences, and the rigor of the science concepts can make science come alive in unique and meaningful ways for these children/ teenagers.

Science teaching also builds skills essential to the scientific process such as observing, classifying, and sorting (Eshach & Fried, 2005). Science education is of great importance to many aspects of one's development.

Goerudio Objectives

The aim of the project is to create a learning community of European teachers and students in order to carry out a common analysis and reflection on how to make science more attractive to students. Science teachers and students across Europe will share teaching methods, tools and solutions which will empower students to be managers of their own learning process. The

project aims at exploiting and mainstreaming the most effective projects and experiences available at European level in the field.

- Science teachers and students will join their forces to analyse the teaching and learning of scientific issues and experiences, in order to identify and understand the main obstacles that affect a correct and effective transfer and acquisition of scientific knowledge**.**

- Science teachers across Europe will try to raise students' interest and stimulate their motivation in studying science by sharing and exploiting their most effective experiences; they will then select and promote an inquiry based, interactive and amusing approach to the understanding of science.

- The project will create a network among teachers and students of different European countries and institutions who will exchange experiences and knowledge in order to develop and exploit a new approach to science teaching and learning. School science will no longer be perceived as a set of information to be memorized but as a necessary part of one's future personal development.

Goerudio Project Target groups

The Goerudio project can ensure a consistent impact on its direct target groups: students and teachers of secondary and vocational education schools.

What is characteristic of the Goerudio project is that both target groups of the project will be involved directly and actively in the project activities from the very beginning of the project.

At least 5 schools will be involved in each country; that means a total of 35 schools participating in the project. At least 2 teachers of scientific issues will take part from each school, meaning a total of 70 teachers will be involved in and benefit directly from the project results. Considering an average of 20 students for each teacher, an estimated number of 1,400 students will be actively involved in and benefit from the project activities.

Goerudio Project Activities

a. Teaching and learning science experiences

Students and teachers will work side by side and cooperate at national and transnational level. Both students and teachers across Europe will firstly contribute to the project by describing their science teaching/ learning experiences in order to find solutions to common issues:

- the lack of motivation of secondary and vocational education students in studying scientific related topics

- the difficulties for school teachers in updating their teaching methods in order to direct/increase the interest of their students toward scientific issues

The participants will highlight the everyday practices that are successful in overcoming the above mentioned challenges and will raise other teachers' awareness about the importance of changing the existing approach to teaching and learning science in schools. The project partners will involve 10 teachers (2 for each of 5 schools) and their students in describing their experiences regarding the main obstacles that affect the interest of pupils in scientific

issues and the most effective solutions to overcome them. Teachers will describe their experiences and efforts to adopt teaching methods to enhance students' interest in school science and make them autonomous learners. Students will describe their difficulties in learning sciences as well as their achievements, by highlighting at least one topic that they feel they have learnt well, explaining the reasons for their achievement. The project partners will collect, analyse and catalogue these experiences that will be made available, through a common format on the Portal of the project.

b. Review of projects

The project partners will guide teachers and students in the identification and review of existing projects (e.g. LLP Multilateral and Network projects, National projects) and related resources and materials (particularly online sources) to teach science in a more innovative, attractive and interactive manner. Teachers will be involved in reviewing projects and innovative teaching science approaches which have already made good use of ICT and valorised inquiry based methods. Successful solutions will be identified and made available online in order to empower the learner to control their own learning process and encourage them to be lifelong learners. Thus, students and teachers will benefit from the opportunity to access an invaluable resource of the most successful results available at European level.

Teachers and students will work together in order to collect and review at least 30 past and on-going projects related to teaching/ learning science. Each review will be analysed and commented from three points of view corresponding to the three project beneficiaries: educational experts who will provide feedback on pedagogic reliability, teachers providing feedback on the transferability potential of the product in everyday practices and students who will provide their feedback on the product attractiveness and accessibility.

c. The learning community

Teachers and students will share their experiences and solutions within a large learning community. Under the guidance of the project partner experts they will have to produce at least one teaching/learning resource applying ICT and one of the approaches they became familiar with in the second project stage (review of projects). The learning community will use ICT technology and an inquiry based learning approach in order to raise students' interest and enhance their autonomy in managing their learning process.

Why Use Technology in the Classroom?

Technology, when used appropriately, can help make the science classroom a site of active learning and critical thinking, encouraging student inquiry and connections with the online materials. Teachers can use technology to enable students to explore fundamental curriculum issues and answer core questions. Students can use the Internet, electronic databases and other online sources to gather information. They can use spreadsheets, virtual labs, and other programs to store, organize, and analyze information. Students can also integrate multimedia desktop publishing, web publishing, video and audio editing, as well as graphics programs to create and present information in innovative and engaging ways.

There are lots of educators and researchers deeply concerned with how our schools are going to prepare students for the 21st century; they all agree that our students will need some major competencies: creativity, critical thinking, cross-cultural communication and collaboration, and digital age literacy. In these environments, teachers will act as facilitators and mentors

rather than resources of authoritative knowledge. Helping teachers effectively stimulate innovative, student-centered, inquiry-based learning will involve leveraging technologies.

Technology makes science look real. In order to foster intrinsic motivation, learning activities should be based on topics that are relevant to students' lives.

Technology provides choices. Students' motivation increases when they feel autonomous and in control of their learning process; motivation declines when students have no voice and no choice in the class structure.

Technology can balance the challenge. Students perform best when the level of difficulty is slightly above their current ability level. Scaffolding is one instructional technique where the challenge level is gradually raised as students are capable of more complex tasks.

Technology can establish a sense of belonging. Technology can instil a feeling of being connected or related to other people. In an academic environment, research shows that students who feel they 'belong' to a group have a higher degree of intrinsic motivation and academic confidence. According to students, their sense of belonging is fostered by an instructor that demonstrates warmth and openness, encourages student participation, is enthusiastic, friendly and helpful, and is organized and prepared for class.

Conclusions

Scientific issues are often taught at school in a theory oriented approach based on memorization, which often diminishes students' interest. Teaching methods and tools are static and do not change as fast as the evolution of technology does. Students are perceived as being passive: their main responsibility is to acquire information controlled by teachers. To improve this situation the Goerudio project intends to exploit the results of the most advanced and effective projects that focused on providing methods and related educational tools with a view to making science learning more enjoyable and amusing. The project also aims at enabling teachers to give students the necessary knowledge and skills through an inquiry based approach enriched by new ICT developments.

The project is strongly innovating as it involves teachers and students in a common effort in order to collect, review and share experiences related to the most effective, interactive and innovative approaches to the teaching and learning of science; the project will create a learning community where teachers and students will have the opportunity to discuss and find solutions in order to promote and continuously upgrade science learning in an attractive and challenging way.

The project partners believe that successful science teaching must include strategies that encourage students to learn the science that will help them in future. The project encourages students to be the managers of their own learning process, giving them the chance to achieve personal learning goals in addition to learning the scientific issues that meet their needs.

Reference

Eshach, H., & Fried, M. N. (2005). Should science be taught in early childhood? Journal of Science Education and Technology, 14(3), 315-336.

Gallenstein, N. (2005). Engaging young children in science and mathematics. Journal of Elementary Science Education, 17, 27-41

Kuhn, D., & Pearsall, S. (2000). Developmental origins of scientific thinking. Journal of Cognition and Development, 1, 113-129.

Mantzicopoulos, P., Patrick, H., & Samarapungavan, A. (2008). Young children's motivational beliefs about learning science. Early Childhood Research Quarterly, 23, 378-394

http://goerudio.pixel-online.org/MNG-information.php (23.03.2014)