GOERUDIO METHOD AND TOOL TO ACHIEVE NECESSARY LEVEL OF COMPREHENSION

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Abstract

The project rationale relies on the challenges that the educational and training systems are facing - the lack of motivation of secondary and vocational education students in studying scientific. The motivation of these problems are obviously complex and invest many different factors, but the project partners believe that the most important one is related to the fact that too often students approach to scientific issues is too passive, based on memorising rather than understanding. Goerudio is a learning methodology that is based on user involvement in its application and subject matter development. This program enables the user to explain complex formulas, physics laws and concepts presented by teachers with simple and familiar examples that are readily understood. The key difference between Goerudio and similar tools is that it facilitates learning rather than teaching and does not conflict with traditional teaching methods. Goerudio provides an internet based framework through which the user pool (students) refines the concepts and models in support of any given subject. Through active involvement in the process and the use of familiar examples, the learners rapidly gain a better understanding of the underlying principles or processes. Interaction and communication among the users helps to develop a common understanding of the concepts and their relationships to relevant laws of science and mathematics.

Key words: education, training, science, curricula, students

Goerudio (543223-LLP-1-2013-1-LV-KA4-KA4MP) is a project funded under the Life Long Learning Programme, Transversal Programme – Key Activity 4 Multilateral Project.

The project rationale relies on the shared identification by the project partners, of common challenges that the educational and training systems of their countries and of Europe in general, are facing and that need a common effort in order to be answered to:

- the lack of motivation of secondary and vocational education students in studying scientific related topics, and the related insufficient results that they achieve during their school curricula

- the lack of capacity of teachers and trainers in updating their teaching methods in order to promote the interest of their students toward scientific issues

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Teachers, students and other participants of educational system already for a longer time were discussing a serious problem - necessity to introduce new, innovative methods in attainment of study material, as the main problem was continuing cramming or reproduction of given material instead of understanding its content.

Goerudio is being implemented by the Latvian Education Foundation at the University of Latvia. The Goerudio program received the Latvian Education Innovation prize in 2011. It has been implemented in several schools in Latvia and has been featured in the „US-China Education Review".

In this new project, Goerudio method will be applied in the schools from 7 different European countries (Latvia, Bulgaria, Italy, Spain, Poland, Romania and Slovak Republic).

The aim of the project is to create a learning community of European science teachers and students willing to identify solutions to overcome

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the main obstacles related to scientific subjects studying.

MATERIAL ŞI METODĂ

Goerudio is a learning methodology that is based on user involvement in its application and subject matter development. This program enables the user to explain complex formulas, physics laws and concepts presented by teachers with simple and familiar examples that are readily understood.

The key difference between Goerudio and similar tools is that it facilitates learning rather than teaching and does not conflict with traditional teaching methods. Goerudio provides an internet based framework through which the user pool (students) refines the concepts and models in support of any given subject. Through active involvement in the process and the use of familiar examples, the learners rapidly gain a better understanding of the underlying principles or processes. Interaction and communication among the users helps to develop a common understanding of the concepts and their relationships to relevant laws of science and mathematics.

Poor understanding is the result of a poor communication. Poor communication, in its turn, can be described as a presentation of facts and viewpoints in such a system of notions (usually theories, instructions, rules, customs and other man-created notions with their inherent terminology, concepts and fixed correlations) that is unfamiliar to the target audience. That either creates erroneous and insufficient conception or is not perceived at all, as everything seems incomprehensible.

Communication can be improved by a tailor-made interpretation targeted at a particular audience, using concepts and correlations familiar and well-known to that audience, and by creating equivalent (also associative) models.

Models aid to develop intuitive perception/ notion of a phenomenon, understand what it is and according to what principles it functions.

Term "model" denotes interpretation of concepts or relations used in a theory, rule, instruction or other notion by expressing them through familiar phenomena and natural, conventional relation creating a conception easy to perceive intuitively – image.

Model works better if it's created image is close to recipient – experience, culture, climate, nationality - are only some of the influencing factors. Models are controlled to avoid mistakes.

Time spent to reach comprehension can be notably shortened if new concepts and relations are substituted with similar or familiar ones.

The system allows audience to participate in evaluation of models. Audience can either select the best models or create and propose their own solutions. Both types of involvement provide feedback from the system.

The feedback gives participating teachers idea of how teaching process could be improved. More, daily monitoring shows tendencies that can be discussed and analysed in educators' workshops.

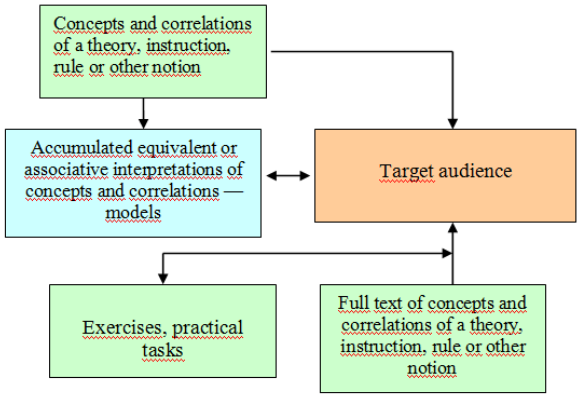

Figure 1 **This is proposal of new approach of reaching comprehension using models in close connection with other methods of education**

Functions of Comprehension Worksheet

Comprehension Worksheet is a public internet tool that provides:

1. Comprehension of the concepts and correlations related to the subject matter through models/interpretation more familiar to the particular region and its target audience (these are multiple choice questions, like – what does it mean? why and how does it function?)
2. Feedback – participation of the target audience in the development of new models and in the evaluation of the existing ones.
3. Verification of models/interpretation submitted by the target audience
4. Quality assurance and quality control of the presented material
5. Participation statistics.

Comprehension Worksheet is designated for enhancement of comprehension skills and does not aim at comprehensive teaching of the subject matter or skills, therefore Comprehension Worksheet contains links to websites to the teaching materials of subject matter and related tasks and exercises.

The implementation process starts with the training of the teachers and administrators and setting up the local web site. An initial set of subject-related concepts and relationships is formulated and the students invited to develop models that support the given material.

The process of developing the models quickly identifies those who have the best understanding of the concepts and the ability to express them in simple and effective terms.

These students can be given special recognition as an incentive for other contributors.

REZULTATE ŞI DISCUŢII

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.

Teachers and students are sharing their experiences and solutions within a large learning community (http://goerudio.pixel-online.org/experiences.php).

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.

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.

Teachers' testimonials:

"I have always noticed that pupils find it difficult to tune in to a new science… I always took their age and experience into consideration and as a result my explanations were simple but I still couldn't manage to draw my pupils' attention to what I was saying."

"Chemistry opens doors to our innate curiosity and also provides us with answers. Experiments are memorable either by their visual nature or by testing theory. As a teacher I have tried to communicate the excitement and wonder of the subject I teach and I am interested in to my students so that they will want to take it further. It is a matter of communication: as a teacher you have to share your enthusiasm for your subject with your students in a simple way so that they will understand it."

"Children should be encouraged to become real chemists and act like them: make predictions and test them, do experiments or make observations. Simple experiments speak volumes and most of the times are more important than pages of abstract theory in terms of raising students' motivation to learn chemistry."

"Communication is essential when it comes to teaching science. As teachers we have to find and use a language our students understand. If it is too abstract we will lose them from the very beginning; that is why we should always start with things they know and build from there."

"Students usually have difficulties because they find science too abstract. It is true that science uses a wide range of abstract terms and deals with lots of abstract concepts that are not part of everyday conversation. That is why we have to introduce them gradually in a simple way through experiments in most cases. I usually stir my students' curiosity and start with a lot of questions, which is good food for thought."

"As I have already said experiments appeal to students because they are accessible and intriguing and because students are involved in carrying them out. They are not passive; they feel responsible for what they are doing."

"I have always believed in the power of learning by doing. That is why I use experiments in teaching my students. Everything becomes observable, visible and clear. They also engage students who are willing to participate and achieve the objectives of their tasks. Everything is shared and is based on the relationship forged between the adults and students."

"A simple experiment is one of the best ways to motivate your students and raise their curiosity. Make each demonstration looks like a mystery: it is the magic of chemistry."

Students' testimonials:

"I didn't like science when we first started it. I didn't understand it at all. It was like another language. My teacher must have noticed my situation because she tried to explain everything in a clear and simple way. She used experiments to make it clear for us. She engaged us in lots of activities which made our lessons very pleasant and interesting."

"At first I had lots of problems with physics. It took me some time to realize why it is important to study it. At first I thought it was too abstract because the teacher used words I did not understand."

"For me, science was always the expression of curiosity and strives for never ending knowledge and understanding."

"What I really like about science (physics) is that our teacher doesn't ask us to memorize formulas and definitions at all."

"When we first started chemistry and flickered through the textbook I got really scared. There

were lots of formulas and definitions and very abstract terms. I didn't understand a thing. It was our teacher who made it very accessible through a lot of experiments."
"I am really disappointed about the Romanian Education System mainly because we study too much and use all the information too little."
"I encountered some problems in biology because the teacher did not explain it well, although I really like the subject.
I did not do any experiment in any of the scientific subjects, but I wanted to do at least one. I think that would have helped to better understand these phenomena around me."

CONCLUZII

Teachers have to face a major challenge coming from the fact that the speed of the development of scientific knowledge is constantly increasing, therefore too often the gap between the lessons and the teaching materials used and the evolution of research is increasing and leads to demotivation both of the teachers and of the students.

This phenomenon risks to create concrete and consistent obstacles to the achievement of some of the main objectives of the Europe 2020 strategy aims related to the competitiveness and the excellence of scientific research in Europe and its capacity to answer and anticipate the needs of the market and the promotion of science education and knowledge among European citizens.

Scientific issues are often taught at school in a theory oriented approach that often discourages pupils interest, proposing and idea that sciences are difficult to learn and require a huge effort to memorise many different information rather than acquiring a real and effective comprehension of the issues .

Teaching methods and tools are too often the same within years (even decades) and mostly oriented to the transfer of notions through a static approach, where the student is passive and does not acquire the control of his/hers learning process which is at the contrary controlled by the teacher through a vertical approach.

This causes to those who are less attracted by scientific issues to quickly loose contact with the subjects and therefore their knowledge gap increases so rapidly that it becomes for them impossible to learn about it.

The strategies to motivate students to learn science are in line with current trends and research-based best practices in science education (Gallenstein N., 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 (Colibaba A., 2014)

Use of models gives benefits in education, but teachers' participation in process of model use increase the effect by the order.

The current proposal intends to build on these experiences, explore the results of other projects addressing the promotion of scientific knowledge and of innovative practices and methods aiming at putting the learner at the centre of the educational and training process and to involve teachers and students in being the protagonists of an international peer to peer based learning community to share, disseminate and exploit the best practices available at European level in the field.

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.

BIBLIOGRAFIE

Colibaba A.C., Colibaba S., Colibaba C.L., Gheorghiu I. 2014 - *Goerudio: an innovative solution to enhance motivation to teach and learn science*, The Future of Education Conference Proceedings

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

http://www.goerudio.com

http://goerudio.pixel-online.org/index.php