

E-INSTRUMENTS TO FACILITATE POSITIVE CHANGES IN LEARNING AND TEACHING

Abstract

The article analyses the solutions to three challenges facing the European educational systems, as suggested by three projects funded by the European Commission. The projects aim at raising students' interest in studying science (Goerudio, a Lifelong Learning Programme -KA4 Dissemination and Exploitation of Results and Exchange of Good Practice), at fostering collaboration between education and the labour market (School&Work, an Erasmus+ Programme, KA2 Strategic Partnership) and at promoting social inclusion and equal opportunities through increased participation in and equal access to sport for all (Not Only Fair Play, an Erasmus+ Programme). The objectives of the projects are to promote collaboration among teachers and students in order to share, match and stimulate their everyday experiences in dealing with the teaching and learning of scientific issues (Goerudio project), facilitate students' entrance in the labor market (*School&Work* project) and raise teachers', students' and parents' awareness of the importance of sport at school through a better integration of physical education into the school curricula (*Not only Fair play*). The underlying principle of the projects has been to create strong learning communities made up of dedicated teachers and students across Europe. They have been working together to identify common problems and obstacles and to find appropriate solutions based on the findings of the research carried out within partnerships. All three networks generated have developed online data bases of reviews of existing projects and initiatives which tackle the same issues as the projects: students' lack of interest in science, the existing gap between school and work, disinterest in sport and difficulties in balancing school and sport activities. They have also collected and uploaded models of success stories and best practices on the project platforms. The online teaching resources created by the learning communities of teachers and students across Europe can be regarded as conclusions to all the efforts put into the three projects: collaboraton is the key to find successful solutions.

Key words: European projects, challenges, solutions, learning community, database, resources, previous initiatives

1. CONTEXT

Because 'Europe's future depends largely on its young people' [1], the Europe 2020 strategy aims 'to support young people better and to enable them to fully develop their talents to their own as well as to their economy's and society's benefit' [2]. However, the number of students who drop school or are not interested in learning is increasing. European educational systems face challenges that only joint efforts across Europe, such as European projects, can solve. Projects such as *Goerudio*, *School&Work* and *Not only Fair play* have built strong learning communities made up of dedicated teachers and students who have created valuable online materials meant to bring about positive changes in learning and teaching.

2. THE GOERUDIO PROJECT

The Goerudio project (543223-LLP-1-2013-1-LV-KA4- KA4MP) has analysed challenges that European educational systems face in terms of learning and teaching science. Although our society is increasingly dependent on scientific and technological knowledge, skills and devices, students are not motivated and interested in science, while school teachers are unable to find innovative teaching methods. To this end a learning community of science teachers and students has been created across Europe. They have discussed problems and obstacles and shared, uploaded and commented upon knowledge from their experiences or European project initiatives on the project platform. Science teachers across Europe have tried to raise students' interest and stimulate their motivation in studying science by sharing and exploiting their most effective experiences; they have also selected and promoted an inquiry based, interactive and amusing approach to the understanding of science [3]. The

community has been involved in the development of teaching resources for scientific subjects. The most challenging ones have been the Goerudio educational models.

2.1. The Goerudio Models

Goerudio models are based on analogies between two items from different fields. Goerudio models can be useful for teaching and learning when abstract scientific concepts are first introduced to students. Students are asked to find similarities between the scientific concept and a more familiar information with a view to integrating new information in their previous knowledge base. The analogy relies on explaining and thus making less familiar information accessible through common experiences (e.g. classes of the periodic table to human families/ electric current to the way water flows/ a chemical equation to a recipe/ inertia to everyday routine). Students get familiar with the newly introduced concepts in student-centered and inquiry-based experiences. The new knowledge is explored from different angles as students get actively engaged in finding explanations and applying the newly learned material to new situations related to their own experience. Thus, students get a better understanding of the scientific concept and make the learning process memorable and very personal. Goerudio models can make unfamiliar scientific concepts easy to understand, visualize and remember.

Goerudio models [4] can be applied to all scientific subjects (mathematics, physics, chemistry, biology). Students are asked to find the analogy between the scientific concept (its definition is given) and an item from their own experience. They have to justify the analogy by finding the most convincing similarities between the two items. A drawing or a photo completes the Goerudio model.

2.2 Examples of Goerudio models

2.2.1. *The Brownian Motion and Traffic in a City*

Scientific definition: Brownian motion defines the random movement of microscopic particles suspended in a liquid or gas, caused by the collision with molecules from the surrounding medium (Fig1).

Students' model: "We can say that Brownian motion is like traffic in a big city. The cars (like the particles) move chaotically under the influence of time or stress (these are similar with the molecules of the surrounding medium that collide with the particles)".



Fig. 1 Traffic in a big city

2.2.2 *Coagulation of Blood and Team Development*

Scientific definition: Coagulation (also known as clotting) is the process by which blood changes from a liquid to a gel. The mechanism of coagulation involves activation, adhesion, and aggregation of platelets along with deposition and maturation of fibrin. Coagulation is a complex process by which the blood forms clots to block and then heal a lesion/wound/cut and stop the bleeding. Platelets and fibrin are involved in blood clotting.

Students' model: The process by which a team is built out of a fluid group of people is similar to blood

coagulation. Blood coagulation involves the action of platelets to form blood clots. The coagulation of a team is produced through the action of common interests (Fig. 2 and 3).



Fig 2 Individuals in random groups



Fig. 3 Coagulation of teams through the action of common interests

The models are uploaded on the project platform so that all teachers and students can access them and comment on the models. Teachers and students can exchange ideas and work together on the uploaded models. Goerudio models trigger new ideas and as a result generate new Goerudio models. Everybody highly appreciated the Goerudio models as exercises "in creativity, making thinking visible, learning pleasant and interesting" (P.R., teacher of Mathematics). "I think that Goerudio models offer plenty of opportunities for students to exercise their creativity." (C F., teacher of physics) "Have you ever thought of having fun while studying science? Then you have to study science with Goerudio model, where humour is an essential ingredient!" "Science classes are full of abstract concepts, which are difficult to understand. Goerudio models help students understand them by relating them to their everyday experiences. (M. C. teacher of biology)" "I believe teaching science using Goerudio models has changed my teaching. I have noticed how much it has enhanced my students' motivation to learn chemistry. Active learning makes knowledge lasting. It helps students get meaning out of their education." (M.C., teacher of chemistry)

3. THE SCHOOLS @ WORK PROJECT

The Schools @ Work project community first considered and analysed the existing results of previous European projects addressing early school leaving problems and which have found solutions to motivate students to learn and complete their studies. The main outputs created by the Schools @ Work project aim to equip school teachers and advisors, mentors and counsellors with the skills and tools which will enable them to better understand pupils' individual attitudes, interests and potential skills they need in their future career and help them valorise individual attitudes as a means to motivate students and raise their self-esteem. The project has identified and promoted the importance of specific professional and sectorial skills and competences that companies and the job market take into consideration when recruiting their staff.

The project instruments provide school teachers and advisors, mentors and counsellors with the information related to the transversal skills necessary to do a job, which are often referred to as core skills, basic skills or soft skills. They are the building blocks for the development of the "hard" skills and competences required to succeed in our society: 1) ability to readily and easily communicate in the mother tongue, 2) the ability to speak foreign languages, 3) mathematical competence and basic competences in science and technology 4) IT skills, 5) social and civic competences, 6) sense of

initiative and entrepreneurship, 7) capacity to learn to learn, and 8) cultural awareness and expression [3].

3.1 The Tool-kit for Counsellors and Teachers

The Tool-kit for Counsellors and Teachers can be used by school counsellors and teachers to create and use their own personalised guidance services. They are based on the analysis of students' personal attitudes and which are matched with what is requested on the job market. The tool-kit includes valuable information on the transversal competences (literacy, ICT, numeracy, communication, entrepreneurial spirit, learning to learn, cultural awareness) that companies and recruiting services take into account to select staff resources. The information has been collected and made available on the project portal. The kit helps teachers analyse and highlight students' aptitudes, interests and skills in order to identify students' most appropriate professional career and to motivate them to complete school. The kit helps students envisage what the necessary steps are in order to have the job which matches their aptitudes, interests and skills. To the same end, the community has created a substantial "Identification of Students' Potentials" Toolkit that comprises: online database of tools aptitude tests; online database of skills tests; 12 interactive wizard tests which can be used to discover students' abilities, aptitudes and skills. The wide range of tests are available for teachers and students and take 40 to 60 minutes to complete. They not only raise students' awareness about their personal attributes (interests, values, preferences, motivations, aptitudes and skills) but also highlight their impact on their success in life. Students can do career tests, which help them gain insights into what types of careers would be best suited for them. Personality career tests determine students' personality, social and moral values as well as strengths and weaknesses. Personality career tests can help students select the right career by showing them what types of work and careers are most suitable for them, and what their values are. Interest based career tests reveal students' interests and identify which jobs match these interests. Complex questionnaires provide information on skills, abilities, knowledge, work activities, and interests associated with jobs [4].

3.2 New Developments

The e-learning package is a course addressing teachers dealing with students at risk of early school leaving. Teachers are provided with useful tips and strategies on how to motivate students to continue and complete their education at school. The material provides school counsellors and teachers with the necessary skills to understand their students' individual aptitudes. Ten most demanded jobs have been identified in each partner country. The accompanying profile of each job comprises the standard occupational description, the main skills, knowledge and competences necessary to perform the job. In Romania for instance the most required jobs are in the field of health care, IT, construction and education: nurse, surgeon, carer, computer analyst, maintenance worker, carpenter, kindergarten teacher, systems administrator, accountant and project manager [4].

4 THE NOT ONLY FAIR PLAY PROJECT

The Not Only Fair Play project community made up of teachers and students across Europe have dealt with cross-border threats to the integrity of sport, such as doping, match fixing and violence, as well as different types of intolerance and discrimination; the community has also promoted and supported "good governance in sport and dual careers of athletes as well as voluntary activities in sport, together with social inclusion, equal opportunities and awareness of the importance of health-enhancing physical activity, through increased participation in, and equal access to sport for all" [6]. The community holds that the relation between the education sector and physical activity is a key aspect for the promotion of sport and physical activities among young people. However, there is still a concrete and strong risk that the combination of the actual educational model and of the way sport is perceived often leads students to make a selective choice between studies or sport. In a few words, a misleading perception of sport and physical activities as a measure of success and as a menace for education, leads to a dichotomy between school and sport. The project community tries to confute this dichotomy and propose a more appropriate approach to sport and physical activity and a more fruitful cooperation between schools and sports organisations. The Not Only Fair Play project community promotes and diffuse a more ethic-based, sane and appropriate perception of the importance that sport and physical activity can and should have for young people [5].

The project aims at promoting the enhancement of the sport and physical activities offer of European schools both within the curricular activities and through extracurricular initiatives in order to confute the need to necessarily choose between studying and doing sports. It also promotes sport and physical activity as a fundamental educational tool to provide students with self confidence, socialisation opportunities, mutual understanding among different cultures and to valorise the role that the universal language of sport can play in order to achieve social inclusion, equal opportunities and tolerance. It promotes a different and ethic based approach to Sport and physical activities, overcoming the hyper-competitive perception that often leads to overwhelming expectations and an incapacity of managing failure, exposure to the risk of doping, violent and intolerant behaviours.

The specific objective of the project is to provide teachers and school staff with a set of information, teaching and learning tools and best practices to be used to promote a more fruitful and mutual beneficial relationship between the educational offer and sports. It creates a network of schools and sports associations to build an effective collaboration oriented towards promoting a more ethic based approach to sport and increasing awareness of the importance of physical activities for the health and personal growth of students

The project has produced the following online instruments through networking activities among the institutions involved [6]:

4.1 Collection of Best Practice for Sport Promotion at School

Project partners have collected and reviewed success stories and best practices in the promotion of sports and physical activities at school and in their integration into the educational offer.

The collection consists of: schools' initiatives, both at curricular and extracurricular level, for the promotion of sport and physical activities (e.g. sport competitions among schools, school sports days etc.); experiences and projects using sports and physical activities to promote mutual understanding among cultures, to promote socialization among students, to promote values and ethics etc. (e.g. use of sport as universal language to promote the interaction between students from different ethnic/cultural groups); experiences of the use of sport and physical activities to promote students' motivation to learn and to stay at school, thus preventing early school leaving; success stories of students that managed to balance their school career with their passion for sport and succeeded in organizing their time and their life to continue both activities.

4.2 Toolkit for teachers to capitalise on sport and physical activities for educational purposes

Project partners have cooperatively developed a toolkit for teachers and leaders of sporting activities, which promotes young people's participation in sport and physical activities, supported by a mutual beneficial cooperation between schools and the world of sport.

The Toolkit contains innovative methodological approaches as well as teaching tools and practices for teaching curricular lessons through sport related initiatives and/or physical activities (e.g. Trekking for scientific lessons, sport events to teach history or culture etc.). It also recommends innovative approaches and teaching tools to use sport to develop students' transversal skills such as communication, learning to learn, entrepreneurial spirit etc. Moreover, it suggests sport based practices, role plays, events and extracurricular activities, which can be used to motivate students to learn, stay at school and continue their studies, to socialise and overcome cultural, social, economic, racial issues (e.g. organising school tournaments to invite students to perceive school as an interesting dynamic place; creating opportunities for students from different backgrounds to meet, interact and socialise). Finally, the toolkit offers a different approach to sport, not only focused on competition and success but also as a strongly ethic based activity that can promote the prevention of racism, violence, doping and match fixing [6].

4.3 New developments: Guidelines for integration between Sport and Education

Project partners will cooperatively develop a set of Guidelines addressed to policy makers on how to promote and implement a mutual beneficial integration between sport and education. Based on the best practices in the field at European level, the Guidelines will set principles and suggest necessary steps and solutions to promote sport and physical activities as a beneficial tool for enhancing the educational offer of schools and not as a menace [6].

5. CONCLUSIONS

The solutions suggested to the three challenges that European education faces nowadays are rooted in the collaboration among teachers and students who join their efforts in order to raise students' interest in learning scientific issues (Goerudio project), help students find their place in the labor market and foster collaboration between school and work (*School&Work* project) as well as to promote social inclusion and equal opportunities and raise teachers', students' and parents' awareness of the importance and role of sport at school and in life (*Not only Fair play*). The project results are based on the findings of the research carried out within partnerships and on the findings of existing projects and initiatives dealing with the same issues as the projects under discussion: students' lack of interest in science, the existing gap between school and work, as well as disinterest in sport and difficulties in balancing school and sport activities. The online teaching resources created by the learning communities of teachers and students across Europe comprise a wide variety of materials where students, teachers, counsellors and parents can find solutions to their problems.

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