The Nano Technology for Science Education Project (NTSE)

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THE PARTNERS

Doga Schools

Private Doga ("nature") Education Institutions, founded in 2002, has got 8 campuses in Istanbul, comprising 39 schools from kindergarten to Upper Secondary level, 15000 students, 1000 staff members. Its purpose is to provide individual development for pupils in a way that is multi-directional, participative, creative and sensitive. The love for nature, the idea to learn with nature is at the center.
Doga schools gives also great importance to integrate ICT. All classes are equipped with smartboards. "DOGA online" is a virtual library enabling teachers and pupils to follow curriculum subjects online. "E-HOMEWORK" offers pupils facilities to do their homework interactively/online, it is used also for preparing projects, and exams. Parents and teachers can check pupils acitivities.
"E-Doga" enables parents to reach information like the time schedule of their children, teachers, schedules/results of exams etc. "E-Doga" is used to form an educational triangle pupils - teachers - parents.

Fondazione Idis

Fondazione Idis-Città della Scienza is a non-profit organization which operates in Naples since 1987 and plays a leading role in the dissemination of scientific knowledge, technological innovation and research on education. The science centre has became, for the quality it proposes, the contents, the high interactivity, the dimension (10.000 sq.m) and the innovation of technologies and exhibition areas, the first interactive science museum in Italy (about 350,000 visitors/yr) and has received important awards at European level: Micheletti Prize in 2005 for the best scientific museum of the EMYA and the Descartes Prize for Science Communication in 2006. Other nanotechnology related projects: NanoToTouch, TimeForNano, etc.

Sirma Media

Sirma Media AD is the leading BG publisher of multimedia knowledge -- e-encyclopedias, dictionaries, e-lessons, educational games, web-based knowledge portals and language tools. Sirma Media has significant experience with design, software development, support and maintenance of multimedia knowledge products and services, most of them commissioned by the Bulgarian Ministry of Education, Youth and Science. Sirma Media products are licensed to all 3 000 Bulgarian schools are actively used in the learning process within the frames of the current state curriculum. Sirma Media develops and organizes qualification teacher training courses. Sirma Media is part of Sirma Group Holding, which is one of the top 3 software companies in BG, more than 400 people highly qualified staff. Through one of its companies - Ontotext (research & development laboratory for knowledge processing) the holding is the most active Bulgarian participant in 5th & 6th European Research and Development framework programs.

IACM ITE/FORTH

The Educational Research and Evaluation Group (ERE) of the Institute of Applied and Computational Mathematics (IACM) is a small research team based in Heraklion, Crete, Greece: with research concerns in the areas of: Technology enhanced learning - focus on pedagogical effectiveness of various learning approaches (experimental, situated, adaptive, exemplary learning), organization of teaching / learning and self-evaluation. Considered and studied are also diverse theories of organizing learning amongst which is the Multiple Intelligence Theory; Teachers professional development -focus on pedagogical applications of ICT and the pedagogy of the discipline of specific orientations;Life-long learning -focus on the use of new technologies in formal and informal learning settings; Socio-economic research-focus on the implications of ICT use in the learning process and organizational change.

Center for Creative Training

The Center for Creative Training Association (CCTA) is a non-profit association, established with the aim to work for public benefit in the field of educatio.& aims to contribute to the positive change in the field of education and training - a change to practical education which effectively masters key competencies and helps learners to enhance their potential for successful social and professional realization & addresses its work mainly to the young people in the school age. It develops programs for out-of school activities which offer balanced and comprehensive development of the personality of the youngsters, encourages free communication and creative approach to the knowledge.In addition to the work with young people also offers wide number of teacher training prgs, aimed at dissemination of interactive methods and innovative approaches in teaching. In 2009 CCTA started developing a network of partner-schools in BG, which currently has more than 40active members & continues to expand.

Valahia University

Valahia University Targoviste is a State University, founded in 1992. Its structure comprises 8 Faculties (long-term courses of 3 or 4 years). The University proposes 28 licence's degree specializations, 26 Master's degree courses, doctoral studies (in History, Materials Science and Economics), teacher training courses and distance / lifelong learning courses. 12,000 students attend all forms of study, guided by 350 teachers. As an organizer of teacher training / distance learning courses, together with the experience gained in Socrates-Comenius projects (as coordinators and partners), the university staff involved gained an important experience on working with virtual instrumentation, collaborating platforms and web-sharing instruments.

ABSTRACT

The Nano Technology for Science Education project is an EC Lifelong Learning Transversal KA3 ICT (Information and Communication Technology) project that aims to use ICT as a tool to make the learning of science subjects more attractive and accessible. The project's target groups are students from the general and vocational schools aged 13 to 18, teachers in science subject, and college and university students attending science education courses. Mainly, the project will establish a Virtual Lab (VL), as an experimental virtual aid to science learning. It seeks to address the problems by integrating well established, but currently independent technological developments, within creative and motivating teaching materials and virtual learning spaces.

MILESTONES

- ☐ Curricula matches for Physics, Chemistry, Biology
- ☐ Questionnaries for students and educators
- ☐ Analysis of the Questionnaries
- ☐ Concept for the Virtual Laboratory (VL)

A CONCEPT FOR THE VIRTUAL LABORATORY

The Virtual Lab will provide to its users deeper and more comprehensive scientific information in order to illustrate and let them investigate the proposed educational material.

It will be very important to emphasize the links between daily life and the experiments and the experiences proposed in the virtual lab independently of the way to show them and of their less or more theoretical features.

It is important that under its structural point the Virtual Lab will show clear analogies with the framework of the project itself in order to facilitate the beneficiaries in understanding activities proposed by both Virtual Lab (educational activities, virtual experiments, *etc.*) and the project itself (competitions; educational camps; meetings; etc.).

The Virtual Lab will be subdivided into several rooms with different purposes and functionalities :

➢ **Nano Tech Experiments room -** providing to its beneficiaries all the information needed to carry out nano related experiments: practical materials as step by step scenarios (lesson plans), texts, PPTs, videos, templates, etc.

➢ **Broadcasting room -** to provide and share experiences carried out in the framework of the project in the guise of multimedia product as video clips, images, etc. in this room will be prepared special Web 2.0's pages (in social networks, forums, broadcasting channels, *etc.*) that will allow beneficiaries of NTSE to share the educational nano related experiences carried out in framework of the project as well as to exchange opinions and ideas about results and so on.

➢ **Repository of nanorelated educational materials and glossary** – to collect a list of nano related educational resources already available in the Web (educational sites, science journals; online multimedia tools, *etc.*) and nano related educational tools and materials (texts; multimedia; applets; *etc.*) already existing and free downloadable.

THE PROJECT OUTPUTS

VIRTUAL LABORATORY (VL)

The use of a Virtual Lab (VL) will serve as a platform for science lessons, as a database of teaching materials and as a hub for science-learning-related graphic aids and recorded and illustrated appealing experiments on Nano-Tech. Students and teachers in secondary schools will be able to use and refine the VL, for lessons and sharing information. Their experiences will be recorded both on the Virtual Lab and in the Annual Nano-tech books. The VL will last long after the life of the project and will be an ongoing platform for sharing ideas, lesson plans and information. It will be updated and tested through inviting 10 teachers from the partner countries each year.

NANO-TECH GUIDELINES & NANO-TECH ANNUAL

During the project, two books (Annual & Guidelines) will be produced to highlight yearly project achievements.

Nano-Tech guidelines

There will be pedagogical guidance including teaching strategies and online assessment grids/innovative methods for the assessment of the impact on learners and technical guidance. The aim of the Guidelines is to demonstrate how nano-technology will be used in the Science Lessons. The Nano Tech Guidelines will be produced to enable the target groups to use VL properly according to their educational settings and will be printed in 6 different languages (BG, EL, EN, IT, RO, TR).

Nano-Tech Annual

The Nano Tech Annual will be produced for Nano Tech readers to acknowledge them about the past year of the project and will include facts, statistics and graphics about the project. After the finalization of the project, it will be printed annually. The project annual will be dispatched to the schools, directorates, universities, public libraries, teacher training centres, research institutions.

NANO-SCIENCE CAMP

The Nano Science Camp will be made in Lozen in Bulgaria addressing the teachers and their students. Partners' universities and general & vocational schools and the entrepreneur learners in the Nano-tech project competition will be invited to the Nano Science Camp which will include hands-on demonstrations, viewing animations, and a demonstration of nano material. The aim of the camp is to gather the learners who are eager to use/ learn science, earning them the title 'little nano pioneers' and this camp will go on being approbation of the contents and functionalities of the VL. After the project the camp will be ritual.

NANO-TECHNOLOGY COMPETITION

The Nano Competition will address the students between the age 13 to 18 and teachers whom can be both from the project partner countries and from other countries. The theme of the competition will be determined by partners and will be announced to the users on the VL. Students who are willing to attend this competition will prepare their projects and upload their projects to the VL. The VL users will vote on the successful projects for a month. The favourite projects will be awarded and promulgated on VL and the winners will be invited to the International Nano Tech Conference that will be held in Istanbul/Turkey. The essential aim of the Competition is to encourage the students to produce projects with regard to Nano technology and inspire science education for future scientists. The Nano Tech Competition will be ritual each following year to create new Nano Pioneers.

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