

**Lifelong Learning Programme  
Information and communication technologies - ICT (KA 3)**

# **Nano Tech Science Education**

*Grant Agreement No 2010-4223/001-001*



**D24. SECOND INTERIM REPORT ON  
DISSEMINATION ACTIVITIES**

## SECOND INTERIM REPORT ON DISSEMINATION ACTIVITIES

The dissemination of the project was initiated with the 1st Project Meeting and it was carried out through the project by the partners. Doga was the leader of the dissemination work package and Turkish partner defined the dissemination strategy of the project and the project outputs to the target groups in partners' countries and other European countries.

During the project, the project partners aimed to raise awareness about the use of Nano technology in science education, present the educational tools in the virtual lab to have the impact on potential users: learners aged 13-18 in General & Vocational School, science teachers of lower secondary and upper secondary stage and prospective teachers and university students at science education faculty. The project was initiated through presenting the project content and outcomes to the potential users.

### Dissemination Activities of Doğa

On 17.03.2011, 22 upper elementary students from Beykoz Doga School and 6 female high school students from Kartal Doga School were **invited to Yakacık Doga Nanobiotech Lab** to test the nanotech experiments in order to initiate the experiments of the Virtual Lab.

At APMAS - **International Advances in Applied Physics and Material Science Congress**, on 02.05.2011 in Antalya-TURKEY, NTSE project was presented to 300 participants whom were prospective teachers, university students and academicians of universities.

On 06.09.2011, thirteen teachers chosen from Doğa Schools attended to the **Teachers' Training Course of Nanotechnology** between 6th and 8th September, 2011 in Yakacık Nanobiotechnology Laboratory, İstanbul. The teachers are working as Science, Physics, Chemistry and Biology teachers both at upper elementary and secondary schools of Doğa Schools.

On 05.09.2012, the **local workshop to Group Leaders of science teachers** was organized. Ten science teachers (at upper-elementary and secondary school levels) of Doga Schools from different campuses in Turkey attended in İstanbul on 05.09.2012.

On 14-15 November 2012, the project Coordinator Zuhul Y. Dogan, presented the project and virtual lab in Media Learning Conference that was held in Brussels. Media & Learning 2012 brought together policy makers, service providers and practitioners to explore the role of creativity and innovation in education and training against the backdrop of dramatic change in how, where and what learners learn. NTSE files, leaflets and bookmarks are distributed. 282 participants from 41 countries attended to Media Learning Conference. The more information about Media Learning conference is in the following link [http://www.media-and-learning.eu/files/pdf/Media-andLearning-2012\\_public\\_report.pdf](http://www.media-and-learning.eu/files/pdf/Media-andLearning-2012_public_report.pdf).

On 05.03.2013, **vocational school visit for Hacı Rahime Maritime Vocational High School students** (20) was organized. Students visited Yakacık Doga Nanobiotech Lab and they worked on nano kits and were informed about the poster competition.

On 08.03.2013, **the project experts visited the 30 Ağustos Female Technical and Vocational High School** (50 students) in order to introduce virtual lab and announce the poster competition. Between October and November, **6 lessons on nanotechnology were given to 30 Ağustos Female Technical and Vocational High School students** (26) in three school visits.

On 08.06.2013, **the conference, Joy of Sharing International Projects and Good Practices**, was organized in İstanbul. The Project was presented to 200 participants consisting of EU Project partners and coordinators, "Sustaining Development in Early School Education" Project experts, EACEA and Turkish National Agency representatives, students, teachers and parents of different target groups, decision makers, Governorship and partners of centralized and decentralized EU Projects.

At APMAS - **International Advances in Applied Physics and Material Science Congress**, on 24.04.2013, the participants of Nano-Tech Competition were voted by the scientific jury in the semi-finals. There were 400 participants at the event.

On 15-16 November 2013, "**International Nano Technology Science Education Congress: "INT-NTSE" Congress**" took place in Istanbul (TURKEY). The aim of the congress has been to promote the sharing of good practices and transnational cooperation in the field of the application of Nano Technology and ICT in Science Education learning and training. In two days, approximately 200 people (mostly students and teachers) attended the congress.

NTSE project is announced at **oxygen press** in Doğa Schools. Target audience were teachers, students, parents and managers of Doğa Schools.

All the news published in visual and print media about the project can be reached at <http://www.dogaabprojeleri.com/basinda-biz>

Broadcasting on national TV:

<http://www.dogakoleji.com/tr/basin/televizyon/detail/article/atv-doga-koleji-ab-projeleri/>

<http://www.sondakikahaberleri.info.tr/haber/184394-doga-koleji-ab-den-500-bin-euro-hibe-kazandi>

<http://www.haberler.com/doga-koleji-nde-ab-projeler-zirvesi-4765658-haberi/>

[http://www.yerelgundem.com/haberler/5334/doga\\_koleji\\_gelecege\\_yatirim\\_yapiyor.html](http://www.yerelgundem.com/haberler/5334/doga_koleji_gelecege_yatirim_yapiyor.html)

<http://e-oksijen.com/2011/04/> "Nano-tech science education" started in DOGA

<http://www.hurriyet.com.tr/ekonomi/17791693.asp?qid=384>

<http://yenisafak.com.tr:999/ekonomi-haber/doga-koleji-500-bin-avro-hibe-kazandi-16.05.2011-319413>

<http://www.iyigunler.net/h/ABden-Doga-Kolejine-500-bin-euro-hibe>

<http://m2.samanyoluhaber.com/ABden-Doga-Kolejine-500-bin-euro-hibe-haberi-556017.html>

<http://kadikoy.meb.gov.tr/www/nano-teknolojileri-fuari/icerik/267>

<http://www.egitimtercihi.com/ayindosyasi/12877-doga-koleji-nde-projeler-ogrenciler-onculugunde-gerceklesiyor.html>

<http://www.beykozguncel.com/537-doga-koleji-ne-300-bin-avroluk-fon.html>

<http://www.beykozgundemi.com/doga-koleji-nde-ab-projeler-zirvesi-4765658-haberi/>

<http://www.gazetegercek.com/abden-doga-kolejine-500-bin-euro-hibe.html>

<http://www.stargundem.com/gundem/1182204-abden-doga-kolejine-500-bin-euro-hibe.html>

<http://www.haberpan.com/haber/doga-kolejine-abden-500-bin-avro>

[http://arthaber.net/HD24463\\_abden-doga-kolejine-500-bin-euro-hibe.html](http://arthaber.net/HD24463_abden-doga-kolejine-500-bin-euro-hibe.html)

<http://www.gazeteoku.org/haberler/AB-den-Doga-Koleji-ne-300-bin-Euro-luk-fon.php>

Dissemination Seminar in İstanbul, Turkey was held on December, 13 2013 to 34 teachers from 25 different state schools. NTSE project was presented and NTSE guidelines, annual were distributed.

## **Dissemination activities of Fondazione Idis-Città della Scienza**

### **Presentation of the project in 3GIORNIPERLASCUOLA, Smart Education & Technology Days 2012**

3GIORNIPERLASCUOLA is an annual national convention held from 2003 in Città della Scienza, Naples, and dedicated to school and education issues, as the promotion of new learning technologies. The 10<sup>th</sup> edition has been held from 10 to 12 October 2012. In particular on October 10<sup>th</sup>, NTSE was presented in the framework of the session *Nella scuola dei nativi digitali. Esperienze e traiettorie in Italia e in Europa*.

### ***Presentation of the project in 3GIORNIPERLASCUOLA, Smart Education & Technology Days 2013***

The 11<sup>th</sup> edition of 3GIORNIPERLASCUOLA (see above) has been held from 9 to 11 October 2013. Several thousands teachers and other stakeholders engaged in educational issues attended the event. In particular on October 9<sup>th</sup> a special session has been held in order to present and promote the activities carried out in the framework of NTSE. A sample of students who attended both the Nanocompetition and the Nanocamp took part in the session talking to the public about their experiences presenting some of the scientific issues they learned during the camp. Several teachers attended the session.

### ***Presentation of the project in ASTC Annual Conference 2013***

The annual conference of Association of Science - Technology Centers has been held on 19-22 October 2013 in Albuquerque, New Mexico, USA.

A representative of Fondazione Idis-Città della Scienza attended the conference presenting the activities of the Foundation. Also the activities carried out in the framework of NTSE have been presented among the others developed by Idis.

### ***Presentation of the project in Toy Expo 2013***

The Toy Expo is a science fair annually held in Potenza, southern Italy, aiming to involve young students in scientific laboratory activities. Fondazione Idis-Città della Scienza took part at the 2013 edition - from 16 to 22 December - presenting some nano related activities developed in the framework of NTSE. About 3.000 students attended the event.

### ***Presentation of the project in P.O.N. F3 Andare a scuola, perché?***

On November 27<sup>th</sup> and December 4<sup>th</sup> in ISIS Europa of Pomigliano D'Arco, district of Naples, the lesson plans of NTSE have been presented to groups of students involved in the national educational programme P.O.N. F3 *Andare a scuola, perché?*

## **Dissemination activities of Valahia University Targoviste**

***Presentation of the paper: „Teachers’ perception related to the promotion of Nanotechnology concepts in Romanian Science Education”*** (Authors: Gorghiu L. M., Gorghiu G.) concerning the Romanian teachers’ feedback based on the questionnaires applied in the beginning of the NTSE project – to the **4th World Conference on Educational Sciences (WCES 2012)** – Barcelona, SPAIN, February 2<sup>nd</sup>-5<sup>th</sup>, 2012. Approximately 500 participants from secondary education, higher education, adult education, regional and national authority (as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the conference.

***Presentation of the paper: „ Teachers’ and Students’ Feedback Concerning the Use of ICT Tools in Learning Science through Nanotechnology”*** (Authors: Gorghiu L. M., Gorghiu G.) to the **11th WSEAS International Conference on Applied Computer and Applied Computational Science (ACACOS’12)** – Rovaniemi, FINLAND, April 18<sup>th</sup>-20<sup>th</sup>, 2012. Approximately 300 participants from Secondary Education, Higher Education, Adult Education, Regional and National Authority (as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the conference.

***Presentation of the paper: „Considerations on the introduction of nanoscience specific topics in preuniversity and academic Romanian educational system”*** (Authors: Gorghiu L. M., Gorghiu G., Dumitrescu C., Olteanu R. L., Bizoi M.) to the **Yearly Scientific Seminar of the Faculty of Science and Arts**, with national participation organized in the frame of **„Valahia University Days”** – Targoviste, ROMANIA, May 24<sup>th</sup>, 2012.

Approximately 100 participants from Education environment (teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the seminar.

**Publication of paper: „Teachers’ and Students’ Feedback Concerning the Use of ICT Tools in Learning Science through Nanotechnology”** (Authors: Gorghiu L. M., Gorghiu G.) in **Recent Researches in Applied Computers and Computational Science (Proceedings of 11th WSEAS International Conference on Applied Computer and Applied Computational Science)**, ISBN: 978-1-61804-084-8, pp. 194-199, which is indexed by Association for Computing Machinery (ACM) International Databases and assure a worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Publication of paper: „Teachers’ perception related to the promotion of Nanotechnology concepts in Romanian Science Education”** (Authors: Gorghiu L. M., Gorghiu G.) **by Elsevier in Procedia - Social and Behavioral Sciences**, vol. 46, 2012, pp. 4174–4180 - which is indexed by the following International Databases: ScienceDirect, Scopus and Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science) and assure a worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Presentation of the paper: „ Promoting the Nanotechnology Concepts in Secondary Science Education through ICT Tools - the Romanian and Turkish Teachers’ Perception”** (Authors: Authors: Gorghiu L. M., Gorghiu G., Yilmaz Doğan Z., Gerçeker P.) to the **3rd World Conference on Information Technology 2012 (WCIT 2012)** – Barcelona, SPAIN, November 14<sup>th</sup> -17<sup>th</sup>, 2012. Approximately 500 participants from secondary education, higher education, adult education, regional and national authority (as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the conference.

**Publication of paper: „Promoting the Nanotechnology Concepts in Secondary Science Education through ICT Tools - the Romanian and Turkish Teachers’ Perception”** (Authors: Gorghiu L. M., Gorghiu G., Yilmaz Doğan Z., Gerçeker P.) in **Global Journal on Technology, Vol 3 (2013) (Proceedings of 3rd World Conference on Information Technology (WCIT-2012))**, ISSN: 2147-5369 that assure a worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Presentation of two posters: 1. “Related Aspects on Using Digital Tools in the Process of Introducing Nanotechnology in Science Lessons”** (Authors: Gorghiu L. M., Gorghiu G.) **and 2. “A Repository Designed to Raise the Students’ Knowledge and Awareness on Nanoscience and Nanotechnology”** (Authors: Gorghiu G., Bîzoi M., Gorghiu L. M., Yilmaz Doğan Z.) (Authors: Authors: Gorghiu L. M., Gorghiu G., Yilmaz Doğan Z., Gerçeker P.) to the **3rd International Advances in Applied Physics and Materials Science Congress (APMAS 2013)** – Antalya, TURKEY, April 24<sup>th</sup> -28<sup>th</sup>, 2013. Approximately 500 participants from secondary education, higher education, adult education, regional and national authority (as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the congress.

**Presentation of NTSE project: “NTSE – Nano-Tech in Science Education”** (Authors: Gorghiu L. M.) to the **4th International Conference on Baltic and Nordic Studies in Romania: Empire-building and Region-building in the Baltic, North and Black Sea Areas 2013** – Constanta, ROMANIA, May 24<sup>th</sup> - 26<sup>th</sup>, 2013. Approximately 100 participants from secondary education, higher education, adult education, regional and national authority (as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the conference.

**Presentation of the paper:** „*Utilizarea experimentelor virtuale în predarea nanotehnologiilor. Experiența proiectului NTSE (The use of virtual experiments in teaching nanotechnologies. The NTSE project experience)*” (Authors: Gorghiu L. M., Gorghiu G., Olteanu R. L., Dumitrescu C.) to the **Yearly Scientific Seminar of the Faculty of Science and Arts**, with national participation organized in the frame of „**Valahia University Days**” – Targoviste, ROMANIA, June 15<sup>th</sup>, 2013. Approximately 100 participants from Education environment (teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students, etc.) attended the seminar.

**Selecting as a Key Research Article and indexing of the paper:** „*Teachers’ Perception Related to the Promotion of Nanotechnology Concepts in Romanian Science Education*” (Authors: Gorghiu L, Gorghiu, G.) by **Psychology Progress Ltd. – Center for Top Research in Psychology** – July, 2013. Key research papers are selected by Psychology Progress Ltd. – Center for Top Research in Psychology from a wide variety of peer reviewed journals and are judged to be of major importance in their respective fields. That improved the worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Publication of paper:** „*A Repository Designed to Raise the Students’ Knowledge and Awareness on Nanoscience and Nanotechnology*” (Authors: Gorghiu G., Bîzoi M., Gorghiu L. M., Yilmaz Doğan Z.) in **Journal of Science and Arts**, 3(24), pp. 319-325, 2013, ISSN 1844-9581. The journal is indexed by a big number of International Databases: Index Copernicus Journals Master List, Directory of Open Access Journals, Google Academic, Journal Seek, Open J-Gate, Summon Serials Solutions, Zentralblatt MATH, ProQuest products: ProQuest Technology Collection; ProQuest SciTech Collection; ProQuest Materials Science Journals; ProQuest Engineering Journals; ProQuest Advanced Technology & Aerospace Journals; ProQuest Engineering Journals; ProQuest High Technology & Aerospace Journals; ProQuest Natural Science Journals, Academic Journals Database, University of Zurich, WorldCat, Wageningen UR, E-Library, Center for Teaching and Learning Resources in Central Taiwan, CORE (CONnecting REpositories), EBSCO Host. This assures a worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Organization of the First Dissemination Seminar in Romania and dissemination of NTSE project results.** The seminar took place on September 11<sup>th</sup>, 2013, in Targoviste, ROMANIA. During the seminar the educational features of the NTSE Virtual Lab were presented and different materials related to the NTSE project results (leaflets, bookmarks, posters) were spread. A number of 60 participants from Dambovită County education environment (secondary and higher education, regional authority), like teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, students, etc. were attended the seminar.

**Presentation of NTSE project: Nano-Tech Science Education - A European KA3-ICT Project that Promotes Science Education through Virtual Experimentation** (Authors: Gorghiu G., Gorghiu I. M., Bîzoi M., Yilmaz Doğan Z.) to the **International Organization for Science and Technology Education Eurasian Regional Symposium & Brokerage Event Horizon 2020 (IOSTE 2013)** - October 30<sup>th</sup> – November 1<sup>st</sup>, 2013, Antalya, TURKEY. About 80 participants as educators, academic staff, scientific researchers, PhD students, etc. attended the symposium.

**Publication of the abstract:** „*Nano-Tech Science Education - A European KA3-ICT Project that Promotes Science Education through Virtual Experimentation*” (Authors: Gorghiu G., Gorghiu I. M., Bîzoi M., Yilmaz Doğan Z.) – in **Abstract and Programme Book of The International Organization for Science and Technology Education Eurasian Regional Symposium & Brokerage Event Horizon 2020 (IOSTE 2013)** - October 30<sup>th</sup> –

November 1<sup>st</sup>, 2013, Antalya, TURKEY. That assures the worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

**Organization of the Second Dissemination Seminar in Romania and dissemination of NTSE project results.** The seminar took place on November 6<sup>th</sup>, 2013, in Targoviste, ROMANIA. During the seminar the educational features of the NTSE Virtual Lab were presented and different materials related to the NTSE project results (leaflets, bookmarks, posters) were spread. A number of other 20 participants from Dambovitza County education environment (secondary and higher education, regional authority), like teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, students, etc. were attended the seminar.

**Organization of the Third Dissemination Seminar in Romania and dissemination of NTSE project results.** The seminar took place on November 8<sup>th</sup>, 2013, in Cluj-Napoca, ROMANIA. During the seminar the educational features of the NTSE Virtual Lab were presented and different materials related to the NTSE project results (leaflets, bookmarks, posters) were spread. A number of 40 Participants from Cluj County Education Environment: Secondary and Higher Education (as teachers, teacher educators, academic staff, prospective teachers and students) were attended the seminar.

**Presentation of the study: Virtual Resources Developed in NTSE Project for Raising the Interest of Romanian Students' and Teachers' for Nanoscience and Nanotechnology** (Authors: Gorghiu L. M., Gorghiu G., Olteanu R. L., Dumitrescu C., Chilian A.) to the **International Nano-Tech Science Education Congress 2013** - November 15<sup>th</sup> – 16<sup>th</sup>, 2013, Istanbul, TURKEY. Approximately 150 participants from education environment (secondary and higher education, regional and national authority) as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, students were attended the congress.

**Presentation of two papers: 1. Using Various NTSE Virtual Laboratory Resources for Developing the Students' Knowledge Related to Nanoscience and Nanotechnology** (Authors: Gorghiu L. M., Gorghiu G., Olteanu R. L., Dumitrescu C.) and **2. Educational Case studies Related to Promote Nanoscience and Nanotechnology Issues in Science Education, Based on ICT Tools** (Authors: Gorghiu G., Gorghiu L. M., Antonescu C., Badoiu N.) to the **4th World Conference on Information Technology 2013 (WCIT 2013)** - November 26<sup>th</sup> -28<sup>th</sup>, 2013, Brussels, BELGIUM. Approximately 500 Participants from the Education Environment: (secondary education, higher education, adult education) as teachers, head teachers, inspectors, initial and in-service teacher educators, academic staff, scientific researchers, prospective teachers, students were attended the conference.

**Organization of the Final Dissemination Seminar in Romania and dissemination of NTSE project results.** The seminar took place on December 4<sup>th</sup>, 2013, in Targoviste, ROMANIA. A presentation of the NTSE Virtual Lab was sustained by the VUT team and different materials realized in the frame of the NTSE project were disseminated to the participants.

**Participating with university students and experts to the NTSE Webinar sessions** on December 9<sup>th</sup> and 16<sup>th</sup>, 2013. Approximately 35 participants from Valahia University Targoviste were attended the webinar sessions (as teachers, academic staff, researchers and students).

**Publication of paper: „Publication of the paper: „Related Aspects on Using Digital Tools in the Process of Introducing Nanotechnology in Science Lessons”** (Authors: Gorghiu L. M., Gorghiu G.) in **Acta Physica Polonica**, ISSN: 1898-794X, 2014. The paper was accepted for publication and is in press. Since the journal is indexed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science), this will assure the worldwide dissemination to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.



**Publication of papers:** „*Using Various NTSE Virtual Laboratory Resources for Developing the Students' Knowledge Related to Nanoscience and Nanotechnology*” (Authors: Gorghiu L. M., Gorghiu G., Olteanu R. L., Dumitrescu C.) *and* „*Educational Case studies Related to Promote Nanoscience and Nanotechnology Issues in Science Education, Based on ICT Tools*” (Authors: Gorghiu G., Gorghiu L. M., Antonescu C., Badoiu N.) in **Global Journal on Technology, 2014 (Proceedings of 4th World Conference on Information Technology (WCIT-2013))**, ISSN: 2147-5369. The papers were accepted for publication and are in press. Starting with the moment of publishing, they will contribute to the worldwide dissemination of NTSE project results to the level of scientific researchers, academic staff, in-service teachers / educators from secondary education, higher education, adult education, regional and national authorities members, prospective teachers, students, and general public.

## **Dissemination activities of FORTH**

### **Presentation of NTSE Project to science teachers**

On April 4<sup>th</sup> 2012, the NTSE Project was presented to the science teachers of Experimental High School of Heraklion. FORTH has a formal collaboration with the set of Pilot / Experimental Schools of Greece (15 in Upper Secondary level and 15 in Lower Secondary level). The head of the school, two physics teachers, two chemistry teachers and one biology teacher were present.

### **Newsletter to science teachers**

On June 1<sup>st</sup> 2012, a newsletter in the form of e-mail was send to Science Teachers” (including the project’s leaflet in pdf format) introducing the project to them. Three National Unions of Scientists. (Teachers of Physics, Chemistry and Biology) were targeted.

Submission of the project in STENCIL Catalogue

On June 24<sup>th</sup> 2012, the NTSE Project was submitted in STENCIL Catalogue (<http://www.stencil-science.eu/>). The Science Teaching European Network for Creativity and Innovation in Learning (STENCIL) offers to science teachers and practitioners in science education from all over Europe a platform to encourage joint reflection and European co-operation, to contribute to the improvement of science teaching.

### **Presentation of NTSE Project to science teachers**

On November 23<sup>rd</sup> 2012, the NTSE Project and the Virtual Lab were presented to the science teachers of the 2<sup>nd</sup> Gymnasium of Heraklion. Nine teachers participated in the meeting (Head of school, five physics teachers, two chemistry teachers and one biology teacher).

### **Newsletter to science teachers**

On January 31<sup>st</sup> 2013, a newsletter in the form of e-mail was send to all EKFE (Laboratory Centers for Science Education) around Greece, including the project’s leaflet and the nanocompetition poster in pdf format. EKFE operates under the Ministry of Education. 80 Laboratory Centers for Science Education (and through those centers all science teachers in secondary education) were targeted. After that email there were more than ten articles / references about NTSE in Greek educational portals, blogs, school sites and newspapers.

### **Newsletter to science teachers**

On March 11<sup>th</sup> 2013, another newsletter in the form of e-mail was send to all EKFE (Laboratory Centers for Science Education) around Greece, including updated information regarding the nano poster competition.

## **Poster in “The Onassis Foundation Science Lecture Series 2013”**

The Onassis Foundation Science Lecture Series 2013 that took place in Heraklion, Crete from July 15<sup>th</sup> to July 19<sup>th</sup> 2013 were centered on the topics of Nanoscience and Nanotechnology. The lectures were given by highly reputed international scientific personalities: Phaedon Avouris, Andrea Ferrari, C. Galiotis. Konstantin Novoselov, Paul



Stephan Roche, Christian Thomsen, S. Weiss, and Hua Zhang. Academics and science students (35 Greek and 15 international) were targeted.

**Poster in the poster session of Scientific Retreat at FORTH**

The Scientific Retreat took place at FORTH, Heraklion on July 12<sup>th</sup> – 13<sup>th</sup> 2013. The aim of the Retreat was to inform the members of our scientific community about the current research activities, placing emphasis on interdisciplinary activities. Academics, researchers, policy makers and science students were targeted.

**Newsletter to science teachers**

On October 7<sup>th</sup> 2013 an information letter (in Greek) in the form of email was send to all EKFE (Laboratory Centers for Science Education) around Greece, including information regarding the upcoming NTSE conference (call for papers, poster and deadlines).

**Information letter to STENCIL Network.**

On October 8<sup>th</sup> 2013 an information letter (in English) in the form of email was send to ~30 Stencil Network stakeholders (Policy makers, academics, practitioners) including information regarding the upcoming NTSE conference (call for papers, poster and deadlines).

**First dissemination workshop**

On December 4th 2013, the first dissemination workshop took place in Vamos, Western Crete. A presentation of the NTSE Virtual Lab was sustained by the FORTH team and different materials realized in the frame of the NTSE project were disseminated to the participants. A discussion on teaching nanoscience in Secondary education followed. 35 in total science teachers and educational inspectors / consultants from Wester Crete region were present.

**Second dissemination workshop**

On December 19th 2013, the second dissemination workshop took place in Heraklion, Crete. Again, a presentation of the NTSE Virtual Lab was sustained by the FORTH team and different materials realized in the frame of the NTSE project were disseminated to the participants. A discussion on teaching nanoscience in Secondary education followed. 27 in total science teachers and educational inspectors / consultants from Eastern Crete region were present.

## COMMON EVENTS OF PARTNERS

### Nano-tech competition (24-28 April 2013 in Antalya, Turkey)

NTSE Poster Competition aimed at encouraging the students (aged 14-18) to produce projects with regard to Nanotechnology. The participants had an opportunity to form their team with up to two friends. They selected a topic in nanotechnology about current and the possible future applications from given topics:

- ✓ Health (nanocosmetics)
- ✓ Environment (nanoparticles with antibacterial properties and nanoparticles used for purifying water and air)
- ✓ Nanotechnology used in Sport equipment
- ✓ Nanotechnology used in electronic devices

They made a first-class research and collected information, photos and images. The NTSE posters were designed about current applications in daily life and creative ideas/innovations for the future of nanotechnology in 300 words, A1(59 cm x 84 cm) in size with a clear title. 145 posters were uploaded to Virtual Lab web site in six countries (BG, DE, EL,IT, RO& TR) until 15 March 2013. The statistics about the number, age range of the competitors in NTSE Poster Competition:

	BG	EL	IT	RO	TR
The students between 13-15	0	17	0	28	9
The students between 16-18	19	10	44	0	70
Number of the competitors	19	27	44	28	79
Number of the posters passing the content evaluation	12	13	9	15	51
Number of the posters in Antalya	7	6	6	6	14

The examination period was initiated on 16<sup>th</sup> April 2013 and finished on 19<sup>th</sup> April 2013. The aim of the evaluation is to ensure a fair assessment of the NTSE project posters produced by the students involved in the competition. All partners were in charge of poster evaluation and NTSE posters were evaluated in two steps by a committee comprised of international group of scientists with expertise in nanotechnology. First selection was done according to the criteria in the RUBRIC below.

<i>Percentage distribution</i>	<i>Criteria</i>	<i>Points</i>
60%	<i>Clarity of Content</i>	18
20%	<i>Clarity of Design</i>	6
20%	<i>Online voting</i>	6
<b>1<sup>st</sup> SCORE</b>		<b>30</b>
<b>ANTALYA SCORE (EXTERNAL SCORE)</b>		<b>20</b>
<b>TOTAL SCORE</b>		<b>50</b>

To be a finalist in APMAS 2013 Congress, 135 selected posters were voted online in the networks they are linked with (Facebook, twitter, google+, etc) and announced on our Virtual Lab.



Following the online voting 40 posters were exhibited in APMAS 2013 International Congress in Antalya (<http://www.apmas2013.org/>) and all posters were evaluated during the Congress by the scientists externally. All national winners chosen from partner countries were announced on our Virtual Lab and all winners were awarded to take part in the International nanoscience camp in the city Balchik, Bulgaria between 30th of June and 7th of July.

### NATIONAL WINNER LIST FOR ANTALYA

	NAME AND SURNAME	TITLE OF POSTER	ORGANIZATION/ SCHOOL	COUNTRY	TOTAL SCORE
1	Stratis Trachanias, Nikiforos Mplemenos, Alexandros Moschogiannakis	Applications of nanoelectronics	2 <sup>nd</sup> Gymnasium of Heraklion, Crete	Greece	31.6
2	Furkan Satis	Nanomedicine	Atasehir Doga High School	Turkey	33.6
3	Davide Cagno	Nano for diabetes mellitus	Liceo Scientifico Mazzini Napoli	Italy	30.6
4	Victoria T. Trendafilova	Nanotechnology used in electronic devices	National High-school of natural sciences and	Bulgaria	28.4
5	Dogaru Gabriela	Nanotechnology in sports equipment	Liceul de Arte "Bălașa Doamna"	Romania	20.4

### **Nano science camp (30 June 2013 – 7 July 2013)**

The Nano-Science Camp for teenage researchers is a key event in the process of the approbation of the main outcomes produced by the NTSE partnership. A very successful NTSE project action and event was the Nano Science Camp (July 2013), hosted at “The White Lagoon”, Balchik, Bulgaria, between 30<sup>th</sup> June 7<sup>th</sup> July 2013, where 25 teachers / experts from partner countries (Bulgaria, Greece, Italy, Romania and Turkey) and 45 secondary school students participated to Nano presentations, demonstrations, implementations, hands-on activities and cultural tours, including interactive sessions using the NTSE Virtual Laboratory. It is also in the intention of the project partnership to organize the Nano Science Camp yearly, by exploiting the NTSE project results (especially the NTSE Virtual Laboratory), after the end of the project. In this sense, two proposals for its organization have been already expressed (one from Turkish partner - DOGA, and one from Bulgarian partner - CCTA).



### **Case studies**

The case study is a detailed analysis of a person or a group, especially as a model of a psychological or social phenomenon.

From the management point of view, the case study is a detailed and intensive analysis of an entity or a component of a structure, performed to determine the factors underlying its success or failure.

A case study demonstrates how the problem has been identified, which solution has been chosen, but it must highlight the outcomes for a given area.

In general, a case study is structured in 6 to 20 pages, including graphical content (if available). In terms of format and content, the case study is divided into three main sections, named according to the subject and objective of the work:

- challenge / problem / hypothesis
- approach / solution / implementation
- benefit / result / completion

The case study focuses on a single issue, focused on presenting the solution or the benefit offered by the method / product in question.

### **INT-NTSE congress (15-16 November 2013)**

On 15-16 November 2013, “**International Nano Technology Science Education Congress: “INT-NTSE” Congress** took place in Istanbul (TURKEY). The aim of the congress has been to promote the sharing of good practices and transnational cooperation in the field of the application of Nano Technology and ICT in Science Education learning

and training. The project web site was designed for the dissemination of the congress <http://www.ntse-nanotech.eu/int-ntse-congress.asp> and the calls were sent to more than 500 people in EN and partners language. Apart from this, the e-mailing system was used to send the 110.000 mails to the universities, educational institutions in European countries. More than 160 people were registered online to the congress <http://www.ntse-nanotech.eu/congress/attendee-list/index.asp>. 3 academicians <http://www.ntse-nanotech.eu/int-ntse-congress.asp?p=speakers> were invited as the keynote speakers to give presentations on nanotechnology in science education and use of ICT in learning. Second day of the congress 10 concurrent sessions were planned for the NTSE –kit and virtual lab workshops and case study presentations of implementer teachers of partner countries. In two days, approximately 200 people (mostly students and teachers) attended the congress. <http://www.ntse-nanotech.eu/int-ntse-congress.asp> and participation certificates, folders, pens and guidelines were disseminated during the congress.



- ❖ The local workshops and school and laboratory visits were organized with the science teachers, prospective students and high school learners in partner countries to create and update the educational materials on Virtual Lab. These workshops, school visits were useful to understand the needs of the target groups, to present the use of Virtual lab in the classrooms effectively and disseminate our project results. During the project, 34 workshops, 5 school visits , 3 laboratory visits were held in partners countries with 2750 teachers, head teachers, school IT administrators, consultants, 78 prospective students and 750 learners from secondary and elementary school to reach more and more people, engage the teachers, prospective students and learners as the users of the Virtual lab and implementers of the project, to increase the participation to the NTSE Competition and inform about the Science Camp (please see <http://www.ntse-nanotech.eu/dissemination> ).

Annex 1: for details of the dissemination activities in the partners' countries.

[http://www.ntse-nanotech.eu/docs/D23.NTSE\\_Summary\\_of\\_Dissemination\\_activities.pdf](http://www.ntse-nanotech.eu/docs/D23.NTSE_Summary_of_Dissemination_activities.pdf)

[http://www.ntse-nanotech.eu/docs/D24.NTSE\\_Summary\\_of\\_Dissemination\\_activities.pdf](http://www.ntse-nanotech.eu/docs/D24.NTSE_Summary_of_Dissemination_activities.pdf)

## **CONCLUSIONS&FURTHER EVENTS**

NTSE Project partners had as an important task to exploit the Virtual Laboratory in their own institution, within the existed teaching programs, planned workshops and/or Science events. More, the NTSE Project partners made efforts to encourage educational institutions / organizations and/or individual learners to apply the Virtual Laboratory in different educational settings.

The other important channel for exploitation of project results is represented by the Nano-Tech Annual for Nano-Tech Readers - a printed volume that records, highlights and illustrates the main results of the project, including also the main project facts and several statistics. The volume (printed in English version) is sent and dispatched to schools, directorates, public libraries, teacher training centres and research institutions. A special launching and presentation of the project (and of the volume) will be organized with the occasion of the 4th International Advances in Applied Physics and Materials Science Congress & Exhibition (APMAS 2014) and 1st International Congress & Exhibition on Current Trends on Science Technology Education (SCITEED 2014), both of them being held on April 24th-27th, 2014 in Fethiye, Muğla, Turkey, and proposing special sections dedicated to Nanoscience and Nanotechnology.

A very successful NTSE project action and event was the Nano Science Camp (July 2013), hosted at "The White Lagoon", Balchik, Bulgaria, between July 1st-6th 2013, where 25 teachers / experts from partner countries (Bulgaria, Greece, Italy, Romania and Turkey) and 45 secondary school students participated to Nano presentations, demonstrations, implementations, hands-on activities and cultural tours, including interactive sessions using the NTSE Virtual Laboratory. It is also in the intention of the project partnership to organize the Nano Science Camp yearly, by exploiting the NTSE project results (especially the NTSE Virtual Laboratory), after the end of the project. In this sense, two proposals for its organization have been already expressed (one from Turkish partner - DOGA, and one from Bulgarian partner - CCTA).

Beside the Nano Science Camp, another successful event was represented by the Nano Poster Competition for the students between 14 and 18 years old, having as main theme: Nanoscience and Nanotechnology. The competition was held in the countries participating in the NTSE project: Bulgaria, Greece, Italy, Romania and Turkey, and the winners were selected by an international jury at the 3rd International Advances in Applied Physics and Materials Science Congress & Exhibition (APMAS 2013), in Antalya, Turkey. The NTSE project partnership express the willingness to exploit the success of this competition and to continue to organize another edition of the Nano Poster Competition, in order to encourage the young students to extend their knowledge and to meditate on the topic related to Nanoscience and Nanotechnology, by imaging different Nano-applications in various areas. Local winners from each country will be rewarded with the opportunity to participate in the International Nano Science Camp, in 2014.

A remarkable project result, with a huge potential of exploitation on a large scale, is offered by the realization and production of the NTSE Nano Kit, designed by DOGA experts. The NTSE Nano Kit comprises of nine experiments similar to those ones included in the NTSE Virtual Laboratory that serves for hands-on activities related to Nanoscience and Nanotechnology and Science teaching. With the help of the materials provided in the NTSE Nano Kit, activities concerning Nanoscale, Buckyball, Lotus Effect, Nanocrystals, Ferrofluids and Leds can be taught to students. Thousands of young students (from NTSE project partner countries, but not only!) will benefit of NTSE Nano Kit, during the scholar activities, in the following years. The NTSE Nano Kit can be easier implemented in the Science curricula and offers sufficient strong points to be adopted by the Science teachers for practicing and developing Nano experiments in the classrooms. Apart from the target group; the plans and the content of Nano Kit were revised for the students aged 10 It is

estimated that during the 2014-2015 school year, the NTSE Nano Kit and the NTSE Virtual Laboratory will be used by 4000 students from lower secondary and 3700 students from upper secondary schools.

A clear result comes especially on continuing the NTSE project activities and exploiting them by setting up of a new proposal. In this respect, preliminary discussions with some European partners have been already established with the occasion of IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020 - EU Framework Programme for Research and Innovation (October 30th-November 1st 2013, Antalya, Turkey), where the NTSE - Nano-Tech in Science Education project was presented (Nano-Tech Science Education - A European KA3-ICT Project that Promotes Science Education through Virtual Experimentation – authors: Gabriel Gorghiu, Laura Monica Gorghiu, Mihai Bîzoi and Zuhail Yilmaz Dogan).

Last but not least, the Exploitation of the NTSE project results takes into account the on-line channels, being concretized in practice by the NTSE project website (<http://ntse-nanotech.eu/>). The project partnership intention is to make permanent the Workshop on Nanotechnology in Everyday Life, future editions being proposed to be organized in conjunction with important Conferences or Congresses.