
# Journal on Science Education

№ 1, July 2012

## ESE Leader Congress 2012

# INTRODUCTION

This brochure is a collection of materials of the delegation leaders' congress, which was held as part of the ESE 2012 in Tula, Russia. We hope that such meetings, where delegation leaders — teachers and scientists — can share their experience in working with young people on their projects, will become a significant part of the events organized by MILSET in the future. It is very important not only to present your students' projects but also to tell your colleagues how the project work was organized and what the reasons of its successful completion were.

The Leader Congress (Tula, 2012) was held on June 5 and 6 from 10.00 till 13.00. Everyone was welcome to make a speech of up to 15 minutes length there. Totally, we had over 20 speakers from 15 countries (Russia, Belgium, Germany, the Ukraine, Slovenia, Bulgaria, and more), who spoke about their methods to successfully complete projects in different spheres of science and technology, told about their national systems of students' project activity organization, contests and conferences, presented the projects, in which young people from different countries can take part.

The congress participants emphasized the importance of international teachers' experience exchange within the framework of EXPO-SCIENCES.

We firmly believe that teachers' congresses are a highly efficient and very promising form of work at MILSET events, which will lead to further consolidation of the MILSET community and set a course for its future development.

# JOSE No.1

Founded by the International Movement for Leisure Activities in Science and Technology MILSET

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# WASTES, BETWEEN DENUNCIATION AND VALORIZATION, RECYCLING AS AN ALTERNATIVE

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## 1. INTRODUCTION OF THE ASSOCIATION AND THE LOCATION OF THE AREA OF ACTION

The association ARDH (association of recycling and human development + ARDH in Arabic means the earth, the floor) is an ecologic association, which tries to sensitize people especially the children about the importance of ecology and recycling, and also captivate their interest with different funny ways.

Nowadays, we work in the city of bejaia which is situated in the north east of Algeria, but we work to create a national network in the country to enlarge the action, and why not an international network.

## 2. OBJECTIVES OF THE ASSOCIATION

- Raising people's awareness about environmental issues through various awareness campaigns.
- Ensure the preservation of natural heritage (fauna and flora).
- Introduce and implement environmental education in schools and other educational institutions.
- Encourage the use of renewable energies; recycling and having people respect the principles of sustainable development.

## 3. ACHIEVEMENTS OF THE ASSOCIATION

- Participation in events related to the environment and environmental education at the national level (Bejaia, Boumerdes, Mila, Algiers, Tamanrasset ...) and international (Syria, South Africa).
- Weekly Radio broadcasts (debates, children's programs, ..)
- Creating comics relating the subject of environment.
- Working closely with the competent authorities (ministries and departments concerned: environment, forests, Culture, Tourism, Youth and Sports, National Park ...) in addition to environmental associations and higher education institutions throughout Algeria.
- Exhibitions in schools and colleges: organizing volunteering days, recycling workshops and gardening, lauching concours of green ideas ... Here, we try to

involve the children as they feel theirselves adult and responsible about the nature, ecology and recycling.
- Founding member of the national network for the environment and the sensitization, this will allow us to organize national actions easily and try to follow one common program.
- Participation in training days in the field of environment and related subjects.

**4. FUTURE PROJECTS**
- Pilot project to establish a primary school meeting the principle of sustainable development with solutions tailored to the region; so the children will study the environmental education, learn to recycle their wastes at school, and use selective sorting. This development proposal will play a dual role ecological and decorative.
- Creation of cleaning days and launching contests of the most beautiful neighborhoods. After the school, the child can participate and sensitize the neighbors about recycling.
- Creation of the museum of ecology where we can expose the works of the children and the association.
- Creation of Ecological Awareness Caravans.
- Introduction of Environemental Watchmen.
- Development of an environmental policy to be proposed to various companies in order to respect the environment. Here, the children will come with the association in the factories to try to convince the directors to change their polluted works into green ones.
- If we success in this project, the training of the child about the ecology will be complete and applied in different areas: school, street, culture, work.

## 5. CONCLUSION. TO CONCLUDE, NOTHING BETTER TO FINISH WITH OUR SLOGAN:


لا مستقبل بال طبيعة
Sans nature pas de future
No future without nature
нет будущего без природы
**沒有自然就沒有未來**
No hay futuro sin la naturaleza
C'è futuro senza natura
яма бъдеще без природата
žádná budoucnost, aniž by přírody
Keine Zukunft ohne Natur
geen toekomst zonder natuur
هيچ آينده اى بدون طبيعت
ingen fremtid uden nature
nélkül nincs jövő természet
нема иднина без природата
ebda futur mingħajr natura
žiadna budúcnosť, bez prírody
ne prihodnost, ne da bi naravo»
**자연없이는 미래도**
doğa olmadan gelecek

# THE VILLAGE «THE LITTLE RESEARCHERS»

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The interactive and informative site "The Village "The Little Researchers" is aimed at the children of pre-school and primary-school age and their parents, school-children and the participants of the exhibition.

It consists of four sections: 1) "The Competition Field"; 2) The projects from different clubs of the international movement "The Little Researchers"; 3) Workshop "Paper Models"; 4) Entertaining show-pieces with informative tasks and workshops "Domestic Experiments" and "Experiments for the little ones". Experienced teachers, students and schoolchildren from different clubs, included into the movement "The Little Researchers" can be the tutors or animators of the sections and workshops.

**THE AIMS OF THE SITE "THE VILLAGE "THE LITTLE RESEARCHERS" ARE:**

1. To arouse children's interest and motivate them to get involved into the scientific researches;
2. To give the children and their parents a chance to make interesting and informative tasks;
3. To get new knowledge and skills

**THE PURPOSES OF THE SITE ARE:**

1. Every visitor, taking part in a game, can find the activity according to their interests;
2. The visitor, fulfilling the first tasks successfully, will be interested in fulfilling other informative tasks;
3. Participation of the children together with their parents. The family become a united team and during the game children see their parents from a different angle, while parents start understanding their parents better.
4. The program should be organized in such a way that every visitor could get interested in the experiments.

The main criteria of the tasks are the principles of children's abilities and of scientific basis and also the principles of developing and bringing-up education. The main organizing form used at the site is the developing education — the aim of the organization of the informative activity of the visitors. Understanding that a person

can cope with the offered informative tasks brings the feeling of satisfaction that they can do it. Cleverly-organized developing interest at the site assures the visitors in their ability to apply their creativity and motivates to develop it.

Why are there several sections of the site?

All the sections, in general, complement each other. For example, a child may like action games ("The Competition Field") at first and then start doing other tasks; another child may like doing paper figures, so the workshop "Paper Models" will meet his/her interests; some other children may like experimenting from the very beginning. One of the main aims of educational process is the development of cognitive, creative and thinking abilities. Problematic aspects, which are the core of many tasks of experiments and active developing games, help realize the principle of developing children while teaching them. In general there are three stages of activity in every section: 1) to surprise and interest; 2) to find the way how to solve the problem; 3) to solve the problem and check it.

**THE TASKS ARE GIVEN IN AN ENTERTAINING AND INFORMATIVE WAY IN EVERY SECTION:**

1. "The Competition Field" – the visitors get involved into joyous active games, which develop logic and improve skills. There are the tasks for teams, for example, for children and their parents. Usually, the children and their parents start with this section and then do the experiments.
2. The projects from different clubs the international movement "The Little Researchers". The children from the clubs present their projects with great pleasure at the similar exhibitions or they simply get acquainted and broaden their outlook communicating with the children from different countries.
3. Workshop "Paper Models". Children who like making and cutting figures from the paper start their joyrney through "The Village "The Little Researchers" with the workshop. It usually unites the children and their parents.
4. Entertaining show-pieces with informative tasks and workshops "Domestic Experiments" and "Experiments for the little ones". The workshop "Domestic Experiments" is the section where the experiments are represented within the methodic of "The Little Researchers". The children need only usual materials and the experiments are held in an entertaining form. All the experiments can be carried out at home! The workshop "Experiments for the little ones" is aimed at the children of pre-school and younger-school age.

During the functioning of the site, different connections appear which can lead to further cooperation.

# RESEARCH AND PROJECT ACTIVITY OF SCHOOL STUDENTS – AN EFFECTIVE WAY OF IMPROVEMENT OF QUALITY OF NATURAL-SCIENCE EDUCATION

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Today before school there is a task of providing each child with available quality education. The value of natural-science education considerably rises and there is a great lack of scientific and engineering technical highly-skilled personnel.

Therefore, any educational institution capable of developing and active introducing of new innovative technologies is looking for its own solutions of the task, depending on external and internal conditions. School N 22 in the town of Kovrov, Vladimir region, met the 22nd academic year in September, 2011, having opened doors for 1222 pupils (50 classes). Elementary school is trained according to 3 programs: the updated School of Russia, L.V. Zankov, School 2000 ….In high school there are profile classes: social-humanitarian, social-economic and with a 20-year old history physical and mathematical profile which has got a good reputation. Obviously, within big school both essentially new, special organization of educational process within school, and its corresponding contents are required for achievement of new quality. Achieving effective result is possible only with the help of joint efforts.

Therefore, our school has chosen the way of creating a network which will allow to organize research and project activity of pupils at a new qualitative level. In order to increase motivation for a successful educational activity of a child it is very important to give a pupil an opportunity to work not only with school teachers, but also with tutors of higher educational institutions, advanced engineering personnel, students, pupils who have achieved good results. For this purpose we signed contracts on joint activity with Kovrov State Technological Academy and the MEPhI Research nuclear center which run courses for pupils on the solution of problems in mathematics and physics of the increased complexity, on preparation for Unified State Examination, programming, robotics, with the town enterprises where professional orientation work and social practice of pupils are organized.

In 2011 the school became the participant of the educational project of Rosatom State Corporation «Atomklass». Within the project, with the financial support of the

fuel and energy company Rosatom State Corporation TVEL, a classroom was opened which was equipped with modern interactive and laboratory equipment for the lessons of Physics that allowed to increase a share of experiment in teaching, to carry out virtual laboratory work, to carry out creative research tasks, projects. Since December, 2010 the school has been participating in the events of Small Nobel Academy organized by the Interregional center «Education without borders», St. Petersburg. The pupils of our school represent research and project works at the All-Russia interuniversity conference of young researchers (seniors and students) «Education. Science. Profession». Degtyaryov's plant and Kovrov Machinebuilding Plant help us with the organization of trips. In 2012 we entered the municipal project «Educational Robotics in the town of Kovrov».

Participation in all these projects demanded new high-quality changes in the organization of research and project activity in school. These changes concerned first of all the educational program, the curriculum: use of hours of a school component and extracurricular activities allowed to create for all the pupils a possibility to be engaged in research work, the school scientific organization covers today the most active researchers of the 1–11th forms. It is clear that serious professional efforts and growth were required from a teacher: methodical support in work with exceptional children is rendered by teachers of NIYaU MEPhI, holding seminars and conferences for the teachers of the school.

Such interaction allowed Municipal Budgetary Educational Institution High Comprehensive School No. 22 to achieve good results in teaching: following the results of Unified State Examination of 2012 in the town rating we take 1–2 place in Russian and Mathematics, we have 100 points result in Russian, over 90 points in Information Technology, History, English, Geography, Physics; annually 96–98 % of our school-leavers enter higher educational institutions (the Moscow State University, MFTI, MEPhI, MVTU of Bauman, etc.) . But as the main result I consider the increase in pupils and parents' activity in the events of various levels from school to international. Only during 2011–2012 academic year there were 2836 participations in the international and All-Russia tournaments, Olympiads, championships of intellectual and subject orientation. 10 research works and technological projects are the winners and prize-winners of All-Russia conferences. Sokolov Pavel (a pupil of a physical and mathematical class) became the co-author of the scientific publication in the collection of articles at XII International scientific and practical conference in St. Petersburg «High technologies, basic researches, economy».

# STŘEDOŠKOLSKÁ ODBORNÁ ČINNOST – SCHOOL SCIENTIFIC ACTIVITY

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For 34 years, the competition organised by the National Institute of Child and Youth and promoted by the Czech Ministry of Education is regrouping high school students of and, exceptionally, basic school pupils with their scientific projects divided in 18 scientific fields.

The fields are mathematics and statistics, physic, chemistry, biology, geology and geography, medicine, agriculture, food and water management, protection and environmental education, engineering, metallurgy, transport and industrial design, electric, electronics and telecommunications, construction, architecture and interior design, creating of teaching materials, didactic technology, economy and management, pedagogy, psychology, sociology and the issue of free time, theory of culture, art and artistic creation, history, philosophy, political science and other humanities and social sciences each of them counting with a dedicated jury at all competition levels.

The competition is based on a wild network of schools developed through the years with the support of the Czech Ministry of Education. Each school is, usually, counting with one responsible teacher who is in charge of relaying the information, taking care of the school selection and supporting the students in their preparation (defining the structure of the project, finding consultants, financial support, etc.).

The competition is following a structured process:

A large communication campaign is organised to inform the participants and the teachers about all aspects (calendar, rules, categories, etc.);

The participants are preparing their projects counting with the support of the responsible teachers. The projects are reported on maximum 40 pages and are presented in maximum 10 minutes front of a jury followed by a 10 minutes session of questions.

If there is enough participants, a school competition is organised;

The laureates are sent at the area competitions where the 1st and, if the jury decide so, the 2nd continues to one of the 14 regional level;

The best project of each category in each region is sent to the national competition taking place during 2 days. The projects representing Czech Republic abroad are selected among the winners and receive, among other awards, training.

The participation at the national competition is fully covered by the organisers and, since 2011, the projects are exposed in a fair.

To support the teacher and the best participants but also motivated future participants, summer camps are organised.

While the teachers are following workshops helping them to carry their role, the students are separated in two groups:

The first group, counting with the awarded participations, are trained for foreign events, having English classes, help at the presentations, support at the communication and training in presenting their projects. They have also the possibility to improve their projects working with scientists. They are also practising on the global process by developing in team small projects.

The second group is composed of the students motivated to prepare the scientific projects. They get support from the former participants, scientists and specialists in choosing and developing the topic, in writing their report and in preparing their presentation.

# EXPERIENCE OF ORGANIZATION OF SCIENTIFIC PROJECTS IN CHEMISTRY IN AESC MSU

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Youth's creativeness is one of main competencies that should be developed during education. We can stimulate this ability by performing of scientific projects. From the point of view of psychology, senior pupils are ready to self-sufficient investigation activity under the supervision of teacher or tutor, but in most cases deficiency in qualified personnel and necessary equipment preventing the realization of projects.

At this moment Advanced Educational Scientific Center (AESC) has enough possibilities to solve both problems. Since 2004 we have been performing scientific projects in chemistry for pupils of 10th grade on the base of school laboratory, MSU faculties and other scientific organizations. For the last 8 years our children made ca. 70 projects, including 12 at the current school-year. The projects are an important part of educational program of chemistry in our specialized classes. The ordinary investigation consists of choice of most interesting topic; search of related information by using of MSU scientific library; public presentation of literature review of problem; experimental activity and analysis of results. A final step of the project is the presentation at school conference. Typically the projects begin in September and finish in April. Materials of current year's works are available on AESC web-site [1].

The most valuable results were presented on local and international youth conferences and were awarded for many times. Some of them were presented on scientific conferences and published in peer-reviewed journals [2,3].

One of the most successful projects belongs to bioinformatics area. It should be noted, that currently the main-stream investigations are interdisciplinary studies. Bioinformatics are connected with chemistry, biology and informatics. Basic knowledge of these subjects on the school level is enough to begin the study in bioinformatics under the competent supervision. One of benefits of research in this area is minimal requirements to equipment and reagents. We need the computer with Internet connection only. The projects in bioinformatics were supported in AESC by regular informatics lessons, by special courses in English and molecular biology and by our local database of protein structures based on RCSB project [4]. The results of our work were summarized in recent publication [5].

From our point of view, project activity in coordination with researchers and high school teachers gives pupils the first skills in scientific work, improves their creativity and logic, develops an ability to present and discuss self-obtained data. As a result — most pupils after graduation from AESC successfully continue their study and researches as students of MSU and other leader universities.

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# THE EDUCATIONAL RESEARCH ACTIVITIES OF PUPILS IN RUSSIA

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The Educational Research Activities of Pupils is a widespread approach in Russian school education. It is developed in high schools, non-compulsory complementary activities educational establishments (the unique Russian system of extra-school activities).

The practice is based on activity of Moscow State Educational Center of Creativity of the Young (non-compulsory complementary activities educational establishment), and Lyceum 1553 (Preparatory high school). These establishments are developing an integrated program of educational-research department.

The Educational Research Activities of Pupils we understand as an educational technology when pupils are supposed to deal with research and/or creative tasks the under tuition of a specialist (mentor). There are the following stages in working (not depending on the sphere of activities): Studying theoretical works, Formulating the problem and the aims of a research work, Learning the methods of research, Collecting experimental data, Data processing, Formulating and analyzing the result, Presentation of research work. These stages are independent of a field, which a young researcher is dealing with. Our main task is to develop the ability of the young to get involved to the research activities, to teach pupils the research way of thinking, to understand and to use the research methods, to arouse their interest in cognition. It is a very important feature as it lets people assess themselves, build up their ideas and their attitude towards the surrounding world, as well as build up a successful career.

The study program is designed for high school and includes four parts.

**COMPONENTS OF RESEARCH ACTIVITY**

| COMPONENT | FUNCTIONS | PARTICULAR FORMS |
|---|---|---|
| Basic school subjects | Invariant component | Invariant theoretical courses |
| Compulsory subjects | Variant component | Theoretical courses in different spheres of science |
| Non-compulsory complementary activities | Practical component | Practical studies, individual tuition, term papers |
| Extra-school activities (expeditions) | Independent creative component | Independent research in a chosen field of activity |

The first component consists of several invariant courses of methods of scientific research and science history. They are part of the basic educational plan of a school, compulsory for all the pupils (there are 25 persons in a class.) The second includes specialized courses in several sciences. Pupils are taught general notions in a chosen sphere of science. They are divided into groups of some 10–15 people of different age. The third component is a course of practical training of research methods; an individual theme is given to each pupil. They are also taught to process data and to represent the results as an article or a report. Personal tuition is individual, sometimes pupils work in groups of some 5 people. The fourth component involves expeditions and other extra-school activities, when pupils can use methods they had learned and obtain their own results. Yearly every pupil works at a term paper in a chosen field of science. The theme is given individually to each pupil. Total volume of study charge is about 140 hours per year.

The main fields of Developing the Research Activities of Pupils are Geology, Geography, Geobotany, Ecology, Astronomy, Folklore, History and Culture of Russian Villages, Dialectology, Onomastics and others.

The Educational Research Activities of Pupils is organized in such forms as Analysis at lessons of Basic school subjects, Group and individual work with tutors in classroom (specializations), Research/creative expedition, Scientific and practical conference/festival/fair.

**YEAR-ROUND CYCLE OF DEVELOPING EDUCATIONAL RESEARCH ACTIVITIES OF PUPILS**

| Theoretical courses | Methods mastering | Expeditions | Data processing | Presenting results (science fairs) |
|---|---|---|---|---|
| JANUARY | APRIL | JULY | OCTOBER | DECEMBER |

Year-Round Cycle of Developing Educational Research Activities of Pupils begins in January and finish in December and includes several stages, using the main forms of educational activities: theoretical courses, methods mastering, expeditions, data processing, Presenting results (science fairs).

We consider expeditions and science fair the cardinal forms of research activity.

The program of youth complex scientific expeditions has been developed for 10 years every summer in different areas of Russia. Here's a map of disposition of expeditions for 10 years. Each group has an original scientific program, and each pupil has his own theme and program of practical measurements. The participants of an expedition live in camp-sites. In total there are about 15 camps and 200 participants, including pupils, tutors and mentors.

The main fair we organizing is the Fair of Junior Educational Research in Memory of V. I. Vernadsky. Usually there are about 130 delegations consisting of 3–7 people each (teachers, tutors, pupils age 12–17 — total 600 persons), who take part in the fair and present the most interesting research works. More than 100 cities from 40 regions of Russia are presented. Pupils from Lyceum and Center take part too.

The main way of propagating the method is to realize the program of development of research activities of the young. The group of development is a community of researchers — scientists and experts, that elaborates the main general ideas how to develop the research method among the young. The program unites several educational establishments (10 schools and creativity centers) where teachers are interested in developing research in their work with the young. The main aim of this unity is to develop and to describe innovational forms of organizing the research process, methods of research, and to put it into practice in future. There are special tuition courses for teachers who want to get involved into this practice. The main informational source of the program is the journal "Research In School". It contains articles about research works of the young, the best projects, news about conferences, expeditions, other information. There have been published three issues of the journal so far. Web-site www.researcher.ru is its Internet-version. There is also a bank of methods, that is, a library of projects and designs, which is open to all comers. The main consolidating part of the program are expeditions and profile hours where the most active participants of the program can take part, too. Conferences and contests play a great communicative role. The principal conference is the All-Russian conference in memory of V. I. Verrnadsky. Teachers, taking part in this conference, then use principles of researching in their work with the young, too.

Such program permits to propagate successfully our experience in the system of education.

The program developing a true community of the young and the tutors from different parts of our country practicing research activities. It unites intellectual resource of scientists and educators on the basis of the best traditions of scientific and pedagogical schools.

Research activities of the young are an effective means of developing universal skills of thinking, setting them more proficient, a way of familiarizing the pupils with cultural heritage of the community of scientists.

# SOME SUGGESTIONS TO YOUNG AUTHORS OF RESEARCH WORKS

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We hope that the following release will help tutors and authors of junior scientific research works avoid some defects and errors in designing and carrying out their works, summing up their results, and on the whole improve their quality.

Research or scientific approach to studying different phenomena is one of the methods that people use in order to cognize the world surrounding them (art, religion and the others can also be methods of cognition).

This approach has some specific patterns that are customary in the scientific world, and those characteristics should be presented in every research work using scientific approach.

What are those above-mentioned characteristics of a scientific work?

First, there should be a distinct aim of the research and it should be formulated in it, because reading certain works presented to the Conference of junior scientific works one cannot clearly understand what were the reasons to carry out such a work. It is mostly a feature of fiction, when the composition of a novel is designed by the author in order to mark out certain details of the plot and so sometimes all the reasons come only in the end of the story as a denouement. But it is in a different way in research scientific works, that are bound to have a standard composition and structure, and those standards and rules shouldn't be easily broken (as it is not allowed to use your hands when playing football).

The aim of a research mostly consists in studying several facts and events — for example, we could study levels of acidity of the water taken from different lakes, rivers and other sources in a certain national park. Of course, the same approach should be applied to research in the field of the humanities, too.

Second, there should be a hypothesis in the research. It is very important, too, as it can concretize the research and make it deeper. In carrying out the research the hypothesis can be confirmed or denied. The hypothesis should be based on some bibliographic data and be logically formulated. In our example we could take as a hypothesis a proposition that the water acidity may depend on the depth of the water reservoir from where it had been taken. This proposition can also determine the choice of water reservoirs to take specimens from — more and less deep ones.

Then one should set a task in order to confirm or to deny the proposition, that is, to determine concrete things to do – for example, to take a number of specimens of water in different water sources and to analyze their acidity using indicators, such as litmus paper or others.

And, certainly, a research work should contain a bibliographic summary, that is, a brief summary of other research in the chosen field of activity studying the same problem. It is necessary to show that the author is familiar with the problem he/she attempts to solve, that there is something new in the task set, that the author hasn't merely copied the results from other research and so on. Writing a a bibliographic summary will help young researchers to familiarize themselves with the material, to make it easier for them to answer questions during their reports. If the work is properly and well done, the contents of the report and even the text itself are like a visible part of an iceberg, whose main part is hidden under the water.

Using the example in which we determined the water acidity we show the methods used in a research work – for example, what containers we used for water specimens, whether we took them standing ashore or from a boat, from what depth they were taken, if it was by day or at night, if we used litmus paper at once, how we determined the color of certain specimens – using the color circle or without it, the way we registered the obtained data and so on. Those methods should also be described in a research work. Authors must clearly understand how their methods can affect the results – for example, what can happen if they used dirty containers.

Then authors present their own data. The difference between operational data and the data presented in the text of a research work must be also distinctly understood The fact is that during a research there are often huge amounts of data, and they needn't be presented all. Authors should choose the most significant ones to illustrate their research and to confirm the conclusions they came to. That's why they are to process operational data and to quote only some of them, which are the most important. Graphs are the most illustrative form of showing the data obtained in a research, because they enable the reader to grasp the gist of a work in a short period of time.

The data should be compared with those taken from articles and other scientific sources and then analyzed, that is, there should be determined any regularities which were found during a research.

And, finally, every research work is concluded with the results. The conclusions are to be concise, brief and strict, they should be answering questions risen in the work, dealing with its aim, tasks and hypotheses.

There is a great difference between the text of a work and the report. In fact, why are scientific conferences held, if apparently everybody can read any work in a journal or in a book? But conferences have their own advantages. Giving a report, one has to choose only the main and to present it to the audience vividly and emotionally, illustrating it with a relatively small amount of data. Reporting is not only a form of presenting data and results, it also has a communicative role, so the speakers

is to reveal their own individuality in the research, to get into contact with their colleagues listening to them.

It is the reason why a written article and a report basing on it differ so much and so deeply, and authors should prepare to them in a different way, too. Making a report you can not merely read out the article nor you can overload it with insignificant data. There is a strict time-limit at scientific conferences, too — it takes no more than 10 minutes on average, and it is really enough to make the audience get the gist of a work. If the work is of any interest to the audience, questions will follow, so the speaker will have an opportunity to give more information about the work.

And now a few words about ethical rules that are customary in the world of science. Above all, the participants of a conference are colleagues, who have the same aim — to cognize the world, surrounding us, to get to know its principles, its laws, if only a part of them. That is the reason why mutual respect is the main and the most important in their communication. We ask you to remember about it, to bear in your mind, that you may unintentionally offend a colleague of yours if you are leaving the room during his/her report and thus showing your lack of respect for the work being presented and its author, too, and to avoid any actions that could be understood as offensive of disrespectful.

Research works of yours are the first step through the door that leads into the world of science. Please never forget your tutors, who helped you to make this first step and opened that door for you. A real, proper, independent research is possible only when you got a good all-round education, so if your ambition is to become a scientist, there are years and years of intense studying before you. Good luck and don't stop moving to your achievements!

# EVALUATION WAY TO SUSTAINABLE PROJECT BASED LEARNINGS

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I know that you have heard about PBL. Our goal of education is how to change information to knowledge. There are many ways to approach it. PBL is one of the most efficient models that can help this objective. Project-based learning (PBL) is a model that emphasizes learning activities which are long-term, interdisciplinary, student-centered, and integrated with real world issues and practices.

Before project's activity (the Most important period)

in this period all preparatory work should get done: evaluation of resources, setting up goals, fixing time schedule, choosing evaluation tools etc.

While the project takes place, mostly formative evaluation is in progress.

After the project the summative evaluation takes place. The educational value and usefulness of the project will be evaluated. Necessary modifications will be made for future.

Project-based learning helps students develop skills for living in a knowledge-based, highly technological society.

The old-school model of passively learning facts and reciting them out of context is no longer sufficient to prepare students to survive in today's world.

Solving highly complex problems requires students to have both fundamental (reading, writing, and math) and Digital Age skills (teamwork, problem solving, research gathering, time management, information synthesizing, utilizing high-tech tools).

With this combination of skills students become directors and managers of their learning process

It begins with an idea and an «Essential question». With these standards in mind, it devises a plan that will integrate as many subjects as possible into the project. Have in mind what materials and resources will be accessible to the students to assist them! Next, students will need to be given assistance in managing their time — a definite life skill.

Finally, have multiple means for assessing your students' completion of the project. Did the students master the content? Were they able to apply their new knowledge and skills?

Start With the Essential Question : The question that will launch a project-based learning lesson must be one that will engage the students.

Design a Plan for the Project: Students feel ownership of the project when they have an active role in the decision making for the activities. Select activities that support the question utilizing the curriculum, thus fueling the process. Integrate as many subjects as possible into the project. Know what materials and resources will be accessible to the students to assist them

Create a Schedule: What time allotment will be given to the project?

Will this project be conducted during the entire school day or during dedicated blocks of time?

How many days will be devoted to the project?

Monitor the Students and the Progress of the Project: What is required for the project completion? What is the final product: A word processed document? A multimedia presentation? A poster? A combination of products? What does a good report/multimedia presentation/poster/product look like? Make the requirements clear to the students so that all can meet with success.

Assess the Outcome: Assessment helps the teacher design instruction to teach more effectively. Whenever possible, give the students the opportunity to do self-assessment. When a student's assessment and the teacher's assessment don't agree, it's a perfect time for a student-teacher conference. These conferences let the student explain in more details his or her understanding of the content and justify the outcome.

Evaluate the Experience: Validate what they have learned and make suggestions for improvements, or things they wish they had done.

# THE PERSPECTIVE DIRECTION OF FUNDAMENTAL GEOMETRY

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The first problem puts forward a goal to find «a special beauty» of number 496.

The second problem demands to find three-value numbers of a kind авс which figures satisfy to the equation а2 – в2 – с2 = а – в – с.

So, the huge difference of two problems picked up by me consists in a degree and result of researches. The main thing is in an irrefragable answer in the second case and the objective infinity of results, not always interesting from the mathematical point of view, in the first case.

Thus, there is obvious that the modern research math expansion of fundamental knowledge for the account of their generalization can be considered as the most interesting and productive direction. The constructed models of a general view will necessarily find the application in the conditions of so-called world technical break.

Well known Russian mathematician Sarantsev has allocated generalization as one of the main methods of scientific knowledge: inductive-reproductive, inductive-heuristic, inductive-research, deductively-reproductive, deductively-heuristic, deductively-research, reproductive generalizations, heuristic generalizations, research generalizations.

So, all chosen methods can help in leaning well known fundamental scientific knowledge.

I think only methods number eight and nine can help to appear something new.

I'd like to mention seven kinds of mathematical generalizations which step by step I've chosen for my teaching work with talented students: generalization on dimension, generalization by rejection of conditions, generalizations on the basis of consideration of special cases, generalization on the basis of a proof method, generalization by change, generalization as strengthening, generalization on the basis of connection.

So, these seven kinds of mathematical generalizations are used for solving math problems by "interesting" routes.

Now I'd like to speak of open or unresolved mathematical problems.

Practically all ways of generalization assumes a birth of hypotheses and reception of solid knowledge. However the main point is in choosing an object of

investigation. You can tell that it's enough to get acquainted with so-called open or unresolved math problems which were considered by mathematicians, but till now are not solved. Mostly they have the form of hypotheses which are presumably true, but require the proof. In particular, there is a list of such mathematical problems, they are:

- Hilbert's Problems
- Landau' Problems
- Problems of a millennium
- Smejla's Problems

So, it's clear that solving such problems is business of time. As a rule, only skilled enough scientists can do it. Students can only try to solve them.

What discoveries the young can make? Algebra is full of every possible properties and rules. Why is geometry unworthy poor with them? Why do scientists mostly stop on properties of triangles? As a matter of fact, a triangle is only a starting, first point in the general world of polygons. Having understood it, I was engaged in the fascinating activity together with my students.

Some years ago I got the idea that properties and parities for a triangle can and should be shifted on wider class of figures called polygons. One of my pupils, Vasily Petrov, 15 years old, managed to transfer properties of points of Brokar for a triangle on all known kinds of quadrangles.

Another pupil of mine, Dmitry Istomin, 16 years old, could find a condition and a way of construction of such points in any polygon but before he'd generalized and carried out an inequality of Erdyosh for any polygons.

Then Dmitry Istomin could apply it to creation conditions of «Brokar» points in any polygon and by that transfer concept of a point of Brokar on convex polygons, and he also could find criteria of its existence.

After that Dmitry Istomin managed to generalize all properties of a point of Brokar known for a triangle, having transferred them on any convex polygons (in which they exist).

Further, the other student, Konstantin Kozlov, 16 years old, generalized one of the most beautiful double inequalities about perimeters.

One year passed and Konstantin Kozlov generalize d one more parity connecting the sums, direct and return, consistently going relations of the parties of a triangle.

Younger pupil, Ashot Arakeljan, 11 years old, generalized an inequality for the sum of distances from any point taken in a triangle, to its tops.

Two years ago my pupil, Evgenie Volkov, 17 years old, managed to generalize one more, very beautiful inequality connecting the areas of four triangles, formed at connection by pieces of any points on the triangle parties.

This educational year another student, Vadim Vlasov, 16 years old, (he is participating in the exhibition) could generalize the most beautiful parity between lengths of three pieces connecting any point of a circle, described about a correct triangle, with two its next tops and shift it on any correct polygon. Then, he considered

step-by-step movement of a piece and found formulas for calculation of factors of two «basic» pieces.

Besides, we consider a perspective direction in researches when known properties are combined. Just to give an example I'd like to tell you about two researches of my students. In the first case, two pupils: Anastasiej Sokolova and Ilyoj Malikov, both are 15 years old, have been studied properties of the sum of the parties of the Morleevsky triangles, which are corresponding to received at splitting of any not equipotential triangle on the least number (from possible) similar initial triangles.

In the second case, one more student Pavel Tsajukov, 17 years old, managed to find conditions at which beforehand chosen pedal point simultaneously was also a point of Brokar.

In conclusion I'd like to say these results of researches are really useful from the point of view of their generalizing character. They are received by ordinary pupils from ordinary schools.

# THE PSYCHOLOGY OF RESEARCH ACTIVITY

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The research itself in its origin for a person has three components, which coincide with the steps of human development. Biological backgrounds — research interests, reactions and behavior. The conditions for development — socio-cultural and historically built contexts, which can accelerate or slow down the changing of the research behavior into the research activity and which show the patterns and means of fulfilling such kind of activity. Inner position — a trained ability of a person to seek and realize problems; they must consciously, actively and constructively react to problem situations, built up the research relation to the world, towards each other and to oneself.

Research behavior is revealed spontaneously; it is mostly determined by outer stimuli and changes in the environmental contexts. This kind of behavior starts, accelerates and slows down unwillingly. The common factors of the research activity and research behavior of a person, especially at the young age, are like the same of the animals' elementary mental abilities. While growing up, socio-cultural determination becomes the main factor which changes the research behavior into the research activity. The research position of a person can form at a certain stage if there is an adequate correlation of the research initiative and socio-cultural conditions for realization of the research activity as the research itself.

Every person has a natural ability to react unwillingly and spontaneously to any problematic situation in a form of a research. The sporadic research follows people throughout their life independent from their abilities, social status and being the means of investigating reality and interacting with it. At the same time the research itself in contrast to other kinds of human activities (projection, construction and organization) — is the "subtlest" one in relation to its object. Its main aim is to reveal the truth as it is, to watch the object without interfering into its private life if possible. Getting knowledge like this is the key idea of research activity.

Research activity is based on research ambition and research behavior, but in contrast to them it is conscious, meaningful and built up with the help of cultural means.

Science itself (as a special social institution) has worked out cultural standards and means of realization of the main steps of research activity:

- Orienting
- Stating the problem

- Finding the means and ways of solving the problem
- Planning
- Empirical experience
- Analysis
- Self-consciousness

The effectiveness of realization research activity in everyday life and in professional sphere is connected with the presence, the level of development and the stability of the research position of a person. Working out the research position directed to the world, to the others and to oneself occurs during person's development in connection with the conditions of such development in the process of realization of such activity. The mature research position allows a person to interact successfully with the changing realities of the outer world, social environment and also with the subjective reality.

Research position — is not only something what is activated in the situation of frustration, but also the position according to which a person needs to be in such situations, find them; and after finding such a situation which demands the applying the research activity a person needs to go through all the steps of the research.

Interest is the emotional and motivational basis of revealing the research behavior. It stimulates the cognitive activity and makes the processes of perception and attention in order. Interest activation may be realized through the changes in the situation and the context, different animated objects, innovations and also with the help of imagination and mind.

Motivational basis of revealing the research position is the cognitive motive and also the motive of self-realization. If a person wants only to reach success/to avoid failure, then we can speak not about the research position, but about the fulfilling the social-normative activity.

Research position is a complex personal characteristics, revealed through different aspects among which are:

- Readiness for the research reacting in some untypical situations;
- Multi-versioned acceptance of the world;
- Independence of the points of view as the ability to rise above the accepted social stereotypes;
- The conscious and purposeful ability to get special socio-cultural ways of fulfilling the research activity, and also to develop some optional abilities necessary for making a research;
- Reflection as the possibility to rise above the situation and oneself.

Study-and-Research activity is the creational process of some joint action of two subjects (a teacher and a pupil) in order to find out something unknown and during it there is a sharing of cultural values among them and consequently the outlook is being formed.

The teacher's task in understood as working out a hypothetical-projective model of creating the developing environment for pupils. It is the teacher who makes the

conditions for realization of the research activity, which should help to form pupils' inner motivation to solve any problem (scientific or domestic) from the research, creative point of view. Thus, one of the most important tasks is creating inner motivation, changing outer necessity to find something unknown out into inner need.

Key question: how much do the conditions of creating the research activity of pupils develop the research position itself, their subjectivity in cooperation with the surrounding reality, and not only teach to fulfill some certain cultural norms?

While starting and fulfilling the research activity of schoolchildren, the following steps of creating of subjectivity can be (ideally) observed:

- the need in doing everything by oneself ("I want to do everything by myself");
- independence in doing everything correctly ("I can do everything by myself");
- the ability to set a goal of the activity and to control it ("I'm acting myself");
- understanding the cultural and personal meanings of the activity ("I understand why I am acting");
- creating new realities and ways of the activity ("I realize myself in the activity for other people").

The efficiency of following these "steps" of development of a person depends a lot on the correlation of the developing determinates (biological background, conditions of the development and inner position) with each other and how they fulfill the function of mutual facilitation.

Knowing it the teacher should be able:

- to create the environment which provokes a pupil to make a decision himself; it is only possible through the situation of necessity to make such a decision under the conditions of multi-versioned choice on the basis of research position;
- to create dialogical (but not monological) type of communication with pupils where the attentive relation towards the inner world of each other prevails;
- to provoke questions and the desire to find the answers (but not to teach to give the only correct answer possible);
- to create trustful relations with pupils on the basis of communication and mutual respect (it is especially difficult because very often the adults either are not ready to share the responsibility with children or demand his deeds to be as their own);
- to take into account children's interests and motivations, not forgetting about their own;
- to give pupils the opportunity to make important decisions for them;
- to develop one's own type of "open mind" but not to think that the teacher "knows everything" and should plan it all beforehand.

# NOTES ON THE COLLABORATION BETWEEN UNF AND THE DANISH UNIVERSITIES

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How can a voluntary youth organization work together with universities towards a common goal? The Danish Youth Association of Sciences (UNF) has a long history of doing exactly this. The statutes of UNF dictate that the goal of the organization is "to raise awareness and interest in science and technology primarily among youngsters". We accomplish this by organizing lectures, field trips, workshops and science camps and participating in festivals and other events.

Most of these activities are aimed at high school students who are in the process of choosing their future career. By informing them of the possibilities within Science, Technology, Engineering and Math (STEM) we make them more able to choose the field most appropriate for them. In fact a 2009 study among the 800 new students at the Faculty of Sciences at the University of Copenhagen showed that UNF had an impact on the choice of field for 5 % of the new students.

UNF has four local divisions in Aalborg, Aarhus, Copenhagen and Odense. Each of these has made special agreements with the local universities. As an example UNF in Copenhagen has agreements with the University of Copenhagen (UCPH), the Technical University of Denmark (DTU) and the IT University of Copenhagen (ITU). These agreements secure UNF approximately 10.000 € per year plus office facilities at UCPH and DTU. In Aarhus a similar agreement gives UNF 27.000 €, an office and free printing of their program (an expense worth approximately 10.000 €) in exchange for at least two science camps per year held at the university.

The economy of universities all over the world rely on the number of students and (in most cases) how qualified they are. The job UNF is doing is much more effective at getting new students than any kind of advertisement the universities can make, therefore they are willing to pay for it.

# EDUCATION AND INNOVATIVE DEVELOPMENT

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Some time ago, attending the Educator Academy of Intel, I was struck by a datum which made me reflect: in the state of Massachusetts, USA, students involved in different ways in scientific fairs are more than 10 thousand, while inhabitants are about 6,5 million. In Costa Rica, boys and girls involved are more than 400 thousand, that is to say 10% of the overall population of the country.

If it were true that such events play a fundamental role in the promotion of innovation, in the stimulation of scientific careers among students and in the awakening of the public opinion, the research sector in the central American countries should be at the highest level in the world.

On the contrary, the situation is different and everyone knows that the gap between the two areas is totally in favor of Massachusetts: just think of Harvard and MIT, as well as to Route 128 with its huge numbers of high technology businesses.

Therefore, if the quantity aspect is important, the quality of the overall background where opportunities grow is much more significant.

Innovation develops only when there is a general positive situation involving institutions, different organizations, society at large, as well as of course politics and economy. A strong strategy is needed to promote research and innovation, where international relations with the most developed countries and their scientific centers are essential. Above all, highly qualified human resources, coming from the best academies, are fundamental.

However, the role of academy is only relevant at the final stages of education, when people start building their skills well earlier, since the beginning of their educational path. That's why education should be considered as a priority by national policies, because that's the only way we have to create and manage high quality courses and laboratories, to realize the best curricula at all school levels: from primary schools to postgraduate and specialization courses, to lifelong learning. In such a context, international exchanges are more and more frequent, teachers' competence grows, associations like MILSET can propose extra school integrative activities.

As reported by EU Commission and OECD:

- Science education in Europe: national policies, practices and research, and
- Education at a glance,

indicators are available to measure education policies such as: the level of education

of the adults, the number of students finishing secondary schools and tertiary education, the number of those educated in scientific fields, the programs for lifelong learning. In parallel, good policies for education are also based on high quality strategy, availability and use of funds, high number and good quality of facilities.

Those considerations are based on real examples, verified in different areas all over the world. As an example, in Europe we have the "four motors": Lombardy region in Italy, Catalonia in Spain, Rhone-Alps in France, Northern Westfalia in Germany. In the USA, we have the cited case of Massachusetts and, in Asia, the South-Korea. Moreover, the so-called BRICS economies are becoming really important: Brazil, Russia, India, China and South-Africa. They are all countries with high expectations in the research field.

To summarize, it's important to underline that:

- High education is fundamental for growth;
- Scientific education is at the base of innovation;
- Diffused high education stimulates innovation development.

# SCIENTIFIC TOY – A CONTRIBUTION TO THE DEVELOPMENT OF CREATIVITY

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The scientific toy as a object is a small mobile device which brings a simple non-violent manner or uses some natural phenomenon or regularity.

Scientific toy as a subject is voluntary non-political civic association, whose objective is to develop leisure, interests, technical and artistic activities, especially aimed for children and youth, which links to the design, development, production and promotion of scientific toys and games with emphasis on their use in education.

## CREATIVE ACTIVITIES

VYPOČUŤ
ČÍTAŤ FONETICKY
INTERNATIONAL COMPETITION SCIENTIFIC TOY

19 years of competition: 238 proposals (of which 126 from abroad) from 163 authors (of which 53 under 18 years old). 20th year of international competition (by 31st of July 2012) is also an activity of MILSET-EUROPE.

WORKSHOPS /CREATIVE MEETINGS/ AND INDUSTRIAL-LEGALLY PROTECTION

Members have created 31 original industrial-legally protected products.

COMPETITIONS AND SURVEYS OF TECHNICAL CREATIVITY

Creation of individual works within secondary-school vocational activities, student conferences and different competitions for example: competition for the cartoon physics joke SCHOLA LUDUS (Lukáš Počatko, * 1995, winner of the 3rd and 4th years), RoboCup (Ján Maťaš and Andrej Chudý, * 1995, World Champions, Istanbul, 2011; participants INTEL ISEF, Pittsburg, 2012).

Presentations of projects and scientific toys at exhibitions in Slovakia and abroad, since 1995 especially at ESI and ESE — Expo Sciences Internationale and Europe.

EDUCATION AND INFORMATION ABOUT TOYS AND INDUSTRIAL-LEGALLY PROTECTION

The course «Games and toys as a means of education" was accredited by Slovak Ministry of Education. The overall scope of the course is 60 hours, of which 24 hours of lectures, seminars and workshops. The guarantors of education are prof. PaedDr. Vojtech Korim, CSc., Dean of Pedagogic Faculty, Matej Bel University, and PaedDr. Eva Balážová, PhD; Matej Bel University. By organizing courses for teaching staff, or manufacturers and distributors of toys we contribute to an increase in culture of playing and the use of games and toys in teaching and leisure time of children and youth.

SCIENTIFIC TOYS SHOWS AND INTERACTIVE EXHIBITIONS

Toy collection, processing manuals, use of toys in education, motivation of development and production and so forth.

Scientific toy shows at schools, camps, local events, children's hospitals, convalescent homes for example.: European Nights of Scientists, Night in Museum, Day of Town ...

Interactive exhibition is created from scientific toys, games, brainteasers and physical experiments with manuals. From December 1998 until the end of May 2012 more than 360,000 people, especially young people, were visitors on thematic interactive exhibitions of scientific toys on different towns in Slovakia in various institutions (museums, galleries, schools, leisure centers, libraries, local authorities' offices, houses of culture, education centers, etc.)..

The first foreign interactive exhibition «Scientific Toy travels through Europe» took place in Békéscsaba (Hungary). The last one is „MILSET and Scientific Toy" for 25th MILSET Anniversary (Expo Sciences Asia in Bahrain, April 2012).

The permanent interactive exhibition «VEDHRAČKA» is since October 2009 (in House of Technology and in the biggest shopping center) in Banská Bystrica. It is the basis of the Centre of Games and Toys — original comprehensive educational facility of creative learning based on games, which will blend science center features and ludotheks with the application of scientific toy exhibitions know-how.

**CREATIVE CAMP**

First children's daily creative camp took place in the extended premises of the exhibition August 2010 under the auspices of rector of UMB prof. PhDr. Beata Kosová, PhD. Mgr. Ivan Saktor, the mayor of Banská Bystrica, visited the camp during the Day of robotics with RoboCup teams from Banská Bystrica and Vráble.

Daily camp of technical creativity is for 8–14 years old children. Each of them prepared every day one physical toy. Result of inventive trainings and creative play is new toy with logo and patent application.

Scientific Toy organize also since 2010 Worldwilde Day of Playing in Slovakia.

# PROBLEMS IN INTERNATIONAL PARTICIPATION IN SCIENCE FAIRS WITH YOUNG STUDENTS

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## LUCK IS NOT A FACTOR

In science events where young people are participating with special presentations contest or in any of the cases we take as a given that luck favored them, it follows my presentation.

## INTRODUCTION

Through participation in international scientific expo events, the methods used to arrive at these great events recognized internationally, are inadequate due to the many complications that come up with the time, which is being carried out a ¨International Group of Friends¨ allowing greater organization to reach these kinds of events.

You can define that international involvement can fail from the start if you are not extremely careful of the factors addressed in this presentation.

**OBJECTIVE**

Overcoming the problems that we have for participation in international events and extend the group of friends and get away from what we call luck.

Process to arrive at an international fair:

Regional —> State —> National —> International

**PROBLEMATIC**

Personal. It is very easy to integrate a group of youth work, but we must be careful enough to find a low resistance caring interpersonal personal traits of each young addition to their personal relationship that allows them to socialize knowledge.

Academic. Students are very careful with outstanding academic performance and is not easy to get away from the academy and that causes the disorder lose school performance that locate in outstanding groups, so it is advisable to look very closely their performance .

Documentation. We find the following situation the student has earned the opportunity to participate in overseas but has no regularity in their personal documents and this prevents their participation. It is recommended to monitor the whole process from the beginning of their participation in science projects and do exhaustive reviews of personal documents.

Language. Recall that all international participation requires the student to speak and can communicate in English this is part of the development work of the project from the start.

Economic. It is a very embarrassing and difficult factor to address but it is best to involve in the project directives personalities before participation in the regional phase.

Integration of youth groups científicos. Motivación Join expo.

Adaptation to scientific language

Operation manuals for various international fairs

Domain of scientific research method, either experimental or non-experimental.

Recomendaciones. Respeto to privacy of the young and their environment.

Interpersonal care in handling.

Care in handling transfers. The special recommendation is to contact a member of the group of friends to meet situations hotels, visas and special situations of the place where their travels.

Integration of international peer group support, to facilitate international participation.

The Materials of the Delegation Leaders' Congress
Expo-Sciences Europe 2012
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MILSET EUROPE

NON-FORMAL SCI-TECH EDUCATION AND ITS INTERNATIONAL DEVELOPMENT

# NON-FORMAL SCI-TECH EDUCATION AND ITS INTERNATIONAL DEVELOPMENT

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When wondering about the role of non-profit and non-governmental organisations in education, we are facing a fundamental question: why do we have non-formal education activities developing, is it not a prerogative of the formal education? Among the different education fields, science and technology are representing an important area which will catch all my attention as being the core of the International Movement for Leisure Activities in Science and Technology (MILSET).

While observing science education, we can't avoid seeing a paradox: Science has never been so visible and open: televisions, magazines, exhibitions, movies, etc. yet, formal education, despite its key role and the unlimited value of its contributors, lacks means and, unfortunately, too often, unable to follow the evolutions of our time. This situation may result in bringing science education to its most extreme and off-putting stereotypes.

Referring to the "Rocard's report (on science education)"[1], the European experts have conclude: «[…] The deductive approach — beginning with a concept and its consequences, which is then illustrated by means of applications — must give way to the inductive approach, based on first awakening natural curiosity. […]». Let's note the direct connection with the motto of many organisations and institutions which are working for decades to provide young people with opportunities to discover and to explain science.

These activities are reinforcing the scholar practices by bringing young people together in common projects carried out alone or in teams; it is a strengthening of a well-known and dynamic science teaching. Their diversities allow them to be applied to a large scale of participants or to the narrowest and the most talented ones giving them a playground where to bloom.

A space is given to youngsters to exchange freely about their discoveries, their researches, etc. in many activities which could separate them in two categories.

The first one, which could be illustrated as a pyramid, consists in bringing participants for an international "final" event after, in most of the cases, similar events set at local/regional/national levels sending their best participants or their representatives. The best example being the science fairs or expo-sciences which

aim at promoting scientific projects created by children and young people through an exhibition in a multi-cultural environment, also allowing the participation of institutions which want to assist young people in their projects developed at school, in clubs or at home.

The second group, the delocalised international activities, consists of common activities spread over different locations with a central point of coordination giving a unique opportunity to use the effort of one for the benefit of all. It can be declined in different variants. The simplest one consist in a centralised activity, such as the MILSET Science Photo Contest, which is often held online for all and coordinated by a small team beneficing of the advantages of the ICTs; the partners limiting their involvement at the promotion level. Another interesting variant, well represented by the Young Citizens Conferences and the European Science Day for Youth, consists in developing a model, a framework and to open it to everyone; the partners having a large role as being responsible of the participation at their level. This could be completed creating a community and valuating each participation in a common result.

Obviously, the alternatives and combinations are limitless and the audience unlimited. Counting a shared effort and the available technologies of information and communication, it is possible to reach, at low cost, a quick and wide dissemination and participation; the communication becoming the fundamental principle of the success.

At the contrary, the effort requested to deploy them are limited as shared. Nowadays, the ICTs allow, with a limited cost making a great balance, a quick and wide dissemination. Nevertheless, it requests, at least, a strong communication campaign to be fully efficient.

The place of the NGOs as the logic complement to the educational model next to the formal education is to bring science in educational activities out of the scholar frame. They have possibilities to explore different approaches which generate opportunities to open the mind and the interest of youngsters.

The organisations and institutions carrying out those activities are counting with the involvement of skilled and passionate individuals. The limits of means push them to make choices in their development, their activities and the realization of their objectives. This situation naturally leads to the research of partners what, in a defined field, is not always easy in a closed area and opens the view to the international.

For 25 years, MILSET, the International Movement for Leisure Activities in Science & Technology, has gathered organisations and institutions whom share common values of promoting sustainable development, citizenship and peace by practicing science and technology in a spirit of respect, understanding and solidarity within different cultural, geographic and spiritual communities.

Nowadays, MILSET is counting with affiliated organisations and institutions in over 90 countries. The movement is also representing actively the organisations to

supranational and international bodies such as UNESCO where MILSET held the status of NGO in operational relations, UN as a consultative member of ECOSOC and the European Union.

Through this international platform, it is given a leeway to the organisations to grow together sharing resources and knowhow, setting exchanges, participating to common programmes with the aim of developing the capacity to provide always more opportunities to the youngsters. The platform is also used to relay information and promote everyone initiative in sci-tech education.

Together, we are offering the youth evermore opportunities to discover, share and enjoy science!

[1] European Commission "Science Education NOW: a renewed Pedagogy for the Future of Europe" Office for Official Publications of the European Commission 2007.

# NONGOVERNMENTAL ORGANISATIONS MAKE IMPORTANT CONTRIBUTION TO THE EDUCATION AND INNOVATION

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**Association for Technical Culture of Slovenia** (ZOTKS) is a non-governmental organization which raises interest for technical and natural sciences among youth and helps them develop their innovative, creative and research spirit. Its various activities enable the youth to acquire additional technical skills, with the intention of promoting technical and natural sciences and professions among them. The youth engagement in these activities help them develop critical thinking, learn the applicative value of technical and natural sciences as well as establish logical connections with other sciences. It is of great importance to spread technical knowledge and to ensure information and digital literacy both in a formal and non-formal way.

## WE ARE ADDING TO THE PURPOSE OF EDUCATION

Education should not be only transfer of knowledge, learning of facts or struggling for good marks. It should rather aim at helping students to learn how to think independently and analytically, to be creative and innovative and to explore new ideas, to get applied knowledge and skills which they will use critically, and to develop imagination, curiosity and desire for lifelong learning.

School, of course, is playing a crucial role in this process. However, school itself is not enough. Beside the formal education that is being conducted in schools, today is very important also the non-formal education that many non-governmental organisations and those gathered in MILSET are offering. While in most of schools today learning is still a passive experience for children, who mainly listen, most of programs of non-formal education, especially in the fields of technical and natural sciences, are “hands on”, where children are not just consumers but creators instead.

Some research shows, that children and youngsters that are conducting science projects, or are attending research activities — camps, are more motivated and have better understanding of the subjects they are working on. They obtain knowledge and skills through learning by doing, while they create concrete products and solve real problems. Through such work the knowledge that they’ve acquired in school

also gets a purpose and practical value and they learn to be creative and innovative. Also events like Expo Sciences, Science Camps, Science Days for Youth etc. organised by MILSET and its members are largely contributing to that.

**WE ENCOURAGE YOUNGSTERS TO BE INNOVATIVE**

Innovation fosters improvements in the society (economy, daily life etc.), and can help in decreasing costs as well as in decreasing problems.

According to Sharon Daniels (CEO of Achieve Global in Tampa, Florida) it takes six „C's" in business to maintain a culture of innovation:

Collaborative – encouraging people to work in teams, where they can cross-fertilize ideas and experiences

Customer Centred – having deep commitment to understanding and meeting customer expectations

Context rich – focused on collecting information and allowing it to flow freely throughout the workforce

Curious – encouraging workers to question everything – from their own assumptions, to the opinions of others

Confidence Building – empowering employees through training and mentoring

Challenging – with leaders who are willing to challenge the status quo.

Innovation is indeed a driving force of today's world and we need innovators more than ever before. It is therefore extremely important, that young generations are increasingly innovative and creative. What is needed for a person to be innovative?

Imagination

Inquiry / curiosity

Embracing change

Practical / useful knowledge

Taking initiative

Here comes in the non-formal education, where an important role is being played by our organisations for the following reasons:

If day-dreaming (imagination) is discouraged in most classrooms, it is most certainly encouraged in our programmes.

If curiosity is often not appreciated in many classrooms, it is essential and a must in our programmes.

In our programmes we teach children and youngsters how to make changes and to embrace them.

In our programmes we add practical value to the knowledge that children and youngsters obtain in school.

We encourage children and youngsters in our programmes to take initiatives.

**IN OUR PROGRAMMES CHILDREN ARE ALLOWED TO FALL IN ORDER TO STAND UP AND GROW**

Today we often hear about the need to protect children from bad experiences, from failing. We should make it as easy as possible for them. Very often in schools

failure is even penalized. Is that really in the best interest of children? The child who never falls will not learn how to stand up again.

Amanda Alonzo, a teacher from California, who has mentored many Intel Science Prize finalists and semifinalists in the last years – more than any other public school science teacher in the U.S. – said, «One of the most important things I have to teach my students is that when you fail, you are learning.» Students gain lasting self-confidence not by being protected from failure but by learning that they can survive it.

In our programmes children and youngsters are often exposed to situations, where they first need to fail, to be able to find the right way eventually. That way they learn the most.

**WE CELEBRATE CHILDREN AND YOUNGSTERS WHO ARE SUCCESSFUL IN SCIENCE**

In today's society we are very good in praising and awarding those who are good in sports and show business. However, we are much less excited about the children and youngsters who show talents in knowledge and science. How often can one see in media stories about youngsters who did well in science in comparison to those who have done well in sport or singing?

In our organisation we created an event called Zotka's talents (Zotka is a popular short name for our organisation) to celebrate publicly these young talents. With that we are try to show to the public successful youngsters who made their achievements with knowledge and skills in science.

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# KITES IN THE PEACEFUL UKRAINIAN SKY

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May, 9th, 2012 at 10.00 am 67 kites depicting the orders od the Great Patriotic War (1941–1945) soared into the sky over the Eternal Flame. This action took place as part of the Victory Day celebration and was performed by the city children's public organization "Association of Kites". Many of its members are great grandchildren of those who took part in the war.

In the city of Kherson (the Ukraine) festivals of kites take place every year under the patronage of MILSET, Eurotalent and the international movement "One Sky — One World". The idea of such festivals first came to Janet Parker Ambrous, owner of a small kite shop in America.

I have developed a set of tools to make paper kites with contour images of World War II orders and medals. The set can be used at Technology classes in primary school.

Together with the city department of education we regularly hold master-classes, where we teach primary school teachers to make kites, depicting the orders of the Second World War.

Kite launching is always great fun for both children and their parents. We organize kite making and kite launching contests in different schools of Kherson. Winners of the school contests take part in the city competition.

While holding the line, feeling the wind blow, and looking at the kite soaring up in the sky, a child feels proud and close to nature. Making and launching kites depicting the orders also develops the child's interest to the history of his\her country.

http://jose.milset.org/