Mouvement International pour le Loisir Scientifique Et Technique.
The International Movement for Leisure Activities in Science and Technology.

JOSE

Journal on Science Engagement

Issue 5, September 2019

ISSUE 5, 2019

Founded by The International Movement for Leisure Activities in Science and Technology (MILSET — Mouvement International pour le Loisir Scientifique et Technique).

EDITORIAL BOARD

Mouvement International pour le Loisir Scientifique et Technique
International Movement for Leisure Activities in Science and Technology

EXECUTIVE COMMITTEE

President
Roberto Hidalgo
Mexico

Vice-President
Adnan Al Meer
Kuwait

Reni Barlow
Canada

General Secretary / Treasurer
Carole Charlebois
Canada

Honorary President
Jean-Claude Guiraudon
France

Committee Members
Ksenia Salnikova
Russia

Jeppe Willads Petersen
Denmark

Special Advisor
Driss Louaradi
Morocco

MILSET is a non-governmental, non-profit and politically independent youth organisation, which aims at developing scientific culture among young people through the organisation of science-and-technology programmes, including science fairs, science camps, congresses and others activities of high quality.

Mission and Objectives

MILSET supports its member organisations to engage youth in science, technology, engineering, arts and mathematics (STEAM) through motivation, cooperation, collaboration, and networking. We do this by:

Helping member organisations create a local or national environment to motivate youth to be involved in STEAM;

Connecting, supporting, and representing member organisations around the world;

Stimulating and supporting international youth networking and cooperation through STEAM; and

Providing member organisations with global opportunities to engage youth in STEAM.

Philosophy

MILSET programmes and events reflect the organisation's non-negotiable values:

- Participation: MILSET programmes and activities are open to all.

- Ideology: MILSET programmes and activities focus on science, technology, engineering, arts, and mathematics (STEAM) and are free of political, religious and other ideological agendas or propaganda.

- Integrity: MILSET is honest, consistent, and clear in its conduct and relations with members, youth, and others.

- Competition: MILSET believes that competition motivates youth to participate in science, technology, engineering, arts, and mathematics (STEAM);

ESIs are non-competitive events with a program that focuses on cooperation, collaboration, and networking. No form of project competition or awards is permitted; youth may be recognized equally for their participation.

AFRICA AMLAT ASIA EUROPE NORAM VOSTOK

Table of Contents

LETTER OF THE EDITOR

Alexander Leontovich 5

BEST PRACTICES

Reni Barlow (Canada), **Ksenia Salnikova** (Russia) 7
International Experience in Organizing Youth Science Project Contests (Mexico, Taiwan, European Union, Canada).

Driss Louaradi (Morocco) 23
A priority to promote science in Africa.

Vasilii Pavlov (Russia, Yakutia) 33
International Science Games: convergence and collaboration in science learning.

Zuzanna Ziajko (Poland) 36
Expo Sciences Europe 2018 in Gdynia, Poland.

William Suarez Fernandez, ... 40
Nora Milena Roncacio (Colombia)
Research incubators.

STEAM FOCUS

Jeppe Willads Petersen (Denmark) 43
Social interactions at a science camp.

FROM THE HISTORY OF MILSET

Juan Manuel Padilla (Argentina) 49
Enrique Padilla Award

USEFUL LINKS

Sheikh Abdullah Al Salem Cultural Centre - Kuwait City 52

Centre For Technical and Vocational Education and Training 53
- Abu Dhabi

Living Bee Museum - Rabat 54

Editor

Dear colleagues,

We offer you the fifth issue of JOSE – the Journal on Science Engagement. JOSE is the main print publication of MILSET. It's main tasks are to unite all the members of our movement, telling them about the priorities, history and events in MILSET, and presenting interesting projects and methods of science education on different continents. Today, the world is global and people in different countries involved into popularization of science and youth scientific creativity face similar problems. Therefore, it is important to collaborate on how to resolve them.

There have been many interesting events in MILSET since the last issue. There were the traditional MILSET Regional Expo-Sciences, which were held last year in Chile, South Korea, Poland, and Yakutia (Russia), MILSET Young Citizens Conferences, Leaders Congresses, Science Camps and many others. We now have the MILSET Expo-Sciences International standards that will help ensure continuity in the organisation and the quality of future ESI events. Regional Expo-Sciences standards should be ready by the end of the year. The Executive Committee has completed a major review of the MILSET Statutes and Internal Rules. A modern vision of governance will soon be in place, improving our development and management of member organizations, governing bodies and regional offices.

MILSET's main priorities have been reconfirmed: the popularization of science and technology; the non-competitive nature of its events; and stimulation of communication between young people from different countries. The MILSET family unites youth and adults regardless of nationality, political views and religious affiliation on the basis of work in the field of scientific and technical creativity and integration of the arts. Also, we launched a new MILSET web site and online registration system.

In this issue we present the most interesting materials from different countries and continents.

The first article presents research by Ksenia Salnikova (MILSET Executive Committee Member, Russia) with assistance from Reni Barlow (MILSET Vice-President, Canada). They compare well-known youth STEAM project competitions from Mexico, the European Union, Taiwan and Canada, exploring the principles of selection of students' projects, age groups and thematic sections, jury selection, presentation of projects, project evaluation criteria and award structures. In conclusion, the authors discuss a topical issue – how to reward the best projects? The article will be very useful for organizers of national competitions in different countries.

An article by Driss Louaradi (Morocco) describes the prospects for science education development in Africa.

William Suarez Fernandez (Colombia) tells about the promising experience of Research Incubators as a platform for the development of research abilities in students.

Vasily Pavlov (Yakutia, Russia) talks about a grand event - the International Intellectual Games, which were held last year in Yakutia. He analyses games as a model of cooperation and scientific education of young people.

Our regular author Jeppe Willads Petersen (Denmark) presents an article in the classical scientific style. He writes about an original method for organizing project work in a scientific camp (using the example of the 11th International Research School) conducting research into the social connections between the participants.

Juan Manuel Padilla (Argentina) tells about the life and tragic death of his father, Enrique Padilla, who was a founding director of MILSET and contributed significantly to the development of the organization – the reason that the Enrique Padilla Award is so valued within MILSET.

The issue concludes with an article by Zuzanna Ziajko (Poland) who describes the process of organizing a regional Expo-sciences using Expo Sciences Europe 2018 in Gdynia as an example.

The Editorial Board hopes that after reading the materials of this issue you will have a richer understanding of the ideas of MILSET and of the people who implement these ideas around the world.

I also invite all of you to become authors of articles for the next issue!

With respect,

Alexander Leontovich
Editor-in-Chief
MILSET Vostok President

International Experience in Organizing Youth Science Project Contests (Mexico, Taiwan, European Union, Canada)

Ksenia Salnikova

Vice-Principal of the Sakha Junior Science Academy,
MILSET Executive Committee Member,
Moscow, Russia
e-mail: ksbarkova@yandex.ru

Reni Barlow

Executive Director, Youth Science Canada;
Vice President, MILSET
Ottawa, Canada
e-mail: reni.barlow@youthscience.ca

Abstract:

This article compares a number of important aspects of youth science project contests in different countries. After visiting national and international level contests in Taiwan, Mexico the European Union, and Canada, the authors conducted an analysis of their key components such as: principles of project qualification, age groups and project categories, format of project presentation, jury formation, criteria and system of evaluation and awards. Each aspect is reviewed in a separate section of the article. And at the end of each section recommendations useful for youth project contest organizers are given.

Key words:

youth science project contests, international contests, national contests, project activity, research activity, project works qualification, age groups at the contest, project categories, jury formation, project presentation format, criteria and system of project evaluation and awards.

Contests of project and research works of school students are widespread around the world. In many countries they have turned into a successive multi-leveled system (on local-regional-national-international levels) where winners of each stage have an opportunity to go further and as a result to present their work on the international stage. It is from the national contests of project works that the MILSET member organizations select the participants for regional and international MILSET Expo-Sciences.

Participation in such contests usually motivates school students to do their research or projects after regular school hours, to adopt norms and techniques of scientific work and presentation of its results. This activity often helps school students to find their interest in scientific and engineering spheres, to choose their future career and to plan a trajectory of their further development.

In this article we will analyze three contests of project and research works among school students: in Taiwan, Mexico and the European Union. We have chosen these contests according to their geographical remoteness in order to compare the most different experiences. All three contests represent a final stage of project selection at the national or international level and also have international status. Each contest has unique features defined by a number of important components:

- What is the procedure of selection and submission of the works for the contest?
- What age groups and sections do the participants compete in?
- What is the format and rules of presentation of works?
- How is the jury formed and according to what criteria do they carry out the evaluation ?
- How are the winners ranked and awarded?

We are going to compare the three contests in question according to these criteria.

It is far easier and more effective to develop your own events if you know how others are organized. We hope that this comparison and analysis of different approaches to the organization of national contests of project works will be useful to the MILSET member organizations, which hold or are planning to hold similar events in their countries, and, perhaps, they will be able to find they could use themselves.

1. General information on contests

The Taiwan International Science Fair (TISF) is the final stage of selection of project research works of school students in Taiwan. TISF has been carried out annually in the capital of Taiwan Taipei: since 1960 as a national contest, and since 1991 as an international one. Now Taiwan school students compete not only with each other, but also with children from other countries. The contest has the accreditation of Intel ISEF, i.e. the best works can be sent there, but only from Taiwan. The main organizer is the National Taiwan Scientific and Educational Center (NTSEC) – the state center. Statistics of TISF 2018: 23 countries, 160 projects (40 international, 120 of Taiwan), 500 participants.

The contest ExpoCiencias Nacional in Mexico – the final stage of selection of project research works of school students. It has been carried out annually since 2003 in different cities of the country. International projects, which also annually take part in ExpoCiencias Nacional compete in a separate category. The main organizer of the contest is the public association National Network of Scientific and Technical Creativity of Youth (Red Nacional de Actividades en Ciencia y Tecnologia – RED). Statistics of 2018: 11 countries; 500 projects (37 international, 463 of Mexico); 2000 participants.

The European Union Contest for Young Scientists (EUCYS) is organized by the Directorate-General for Research and Innovation of the European Commission for promoting the idea of cooperation and mutual exchange between young scientists. Since 1989 the contest has annually been bringing together the winners of national contests of scientific works of school students from the European Union countries and also countries-members of the European research and innovative program Horizon 2020, neighboring countries, and those countries that have signed the agreement on cooperation in science and technology with the EU. The list of countries-members of EUCYS is published on the website of the event. Every year the venue of the contest changes. Hosting the contest is a good chance for a country to draw attention of its youth to careers in science and technology. In 2017 EUCYS was hosted by Estonia, which was a big event for this country: the event received extensive coverage on television and other medi; the Minister of Education of the country attended the official ceremonies. Statistics of EUCYS 2017: 38 countries, 146 school students, 89 projects.

The Canada-Wide Science Fair (CWSF), organized by Youth Science Canada (YSC), has been operating annually since 1962, making it one of the oldest national science fairs in the world. The weeklong event each May maintains a strong national focus; international participation is limited to a small number of invited guests. In 2018, the CWSF welcomed 468 Canadian finalists with 402 projects, plus 10 international youth with 5 projects from Mexico, Taiwan and Thailand.

2. How are the works selected and submitted?

Taiwan International Science Fair selects participants from Taiwan at the correspondence stage of the contest, which is organized three months prior to TISF. Written texts of the best works are sent to the contest by the schools where project and research activity is practiced. The jury shortlists about 120 out of 200 works for participation in the TISF. Foreign participants are selected at national and regional levels in different countries. The responsibility to select international participants lies on "national coordinators". In Russia this is the All-Russian Movement of Creative Teachers "Researcher". The free participation quota provided to each country participating in TIS is two people / two projects. The national coordinator sends to organizers the completed application and summaries of projects in English in due time. Since 2018 national coordinators have been able to send participants over a quota on a paid basis.

Participants from Mexico can get to ExpoCiencias Nacional having won one of 38 selecting events, among which are:

- 28 regional ExpoCiencias;
- 6 affiliated contests of different levels;
- 4 scientific actions for children up to 12 years.

A certain quota – the number of works which can be sent to the national contest is allocated to each event. This quota is changed every year based on the results received by the projects previously sent by this selecting event.

International projects are selected by the partner organizations in different countries. Restrictions for participation are not given. For participation it is necessary to register the application beforehand and to send the full text of work in English. International participants pay participation fees, covering accommodation, food and participation in the program of the contest.

Winners of national contests of project research works of the EUCYS member countries take part in the European Union Contest for Young Scientists. Participants of each country are nominated by "The national organizer" (in Russia it is the contest "Step Into the Future"). Each country can send up to three projects and six school students. Projects can be conducted individually or by a team. At the same time in one project team there should not be more than three people, and all of them surely have to be present at a contest. For participation the national coordinators register the application, upload the summary of the project and the written report of up to 10 pages. Participants from EU member and associate countries do not pay a participation fee, which includes travel, as well as accommodation and food during the days of the contest. Guest countries pay a participation fee and the cost of accommodation and travel.

Canada-Wide Science Fair (CWSF) finalists are selected at 104 regional science fairs, held in every province and territory. Each region is allocated a number of CWSF finalists based on student population. The smallest regions – those with 1,000 to 3,499 grade 7-12 students – can send three finalists. The largest region (Toronto), with approximately 200,000 grade 7-12 students, is eligible to send 27 finalists. The system is intended to ensure that every part of Canada is fairly represented, though the structure slightly favours students from smaller, rural, remote and Northern communities. Six of the 104 regions serve Indigenous populations exclusively – an area of significant growth in recent years. CWSF projects may be in English or French and must be the work of one or two students. Youth Science Canada coordinates all travel for Canadian CWSF youth and adult participants, including purchasing all plane, train and bus tickets. The cost of travel is equalized so that every region pays the same amount per participant, ensuring access for all Canadians, regardless of location. In general, the cost of CWSF participation is covered by fundraising at the regional level. International guests pay the full CWSF participation fee and cover their own travel costs.

For these four contests we see that there are two approaches to the selection of works: to centrally carry out the evaluation of the texts of works at the correspondence stage, as it happens in Taiwan, or to trust shortlisting to affiliated contests and regional or national stages as it happens in Mexico, Canada and the European Union. The first option gives more certain quality assurance of the selected works as the evaluation is carried out by a skilled team of experts, who are familiar with the criteria, and generally not connected with the contestants. It makes sense to apply it for contests where the number of works is not too large – for example, in Taiwan where about 120 works are selected from 200. At the correspondence stage this principle is quite justified, but it is difficult to apply to larger events. Centralized selection requires considerable resources; however, it is not impossible.

The BT Young Scientist and Technology Exhibition (BTYSTE) in Ireland – operating since 1965 – uses a centralized correspondence approach to select 550 projects from over 2,000 applicants for its annual national exhibition in Dublin.

Entrusting project selection to affiliated events allows more youth to participate in the contest, but also to build a multilevel competitive system. In Canada, the focus is on representation of the country, both geographically and by population. Regions select their best projects, with most using the CWSF evaluation criteria. This is similar to Europe, where each country can send its top three projects. Other jurisdictions like Mexico base allocation in part on project quality, modifying quotas given to affiliated events based on their performance in the previous year.

3. Age groups and sections

Only senior school students can take part in Taiwan International Science Fair.

Participants compete in 13 scientific sections:

- Mathematics;
- Physics and astronomy;
- Chemistry;
- Sciences about Earth and the environment;
- Zoology;
- Botany;
- Microbiology;
- Biochemistry;
- Medicine and health;
- Engineering;
- Computer sciences and information engineering;
- Ecological engineering;
- Social and behavioral sciences.

Expo Ciencias Nacional allows, perhaps, the widest range of ages: from kindergarten to final years of the university. The authors of the projects compete in the following age categories:

1. Scientific gangs (Pandilla Científica):

   - preschool children and primary school pupils of 1-2 grades;
   - primary school pupils of 3-6 grades;
   - secondary school students (12-14 years).

2. High school and undergraduates.

3. Final years of the university.

Projects are represented and evaluated in 10 subject sections:

- Exact and natural sciences
- Medicine and health
- Social sciences and humanities
- Engineering sciences
- Agricultural and nutrition sciences
- Science promotion
- Environmental sciences
- Mechatronics
- Biology
- Computer sciences and software

The official age limits at the European Union Contest for Young Scientists are secondary school students, ages 14-20, though students who completed their project in the final year of secondary school may have just started university. Age limits apply to all members of the project team.

All EUCYS projects are grouped into 10 subject sections:

- Biology;
- Engineering;
- Computer sciences;
- Mathematics;
- Materials;
- Environmental sciences;
- Medicine;
- Chemistry;
- Physics;
- Social sciences.

The Canada-Wide Science Fair (CWSF) has three age groups, based on school grade:

- Junior (Grade 7/8 – approximately 12-13 years old);
- Intermediate (grades 9/10 – approximately 14-15 years old); and
- Senior (grades 11/12 plus Cégep in Quebec – approximately 16-18 years old).

The CWSF groups projects into seven challenge areas:

- Discovery;
- Energy;
- Environment;
- Health;
- Information;
- Innovation;
- Resources.

The question of which section the work will be in is important enough for the authors, because the results often depend on who evaluates the work. In the world there is no universal, widely-accepted classification of sciences, therefore at different contests and conferences school students often face completely different systems of sections: the same work can be referred to the physics' section at one place, and somewhere else to the section of space or engineering. Often the organizers make separate sections for scientific areas popular in this region. For example, in Mexico there are Mechatronics and Science Promotion, and in Europe where many industries are focusing on the development of innovative materials, it is logical to see the section called Materials.

Today when school students carry out increasingly cross-disciplinary works, it is becoming more difficult to assign a work to a particular thematic section. Therefore, division into sections according to the type of problem that the work is aimed at or the type of method used in it (survey, experiment, engineering, etc.) become more relevant. This approach has been applied since 2011 at the Canada at the Canada-Wide Science Fair, as well as in Russia at the Vernadsky All-Russian Youth Contest.

4. How is the jury formed?

At the Taiwan International Science Fair (TISF) the jury is formed according to the subjects of the works selected at the correspondence stage: more experts are attracted to more popular sections. The best experts, who know English, are recruited from the universities and scientific centers of Taipei. The jury consists mainly of skilled experts who participate in TISF from year to year, at the same time about 20% of them change each year. In total about 35 experts work at the contest (where on average there are 160 projects). The work of judges is paid.

At ExpoCiencias Nacional the jury team is annually formed anew as the contest takes place every time in a different city. The main list of experts is compiled by the organizing committee on site and includes teachers and scientists of the universities and scientific labs of the state/cities. At the same time, experts are recruited through open electronic registration for all comers. The final list of the jury is approved after the formation of the list of participating works in accordance with their topics. Special training is held for all experts before the start of the fair. The organisers also send out video guides, which tell about the principles of expertise, criteria and the system of assessment in detail. Each project is evaluated by at least three experts. At the same time each expert interviews no more than seven projects. The number of experts annually changes: 2017 – 235 experts (500 projects), 2016 – 400 (500 projects). Experts do not receive any monetary royalties, it is an honorary volunteer work for them.

The jury of the European Union Contest for Young Scientists is formed by the European Commission from among scientists and representatives of business with the international reputation. The usual number of judges is 18-20 people (for 90 projects). When forming it is important to strike a balance for both geography and gender. To achieve maximum transparency and openness of refereeing, the structure of jury with photos and biographies must be published on the website of the event approximately one month before the beginning of EUCYS. As a result, the number of experts for each section is not defined by the works submitted this year but the statistics of previous years: biology (21% of works), physics (16%), engineering (14%) and the environment (14%), and less popular – social sciences (1%), materials (1%) and mathematics (2%). At the same time, it is initially announced that not all the judges evaluating a project are profile specialists in the project subject area, therefore one of the contestant's tasks is the ability to explain the work to a non-specialist. According to the rules of the contest 1/3 of the jury must be updated annually. The president of the jury who coordinates the work is elected annually just before the contest. The openness of refereeing is observed also during the contest: one can read about its structure in the EUCYS catalog and its program, see experts' photos on plasma panels in the exposition hall. At the stand presentation the jury can be recognized by a certain color of the T-shirts they wear. The work of the jury at EUCYS is paid by the European

Commission. It is interesting that the program for the judges who arrive at the contest from different countries is formed in such a way to ensure minimum crossings with the participants and their leaders. They live in different hotels, eat separately, they have their own cultural program. It is made to exclude any possibility of influence on judges from the participating delegations.

Similar to Mexico, the Canada-Wide Science Fair takes place in a different city each year, though a three-city rotation has recently been adopted. Youth Science Canada, in collaboration with the local host team, recruits approximately 370 local volunteer judges from post-secondary institutions, industry, government agencies, research facilities, and professional associations. Judges with PhD qualifications are preferred; master's level and professional degrees (MD , PEng, DVM, etc) are highly desirable. Some judges with bachelor's qualifications are recruited, but they are almost always assigned to evaluate junior projects. Approximately 75 French-speaking or fully English-French bilingual judges are required to accommodate projects in French, which represent 10 to 15 percent of those at the CWSF. Effort is also made to recruit judges with expertise that roughly matches the project profile of the fair. Particular attention is given to ensuring an appropriate number of judges in engineering and health, which are popular project areas in Canada.

Summing up this part of the article, we can make several valuable generalizations:

1) In order that attention has been paid to all the contestants during the expertise, the organizers seek to make the number of experts in each section proportional to the number of works in it. At TISF and ExpoCiencias the experts are invited only after the approval of the list of the participating works. At EUCYS and the CWSF where the jury is formed beforehand, they use statistics from previous years.

2) It positively affects the quality of expertise if a significant part of the jury consists of persistent experts, who have long-term experience and are familiar with the criteria and the system of assessment at the contest. However, if the location of the contest changes annually, the participation of permanent experts will either demand additional resources (as in the case of EUCYS), or if there are no such resources, it becomes impossible (as in the case of ExpoCiencias Nacional). Interestingly, the CWSF is considering transitioning to a core team of 25 to 30 persistent judges who would be supplemented by locally-recruited judges. The goal is to increase judging consistency and reduce the overall number of judges required. If all members of the jury are recruited annually, it is important to pay close attention to their preparation: to provide instruction and/or training.

3) The principle of balance according to gender and geographical criteria among the jury used on EUCYS creates conditions for more independent and objective examination and also allows to avoid suspicions of bias of assessment.

4) In some countries and regions, the work of experts at a contest is paid (Taiwan, the EU), and in others it is volunteer work (Mexico, Canada). Paying experts gives organizers more freedom in selecting the jury based on their professional experience. The volunteer principle of work of experts helps create a community of enthusiasts, who regard the activity as a social contribution to the development of the country/region. At the same time, it is necessary to understand that a number of conditions – relatively high social status and the salary of the teacher and scientist in the country, high prestige of the contest, etc. - are necessary for such social motivation.

5. Format and rules of project presentations

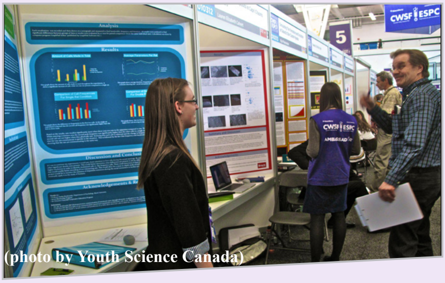
At Taiwan International Science Fair, the authors present their projects at the stands. Rather strict safety rules act during the event. At the stands it is forbidden to have chemical reactants (including even water), live or dry plants, samples of soil and minerals, food and household goods (even if they are the actual result of the project work), sharp objects, glass, etc. In fact, only posters and models are allowed. One day is completely devoted to interviews with the experts. On that day neither research supervisors, nor attendants, nor general public are allowed to visit the poster session. The day is rather intense for the contestants: they spend most of the time waiting for the experts, without knowing the exact time of their arrival, without having an opportunity to depart and look at other works. On the next day the excursion program is planned by TISF for the participants, and on the third day they come back to their stands to talk about their works with visitors, journalists and each other. However, on that day the participants only have the time before lunch for free presentation of their works, so they do not often manage to look at other works at the contest.

At ExpoCiencias Nacional the participants also present works only at the stands. The poster exhibition lasts for two full days. At the same time there is no special day or period for experts' interviews. The experts visit the project along with the public and journalists. The Mexican contest is strongly marked out with the interactivity of demonstration of material at the stands. Here at stands there are simple chemical experiments, scientific quizzes are held, ready-made food and cosmetics (cream, soap) are tasted and tested, mechanical and electronic models are shown, etc.

At the European Union Contest for Young Scientists it is also organized in the format of a poster exhibition, which is open for the public and the press within three days. The event has safety rules, but they are not as strict as at TISF, which uses the ISEF rules. In rules of a contest it is just reported that the European Commission reserves the right to forbid to present at the stand any material which poses risk to health and safety or which is considered unacceptable for public demonstration. In general, at stands it is possible to meet interactive and working interactive models, and samples.

At EUCYS, experts evaluate projects at the same time as visitors come and go. Jury members post a sign at the project to indicate that they are judging and should not be disturbed. They can also be recognized by their distinctive t-shirts. Their photos are also placed on electronic displays and in the participation guide. Both a jury member and a student or a journalist from television can come to the stand, listen to the participant's presentation and ask questions. Normally, the experts always allow the project authors to end a conversation with the visitor before starting to interview them. For the delegation leader (national organizers) there is a special program, which includes excursions, seminars, and meetings. During the evaluation , they almost never appear in the exhibition hall. According to the rules of participation, their presence at the stand during the interviews is strictly forbidden and breaking this rule may lead to the removal of the project from the competition. Participants spend most of the time at their stands presenting the projects, because, according to the rules of evaluation , at least five judges have to interview each of the 90 projects, which means that each of 20 judges interviews about 25 projects. The judges also need time for meetings and discussions during the day. It is really tiring for the participants: they have to spend nearly three days from 9:00 till 17:00 indoors; however, most participants make time to visit other projects between jury interviews, which typically last 20-30 minutes Such long work with the experts can also be emotionally demanding. To take their mind off the evaluation the organizers offered the participants the opportunity to join a game: to build a pyramid of plastic cocktail sticks together with the students from neighboring stands, applying their creativity and engineering knowledge. This amusing competition – whose pyramid will be higher – helps participants during the breaks between interviews with judges to relieve tension and make friends with other contestants.

The Canada-Wide Science Fair has one day dedicated to judging, during which only the finalists, judges and event organizers are permitted in the exhibit hall. Most CWSF finalists are busy presenting and/or speaking about their project throughout the morning and afternoon of judging day. The next day is dedicated to tours of local points of interest followed by three days of school and public visitation, during which the finalists are also given scheduled time to visit other projects and approximately 75 interactive STEM Expo exhibits by sponsors, universities, research institutions and youth STEM promotion organizations.



Stands presentation at the Canada Wide Science Fair 2018.

Poster presentation is the general format for all four contests. It allows experts to discuss projects with participants in greater detail, to come to a substantial dialogue and ask some detailed questions. For participants, an interview at their stand is less intense than an oral public presentation, and it gives participants a chance to present their projects repeatedly, refer directly to their poster and dispay materials and (usually) build confidence with each presentation. In addition, at the stands participants present their work to different audiences, including those who are not specialists on the subject. It helps them to develop the skills of promoting their research or invention.

Presenting a project to members of a jury can be a challenging and difficult experience for a student, even in the form of individual interviews at stands. How do we minimize the tension and nervousness? We see two possible solutions.

- At TISF, CWSF and other contests of the Intel ISEF system, only one day is given for evaluation. On that day no one except the judges and participants is allowed to visit the stands. The lack of distracting factors helps participants focus, but does not provide much opportunity to relax by switching to another activity. Although many enjoy it, this is always the most challenging day for participants. To help compensate, the following day is usually reserved for excursions or cultural events.

- At ExpoCiencias and EUCYS the jury members visit the stands alongside the public and journalists. This may be less stressful for the participants, but it may also be more difficult for them to concentrate – and it takes more time.

It should be specially mentioned that at all four contests the presence of research supervisors or mentors at the stands is forbidden during judging. It is obvious that this rule is in place to prevent any influence on the evaluation process. However, the fact that research supervisors or mentors cannot watch their students' presentations prevents them from noting strengths and weaknesses and then discussing those with the participants so they can improve. The EUCYS model does permit the judging process to be observed from a distance and for the supervisor to discuss it with the participant(s) immediately afterward.

It is very important to schedule time when participants can visit other participants' stands. Often during judging, and sometimes during the public exhibition as well, participants have no opportunity to view other projects: they are either waiting for a judge or presenting their projects to visitors. When no specific time is allocated for participants to visit other projects, they lose a valuable opportunity to learn about project planning, presentation formats – and to meet their peers from other regions or countries.

6. Criteria of evaluation and assessment system

(Photo by European Comission)

Projects evaluation at the EU Contest for Young Scientists 2018.

At Taiwan international Science Fair (TISF) on the day of the evaluation , the judges normally interview all the participants in the first half of the day. Each interview lasts for about 10-15 minutes. Each project is interviewed by at least four experts.

Project summary
Clarity of the text and its structure
Literacy
Well defined goals
Project methodology/stages of development
Correspondence between the goals and results

Visual presentation of the project
Adequate representation of the ideas and principles of work
Supporting materials (photos, maps, graphs, models)
Presentation Creativity
Creative component of the presentation

Oral presentation of the project
Mastery of the subject
The author's contribution
Accuracy of the data
Accuracy of representation
Adequate presentation of the ideas
Understanding of the subject
Knowledge of technical language

Relevance of the research
Social value
Topicality of the subject
Possible application according to the context
Innovation
Good explanation of cognitive abilities of the person

Each expert gives points to a project according the following criteria:

- Originality and creativity
- Scientific approach
- Scientific thinking and understanding
- Thoroughness and effort
- Academic or practical value
- Presentation and technical skills
- Research data and references

After lunch the jury carry out discussions and give works an average score for each criterion. If the judges do not come to an agreement on a certain project, then during the second half of the day the student(s) is interviewed again, and, if necessary, more experts are invited.

At ExpoCiencias Nacional examination takes place in two stages. The first stage is correspondence, during which the judges study the written texts of the works. The second stage is oral interviews during the poster session. According to the results of both stages, every judge fills out an evaluation sheet where a score from 1 to 5 is given for each criterion. Evaluation sheets have only a few differences from section to section, mainly under Relevance in the section "importance". Here is an example of an evaluation sheet:

(Photo by ExpoCiencias Nacional)

View of stands presentations at the ExpoCiencias Nacional in Mexico.

Experts do not show their sheets to each other and do not discuss their evaluation with their colleagues; they simply hand in the sheets. The best projects become known only on the last night before the awards ceremony, when all the points are counted.

It should be noted that on the website of the event, as well as in the guide for the participants and the jury, it is explained in advance what is and what is not included in the evaluation for the competition.

What is evaluated?	What is not evaluated?
Student's work and efforts to present at the expo	Student's origin, life history and CV
Presented information in correlation with scientific concepts	Money invested into the project
Quality of the contribution that the project makes to its scientific sphere	Difference in views between the judge and the participants
Acquired scientific skills	Visual effect from the presented material and the amount of technical resources available to student
Contribution to the promotion of the subject	Visual appeal of the stand and the prestige of the institution that provided it

This interesting Mexican solution not only establishes a clear focus for the jury members, but it also prevents various complaints about the results of the evaluation.

At the European Union Contest for Young Scientists the expertise also takes place in two stages:

The first stage is correspondence, within two months after the works are accepted for the contest (usually from the end of June to September). During this time, the jury reviews the participants' written reports. Each member of the jury has to review about 15 works. At this stage, the jury members may seek advice from other experts if the topic of work is beyond the scope of their competence.

For evaluation the following criteria are used:

- originality and creativity in the identification of the main problem and approach to it;
- skill, care and completeness of work at the stages of design and realization;
- the general logic and completeness of the research from the plan to the conclusions;
- logic and clarity of reasoning in the of interpretation of the results;
- quality of the written report (without exceeding the standards for its length).

While applying these criteria, the jury also considers the educational level of the contestants and the quality of resources available to them. They do not give any points to each of the criteria, but are guided by a simple principle: following the results of the first stage of expertise, each judge assigns the work to one of three groups:

- A - Worthy of a prize;
- B - Maybe worthy of a prize;
- C - Not worthy of a prize.

In addition to this level, each judge specifies the degree of confidence in these estimates. For example, this confidence cannot be high if the judge relied on opinion of colleagues, more competent in the project's field.

Upon termination of this stage (usually at the beginning of September) the jury meets in Brussels for discussion of all works. The president of the jury collects the scores and assembles them into a table, which becomes available to all the judges before the start of the second stage of the contest.

The first stage (in the opinion of the head of the jury) was designed to provide a preliminary overview and assessment of the works. The results of the first stage are not summarized with the ones of the second stage; moreover, the final results often differ radically from the preliminary ones.

The second stage of the evaluation takes place at the poster session. After the opening of the contest, the jury members meet to determine who will interview each of the projects and the interview schedule. The president of the jury forms the interview plan. According to the standards, at least 5 judges must visit each project. Thus, on average each judge interviews about 25 projects. Interviews take place over three days (the second, the third and fourth days of the exhibition). When the schedule is drawn up, the jury, through the delegation leaders, advises the participants about the interview schedule so that they will not leave the stands during this period.

Interviews are not confidential: visitors and observers at this time are also in the exhibition space and visit different projects. Jury members can be easily recognized by distinctive T-shirts, so it is obvious to everyone that now a jury member has approached the stand and will be interviewing the authors. In addition, jury members post a sign on the project to indicate that judging is in progress. Everything is as open as possible. National organizers, other accompanying people and scientific supervisors of the project cannot be present at the stands during the interview according to the contest regulations. They are asked to leave if the jury member feels they are too close.

During an interview judges may not only evaluate the works, but also advise the participants, giving them recommendations. According to some participants' feedback, not every expert does it, but the jury has given some of them some important ideas.

Criteria for evaluation of works at the second stage are the same as at the first one (only the last criterion "quality of the written report" is replaced with "quality of the presentation and ability to discuss the project with the judges"):

- originality and creativity in the identification of the main problem and approach to it;
- skill, care and completeness of work at the stages of design and realization;
- the general logic and completeness of the research from the plan to the conclusions;
- logics and clarity of reasoning in the of interpretation of the results;
- quality of the presentation and ability to discuss the project with the judges.
- There is also a list of recommended questions for the jury, the answers to which are important for proper evaluation of the work:
- Who is the author of the idea of the project?
- How qualitatively and fully was the research conducted?
- Was a new approach developed?
- How are the materials and the methods presented?
- Is there anything in the materials presented at the stand, which was not mentioned in the written report?
- Is the contestant aware of the limitations for the equipment and methods used?
- Does the contestant have a plan of further development of work or any alternative hypotheses?

Following the results of the interviews, as well as in the correspondence stage, each judge refers the work to one of three groups:

A =Worthy of a prize;
B= Maybe worthy of a prize;
C= Not worthy of a prize.

However, this time the range of marks is wider. Each category includes three options: A +, A, A-, B +, B, B-, C +, C. Subsequently, these marks are turned into numbers from 1 to 8.

In assessing the quality of the contestants' achievements, their age, level of education and external assistance provided to them is taken into account.

According to the regulations, the jury members must report to the commission if one of the following facts is observed:

- the contestants have received excessive support from experts during the work on the project;
- the contestants had exclusive access to resources;
- the ideas of the contestants' work are plagiarised (in this case, participants can be removed from the competition altogether);
- the participants refuse to provide information about the work.

After the interviews, the judges gather for a meeting, where they rank the works. The calculation of points is conducted digitally. This meeting is always recorded. First, the jury members discuss the projects by scientific disciplines and rank them within each category, and then there is a general discussion where the list of winners is approved. This list is signed by all members of the jury and given to the secretary for the preparation of certificates. All the decisions are not made by voting, but by the consensus of all the judges.

The president chooses several people from the jury to write final reviews in English for the winning projects. These reviews are no more than 10 lines in volume and understandable to the press and a wide audience. For works that have won Honorary Awards or Special Awards, the president writes reviews personally, indicating what the award has been given for.

The final decision of the jury is not subject to revision. No written feedback / review of the work is provided to the contestants (as it is explained, to avoid complaints and appeals). All the feedback that can be given is given during the interview.

During the morning of judging day at the Canada-Wide Science Fair, each project is evaluated five times by individual judges who are members of a team judging a group of five projects. Each judge spends 20 minutes with each project, followed by 10 minutes to make notes and assign a level and rating (high, mid, low) in each of three sections:

- Scientific thought (weighted 50%);
- Originality and creativity (weighted 33%); and
- Communication (weighted 17%)

During the two-hour lunch break, each team of judges meets to discuss and then agree on a consensus score for each of their five projects in each section. The score consists of a level from 1 to 4 that rates the project against a set of criteria for each section – and a rating from 0 to 9 that represents the relative quality of the project within that level. The level and rating combine to form a decimal number from 1.0 to 4.9 for each section. These numbers are entered into software, which applies a weight to the scores. Next, a preliminary rank-ordered list of projects is generated. Within each age/grade category, the top 10 are assigned gold medals, the next 20 silver and the next 30 bronze. After lunch, small teams of experienced judges visit the projects on each cusp or margin between medal groups (as well as those between bronze and no medal) to determine whether any projects should be shifted up or down. These changes are entered, and the final medal lists are generated. In the afternoon, judges are reorganized into different teams to evaluate projects for approximately 25 special awards offered by various sponsors and organizations.

The TISF 2018 "Young Scientist Award" is presented to the winners by the president of Taiwan.

We can see that evaluation criteria and strategies can be very different, which helps distinguish contests from each other.

What is interesting here is the difference in approaches to final assessment. At TISF, EUCYS and the CWSF all the decisions are made collectively, by consensus of the jury members, and at ExpoCiencias by mathematical calculation of the points each expert has given. It should be noted that for truly objective expertise it is important that all the judges equally understand the evaluation criteria and the value of each point. That is why it is important to prepare the judges for work through briefings, trainings, preliminary discussions, as it is done in Mexico.

The final discussion also helps to establish a common understanding of the criteria and arrive at a unified assessment of the work. At the same time, there is a risk that more experienced or reputable experts could dominate the decision-making, and possibly "impose" their position on their colleagues.

7. Results and awards

At Taiwan international Science Fair (TISF) projects are awarded by section. The usual proportion of places (which can change according to the decision of the jury) is as follows:

5% – 1st place;
5% – 2nd place;
15% – 3rd place;
20% – 4th place.

Cash bonusesare given as prizes:

1st place – NT$5000 (about 162 USD);
2nd place – NT$3000(about 97 USD);
3rd place – NT$2000 (about 65 USD);
4th place – NT$1000 (about 32 USD).

The highest award of TISF is the "Young Scientist Award", which is presented to the winner personally by the president of Taiwan. It is awarded beyond the sections and only to three projects. The cash bonus corresponding to this award is NT$50 000.

The authors of the best works from Taiwan are also sent to five international events:

- Intel ISEF (USA);
- INESPO (Netherlands);
- European Union Contest for Young Scientists (EUCYS);
- Canada Wide Science Fair (CWSF) (Canada);
- MILSET Asia Expo-Sciences.

At ExpoCiencias Nacional the works are not ranked by places and do not receive medals. The best 84 projects (out of 500), the authors of which are older than 12 years, obtain accreditation for participation in 35 international events. The list of events where the 2017 winners were sent is provided below:

1. ExpoCiencias Latinoamericana ESI-AMLAT 2018; Antofagasta, Chile;
2. ExpoCiencias Asia ES-ASIA 2018, Daejeon, South Korea;
3. TISF 2018. Taiwan International Science Fair, Taipei, Taiwan;
4. ExpoCiencias Europea ESE 2018, Gdansk, Poland;
5. ExpoCiencias Vostok ESV 2018, Yakutsk, Russia;
6. Stockholm International Youth Science Seminar SIYSS; Stockholm, Sweden;
7. MOSTRATEC; Gamburgo, Brazil;
8. Canada Wide Science Fair (CWSF) – Canada;
9. FAST Italian Contest, Milan, Italy;
10. CIENTEC, Lima, Peru;
11. Encuentro de Jóvenes Investigadores; Salamanca, Spain;
12. London International Youth Science Forum LIYSF; London, England;
13. International Sustainable World Project Olympiad I-SWEEEP, Houston, USA;
14. Feria Nacional de Innovacion Educativa 2018, Argentina;
15. International Research School, Yakutsk, Russia;
16. Expo ESKOM for Young Scientists, Johannesburg, RSA;
17. Encuentro Internacional de Semilleros de Investigación, Colombia;
18. ONDAS 2018. Encuentro Nacional Ondas "Yo amo la ciencia 2018", Bogota, Colombia;

19. Genius Olympiad, Oswego (New York), USA;
20. EXPOCIENTEC, Encarnacion, Paraguay;
21. Mostra Científica Norte Nordeste MOCINN, Brazil;
22. Feria Nordestina de Ciencia y Tecnología, Pernambuco, Brazil;
23. ExpoCiencias Bruselas, Brussels, Belgium;
24. Golden Climate International Environmental Project Olympiad, Kenya;
25. ExpoCiencias Nacional EXPOCYTAR, La Pampa, Argentina;
26. Feria Nacional de Clubes de Ciencia, Uruguay;
27. Campamento Científico Interactivo y Foro de Ciencias y Civilización, Entre Rios, Argentina;
28. EJCMA 2018. Encuentro de jóvenes comprometidos con el medio ambiente. Argentina;
29. Youth Science Meeting, Portugal;
30. Infomatrix, Bucharest, Romania;
31. Feria de Ciencia y Tecnología Girasoles. Encarnacion, Paraguay;
32. Muestra de Ciencia y Tecnología, Escolar Acai, Abaetetuba, Brazil;
33. Expociencias MILSET Brazil, Brazil;
34. FJIPE 2018. Feria juvenil internacional de proyectos emresariales, ciencia, tecnología e innovación "Aprender a emprender", Ecuador;
35. OKSEF 2018. Özkaya Education Karademir Science Energy & Engineering Fair. Turkey.

Accreditation for the events takes place not only by the number of points scored, but also in accordance with the formal requirements of these events (published on the ExpoCiencias website and in the participation guide in advance). Accreditation does not always mean full payment for participation. Cash support for participation is very often only partial. However, the official status of this accreditation and its uniqueness (no other competition in Mexico can send participants to these international events) allow the winners to get financial support for their trips from regional administrations, schools, sponsors and even through individual donations.

The best works of the under 12 years old participants are given special certificates, which are also not ranked.

At the European Union Contest for Young Scientists the prizes are divided into two categories: The main awards (Core Prizes) and the special prizes provided by partners (Special Donated Prizes). Places and awards are distributed beyond the sections.

The main awards are given to the top nine projects:

1st place (up to 3 prizes) – €7,000;
2nd place (up to 3 prizes) – €5,000;
3rd place (up to 3 prizes) – €3,000.

Special awards are educational trips to various events, which take place at leading scientific facilities or universities. The jury gives these prizes to the contestants who most deserve them and who, inthe judges' opinion, will benefit the most from the experience of participating in these events. As a result, one contestant or group of contestants may receive both a main award and a special award. Expenses for participation in the events and internships are paid by the European Commission or EUCYS partners.

Special awards for the participants of EUCYS 2017 included:

Events:

- three project authors were awarded with participation in the London International Youth Science Science Forum;
- two project authors were awarded with participation in the Stockholm International Youth Science Seminar;
- three projects (up to nine students) were awarded with participation in Intel ISEF in the USA in May of the year following the contest.

Internships:

The joint research center gives an opportunity to three projects (up to 9 students) to go to one week in Ispra (Italy) to visit:

- Institute for the Protection and Security of the Citizens (IPSC);
- Institute for Environment and Sustainability (IES);

- Institute for Health and Consumer Protection (IHCP);
- Institute for Prospective Technological Studies (IPTS)

EIROforum organizations award trips for one contestant each to:

1. CERN - The European Laboratory for Particle Physics;
2. EUROFusion-JET - The European Fusion Center;
3. EMBL -The European Molecular Biology Laboratory;
4. ESRF - The European Synchrotron Radiation Facility;
5. ESA - The European Space Agency;
6. ESO - The European Southern Observatory;
7. ILL - The Institute Laue-Langevin;
8. XFEL - the European X-Ray Free-Electron Laser Facility

At the Canada-Wide Science Fair, there are four groups of awards – Excellence, Challenge, Special and Grand. The excellence awards consist of gold, silver and bronze medals presented to the top 10, the next 20 and the next 30 projects in each of the three age/grade categories. A total of 180 projects (approximately half the participants) receive a medal. All projects in the three age/grade groups compete against each other for medals, regardless of project topic. Six Canadian universities provide entrance scholarships to CWSF medal winners, mostly at the senior level. Three challenge award certificates are presented to the highest-scoring project in each of the seven challenges in each age/grade category. Approximately 25 special awards are presented to projects achieving excellence in specific areas determined by the award sponsor. These awards provide either cash prizes – CAD$500 for junior, $750 for intermediate and $1,000 for senior winners – or experiential opportunities such as trips. Three grand awards recognize the best project in each age/grade category, selected from the gold medal winners. Two receive Platinum Awards and a cash prize of CAD$1,000. One receives the Best Project Award and a cash prize of CAD$2,500, and the title of Canada's top young scientist for the year. All three grand award winners also receive an all-expenses paid trip to represent Canada at the European Union Contest for Young Scientists, subject to compliance with EUCYS age rules.

It is not an easy task to compare children's projects and research works. One work may be stronger from perspective and another is better in a different way. As a result, some contests have abandoned competition: either they completely remove ranked prizes, replacing them with accreditations for events, as in Mexico, or, as in Taiwan, give prizes to a large number of contestants. At the European contest a small number of main awards is combined with special prizes – educational trips.

The idea of awarding educational trips and participation in higher level events is becoming increasingly popular. Some organizers are moving from a focus on winning (medals, trophies), to providing rewards as a passage to the next level or access to additional resources and opportunities to help participants develop their skills.

Another question is whether to award participants' works by scientific section (as in Taiwan) or to rank all projects together (as in Mexico, the European Union and Canada). One argument in favour of the latter is that the number and level of works in each section typically varies, which means that the level of competition for prizes also varies. In smaller sections, experts may have no option but to give prizes to relatively weak works, while in larger sections some excellent works may not receive a prize. In principle, competition that compares all projects, regardless of section should be more objective. However, this approach requires well-coordinated work of experts, who, as already decribed above, should fully and equally understand the evaluation criteria and the value of the points they assign to works.

THE PRIORITY TO PROMOTE SCIENCE IN AFRICA

1- Science tranformed and stil transforming the world

Dr. Driss LOUARADI

• PhD Earth Science, Paris VII - Denis Diderot University.

• International Expert in Science Didactics-Science After-School Activities.
e-mail: driss.louaradi@yahoo.fr

The science is a powerful tool for understanding and transforming the world. The gathering of scientific knowledge, particularly during the two last centuries, has led to a huge amount of discoveries and innovations which were beneficial for the humankind : the life expectancy increased, diseases eradicated, agricultural production boosted, and the living and transport conditions improved thanks to fossil energy resources. Otherwise, the New Technologies of Information and Communication (NTIC) have brought unprecedented scientific and society transformations.

But the other Janus side of scientific progress is the weapons of mass destruction and the serious and irreversible degradation of the nature. Yet, we, as a human kind, are a part of the Earth-system and our survival as well as all forms of terrestrial life are strongly correlated to the preservation of our natural environment which depends on the way we act on daily and on our ethics and our relationship to it.

Science must be at the service of humanity, helping citizens to understand the complexity of the surrounding nature and our societies. Science must help the humanity to achieve a better quality of life, in sustainable and healthy environment and in a world where peace and fraternity reign against all kinds of extremism and violence.

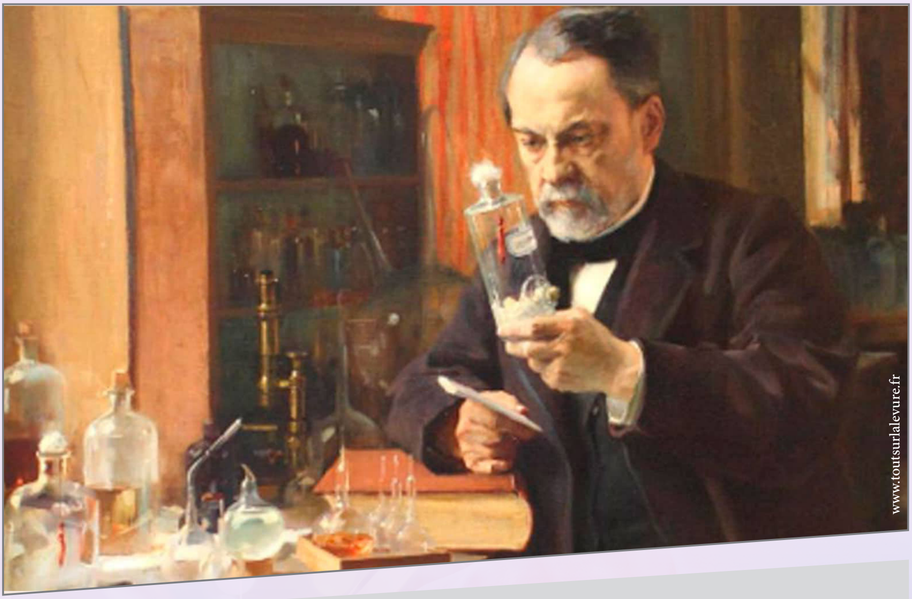
The peculiarity of scientific thinking consists in examining any problem any phenomena, any observation from different perspectives and questing different explanations, a new questions, and then a new hypothesis. This approach, initiated by the Greeks developed by the Arabs and definitively established during the industrial and technologic revolution in Europe, impose a continue research and a permanent observation of different object of the nature from the atom to galaxy.

Persistently submitted to critical analysis, science relies on critical thinking and is subject to the principle of refutability, reproducibility and verifiability. Those are the fundamentals required to build strong economic, educational and cultural background necessary to the rising of the developped and democratic societies.

The «intellectual and moral solidarity of mankind» mentioned in the Constitution of UNESCO, make the scientific community vision of the world unique and transcends nations and religions.

Louis Pasteur the discoverer of microbe and the inventor of the vaccine was right: "Science knows no country" Thereby, sciences and technology can be used to promote culture of peace solidarity and respect of environment and to prevent conflicts.

Science technology and their applications are indispensables for development. The decision makers must develop a scientific and technological system through appropriate education and research programs to achieve the economic, social and cultural development. This is particularly urgent for African developing countries.



"Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world".

Louis Pasteur

2- A scientific knowledge: A key for democracy and sustainable development in Africa

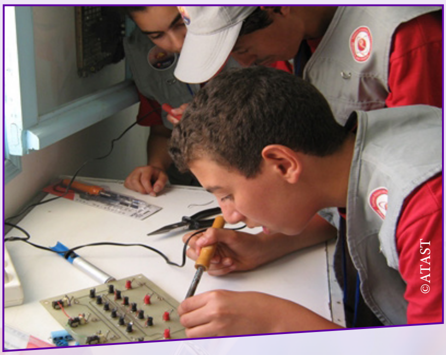
Students consulting books in Ecomuseum Library "The Roots of the Futur" in Ahfir City, eastern Morocco.

Sharing knowledge, and specially the scientific information, become an absolute necessity in Africa, because all the african countries need it to build a collective mind based on rational thought and critical thinking, a two necessary tools for democratic debate on the production of science and technology and their applications. Through a diffusion of scientific knowledge, generalization of citizen debate, the public can trust and support the benefactress science, which is necessary to build an equitable and democratic societies.

One of the major challenges of the African continent is to reach a sustainable development. To achieve this goal, African countries must develop science literacy (scientific culture) through, critical thinking reasoning ability and a ethical values. This is the only way for the African citizens to participate in decisions related to the application of new scientific knowledge and to become full-fledged actors in building a society of progress.

The use of the New Information and Communication Technology (NTIC), particularly through Internet and social medias, should facilitate the free flow of knowledge greatly and will foster the emergence of the knowledge societies in Africa.

The policy makers in developing countries, as the majority of African countries, must develop educational programs and training to achieve competent and motivated science teachers and educators. Science teachers and informal science educators should have the permanent possibility to update their knowledge to succeed their educational mission.



Activity in an electronic computer club of the NGO ATAST (Tunisian Association for the Future of Sciences and Technology,).

3- The youth of Africa facing a major challenge

According to the National Institute of Demographic Studies (INED), one of the "big changes" to come is the African population increase. Today, one man on six lives in Africa, more than one out of three would live there in 2120. The African market will have 1.2 billion consumers in 2017, 2.5 billion by 2050 and 4.4 billion by 2100.

Such demographic growth is both hopeful and feared. Accompanied by suitable educational policy favoring the emergence of an open and dynamic economy, it can create the "desirable scenario" and then the necessary conditions for the expression of the potential of youth. Badly mastered, it is a time-bomb that will inevitably lead the continent to poverty, frustration and anarchy and push youth, the living force of the nation, to emigrate massively at the risk of their lives.

To avoid this worst-case scenario, African youth must participate in the affairs of the city and with their scientific practice, they would contribute to the emergence of the knowledge society to ensure the development of their continent.

The African population will remain marked, for many decades, by its youthfulness. According to INED, by 2050, nearly 400 million Africans will belong to the 15-24 age group. This demographic projection is expected to generate a sustained increase in needs and would require accelerated growth in the most diverse economic sectors.

African countries must invest in education, health, vocational training and employment, in a vision of the future that aims improving at their socio-economic situation and contribute to the emergence of an African economic space that will be one of the locomotives of global growth.

The scientific knowledge generalization remains a powerful tool for accessing the economic and social development that has shown its effectiveness in Europe and the United States in the 18th century, in Japan in the 19th century, in South Korea in the 20th century and in China, India and other countries in the 21th century.

The Schlumberger Foundation supports Science, Technology, Engineering, and Mathematics (STEM) education, recognizing the strong correlation between science, technology, and socio-economic development.

©www.slb.com.

4- Scientific literacy and knowledge society in Africa to meet the challenge

Formal and informal scientific activities represent a formidable lever for African youth to accomplish the desirable scenario. The International Movement for Leisure Activities in Science and Technology (MILSET), help organizations to engage youth in science, technology, engineering, arts and mathematics (STEAM) through motivation, cooperation, collaboration, and networking. Thereby, MILSET can contribute to reach this goal by developing science and technology programs, including science fairs, science camps, congresses, trainings, networking and sharing knowledge.

Science and technology play a fundamental role in human, social and economic development and the prosperity of civilizations. It is also clear that this causal relationship between science-technology and civilization progress has been reflected in many examples throughout the history of humanity.

Educational workshops at the Moroccan NGO «Association Marocaine Les Petits Débrouillards» - AMPD.

Indeed, science and technology are considered as the main engine to drive development, where many studies have proved its importance and the need to disseminate it in society within the framework of formal or non-formal educational systems. That is why many countries, such as France, Germany, England and China, have recently made radical changes in the curriculum and have been forced to reconsider how science is taught and practiced. Those countries intensifed their efforts to spread the scientific culture of citizens to maintain their status among the developed nations that build their economy on knowledge, especially at a high level in the field of science, technology and innovation.

In recent decades, India, China, and South Korea have been keen to attach great importance to the teaching of science and to focus on the applied side and modern technology. There is no doubt that the tremendous qualitative leap achieved by these countries in the field of modern technology has a strong relationship with the special status that these countries have given to science and technology. These countries have redoubled their efforts to revise and improve the educational system and disseminate the scientific culture and have been able to gain their qualification to enter the Club of the developed countries through elaborate plans. These nations have demonstrated their ability to emerge from the list of developing countries to developed ones within a few decades.

Moreover, the dissemination of the scientific culture inevitably contributes to the promotion of the values of democracy and freedom, the encouragement of personal development and the spread of tolerance among peoples and religions.

5- The positive impact of Science After-School Activities (SASA) on students

Prehistory workshop-archaeological dig proposed to students from Ahfir city (Eastern Morocco) by the NGO Science & Development (S&D).

Numerous studies in the United States have demonstrated the positive impact of SASA on students, who are less late, high scores, more persistent and homework-ready, greater interest in school. The regular practice of SASA leads to improvement and organization of the way of work and combat behavioral problems and improve performance and academic results.

Among the advantages of SASA is the strengthening the relationship between the school and parents, and the commitment of teachers. Students who had more opportunities to come into contact with science and mathematics in ways other than classical education had fewer difficulties in schooling than students who did not. Students who took part in SASA were the largest recipients of university degrees in science and mathematics.

All these examples provides strong evidence that early encouragement for elementary and middle school students to practice scientific activities may be the best way to guide them to the excellence of students in science-related careers.

"Curiosity is the ferment of thought, the resourcefulness is the ferment of action"

Pierre Gilles de Gennes

Pierre Gilles de Gennes, a Nobel Prize in Physics, was a member of the Committee of Sponsorship of the NGO "Petits Débrouillards" one of the largest science popularization movement for youth in France and over the world.

In this context, the US Academy of Sciences drew the attention of political officials to propose precise recommendations urging the teaching of science in a way that relies primarily on experiments and scientific investigation. In order to implement the recommendations of these studies, targeted STEM programs have become very important in American education policies.

PCAST (President's Council Advisors on Science and Technology) presented a report for President Obama, titled «Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future.»

Part of the scientific activities for Youth Organized by the NGO «Association Algérienne Les Petits Débrouillards».

«Science Spring» 2018 organized by the NGO Les petits Débrouillard de Fès in partnership with the French Institute of Mèknes.

provides students with multiple opportunities to practice applied science in and out of class and link it to daily life. This report emphasized that the contact of students with teachers, trainers, technicians, and researchers outside the school scope makes them more interested in scientific subjects, especially girls and ethnic minorities.

In the United States, 8.4 million children are practicing extracurricular activities, while in Africa there are less than 100,000 children.

All the studies demonstrate the positive impact of scientific activities on students. It is certain that the state's commitment to encourage and develop SASA scientific activities represents a win-win investment in the Africain country's future.

Africa's economy, like all other countries in the world, is forced to be based on knowledge, and especially science and technology.

6- The state of scientific and technical culture in Africa

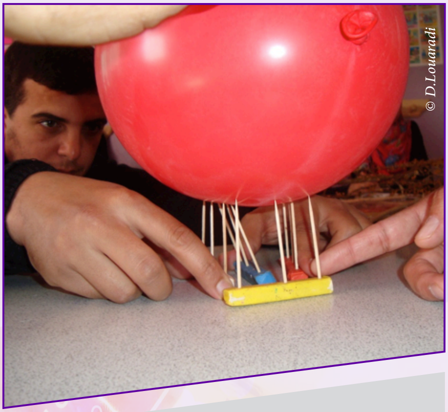
Segenet Kelemu

The Ethiopian scientist woman, Africa prize-winner of Oréal-Unesco Prize for women and science! hopes that this prize is going to help her « to put forward the importance of research and sciences for African youth and the leading elites ».

Public policies favoring the diffusion of scientific and technical culture as NGOs dedicated to scientific mediation in Africa are scarce compared to the enormous need of youth. African media rarely appear as vehicles for diffusion of scientific information in the society. The classic mass media (press, radio and television) do not offer programs of scientific culture. We observe that a few websites are specifically devoted to scientific news in sub-Saharan Africa or the Maghreb, despite some creations such as Scidev.net or Science in Africa portals.

Africans must overcome a numerous constraints:
-absence of national policies for the dissemination of scientific and technical culture.
-scarcity of mediation structures;
- lack of research organizations and universities engaged in science popularization with appropriate communication policy;
- absence of scientific information in the Medias;
The participation of African actors from different horizons (civil society, Medias, business wolrd...) should contribute to promoting the scientific and technical culture to youth and participate in the building of democratic societies that respect the environment and the values of peace and fraternity among nations.

MILSET can help African NGO to develop scientific activities for youth. It offers a framework for collaboration and exchange around STEAM. The opportunity to transmit positive values, among thousands of young people from 5 continents, beyond the barriers of languages, cultures and religions.



Experimental approach training intended for primary school teachers in Safi, in the framework of summer schools organized by the Ministry of National Education and French Embassy in Morocco.

7- For MILSET Africa renaissance


© D.Louaradi

Youth brainstorming" on the importance of bees in the environment", in 'Cabinet de Curiosités' of the living bee Museum - Rabat.

Mr Roberto Hidalgo, President of MILSET sent to members a letter dated August 18, 2017 inviting members to "put in place a better structure representing the needs and culture of the [Africa] region". Indeed, despite the youth of the African continent and the considerable potential for scientific activities for young people, the involvement of civil society in the field of Scientific and Technical Culture remains very limited. In fact, the barely 20 structures adhering to MILSET Africa remain particularly low compared to the huge potential.

The results of the NGO MILSET members consultation conducted in 2018 pointed out, the absence of a clear program and clear vision, the lack of an adequate structure, and the capitalization absence of experiences. These findings would be aggravated by the difficulties of communication and distance between African member countries.

Among the solutions proposed:

- The elaboration of a clear and a long-term strategic vision. This vision must set the course by improving governance tools and by setting itself as supranational objectives that contribute to the improvement of education systems and the strengthening of the role of science in Africa, following the UNESCO recommendations made at the World Science Conference for the 21st Century;
- The wording of a charter for the development of the CST in Africa, which would be elaborated during a symposium on "scientific and technical culture in Africa: an investment for the future". UNESCO could be an ideal partner for this event;
-The search for scientific, academic, industrial

and financial partners which is ready to serve the MILSET objectives in the interest of sustainable development desired by the African continent;

- The research of financial and human supports necessary to act.

Many tools are validated by the NGO MILSET members as key elements in the success of their mission and MILSET's objectives as stated in its charter:

- The creation of an ambitious training program at national, regional and continental levels;
- The organization of training of trainers to increase STEAM activities in Africa;
- The development of a digital platform for the exchange of knowledge of explicit and implicit know-how in the field of CST;
- The creation of a website, an African science magazine and popular science tools for young people;
- Expo-Sciences are acclaimed and recognized as powerful means of promoting scientific and technical culture and bringing youth together and building bridges with different cultures. The best way to promote tolerance and friendship among peoples, and to fight against racism and extremism.

A general view of the North Gauteng Science Fair in South Africa, wich is an annual science exhibition where learners from grade 12-1 present their projects about their own scientific investigations.This expo science regroup every year about 500 projects with about 600 participants from over 50 Gauteng primary and secondary schools.

References:

• Average scale scores for science (2009); retrieved from: http://www.afterschoolalliance.org/ost_role_naepscience2009.pdf.

•Afterschool: A Vital Partner in STEM Education (2011); retrieved from: http://afterschoolscience.org/pdf/coalition_publications/afterschool%20advantage.pdf.

• Bell, P., Lewenstein, B., Shouse, A.W., & Feder, M.A. (2009). Learning Science in Informal Environments: People, Places, and Pursuits. National Research Council.

• Institute of Education Sciences - National Center for Education Statistics; retrieved from: https://nces.ed.gov.

• Kane, T.J. (2004) The William T. Grant Foundation. The Impact of After-School Programs: Interpreting the Results of Four Recent Evaluations. University of California, Los Angeles.

•Louaradi D. (2015) Scientific After School Activities in Kuwait Current situation, benchmark and prospects Unpublished report MILSET Asia-UNDP-General Secretariat of the Supreme Council for Planning and Development.

• Schwartz, S.E.O., & Noam, G.G. (2007). Informal science learning in afterschool settings: A natural fit? Commissioned paper for the National Academy of Sciences Committee on Learning in Informal Environments. Washington DC.

• UNESCO (1999) World Conference on Science for the Twenty-first Century: a New Commitment, Budapest, retrieved: https://unesdoc.unesco.org/ark:/48223/pf0000120706

• Vandell, D., Reisner, E., & Pierce, K. (2007). Outcomes linked to high-quality afterschool programs: Longitudinal findings from the study of promising afterschool programs. Washington, DC: Policy Studies Associates, Inc.

• PCAST, Report to the President Obama: Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future.

Dr. Vasilii Pavlov

Principal of the Sakha
Junior Science Academy
The Republic of Sakha
(Yakutia), Russia

International Science Games:

convergence and collaboration in science learning.

The crux of learning is to liberate oneself from the constraints of self-imposed limitations and beliefs by constantly challenging them through scientific experiments conducted in collaboration with other research-minded individuals and set in an environment of knowledge convergence because knowledge cannot be compartmentalized.

It was a theme of enduring tenacity in the Russian scientific and educational community that the active subject Olympiads participation is the only credible pathway to the science based career. However, recently acquired body evidence suggested the underlying dichotomy of broad ambivalence and appreciation towards positive attitude for science.

In recent years there was an inception of a different kind of thought in Russia induced by MILSET-Vostok, a regional chapter of MILSET International, that the convergence of two strands of science learning, subject Olympiads and experiment based research activities, is a possibility due to the high demand world-wide on collaborative science research projects that defies solely competition based research activities. MILSET, a non-profit international organization dedicated to the propagation of scientific collaboration through staging non-competitive scientific projects exhibition and research-school with international teams conducting open-ended experiments.

The non-competitive aspect of MILSET was considered to worth investigating on the backdrop of the subject Olympiads tradition heavily infiltrated into the psyche and the mode of action of the gifted education specialists in Russia. If any convergence of knowledge may occur on the interdisciplinary approach adopted by the MILSET ideology that will certainly trigger and induce interest in research based activities.

The above-said concept became the basis for the design of the International Science Games developed by the Sakha Junior Science Academy, a specialized government grant sponsored educational entity specifically set up to cater the need of the gifted and talented, as well as highly motivated school students, which were manifestly science-related and based on critical acquisition of knowledge liable to the further testing and intelligent consumption.

Summing up of International intellectual games.

By virtue of its mission the Sakha Junior Science Academy, established in 1999 by the President of the Republic of Sakha (Yakutia), accumulated a vast plethora of expertise and knowledge of organizing and running subject based Olympiads for school students, as well as the special training courses and workshops for Olympiads participants. At the same time the research based science projects were conducted by a large contingent of the Sakha Junior Science Academy.

The subject Olympiad and the school student science projects development expertise helped to set up the basic infrastructure on which the International Science Games, a science festival – cum a science fair and the subject Olympiads, was developed. It is comprised of the following separate events: non-competitive events: MILSET Expo-Sciences Vostok 2018, an international exhibition of school student projects selected by the MILSET regional offices, International Research School, an international science camp of research based scientific project development; whereas the competitive events were as follows: the Tuymaada International Olympiad on Mathematics, Physics, Chemistry and Informatics, a highly competitive event of personal endeavors with more that quarter of a century history, held annually, Yakutsk International Science Fair, a competition based school students science projects exhibition, also as a token to the fashion of the day, so –called The Games of robots, a contest with a decade long history that is based on simple robotic vehicles heads on pushing out of a designated area and a route following tasks, IT-hackathon, a brand new contest where three-men teams compete in designing an IT product, an application, within a limited time frame of three days and 8 hours per day, and the 3-D modeling on a given task in a two-men team.

The first of its kind, International Science Games event was held in Yakutsk July 8-15, 2018, with 180 different school from different countries, most of them coming from the South-East Asia. More than 1500 registered participants from 39 countries took part in the event.

The International Science Games were held in the heart of the East Siberian taiga, a vast expanse of coniferous forest. The entire setting was dramatically different than the one experienced by the participants at their home countries. It was held in an area totally covered by the permafrost, in a region greatly affected by global warming. It was localized in a university campus providing a comfortable and cozy environment of unbridle exchange of ideas and true collaboration. In the vicinity of the city of Yakutsk, the capital of the Republic of Sakha (Yakutia) is unique as a natural occurring depository of the Cambrian explosion artifacts' such as early trilobites and archaeocytes, a first multi-cellular exoskeletal

Work of project teams.

lagoon organism. The UNESCO World Heritage list inducted the Lena pillars National Park nearby was in some cases an important natural setting for the experiments conducted by students.

Overall positive attitude for the science based activities was ignited and the fair or festival like atmosphere helped to facilitate friendship through collaboration in science that may be a basis for deeper and profound connections and links beneficial in a longer time horizon. All these led to passion for science and helped to develop a dedication towards systematic science-based activities.

Dedication and passion for science are the prerequisites of the science-oriented career path and the convergence of knowledge and scientific collaboration lay at the foundation of any event that ignites the passion for science and lead to dedication to pursue a science-oriented activity. Therefore, the International Science Games can be considered an effective model for the convergence of knowledge and collaboration that will be of significant importance as an emotional foundation to many science-oriented career pathways.

Expo Sciences Europe 2018 in Gdynia, Poland

Zuzanna Ziajko
Event Coordinator at High Tech Foundation, Poland

Vice President, Milset Europe

The decision to organize ESE in Poland was taken in December 2015. Then, the authorities of Mislet received the application form from the High Tech Foundation as a candidate for ESE 2018 organizer. In 2016 we received a positive reply and the green light to start preparations.

The wheels got in motion!

Two-year time for preparations may seem a lot, however we may lack time without a detailed action plan. Our preparatory activities took place along our basic scope of operation. We did not resign from anything, nor did we employ any extra staff just for the sake of ESE preparation. We decided to do everything on our own, naturally with the support of Milset authorities. We were looking forward to that challenge.

Role of the organizer

ESE hosting organization holds responsibility for the whole undertaking; Starting with fundraising, through the choice of venue, planning and organizing the exhibition area. Additionally – what matters – is providing accommodation and catering for the participants and finally – the logistics during the event itself. The organizer is also responsible for accepting and enforcing payments of the participants.

The organizer is supported by Milset representatives through all the stages; they provide their unique experience of many ESE events accomplished. They manage Expo registration system – a treasury of knowledge about the event participants.

Good action plan

The most crucial step for the organization of such a big event is to prepare a detailed annual action plan. Among many things to be handled there are some which will only take a few days and others – lasting for almost a year. Only good planning will guarantee the accomplishment of the goal. Otherwise it may turn out that there is not enough time to do it all. Such a plan will also allow you to look at the event as a whole and assess how many people you will need to complete all its stages – when you may face the greatest intensity of works and when to expect a more quiet moment.

The key issue is the budget and the awareness of the total cost. The budget should be closed not later than a year in advance, i.e. appropriate amount of funds for the organization of the event should be raised. It is a crucial deadline!

Financial security will allow you to focus on the logistics and promotion of the event.

Participants

It is important to know the number of participants. The entrance fee paid by participants constitutes one of the main positions in the budget. It also relates to accommodation and catering needs. Unfortunately, registration is not a smooth process. Many organizations are uncertain who – how many people – is going to participate in the event until the very end. Organizations change personal data and numbers of their participants which creates organizational chaos. It is difficult to set a deadline for the final decisions in this respect, and even if there is one, you cannot be sure that the registered participants will take part in the event because it is not connected with the entrance fee and the organizations happen to hesitate until the very last moment.

It seems important to look into this area of Expo organizational proceedings in the upcoming years. We should raise awareness of the common responsibility for the success of this undertaking and of the fact that the hosting organization bears financial losses due to participants resigning at the very last moment which generates accommodation, catering and equipment costs. It should not be like this.

Program

ESE is a long event – 7 days full of emotions, science and common interaction. Lack of competition seems a very important factor, as ESE is not a contest or competition, hence the participants do not compete with one another. All of this leads to great, relaxing atmosphere but at the same time – due to low adrenaline levels – participants become bored.

For this reason it is important to construct the program with attention to detailed scientific and recreational offer. During the Expo in Gdynia we tried to provide many elements engaging the exhibitors. One of them was Pitching on the stage – where Expo participants presented their projects on a special ESE stage. This required preparation of a presentation and allowed them to gain unique and important experience of talking to a larger audience. Pitching turned out to be extremely successful, the young people were happy to present their ideas, encourage and listen to each other.

Additionally, we organized a few contests including the Internet My Day at ESE – where participants published photos from ESE on their Instagram accounts. The one with the greatest number of likes was the winner.

One of the key elements of ESE is the Cultural Evening. Representatives of several countries participate in this Event. Intercultural education plays a significant integration and social and role. In Gdynia we decided to organize our Cultural Evening in a new way. It offered workshops and presentations organized by volunteer organizations. There were Catalonian dance lessons, Dutch street games, Ukrainian dance and singing show, quiz of knowledge about Hungary. This allowed the participants to learn about different cultures, have fun and unforgettable interaction.

While preparing the program, we must not forget that the Expo hosts young scientists. For many of them it is a unique chance to gain additional knowledge and experience related to science. Therefore it is really important to keep a balance between scientific attractions and having fun or visiting new places.

Let's make use of this!

Promotion

The Expo is held during summer holidays, when schools are closed and most people enjoy their free time. Closed events in urban environment are not very popular. Lack of teenage students visiting Expo as a school group is visible. Additionally, Expo is a periodic event – but only in the international context. It takes place only once in each country which causes promotional hardships and lack of wider recognition. For this reason local (national) promotion of the event is very important. It is the only chance to gain interest and attract participants.

We promoted ESE in Gdynia through many channels – local media and materials available in public transport. We widely promoted the event on the Internet – through active Facebook and Instagram accounts.

It is a good idea to promote the event together with local partners, who know best how to reach people in their area. In our case it was the City of Gdynia.

In spite of our active promotion the number of people visiting Expo was unsatisfactory.

Volunteers

350 is the average of participants in each ESE. This requires a big number of staff guarding the course of the event. In Gdynia our team consisted of 30 persons. Due to limited funds we were not able to finance such a big group, hence 19 of them were volunteers.

The volunteers came from Poland and abroad. Those were mostly students, Expo participants from former editions or individuals connected with Milset or the local organizer – in our case the High Tech Foundation. All of them spoke fluent English.

Their scope of tasks involved picking up delegations from the airport, supporting delegations in traveling from the places of accommodation to the venue, pitching on stage or providing organizational support during the Culture Event…

The key factors in the selection of volunteers are proper training and integration. In Gdynia we were trying to recognize the importance of both – knowing how basic it is (for any effective group work) to create the feeling of safety and community. Therefore it makes sense to invest time and effort in order to achieve such goals.

Expo Sciences Europe 2020, will be held at Universitatea „Ştefan cel Mare» Suceava - Romania

Summary

Expo Sciences Europe is a true festival of science. It is an international meeting of people fascinated with science and new technologies. It is huge potential and loads of positive energy. It is also a real challenge for the organizers who want it to be remembered in the best possible way and to give the participants space for inspiration and development of not only scientific relationships.

On behalf of our organization I can say that it was worth it!

And these are the afterthoughts I wish all the future organizers of Expo Sciences Europe to have.

A general view of the Expo Sciences Europe 2018 in Gdynia, Poland

William Suarez Fernandez, Nora Milena Roncacio, Colombia

WILLIAM EDUARDO SUAREZ FERNANDEZ
Industry Engineering
Master in Business Innovation Managment
Research Coordinator at Autonomous University of the Caribbean / Barranquilla, Colombia
National Coordinator REDColsi

Research incubators

This paper is an exploratory analysis of Research Incubators (RI) as a concept and as a discourse. RI promote the formation of new researchers through self-learning as an answer to traditional research training narrowed to general courses, and to the support of research groups in the old fashion way of the 1990s.

Incubators as a concept

Reflecting on the RI as a concept is a necessity since their origin comes from the experience of the very people who participate in them. The RI have consolidated with time, but the conceptual corpus has not been discussed enough. Deleuze (1997) does not establish a simple argument about RI, to his mind the concept underlies a multiplicity, specific components and a progression. On the one hand, the components have to do with learning communities and integral formation to allow endonconsistency; on the other hand, there is a connection between research training and networking to allow exoconsistency.

According to Deleuze (1997) the concept of RI has its origin in Descartes and Plato. Deleuze sets specific problems and contexts to actions, which is not to say that the classic concepts cannot be discussed, but concepts within an ongoing historical moment and the verge of progression. Furthermore, the RI have a story to tell about a research moment in Colombia, which comes from a student movement that focused on the search for knowledge in the National Science and Technology System.

A history of the concept RI

There is an underlying history that comes along with the concept. This history may include other problems from different contexts which may carry other concepts with their own problems, too (Deleuze & Guattari, 1997). In this sense, the practice of RI is in the planomenos of scientific training, here the integral training for science is joint with the research training and networking (Molineros, 2009), which are the main premises supporting the RI practice discourse as a scenario to form researchers.

The RI were established in the 1990s and held a revolutionary background that would step against the research practices developed during that time. In 1996, a crack that would give an opportunity to undergraduate students in research training opens in Colombia due to the students' initiative. According to Ossa (2009), the idea of research people had in mind was that of the feeding of curiosity and the encouraging of questioning as founding pillars to make sense of our daily lives, not the kind of thinking that would promote Master's degrees nor PhDs: in culture and nature, from social sciences to humanities, from hard sciences to natural sciences, and the arts.

It was Antioquia, Manizales and Cauca universities the ones that held this new initiative called Research Incubators. According to Gallardo (2014), the RI were born at the end of the 20th. Century with working groups that would start as extracurricular and would eventually turn into curricular, paving the road to institutionalization.

In 2010, the RI became part of the institutional dynamics in such a way that the Bureau of Education designated the RI as an indicator for research culture promoting. In order to support such declaration, the decree 1295 from 2010 establishes a regulation of processes for joint institutions and for the accreditation of institutions in higher education.

During that time, other working places with a similar profile to the RI were created, but they could not reach the same goal from the RI. These places helped strengthening the new research concept, and as holders of a new reality they would be the answer to the requirements for scientific and technological development in the country. Those places would be the evidence to the ongoing reflection for researcher training.

Two other projects with similar intentions are the predecessors of the RI: Cuclí-Cuclí and Nautilus. The first one took place from 1989 to 1997 and it was a scientific project for children and teenagers in 45,000 schools (four million students), organized by COLCIENCIAS (The Federal Department for Science, Technology and Innovation) and with the help of the Bureau of Education in Colombia. This project had the objective of improving the school methodology with the use of games applied to hard, natural and social sciences, in other words, these activities would stimulate the children's creativity, curiosity and imagination (COLCIENCIAS & Diario El tiempo).

The second project was also a meaningful one and was directed by the academic and consultor Francisco Cajiao in 1996. This project had the objective of broadly exploring the scientific spirit at school. In the end, the results of the project led to the conclusion that schools had a hard time promoting and creating new scientific knowledge. Therefore, there was a clear vision that it was necessary to come together to make changes in education and the fostering of knowledge. Furthermore, as a result of this analysis some strategies were created to be applied in many schools (Daza et al, 2006).

COLCIENCIAS also had a program called Ondas that would support the idea that children and teenagers have the potential to become researchers; schools and clubs are also available places to develop research skills that can be useful to the academic community, schools, society and the country (Daza et al, 2006, p. 61).

Unfortunately, the projects mentioned above have proven to be insufficient and inefficient, after some time they have gradually lost strength. This loss may be due

to the political or the economic system, and the concentration of their efforts to limited sectors of society. Even though those efforts have given results in science and technology, they still do not have a big impact in the development of the country (Molineros, 2009).

It is in this context and as a response to such inefficiency that a new community of young researchers is born, called Research Incubators, which has the objective of bringing the science and technology to undergraduates through a process of training that connects to their own area of study. The result is the development of research skills that allows students the drafting of research projects in the short and long term to solve problems in real contexts.

Research Incubators in practice

Understanding how RI work in the institutionalized context means getting closer to their objectives; Chartier (1996) claims that any work regime has some sort of regularity, logics and internal reasons channeled to its own discourse. In this sense, we can conclude that these efforts to scientific learning (21 years now) exhibit regularity and internal logics to the constitution of a new scenario for the social appropriation of knowledge.

RI practice originates from a discourse that seeks vindication for the student as the center of his own learning, with the development of skills and techniques applied to research practice and human behavior the student builds and manages his own knowledge. This practice has the objective of raising integral education for science, which is based on research training, formative research and community networking. All of this derives from working groups organized in such a way as to aim at the academic production from the RI members, within their individual disciplines (Molineros, 2009).

This is a discourse that focuses on the education of an individual who is sensitive, reflexive and self-critical to his reality, a person who understands the logics of scientific practice. For this to happen, emphasis must be put on autonomy as an educational tool, contrary to the traditional dynamics of science training that would rely on the teacher, making dependent individuals with little power to conduct their own projects.

As a conclusion, the Research Incubators promote a discourse that opens the discussion to self-regulation and transformation of thinking with the help of inquiry, which will reshape everything previously instituted by society. This is a discourse that can even be considered a political one, since it broadens the scope to include a group of individuals who can contribute with scientific research to their country, regardless of their young age. In depth, it is the democratization of research opportunities in the national level.

Social interactions at a science camp

Jeppe Willads Petersen (Denmark)

International Coordinator, Danish Youth Association of Sciences (UNF).

Introduction

Science camps are a place for participants to learn new things about the world they live in, to explore a scientific topic, and to practice their research abilities. It is also a place for them to form new friendships, learn about themselves, and especially at international events interact with different cultures.

At the 11th International Research School ,one of the projects aimed at exploring the ways in which the participants formed social bonds. In this project the participants observed and recorded who their fellow participants interacted with. By doing so, they were able to draw a series of graphs to explore the development over time in who the participants interacted with.

In this article I will explain the process of the project work, highlight some of the results and discuss how this might be used in future events.

Method

Data for the project was collected in two ways:

1. Each of the participants in the project was paired up with another participant to form four pairs, whom were responsible for asking approximately 20 participants 5 consecutive nights to name three other participants they had talked to during the day.

2. In the dining hall video cameras were set up to record who the participants shared their meal with. When a group of people sat together at a table at the same time they would be recorded as having shared a connection.

Data was recorded as connections between participants. Whenever a participant would name another participant a connection between those two would be recorded. When a group of people sat together at a table during dinner a connection would be made between all possible pairings of the people at the table. The data was recorded in separate files for each collection, resulting in five data files for named connections and five data files for dinner connections.

Named connections

The collection of the first type of data proved to be somewhat challenging in multiple ways. The primary challenge was to actually have the project participants collect the data. Sometimes the project participants were too shy to ask their fellow participants for data, sometimes they told us they weren't able to find the participants they were responsible for and other times they simply forgot. It didn't seem to be a problem to actually have the participants answer the question once they were asked.

Because of these issues the collected data became somewhat skewed so that some participants were asked all five days while others were perhaps only asked one or two days. Because the responsibilities were given out based on which delegation the project participants came from it also gives a bias so that some delegations seemed very sociable while others very reclusive. These issues will be discussed further in the discussion.

Dinner connections

Before the dinner was served two cameras were set up in the dining hall to cover all tables. Each table seated up to six persons but the recordings show some cases of people moving extra chairs to their table. In other cases, some participants would finish their meal quicker than the rest at the table and other participants would take their seat. When recording connections everyone sitting at a table at the same time would be registered.
Over the course of the five days, two students were never seen eating in the dining hall.

Theory

Before going into the details of the results I will explain a few keywords about graphs and how they can be analyzed.

In general, a graph is a set of nodes and edges. Nodes are represented as points and will in this article correspond to individual participants. Edges are represented as lines between two nodes and will in this article correspond to the connections between participants i.e. who did they eat dinner with and who did they name. Edges are in this case considered undirected meaning that if a participant talked to another the other is expected to have talked back.

A connected graph is a graph where it is possible to move along edges between any two nodes. A path length is the length of the shortest route in the graph between two nodes, where the length of each edge is considered to be 1. The diameter of the graph is the longest path length in a connected graph. The degree of a node is the number of edges from it. The weighted degree is the same as the degree only now each edge can count as more than one (this could for example correspond to two people having eaten together three times and therefore the edge between them is weighted as three instead of just one). A complete graph is a graph where all nodes are connected directly to each other. A clique is a part of a graph which forms a complete graph.

To make specific aspects of a graph clearer the nodes and edges can be resized or colored. An example could be to color the nodes corresponding to which delegation they come from and to resize the edges based on their weight.

In order to protect the anonymity of the participants no legend will be shown for the graphs to explain the specific country, delegation, or project related to a certain coloring.

Results

For the 108 participants 787 named connections and 473 dinner connections were recorded. To visualize and measure the results the graphing software Gephi was used. All figures and measurements in this article were made using this software.

Named results

As previously mentioned, the results based on the participants naming three people, they have talked to during the day were somewhat biased by the fact that some were asked more often than others. Even though a few participants weren't asked at all the combined results form a connected graph with a diameter of 5 and an average degree of 8.5.

All members of one specific delegation were asked in almost all possible instances and have therefore been studied further (they were responsible for 255 of the named connections (32%)). The delegation consisted of 20 participants and clearly communicated a lot internally as expected (the diameter of the graph consisting only of their internal edges has a diameter of 3 and an average path length of 1.7) (see Figure 1). Looking at their communication with the rest of the participants we see that they have named 41 of the remaining 88 participants and that when named by more than one of the 20 those who named them tended to have named each other (see Figure 2). This of course means that 47 participants (or 43 % of all the participants) haven't been named by any member of this delegation. This is not surprising seeing as the participants were only asked to name three people each day and they were able to name the same people multiple days in a row.

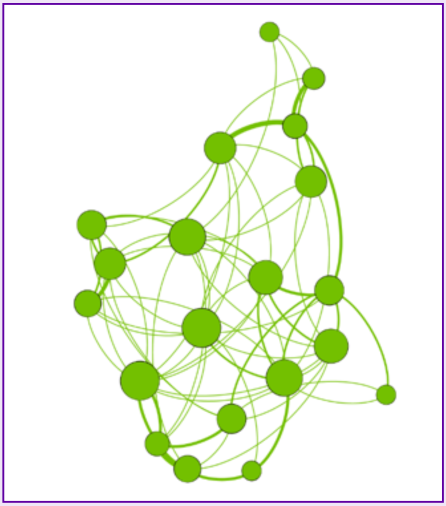


Figure 1: Internal communication among delegation (size of nodes indicate degree)

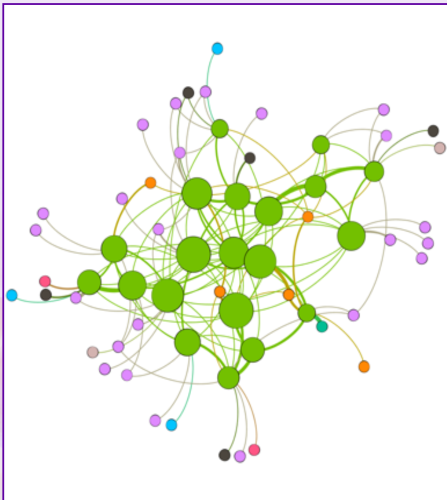


Figure 2: External communication among delegation

Dinner results

The participants were according to the program supposed to eat in three shifts based on their project group. This was in no way possible to be seen from the recordings. Three separate shifts would suggest three separate graphs. As previously mentioned, two participants were never seen in the dining hall. They have therefore been omitted from this part.

The remaining graph consists of two components; a large one and a smaller one. The smaller component consists of 9 participants all of which are from the same country. They were asked by their delegation leaders to sit together during all meals and therefore showed no sign of communication with the rest of the participants.

The larger component (consisting of the remaining 97 participants) has an average degree of 5.9. Considering that each table had 6 seats this seems like a rather low number. It means that throughout the five days of recording each participant only sat with 6 different people on average. On top of this when color-coded for country it is clear that the participants mainly sat with participants from their own country (see Figure 1). There are, however, a few participants who stick out from this trend. Their choice of seating can instead be explained by which project they are in.

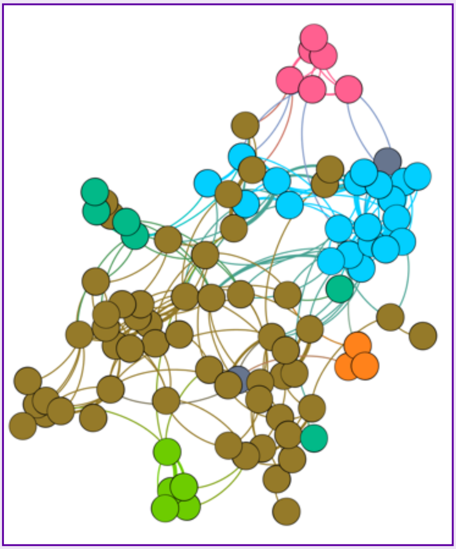


Figure 3: Participants eating together color-coded by country

Two students, the only participants from the same country, refuse to follow any kind of explanation. They don't sit together at all and don't sit together with other participants from their project and each only has 4 connections.

Scientific camp on the theme of rockets organized by the association planet science founded by Jean Claude Guiraudon in 1962.

Combined results

Combining all the data to get one big graph shows an interesting image. The aforementioned component of 9 participants who only ate with each other stick out a lot as would be expected due to their tight connection. They are however quite well connected to the rest of the group based on their named responses.

The participants from the delegation that make up 32 % of the edges in the named results also stick out but form a stronger relationship with the rest of the participants than those eating by country. When resizing the nodes for degree the group become extra clear but also a few other participants become visible (see Figure 4).

Figure 4: All data color-coded by country and nodes sized by degree

The graph of all data has a diameter of 4 and an average degree of 12.0. The average path length is 2.23.

The maximum degree of a participant is 24 and the most common is 11 (see Figure 5).

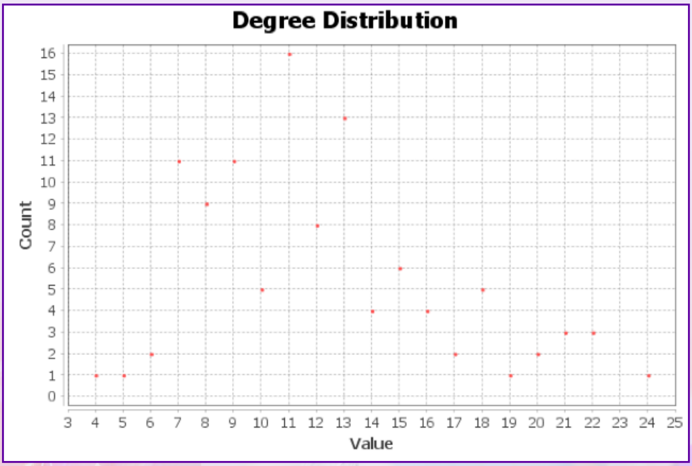


Figure 5: Degree distribution based on all data

Discussion

The results show a tendency among the participants to interact with people they know but also new people. Within a delegation (of a certain size) communication is strong internally. External contact is not directed to a select few by the entire group, but rather to a broad group with largely individual connections from the original delegation. In this analysis, only the edges originating in the delegation has been taken into account. It would be interesting to see how the edges going towards the delegation looks in comparison, meaning the edges formed by other participants naming members of the delegation.

Social norms imposed on groups of participants by delegation leaders can influence the way they interact with the other participants. However, guidelines set by the organizers seem to be more easily ignored. The delegation leaders are often teachers the participants will have to answer to after the school while the organizers have a more distanced relationship with the participants and did not impose any consequences on not following the guidelines.

When eating nationality trumps project work. Even though participants spent up to 8 hours a day working with a group of people they preferred to eat with those from their own country. In a few cases work trumped nationality, but this may have been solely due to odd working hours. A few participants who had very limited English-speaking skills were confirmed to having only interacted with other participants speaking their native language. It is also worth noting that the tutors ate in separate rooms from the participants.

The degree distribution for the combined data sets shows a scenario of many relatively well-connected participants and a few participants with twice as many connections. This view is of course limited by the fact that not all participants were asked equally under the first method and that there was a bias in who actually got asked.

In future events it may be worth considering having the delegation leaders eat with the tutors or everyone eating together to make way for a more mixed seating. A more direct option would be to impose more strict guidelines or make the seating a part of the social program by asking participants to sit with someone from a different country/delegation.

The process itself of asking students who they have talked to throughout the day may also be a factor in getting the students to interact more internationally. Looking at the results of the participants actually collecting the data it is clear that they report more diverse results. The reason for this may simply be an increased focus on naming different participants, but it may also be an actual result of having talked to more people.

Conclusion

It is clear from the results that the IRS succeeds at making the students interact across nationalities. The students still have a tendency to communicate with people they can relate more closely to. The largest limitation to interactions among the participants seemed to be external factors in the form of expectations from the delegation leaders and limited to a few cases of language barriers.

In spite of the limited amount of recorded data some trends were still visible. It could be interesting to follow up on the project with a more extensive data collection at a future event to see if the results can be further supported.

Enrique Padilla Award

Juan Manuel Padilla
Argentina

The Enrique Padilla Award is given by the MILSET Expo-Sciences International (ESI) to a participating delegation that has struggled to engage as many young participants as possible despite difficult conditions.

This award has been created in memory of Enrique Padilla from Argentina.

Mr Padilla left his home country, Argentina, and moved to France as a political refugee in 1978. He worked as communications officer at the Cité des Sciences of Paris in 1984, and was a participant at the Toulouse Assises a year later. As a representative of Argentina, he joined a group to work in the setup of an international organisation that would become MILSET at the first ESI in Quebec in 1987. Later on, he would be appointed to the Board of Directors of MILSET.

Enrique was deeply involved in the French associational life, so much so that he was one of the founders of Petits Débrouillards the following year. Concurrently, he worked with the General Secretariat of MILSET in Paris and conducted many missions in Europe and Latin America to map out the 1989 ESI in Brest. Upon his return to Argentina, he held short ministerial positions to then start working in the private sector. In order

The new ESI BREST CA in 1989

(Left to right): *seated* — Abdul Hamid Al Faqueh (elected), Michel Bois (re-elected), Jean-Claude Guiraudon (re-elected), Maurice Huppé (re-elected), Cheik Dem (elected), Alain Bernard (elected); *standing* — Albert Varier (re-elected); Sébastien Abgodon (elected); Augustin Gampene (elected), Alain Thiriel (elected), Adnan Al Meer (re-elected) Abderramane El Aliq (elected), Angela Miele (elected), Said El Kharrazi (re-elected), Vladimir Lelek (elected), Ibrahim Saleh Al Naimi (elected) and Enrique Padilla (elected). Michel Hallet (re-elected) and Joao Palmeiro (re-elected) are not shown. Names of associations representing executive committee members are listed on page 3.

Hacen el MILSET

El Boletín MILSET sigue con su serie de «retratos» de portavoces de las organizaciones que animan el Movimiento. En este número: el presidente de Ciencia Joven, el Sr. Enrique Padilla.

Sr. Enrique Padilla

Enrique Padilla, un internacionalista convencido

Considera Enrique Padilla que uno de los principales desafiós que tiene la humanidad de hoy, y más que todo los científicos, es él de tomar conciencia de las desigualdades que existen entre las naciones, especialmente en el area de la tecnología. Según él, estas desigualdades causan relaciones de fuerza que pueden —y ahora deberían— reemplazarse por relaciones de cooperación entre los países más ricos y los menos favorecidos.

Es precisamente por eso que este Director de Comunicación de la principal empresa de energía eléctrica de Argentina, ESEBA, encuentra el MILSET interesante. «Yo adhiero por completo a los objetivos del movimiento, y todavía más a éste, que hace de las ciencias y de la tecnología un juego en vez de una competición. El MILSET es algo absolumente necesario, porque está adaptado a las necesidades del mundo moderno».

El Sr. Padilla nació en 1948, no muy lejos de Buenos Aires. Es sociologo de carrera, y desde muy temprano se ha interesado en la Comunicación. De 1977 a 1989, ha vivido en Francia, donde trabajó principalmente con asociaciones culturales, sobre todo para la Ciudad de las Ciencias e Industria de la Villette, cuya inauguración él contribuyó en organizar.

De vuelta en Argentina, rápidamente se interesó por las actividades científicas paraescolares. En un principio presidente del Centro de Estudios y de Investigaciones de América Latina, sigue animando ahora, siempre como presidente, la Asociación Argentina de Ciencia Joven. Es miembro del Comité Ejecutivo de MILSET desde 1989.

«Desde hace dos años, explica el Sr. Padilla, Ciencia Joven va integrando la noción de esparcimiento a sus actividades científicas. He podido constatar que los jóvenes tienen cada vez menos facilidades en entender el método científico; tienen la tendencia a repetir los modelos tradicionales que han aprendido en la escuela, los cuales dejan muy poca iniciativa a los espíritus audaces. El recreo científico es al contrario una excelente manera de estimular la creatividad y desarrollar la solidaridad, dos elementos que forman parte de los objetivos de Ciencia Joven que quiere, además, desarrollar una red asociativa. Ésta facilitaría la participación de un número siempre creciente de jóvenes Argentinos y ayudaría a romper con el aislamiento internacional que conoce todavía la Argentina, al restablecer vínculos de amistad con las demás naciones.» Como se puede constatar, se enmarcan perfecto estos objetivos con los de MILSET.

to stimulate creativity and develop solidarity among the youth, he made a MILSET antenna and founded the Argentinian Association of Science for the Youth. This accomplishment would be reflected in friendly ties with other nations, and also in the 1991 ESI in Prague where many young participants attended.

Two years later, he formed a large delegation in Amarillo, Texas, for the 1993 ESI and surmounted many difficulties, such as achieving that Mexican people enter to a city in Texas. Together with Ibrahim El NAIMI, Carole CHARLEBOIS and Jean-Pierre TRILLET,

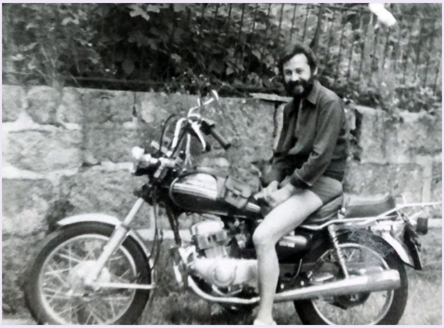
Enrique was the responsible for writing and presenting the final ideas reached by the task force during the congress which redefined the priorities of the international science fairs.

After this, he joined the Board of MILSET chaired by Maurice Huppé. Once in Argentina, he helped to organise the Latin America Science Network giving birth to the oldest AMLAT office of MILSET in his home town, Buenos Aires.

A year later, June 1994, he was murdered in Buenos Aires. He was only 49 years old.

As his life was always linked to political and activist commitment that forced him to live in exile during the darkest years in Argentina, the facts related to the frequent political attacks and ideological persecutions that triggered his death cannot be denied. His death raises many doubts but one absolute certainty, and that is that Quique, as friends and family used to call him, did not perform half-hearted actions. His vision of a fair and equal world was always there, as the famous expression “They bark, Sancho” says.

When his years of student had finished, he obtained a degree from the Faculty of Social Sciences, Buenos Aires University. This university was the scene where he developed his activist commitment with a strong vocation that channelled through political and territorial activity. This vehemence can be related to two significant facts: on the one hand, the fact of being born on May, 25 th , 1945, (the same day of the



commemoration of the Argentinian Revolution) inspired him to give his life for the homeland. On the other hand, there was the feeling of social awareness that he inherited from his grandfather, Luis Girola, who was an important rail unionist that became a representative of the workers at the post war national council founded by Juan Domingo Perón in 1944.The political persecution not only forced him to emigrate to France, but also to leave his children: Abril and Juan Manuel. Many years would pass until they see each other again.

However, he continued to enlarge the family in the old continent welcoming three more children: Gregoire, Mathilde, and Cecille.

Quique was always trying to make companies to transform force tasks into cooperation relationships, therefore he was a keen supporter of MILSET. He was certain that this movement "makes science and technology a game and not a competition." This would "reconcile the knowledge and scientific investigation with the aim of a better and fairer world that every young person believes."

He was positive that non-formal education, experimentation and games performed through science and technology allow a fair knowledge redistribution, and this is exactly the reason why MILSET was created; its mission is not to support the school because the school has its own mission.

His activist comrades, friends and people who witnessed his efforts describe him as a bold person; his actions were always addressed to make radical transformations. This same motivation surrounds MILSET, because a movement will be revolutionary, or will be nothing.

Sheikh Abdullah Al Salem Cultural Centre - Kuwait City

Natural History Museum

Science and Technology Museum

Space Museum

Arabic Islamic Science Museum

Opened in 2018 on a 13-hectare site in the Al-Sha'ab district of Kuwait City, the cultural centre includes the Natural History Museum, Science and Technology Museum, Arabic Islamic Science Museum and Space Museum.

EmiratesSkills
مهارات الإمارات
المسابقة الوطنية
The National Competition 2019

ACTVET
Abu Dhabi Centre for Technical and Vocational Education and Training
مركز أبوظبي للتعليم والتدريب التقني والمهني

ABU DHABI, 18th April, 2019 (WAM) -- On behalf of H.H. Sheikha Fatima bint Mubarak, Chairwoman of the General Women's Union (GWU), President of the Supreme Council for Motherhood and Childhood, and Supreme Chairwoman of the Family Development Foundation (FDF), Dr. Maitha bint Salem Al Shamsi, Minister of State, honoured 114 Emirati youths with gold, silver and bronze medals, during the closing ceremony of the 11th EmiratesSkills National Competition 2019.

The competition, which was held from 15th to 17th April, 2019, was organised by the Abu Dhabi Centre for Technical and Vocational Education and Training, ACTVET, under the patronage of "Mother of the Nation".

The first Bee Museum in Africa and in the Arab World.

Living Bee Museum

The Beehive of Science

An exceptional encyclopedic exhibition to discover in family, with friends or with students.

350m² exhibition to learn all about bees and honey.

4 observation beehives to pierce the secret world of bees.

Email: museeabeille.maroc@gmail.com
Phone: +212 5 37 80 42 43 / Gsm: +212 6 41 34 65 71

34 bis, El Oulja Handicraft Complex,
Bouregreg Valley, Salé, Morocco.
Musée de l'abeille vivante - La ruche des sciences

Designed by EI2M - Morocco
ei2m.dir@gmail.com
+212 641 346 571
+212 537 804 243