AEMASE III
A way towards International Science Centres
in partnership with the La main à la pâte Foundation
October 3-4, 2017
Académie des sciences
23, quai de Conti, 75006 Paris

The AEMASE network, launched in 2013 by the science academies of France, Italy, Morocco and Senegal, and the Egyptian Bibliotheca Alexandrina, aims to sensitize decision makers and other partners of educational systems about the urgent need to improve science (STEM) school education across the African-Mediterranean-European region. A sound interdisciplinary science education forms the minds of young citizens for rationality, is critical for sustainable development relying on innovation and technical progress and supports strong economies. It is also crucial to overcome the big global challenges such as climate change, hunger and health. Achieving these goals implies professional education and development of science teachers in the lines of well-tested pedagogies such as inquiry-based science education (IBSE). It requires a co-construction between scientists and teacher educators.

After the AEMASE I conference in Rome in 2014, then AEMASE II in Dakar in 2015, where the two continents have shared pedagogical methods and strategic expertise about teacher education, the present Paris AEMASE III conference ambitions to put a step further by launching a network of innovative centres called CESAME (Centres for Science Education in Africa, the Mediterranean area and Europe). There, during short international sessions, science teachers and teacher educators, coming from the local area or from abroad and gathered with scientists, will co-construct teaching resources along the IBSE pedagogy. They will adapt these resources to their own countries then transmit them. This conference will hopefully permit the first emergence of a few CESAME centres organized in an intercontinental network fashion!
Odile Macchi
Académie des sciences, France

Odile Macchi is honorary researcher at CNRS and a member of the Académie des sciences. She set up the probabilistic model for the detection of photons and fermions. Her original coincidence approach is a cornerstone connecting Quantum Optics to modern point process theory and the seminal work for determinantal and permanental point processes. In the field of communications she developed the theory of adaptivity, a theory at the basis of what is now called deep learning. With 27 doctoral students, 230 papers, national decorations and international awards, she has a strong influence on the signal processing French community.

Mahouton Norbert Hounkonnou
President of the Benin National Academy of Sciences, Arts and Letters, Benin

Mahouton Norbert Hounkonnou is a full Professor of Mathematics and Physics at the University of Abomey-Calavi, Republic of Benin. His works deal with noncommutative and nonlinear mathematics. He published over 200 main research papers in outstanding ISI-ranked peer reviewed journals and international conference proceedings in the fields of mathematics, mathematical physics and theoretical physics. He is a visiting professor at African, Asian, European and North American Universities. Together with his peers at the international level, he founded the International Chair in Mathematical Physics and Applications (ICMPA - UNESCO Chair) of the University of Abomey-Calavi, which attracts prominent and leading mathematicians and mathematical physicists worldwide who come to give lectures and supervise students research. Professor Hounkonnou supervised more than 33 PhD and 31 M. Sc. students from various countries including Belgium, Benin, Burkina-Faso, Burundi, Cameroun, Democratic Republic of Congo, Niger, Nigeria, Senegal, Togo, Zambia, etc. Professor Hounkonnou was awarded the Tokyo University of Science President Award in 2015, and the 2016 World Academy of Sciences C. N. R. Rao Prize for Scientific Research, “for his incisive work on noncommutative and nonlinear mathematics and his contributions to world-class mathematics education”. He is member of the InterAcademy Partnership working group on Harnessing Science, Engineering and Medicine to Address Africa’s Challenges. He is the current President of the Benin National Academy of Sciences, Arts and Letters. His membership extends to the International Association of Mathematical Physics, American Mathematical Society, African Academy of Sciences (AAS), The World Academy of Sciences (TWAS), Scientific Council of Centre International de Mathématiques Pures et Appliquées (CIMPA), as well as other scientific organizations.
Program

Tuesday October 3, 2017: Strategic Viewpoints

Venue: Académie des sciences, 23 Quai de Conti, 75006 Paris

9:00 Opening session (Grande salle des séances)
Catherine Bréchignac, Académie des sciences, France
Jean-Michel Blanquer, Ministry of national education, France
Giandomenico Magliano, Italian Embassy, France
Representatives of Ministries from the AME region
Hamidou Boly, CEDEAO Commission for Education, Science and Culture, Nigeria

9h45 Session I: Teaching science for human sustainable development (Grande salle des séances)
Chair : Jean-Paul de Gaudema, Agence Universitaire de la Francophonie, France
Firmin Matoko, UNESCO, France
Sharifah Maimunah Syed Zin, IAP, Malaysia
Fostering peace and harmony through the fusion of civilisations curriculum: a project under IAP SEP
Fouad Chafiqi, Ministry of education, Morocco
Curriculum scolaire et éducation au développement durable au Maroc

10:45 Coffee break (Salon Bonnefous)

11:15 Session II: Teaching science for human sustainable development (continued) (Grande salle des séances)
Chair : Mosto Onuoha, Nigerian Academy of science, Nigeria
Svein Sjoberg, University of Oslo & The Norwegian Academy of Science and Letters, Norway
Paradoxes from the OECD PISA-project: should we sacrifice Inquiry-Based Science Education (IBSE) in order to climb on rankings?
Pierre Léna, La main à la pâte Foundation, France
Science education: a challenge for justice and human development
Manuela Welzel-Breuer, University of Education Heidelberg, Germany
Science education for responsible citizenship – some reflections on the scope of sciences centers

12:15 Session III – The CESAME project (Grande salle des séances)
Odile Macchi, France
Norbert Houunkonou, Benin
c-co-chairs of the conference
What is a “Centre for Science Education in Africa, the Mediterranean area and Europe” (CESAME) ?

12:45 Lunch (Salon Bonnefous)

14:00 Session IV - Challenges in science teaching and national strategic plans for science education (Grande salle des séances)
Chair : Albert Sasson, Académie Hassan II des sciences et techniques, Morocco
Carl Figidor, Institute for Molecular Life Sciences Radboudumc, Netherlands
Good practices of science education hubs and future perspectives in Netherlands
Jacques Blamont, Centre national d'études spatiales (CNES), France
IBSE teaching in developing countries : Haïti and others
Fritz Hahne, Academy of Science of South Africa, South Africa
Renewing STEM education in South Africa and beyond
Session V - Challenges in science teaching and national strategic plans for science education (continued) (Grande salle des séances)
Chair: Éric WESTHOF, Académie des sciences, France
Dominique ROJAT, Inspection générale de l'éducation nationale, France
Science teaching in France: improving the citizen's culture
Lamberto MAFFEI, Foundation « I Lincei per la Scuola », Italy
Lincei for the school: a new teaching strategy
Wafa SKALLI and Malik GHALLAB, Académie Hassan II des Sciences et Techniques du Maroc, Morocco
Learning science and learning by science in Morocco
Nicolas ANDJIGA, École normale supérieure de Yaoundé, Cameroon
Competence based approach in education in Cameroon: many students and poor means

16:15 Coffee break (Salon Bonnefous)

16:45 Session VI.1 – Existing resources, equipment and expertise for teachers training (Salle Louis Martin Chauffier)
Chair: Catherine CESARSKY, Académie des sciences, France
Petra SKIEBE-CORETTE, Freie Universität Berlin, Germany
Schülerlabore and the German Action Programme on Education for Sustainable Development
Ahmadou WAGUE, Académie Nationale des Sciences et Techniques du Sénégal, Senegal
Science Clubs activities at school in Senegal
Mark LANGLEY, National STEM Learning Centre, UK
Effective STEM Learning – the STEM Learning Approach
Sinobia KENNY, African Institute for Mathematical Sciences, South Africa
Enriching teachers in the absence of mathematics specialists

Session VI.2 – Successful strategies as a roadmap for CESAME (Salle Edouard Vuillard)
Chair: Alain-Jacques VALLERON, Académie des sciences, France
Suzanna BORDA, University of Geneva, Switzerland
The Fibonacci Project (2010-2013): inspiring practices and lessons learned
Scholastica LAN, Nigerian Academy of Science, Nigeria
Enhancing educational development through mentoring: a case study of the Nas-Schlumberger partnership in Nigeria
Cliona MURPHY, Centre for the Advancement of STEM Teaching and Learning (CASTeL), Ireland
Teach Teachers to Teach about Science
Majia AKSELA, LUMA Centre Finland, University of Helsinki, Finland
The Finnish LUMA model for promoting math, science and technology education

18:00 End of the day

19:30-22:00 OFFICIAL DINNER (Restaurant La Baleine, 47 rue Cuvier 75005 Paris)
Welcome Talk
Erik ORSENA de l’Académie française, France
I feed with science
Wednesday October 4, 2017: The topics

Venue: Simone & Cino Del Duca Foundation, 10 rue Alfred de Vigny, 75008 Paris

8:45 Session VII - Premise for CESAME centres (Grand Salon)
Scenarios proposed by countries for potential CESAME implementations
Chair: Gaël Giraud, Agence française de développement, France

9:15 Session VIII.1 – Mathematics and science education (Grand salon)
Chair: Joos Vandewalle, Royal Flemish Academy of sciences, Belgium
Gerald A. Goldin, Rutgers University, USA
Best practices in mathematics education
Xavier Buff, Université Toulouse III, France
Mathematics, predictions and climate change
Barry Green, African Institute for Mathematical Sciences, South Africa
The African Institute for Mathematical Sciences (AIMS) Educational Ecosystem
Aderemi Kuku, National Mathematical Centre, Nigeria
Towards More Innovations in Mathematics, Science and Technology Education

Session VIII.2 – Science education for health (Salon Vigny)
Chair: Esther Mwaikambo, Tanzanian Academy of sciences, Tanzania
Peter McGrath, InterAcademy Partnership, USA and
André Radloff, Smithsonian Institution, USA
IBSE programmes and infectious diseases
Arnaud Fontanet, Institut Pasteur, France
The Global Health e-Academy: What role for MOOCs in Africa?
Mario Stefanini, Accademia Nazionale dei Lincei, Italy
The SCIESA project in Italy

10:30 Coffee break (Hall)

11:00 Session IX.1 - Science education for climate change (Grand salon)
Chair: Mahouton Norbert Hounkonou, Benin National Academy of Sciences, Arts and Letters, Benin
Philippe Bousquet, Université de Versailles Saint-Quentin en Yvelines, France
Climate sciences and education in France: challenges, actions, future
David Wilgenbus, La main à la pâte Foundation, France
Creating an international Centre for Climate Change Education, a joint initiative of La main à la pâte and IPCC
Nejib Kallel, GEOGLOB Laboratory, Tunisia
Teaching Climate Change in School

Session IX.2 - Science education for biodiversity and sustainability (Salon Vigny)
Chair: Étienne Guyon, ESPCI ParisTech, France
Gabrielle Zimmermann, La main à la pâte Foundation, France
How to teach biodiversity: the experience of a large-scale project by La main à la pâte
Sergio Carrà, Politecnico Milano, Italy
The world in an alembic: problems and initiatives for a sustainable future
Joe Niemela, The Abdus Salam ICTP, USA/Italy
Developing potential with hands-on activities: from teacher-training to socially responsible outreach
12:00  Session X.1 - Science education for digital society and computer science (Grand salon)
Chair: Sameh SOROR, Academy of Scientific Research and Technology, Egypt
Marco GIORDANO, Conservatory “A. Casella” - L’Aquila, Italy
Coding and computational thinking in the school curriculum
Maurice TCHUENTE, University of Buea, Cameroon
Distance education for teachers: lessons learnt from IFADEM
David RIOS, Royal Academy of Sciences, Spain
Exploring science with low cost social robots
Atinuke ADEBANJI, Kwame Nkrumah University of Science and Technology, Ghana
Curing computational thinking deficiency with a CESAME seed

13:15  Lunch (Salle à manger)

14:30  Session XI – Panel: Programs and perspectives by foundations and institutions supporting education (Grand salon)
Chair: Jean-François BACH, Académie des sciences, France
Didier ROUX, R&D Saint Gobain, France
Saint-Gobain : Research and Education
Katherine BLANCHARD, the Smithsonian Institution, USA
Leadership and Assistance for Science Education Reform (LASER): the infrastructure for independent, sustainable, and locally relevant Science Centers
Paula DÖGE, The « Haus-der-kleinen-Forscher » Foundation, Germany
The « Haus der kleinen Forscher » Foundation - one way to foster STEM learning across Germany
Olivier QUINLAN, the Raspberry Pi Foundation, UK
Learning through digital making
Teresa FERNANDEZ DE LA VEGA, Women for Africa Foundation, Spain
Women as protagonists in the house of science

16:15  Session XII - Launching the CESAME project (Grand salon)
Chair: Pierre CORVOL, Académie des sciences, France
The CESAME steering committee
The roadmap towards the CESAME network of intercontinental science houses

16:45  End of the conference
Honorary President:
Catherine Bréchignac,
Member and CEO of the Académie des Sciences - Institut de France, Ambassador at large for Science, Technology and Innovation, France

Co-Chairs:
- Odile Macchi, Member of the Académie des Sciences, France
- Mahouton Norbert Hounkonnou, President of the Benin National Academy of Sciences, Arts and Letters, Benin

Steering Committee: co-chairs plus
- Friedrich J.W. Hahne, Member of the Academy of Science of South Africa, South Africa
- Pierre Léna, Member of the Académie des sciences, France
- Malik Ghallab, Member of the Hassan II Academy of Science, Morocco
- Peter McGrath, Coordinator InterAcademy Partnership (IAP), Italy, USA
- Rosalind Mist, Royal Society, United Kingdom
- David Rios, Member of the Royal Academy of Sciences, Spain
- Giancarlo Vecchio, Member of the Accademia Nazionale dei Lincei, Italy

Scientific Committee: Steering committee plus
- Mostapha Bousmina, Chancellor of the Hassan II-Academy of Science and Technology, Morocco
- Carl Figdor, Member of the Royal Netherlands Academy of Arts and Sciences, Netherlands
- Aderemi Kuku, Member of the African Academy of Sciences, Nigeria
- Wandera Ogana, Member of the Kenya National Academy of Sciences, Kenya
- Günter Stock, President of All European Academies (ALLEA), Germany
- Maurice Tchuenté, Member of the Cameroon Academy of Sciences, Cameroon
- Ahmadou Wague, Member of the Académie Nationale des Sciences et Techniques, Senegal

Operational Committee:
- Matthias Johannsen, Executive Director, All European Academies (ALLEA), Germany
- Jackie O’Lang, Executive Director, Network of African Science Academies (NASAC), Kenya
- Anne Andivero, Operations manager, Académie des sciences, France
- Sophie Lageat, Assistant, Académie des sciences, France

Contact: sophie.lageat@academie-sciences.fr
Sharifah Maimunah Syed Zin is Director of the International Science, Technology and Innovation Centre for South-south Cooperation under the auspices of UNESCO (ISTIC). She has been involved in IBSE since 2000. She coordinated STEM / IBSE capacity building programmes for (ISTIC) and facilitated training workshops in IBSE in Malaysia and Sudan. She is Special Assistant to the current IAP SEP Global Council Chair.

**Fostering peace and harmony through the fusion of civilisations curriculum : a project under IAP SEP**

By familiarising pupils with the richness of each civilisation and their contributions to modern science and technology For the past 15 years IAP SEP has been promoting IBSE as an innovative approach to improve science education in schools. This interdisciplinary approach infuses the scientific mind, issues of environment, social sciences, citizenship education, health education, natural hazards preventions, sustainable development education and history. IAP SEP is now embarking on a project of “Fusion of Civilisations Curriculum for Schools”. Armed and religious conflicts, atrocities and terrorism have resulted in tragedies and displaced persons. The project believes that the seed of respect must begin with the school. It is inspired by the LAMAP thematic programme “Discoveries in Islamic Countries”. The project is given modern relevance by China’s One Belt One Road Initiative which aims at uplifting human conditions of the developing world by physical, cyber and cultural connectivity.

**Biographies and abstracts**

**Firmin Matoko**

Firmin Edouard Matoko is Congolese. He got high degrees in international relations from the University La Sapienza in Rome, the University Cesare Alfieri in Florence and the Centre d’Etudes stratégiques et diplomatiques de Paris. Since 1995 he had led a beautiful career at UNESCO where he is currently Assistant Director General, Africa Department of UNESCO. He is a renowned expert about the development of Africa, published many political studies in Italian, French and English, his last paper in preparation being entitled “L’Afrique, c’est maintenant ! Entre emergence et transformation” (Africa, it is now! Between emergence and transformation).
Curriculum scolaire et éducation au développement durable au Maroc
Le système éducatif marocain a entrepris, pendant les deux dernières décennies, des actions cohérentes en faveur de l’éducation pour le développement durable (EDD). Ces actions s’articulent autour des quatre axes d’intervention suivants :

- La révision des programmes scolaires afin de faire de l’EDD un axe structurant des apprentissages.
- La mise à niveau des connaissances des enseignants par rapport aux défis et enjeux de l’EDD.
- La production du matériel didactique qui permet aux enseignants d’aborder des questions complexes relatives à l’EDD.
- L’encouragement des établissements scolaires pour faire de l’EDD une question centrale des projets d’établissements.

Paradoxes from the OECD PISA-project: Should we sacrifice Inquiry-Based Science Education (IBSE) in order to climb on rankings?
Since the first publication of PISA results in 2001, the PISA scores have become a kind of global “gold standard” for educational quality - a single measure of the quality of the entire school system. In many countries, school reforms are introduced based on what is perceived to be failing results in PISA. While great attention is given to the PISA scores and country rankings, little attention is given to some of the findings that are surprising, unexpected and problematic. The most important and problematic finding is that PISA-scores correlate negatively with nearly all aspects of inquiry-based science teaching (IBSE), the kind of teaching that is currently recommended by scientists as well as science educators, and also endorsed by funding agencies for grants, for instance the EU Horizon 2020. Other paradoxes are abundant: Money and resources spent on education do not seem to matter for the PISA scores. Class size does not matter. PISA-scores correlate negatively with investment in and the use of ICT in teaching. PISA-scores correlate negatively with doing experiments. PISA science scores also seem unrelated to the time given to science in school. Does the political strife to climb at PISA-ranging go at the expense of promoting interesting, motivating and authentic science education for the young learners? Whether one “believes in PISA” or not, such results need to be discussed critically.
Science education: a challenge for justice and human development

Youngsters represent a quarter of the world population, born with a highly uneven expectancy to receive a proper basic education. In today’s globalized world, deep changes, e.g. climate change or internet connectivity, affect almost every aspect of people’s life, their jobs, health, communication, representation of nature. One knows that the poorest three billions of human beings will be the ones to suffer. Most changes are the consequences of scientific understanding and technical development. Schooling systems are challenged in order to prepare the emerging generation to this new emerging world. Science education is at the forefront. The task, an imperative of justice, appears immense, but not out of reach, if scientists consider it as one of their prime responsibility, in order to support the changes in school systems, to accompany the teachers, to create resources for the classroom, to foster the curiosity of the young and help them to grow as adults.

Science Education for Responsible Citizenship - Some Reflections on the Scope of Science Centers

As the world becomes more inter-connected, the European Union has set ambitious goals. One of those is to promote smart, sustainable and inclusive growth (EC 2015). The fourth Sustainable Development Goal (SDG) for 2015-2030 of the United Nations calls for “inclusive and equitable quality education for all”. Science education requires a profound improvement: sound science education is a robust cornerstone for human and social development as well as for democracy. Experts agree that science is often inadequately taught in schools, since it does not often take into account the interest of pupils nor meets the requirements of the society. A science education, based on fundamental results of science education research can be a powerful tool to improve development and society welfare and at the same time to sustain economies. It has the potential to increase the scientific knowledge of students and the number of young people deciding to choose studies which will allow them to enter scientific careers. To fulfil this demand, formal, non-formal and informal settings for science education are to be expanded and developed appropriately and their potential has to be discovered and used more effectively. In my presentation I will focus this idea to the scope of Science Centers/Science Houses. What are their possibilities? How can they be filled with competence and authentic science challenges?
What is a CESAME?
The project called CESAME (Centres for Science Education in Africa, the Mediterranean area and Europe) will participate improving the professional development of science and mathematics school teachers and help them practice an IBSE pedagogy. Its specific goal is the creation of an intercontinental collaborative network of educational centres. In each CESAME centre the training of teacher educators and teachers is to be achieved as a co-construction between trainees, educators and scientists, with face-to-face as well as remote (follow-up) activities. The trainees can be polyvalent teachers in elementary schools or specialized teachers in middle and high schools. Their scientific partners can be faculty members, engineers, technicians and graduate students in all areas of science. The CESAME centres will build upon the solid experience of the many existing pilot projects with similar goals developed over the African-Mediterranean-European region. Ultimately, all centres will be interconnected to jointly develop and share experiences and resources.

Odile Macchi
Odile Macchi is honorary researcher at CNRS and a member of the Académie des sciences. She set up the probabilistic model for the detection of photons and fermions. Her original coincidence approach is a cornerstone connecting Quantum Optics to modern point process theory and the seminal work for determinantal and permanental point processes.

Mahouton Norbert Hounkonnou
Mahouton Norbert Hounkonnou is a full Professor of Mathematics and Physics at the University of Abomey-Calavi, Republic of Benin. His works deal with noncommutative and nonlinear mathematics. He published over 200 main research papers in outstanding ISI-ranked peer reviewed journals and international conference proceedings in the fields of mathematics, mathematical physics and theoretical physics.

Carl Figdor
Carl Figdor is professor of Immunology and as member of the Royal Netherlands Academy of Arts and Sciences (KNAW) he initiated the science education hubs at universities in the Netherlands. There are twelve science education hubs in the Netherlands, which form a connection between universities, pre-service teacher education and schools for primary and secondary education. The core objectives of science education hubs are to make scientific knowledge available for young children (age 9-13) and to encourage their scientific attitude and curiosity. This is established by teacher professionalization in inquiry-based learning and the development of projects inquiry based learning that can be executed in the classroom.

Good practices of science education hubs and future perspectives in Netherlands
Science education hubs in the Netherlands form a connection between universities, pre-service teacher education and primary and secondary schools. Their core objectives are to make scientific knowledge available for children aged 9-13 and to encourage their scientific attitude and curiosity. This is established by teacher professionalization in inquiry-based learning and the development of projects inquiry based learning that can be executed in the classroom. When alpha, beta and gamma sciences become accessible for all teachers and students, they develop a positive attitude towards science and they discover and develop new interests and talents. It is the ambition of the science education hubs to expand on the international context. Therefore, some of the best practices are now translated to English to exchange experiences and to strengthen international collaborations.
Jacques Blamont, born in 1926, professor at the University of Paris (1957-1996) now emeritus is an experimental physicist who was given the task of creating the French Space Agency (CNES). From 1962 to 1972 he was the technical and scientific director of CNES and is still advisor to CNES president. Jacques Blamont is a member of the french Academy of sciences.

IBSE teaching in developping countries: Haïti and others

The TEH program, developed with cooperation of France and financing by the Banque Interaméricaine de développement (BID), experiments a reform of the teaching methods in the first fundamental cycle for the Ministry of National Education and Professional Formation (MENFP). Contents are elaborated in France with the active pedagogy system “La Main à la Pâte”, and adapted to the Haitian programs and language particularities by Haitian teachers in Port-au-Prince.

Fritz Hahne


Renewing STEM education in Southern Africa and beyond

The structure and the diverse quality of the school and university STEM education are discussed. Schools are managed by separate departments in each of the 9 provinces. Hence new initiatives often start up in specific provinces. English is a common language but the mother tongue for a minority. Second and third languages are often used in early grades. Active school outreach projects are operative in the Western Cape and in most provinces. Among them was a “La main à la pâte” pilot project in Pretoria. In addition to establishing IBSE in all 9 provinces, it could reach the other four independent countries of the Southern African Customs Union which have similar structures and languages. Next in line are the full 15 countries of SADC with a population of almost 300 Million and several main languages of instruction.
Dominique ROJAT
Former student of the Ecole Normale Supérieure, agrégé of natural sciences, graduated in depth study of applied ecology. Taught for fifteen years in preparatory classes to the prestigious biological and geological schools in Grenoble. Since 1999, Inspector General of National Education. He was Dean of the group of Life Sciences, Health and Earth Science and Technology. Today, assessor of the Dean of the Inspector General, in charge of international affairs. Member of the steering committee of the Fondation la Main à la Pâte.

Science teaching in France: improving the citizen’s culture
Scientific education occupies a special place in France, in a long tradition since the Middle Ages and the first universities. The “siècle des lumières” places this teaching in the double perspective of the acquisition of a common culture and the training of the enlightened citizen. Therefore, the intellectual process of building knowledge and knowledge itself are both equally important aims of teaching. The great names of epistemological and didactic reflection - Bachelard, Canguilhem - insist on the importance of reflection on science. The thinkers of the complex world - Morin, Serres - insist on the importance of a cultural and interdisciplinary approach to knowledge, especially scientific. For at least half a century, didactic evolutions have been based on this vision of a scientific education in which the pupil is active and participates in the construction of his knowledge, while learning to master the tools of the construction of knowledge.
In France, a happy convergence between institutional changes and the commitments of the scientific community is gradually transforming education.

Lamberto MAFFEI
Lamberto Maffei is Emeritus Professor of Neurobiology at the Scuola Normale Superiore. He was President of the Accademia Nazionale dei Lincei from 2009 to 2015 and Vice President of Accademia Nazionale dei Lincei from 2015 to 2017. Current scientific interests: functions of the mammalian visual system and more recently his interest has focused on the plasticity in the nervous system of children and adults. He was been awarded numerous national and international prizes and has published several books, among them “Arte e Cervello” (Art and Brain), Zanichelli Editore, Bologna, 2008 (in collaboration with A. Fiorentini); “Elogio della lentezza” (In praise of slowness), Bologna, il Mulino, 2014; « Elogio della ribellione » (In praise of rebellion), Bologna, il Mulino, 2016. He has published more than 300 papers, of which 13 in Science, 5 in Nature, 1 in Nature Neuroscience, 2 in Neuron and 1 in Cell. In 2014 he was nominated Cavaliere di Gran Croce al merito della Repubblica italiana (Knight Grand Cross Order of Merit of the Italian Republic)

Lincei for the school: a new teaching strategy
The aim of our teaching program was begun in 2010 in collaboration with the Italian Ministry of education: its meaning is that of strengthening the critical spirit of young people so that they become active citizens and not subjects. Teachers are the target of our teaching. The disciplines on which we focus are Mathematics, Science (manly biomedical and chemical aspects), and knowledge of Italian scientific language. Teaching is based on a laboratory approach, as in the Inquired-Based Science Education, in collaboration with La main à la pâte program. Teaching is held now in 25 Italian cities for at least 20 hours during the year for each discipline.
Wafa SKALLI

Wafa SKALLI, Engineer and PhD in Biomechanics, is Professor at Arts et Métiers ParisTech, with more than 240 international publications and 10 patents. She has been named at the National Academy of Surgery in France and at the Hassan II Academy for Science and Technique in Morocco.

Malik GHALLAB

The research activity of Malik Ghallab is mainly focused on robotics and AI. He contributed to topics such as object recognition and pattern matching, scene interpretation, heuristics search, unification algorithms, knowledge compiling, temporal reasoning, task planning, monitoring, and learning of robots skills and models of behaviors. He (co-)authored over 200 technical articles in journals and conference proceedings, and several textbooks and monographies.

Learning Science and learning by science in Morocco

Morocco is a country of contrasts: while many outstanding students and researchers are internationally recognized, the overall level of research and science education is lagging behind. There is, however, a strong political will to strengthen research and education and their impact on the development of the country. A working group of the Academy Hassan II of Sciences and Technologies has produced a report on teaching science and learning by science as a strategy to:

- Educating all children to become engaged citizen who master reading, writing and counting while increasing their ability to generate, organize and express ideas.
- Teaching children to learn, to do, and to get self-management skills while being respectful for themselves, others and the environment
- Endowing children with a taste for science and awaken their curiosity and scientific open-mindedness through an approach based on inquiries and observations.

The success of such a process lies in the ability to have a committed involvement of various players towards the challenge of increasing school quality and social inclusion: not only teachers and education administration bodies, but also parents, universities and scientific institutions, NGOs as well as private sponsors. A successful experience will be presented, where synergy among actors in the unfavorable Imlil valley lead to quasi-generalization of preschools with more than 2100 children who benefited from these preschools, resulting in a strong impact both on their performance at primary school and on the empowerment of villagers. This required a specific training aiming at social stimulation and at making all the players responsible.

Going back to enquiry based learning, teachers’ involvement and training is essential to evolve towards teaching science based on principles, methods and learning at various levels, from preschool to secondary school. A pedagogic and social network of teachers training centers would allow sharing vision, experience and good practice. Such network could be set in a few hubs (science houses) in Morocco, with the role of making the link both with the global African Mediterranean European network and with the regional players that could facilitate spreading good practice and changing mentalities for a better education to science and by science.
Nicolas ANDJIGA
Nicolas Gabriel ANDJIGA is holder of a Doctorat d'état in Mathematics from the University of Yaoundé in 1993, with specialization in Game Theory. He is Head of Department of Mathematics at the Ecole Normale Supérieure of Yaoundé, and Director in the same institution.

Competence based approach in education in Cameroon: many students and poor means
The teaching method recommended in primary and secondary schools in Cameroon is the competency-based approach, which takes the learner’s immediate environment as a starting point. From this perspective, learning-by-doing, creativity and problem-solving have to be the focal point of learning in each class, especially in the science-oriented classes. However, observation in the schools is that teaching is still teacher-centered and based on the acquisition of theoretical knowledge. In this presentation, we are going to advance some of the reasons why pedagogic practices in the schools are still teacher-centered and theoretically-oriented, despite the official policy that emphasized a competence-based orientation. This will be followed by a presentation of some practical things that can be done to nurture a scientific attitude which Cameroon is now experimenting.

Petra SKIEBE-CORETTE
Petra Skiebe-Corrette is director of a non-formal science laboratory (Schülerlabor) at the Freie Universität Berlin where school students perform hands-on experiments and initiated a regional Schülerlabor network. She heads “TuWaS!”, which supports inquiry-based science education in 280 primary schools. She serves as an expert for various national and international organisations.

Schülerlabore (non-formal science laboratories) and the German Action Programme on Education for Sustainable Development
Schülerlabore in Germany are non-formal laboratories with the aim of increasing children’s interest in science by hands-on activities. They work with pupils, student teachers and teachers and are organized in local and a national network. Schülerlabore take part in the UNESCO Global Action Programme on Education for Sustainable Development (ESD) to scale-up actions in ESD. The German Ministry of Education and Research has implemented a National Platform, which receives input from 6 expert forums. The Schülerlabore are part of the forum Informal and Non-Formal Learning/Youth. The forum has 7 focus areas, which include e.g. the involvement of young people and the strengthening of change agents. To support the National Plan, future conferences of the national association of Schülerlabore will include the participation of youth and will offer 3 newly developed workshops to strengthen change agents. The Freie Universität Berlin will strengthen BNE in its science teacher education program.
Ahmadou WAGUE
PhD in Physical and mathematical sciences at Moscou state University in 1981, Doctorat d'État en Physique atomique à l’université Paul Sabatier de Toulouse France in 1984, Professor of Physics at University Cheik Anta Diop of Dakar, Member of Senegal National Academy of Science and Techniques, in charge of science education and relations with young scientists. President of the African Laser Atomic, Molecular and Optical Sciences Network (LAM Network). Vice president of African Physical Society. Strongly involved in the development of Optics and Photonics Research and education worldwide. Vice President of International Commission for Optics (ICO), and Past Secretary of C13 Commission " Physics for Development " of International Union for Pure and Applied Physics. Member of the African European Mediterranean Academies for Science Education (AEMASE ) committee for science education. Member of the International Advisory Board of IAP SEP Global Council

Science Clubs activities at School in Senegal
The network of Science Club was created on 2 April 2016 with the participation of 22 High schools located in Dakar. The idea of the creation of the Network of science Clubs was to bring individual science club to work together. The Aim of the Network is the promotion of Science by developing different projects on science education and hands on experimentation in science. It was also to bring students at schools to go for science classes and think about the future of science for sustainable development. The program of the Network is to start activities at regional levels and to go progressively towards other science clubs in order to cover the all country.
With this approach it was possible after the participation to the network of science clubs of Dakar High schools to get the participation of Science clubs from Lycee Malick Sy of Thies, Lycee Ababacar SY of Tivaouane, Lycee Orkadiere of Matam etc.
In Senegal there is a relative repulsion for science classes in high school; its concern girls as well as boys. At the same time there is a strong demand for qualify scientific human resources for the development of the country. The network of science club can play an important role in guiding student towards science curricula and also in bringing appropriate information for families in defining professional project.

Mark LANGLAY
Mark leads the development and delivery of the science continuing professional development programmes for school teachers, at the National STEM Learning Centre in York. With a background in teaching chemistry and physics, Mark supports teachers of all science subjects across the UK, including the UK teacher programmes at CERN.

Effective STEM Education - the STEM Learning Approach
STEM Learning supports teachers and others within UK schools with effective STEM education, through a variety of approaches, including face-to-face and online professional development, the largest online STEM education resource library, STEM Ambassadors and a network of local science learning partnerships. Effective impact processes allow for quantifiable improvements to be measured across the various programmes outlined in this talk, as well as our world-class vision for UK STEM education.
Susana Borda Carula holds a PhD in Ethnology from Paris Descartes University (France). She presently works as an international consultant and has teaching and research responsibilities at the Centre for Children’s Rights Studies, University of Geneva. She is the founder of SieNi, an NGO for educating Colombian children to water protection. From 2010 to 2013, she worked for the European coordination of the Fibonacci Project.

The Fibonacci Project (2010-2013): inspiring practices and lessons learned.
In January 2010, a Consortium of partners from 21 European countries took up the challenge of the Fibonacci project: designing, implementing and testing a strategy of large-scale dissemination of inquiry-based teaching in mathematics and natural science in primary and secondary schools in Europe. Local centres with different levels of expertise in teacher support were at the heart of this initiative. I will draw on lessons learned during the implementation of the Fibonacci project in order to nourish the reflection on the construction of the future CESAME network. Inspiring practices include: providing a clear understanding of what inquiry pedagogy is and the means to assess its implementation in classroom practices; treating teachers as active learners and supporting them to bring about change by relying on local resources; promoting knowledge exchange between centres on the basis of common interests.

Enriching teachers in the absence of mathematics specialists
The African Institute for Mathematics Sciences Schools Enrichment Centre (AIMSSEC) is the teacher training component of AIMS South Africa. AIMSSEC offers professional development courses to practising teachers of mathematics who may not have specialised in the mathematical sciences during their initial teacher training. The courses are delivered during ten day face-to-face components followed by distance learning, and delivered by local and international experts. The course material has culminated into a Mathematical Thinking book series for the professional development of teachers, delivered by the teachers who have attended our courses, back in their communities. The chapters of the book give the teachers practical support, a wealth of ideas for introducing mathematical concepts through active learning approaches and the use of appropriate technology in the South African context. AIMS South Africa is in the process of collaboration with teacher trainers of mathematics and science in our region.

Sinobia Kenny started her teaching career as a mathematics and science teacher in a disadvantaged community in the Cape Flats, South Africa. She furthered her experience as a mathematics teacher and Director of Studies in inner city schools in the UK followed by a successful role as a mathematics teaching and learning consultant for a high performing local authority in London. Since her return to South Africa in 2012, she has been a teacher trainer at AIMSSEC in Cape Town with responsibility as Senior Programme Coordinator and strategic lead for Work Integrated Learning.
Scholastica LAN
Scholastica LAN is a Pharmacist and holds a Masters degree in Public Health and works at NAS as the Programme Manager. She has a passion for stimulating youth awareness for innovation, empowerment and self development. Her areas of interest are manpower capacity building, Stakeholder engagement, environmental safety and health systems strengthening.

Enhancing educational development through mentoring: a case study of the Nas-Schlumberger partnership in Nigeria
The teaching/learning Science, Technology, Engineering and Mathematics (STEM) subjects in developing countries is quite challenging. The Schlumberger- Nigerian Academy of Science partnership for Excellence in Education Development (SEED) started in 2012 promotes innovation among students through a hands-on learning which uses top scientists as volunteer-mentors. About 93 schools in Nigeria and Ghana have participated. The SEED competition inspired and encouraged the students to embrace scientific innovations, and importantly has yielded indigenous inventions.

www.planetseed.com

Cliona Murphy
Dr Cliona Murphy is been lecturing in the area of science education at tertiary level for 17 years. Currently, her principle work focuses on the research, development and facilitation of pre-service, post-graduate and continuing professional development programmes in science education. She has conducted and published research in the area of the Nature of Science, Inquiry-Based Science Education and Education for Sustainability. She has developed a range of innovative educational resources to support the teaching and learning of science. Dr. Murphy was the Irish co-ordinator and principal investigator for Ireland in the European Fibonacci and SUSTAIN projects. She is currently one of the principal investigators on the Educating School Teachers and Faculty for Sustainability through Continuing Professional Development project, being funded by the Global Consortium for Sustainability Outcomes (GCSO).

Teach Teachers to Teach about Science
This presentation provides a snapshot of two innovative professional development programmes that were targeted at developing Irish primary teachers’ Pedagogical Content Knowledge (PCK) in teaching about Nature of Science (NoS) through inquiry. The first study examined the impact participation in the programme had on student and practising teachers’ experiences of and confidence in coteaching NoS. The second explored participating teachers’ experiences of and attitudes towards teaching science and the impact their participation in the NoS programme had on pupils’ understanding and experiences of science. The findings from both studies are significant in that they provide strong evidence that teaching about NoS through inquiry has numerous positive impacts on teachers’ confidence, competence and attitudes towards teaching science and on children’s experiences of school science. The content and conceptual framework utilised in both of these programmes could easily be adapted to fit different international contexts and would augment primary curricula that are constructivist in their approach. These methodologies could also be instrumental in empowering teachers to adopt innovative, inquiry-based methodologies that would engage children and make science more appealing and interesting to them.
**Majia Aksela**

Professor Maija Aksela has a 30-year-experience in science education and teacher training in Finland. She has two hats: she is the head of both national LUMA Centre Finland and the Unit of Chemistry Teacher Education in the Department of Chemistry, University of Helsinki. The LUMA represents Finnish model to promote math, science and technology education. She has published over 300 papers. Many research projects are going on supporting both formal, nonformal and informal science education. Professor Aksela is leading the special LUMA Finland program for years 2014-19 sponsored by Ministry of Education in Finland. She has many international collaboration tasks and activities, for example she has been Finland's representative of the ALLEA (ALL European Academies) working group on Science Education since 2010. Professor Aksela has received altogether 14 honours or awards.

**The Finnish LUMA model for promoting math, science and technology education**

The aim of LUMA Centre Finland (abbreviated from “luonnontieteet”, the Finnish word for natural sciences, and “mathematics”) is to inspire and motivate 3-19 years old children and youth into mathematics, science and technology through the latest methods and activities of science and technology education. In addition, our aim is to support the life-long learning of teachers working on levels of education from early childhood to universities, and strengthen the development of research-based teaching. LUMA Centre Finland is an umbrella organization for the collaboration of schools, 12 Finnish universities and the business sector. Some examples of the popular LUMA activities are presented, and the use of design-based research method as a tool for pedagogical innovations.

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**Érik Orsenna de l’Académie française**

Erik Orsenna is an economist by profession. He was cultural advisor to President Mitterrand and sat on the Conseil d’État (the highest legal authority in France). He is also a novelist, having written The colonial exhibiton (winner of the Goncourt prize in 1988), The indian venture or The origin of our loves. Since 1998 he has been a member of the Académie française. As a specialist in raw materials, Erik Orsenna has been exploring the planet for the last fifteen years and has published a series of short summaries of globalization. After writing about cotton, water and paper, he authored The geopolitics of the mosquito, published by Fayard in March 2017.
Best practices in mathematics education

Best practices at the primary and secondary levels in mathematics classroom teaching include (1) achieving in-depth conceptual understanding as well as procedural fluency; (2) using multiple representations and contexts to form connections; (3) projecting high teacher expectations for students; (4) teaching math through problem solving (including exploration, conjecture, pattern-finding), and individualizing instruction for varying ability levels; (5) motivating students, achieving their deep engagement and ongoing interest in and love for math; (6) relating mathematics to the sciences, technology, and other applied domains. Best practices in teacher preparation include: (1) developing teachers’ understanding through methods suitable for use with their students; (2) building pedagogical content knowledge; (3) fostering attitudes, beliefs, and emotional orientations in teachers that are optimal for motivating students; and (4) continuing, career-long professional development and support.

Mathematics, predictions and climate change

To make scientific predictions, a mathematical model is often useful. For example, to predict moonrise, moonset or moon phase, calculations are complicated but predictions are reliable. Some phenomena are much more difficult to predict: for example weather forecast. It is not possible to predict the weather of a given day one month in advance. To study climate change, one must think differently. A citizen who wants to understand what climate change is about must have some understanding of statistics.
Aderemi Kuku has had a long University teaching and research career since 1965. He is currently President, African academy of Sciences and Distinguished Professor of Mathematics, National Mathematical Centre, Abuja, Nigeria. He was President, African mathematical Union for nine years, 1986-95. He is a member of several National and International Academies including TWAS.

Towards More Innovations in Mathematics, Science and Technology Education
We discuss the nature, role and place of mathematics relative to other areas of science and technology that make renovations in education rather compelling — e.g. rapidly changing fronteers, challenges posed by new and emerging technologies, rather profound, sophisticated, technical and diversified contemporary methods with serious pedagogical challenges. We therefore advocate for efficient ways of unifying, simplifying ideas for the purpose of teaching, learning and applications. Then we discuss current and future situations and offer suggestions what should be emphasised in schools and teacher training programmes. It is recommended that the notion of ‘comprehension of mathematics, science and technology’ be introduced at all levels to help would-be science teachers and teacher trainers to acquire the expertise of simplifying technical science materials appropriate to their level and hence be innovative after their training. Such innovative curricula could be best achieved through tapping of knowledge and expertise residing in the IAP and AEMASE networks. Finally, we encourage all countries in the AME region to fully embrace ‘CESAME’. Such CESAME Centres, beyond emphasizing enquiry-based pedagogy, should also renew the scientific contents of mathematics and science education.

Barry Green is the director of the African Institute for Mathematical Sciences in South Africa and the chief academic and research officer for the African Institute for Mathematical Sciences Next Einstein Initiative (AIMS NEI). He completed his PhD at the University of Cape Town in 1984 and lectured at Stellenbosch University before spending ten years as a research scientist at the University of Heidelberg in Germany. In 1996 he returned to Stellenbosch University, where he was appointed chairperson of the mathematics department in 2002. From 2006 to 2009 he was the executive head of the department of mathematical sciences, incorporating mathematics, applied mathematics and computer science, and still holds a mathematics professorship there. In 2007 he received the South African Mathematical Society’s Award for Research Distinction. He has served on the editorial board of Afrika Matematika and been editor of the journal of the South African mathematical Society, Quaestiones Mathematicae, from 2002 to 2015.

Green has been closely involved with the growth of AIMS since it’s founding in 2003 and was appointed the second director of AIMS South Africa in April 2010. He is passionate about promoting the growth of the mathematical sciences in the developing world, particularly in Africa, and has recently been elected the President of CIMPA, the Centre International de Mathématiques Pures et Appliquées.

The African Institute for Mathematical Sciences (AIMS) Educational Ecosystem
The African Institute for Mathematical Sciences is a pan-African network of centres of excellence for training, research and public engagement in the mathematical sciences. Our mission is to enable Africa’s brightest students to flourish as independent thinkers, problem solvers and innovators capable of propelling Africa’s future scientific, educational and economic self-sufficiency. In this talk I will present the AIMS educational model for post-graduate training, teacher training and outreach highlighting success stories, challenges and opportunities since our first centre opened in 2003.

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**Peter McGrath**
Dr. Peter McGrath (BSc, hons, Agricultural Zoology) followed a 10-year research career with 6 years as a science journalist. He joined The World Academy of Sciences (TWAS) in Trieste, Italy, in 2003, where he managed TWAS’s science capacity building programmes. In 2013, he became Coordinator of the InterAcademy Partnership, including acting as Secretary to the IAP Science Education Programme’s Global Council.

**André Radloff**
Andre Radloff is a Science Curriculum Developer at the Smithsonian Science Education Center. He is interested in creating socio-scientific experiences that foster the development of cognitive schema which support sustainable life, work, and global citizenship through the teaching of inquiry and civic decision making with data in a cultural context.

**IBSE programmes and infectious diseases**
The prevalence of mosquito-borne diseases is increasing around the world, especially in developing countries. One way of fighting back is to prepare children and communities by increasing their knowledge of mosquito biology and how diseases such as dengue, malaria and Zika are spread. The Science Education Programme of the InterAcademy Partnership, in a project being led by the Smithsonian Science Education Center, is currently developing inquiry-based science education (IBSE) curriculum modules that aim to address this gap.

**Arnaud Fontanet**
Arnaud Fontanet is a medical epidemiologist specialized in infectious diseases epidemiology. In 2002, he joined Institut Pasteur in Paris to launch the Emerging Diseases Epidemiology unit. Arnaud Fontanet is also Professor of Public Health at the Conservatoire National des Arts et Métiers, where he is Director of the Pasteur-Cnam School of Public Health.

**The Global Health e-Academy: What role for MOOCs in Africa?**
During the past ten years, Massive Online Open Courses have been developed and now represent a considerable source of free online education material for students worldwide. In global health, there are currently more than 300 MOOCs available. The Global Health e-Academy is an international consortium of universities aiming to facilitate access for students and teachers to this material and to offer certificates to interested learners.
Mario Stefanini
Emeritus Professor, Sapienza University of Rome; fellow of the Accademia Nazionale dei Lincei; president of the Accademia Medica di Roma; member of the Executive Committee of the InterAcademy Medical Panel. Active in the field of Reproductive Biology and Medicine, he has elucidated fundamental aspects of the structural and functional organization of mammalian gametes and of gamete interactions at fertilization. He has developed in vitro models to study the paracrine interactions among somatic and germ cells in the mammalian seminiferous epithelium. He has visualized the presence and distribution of HIV in the human testis and in ejaculated spermatozoa during HIV-1 infection. He is now studying the biology of spermatogonial germ cells in the human and has recently published a novel stage classification of human spermatogenesis based on acrosome development.

The SCIESA project in Italy
SCIESA is an IBSE-based project aimed at making primary school pupils aware of the structural/functional organization of the human body and of preventable health risks, so as to encourage awareness, knowledge and skills needed to their autonomously understanding relevance and advantages of running healthy lifestyles. The project, which is being carried out in two schools in Rome is now in its fifth, conclusive year. The project operative phase has consisted in the elaboration of a curriculum, teaching Modules and related activities, and in their delivery to the same group of pupils attending their first four classes. The following topics have been delivered so far: Environment, Relationships and exchanges between man and environment, Movement, Heart and blood vessels, Brain and its networks (Journey of the nervous signals, Senses, Executive functions), From the organism to the cell to the molecule, Food as a source of energy for the body. The activities planned for the final year are finalised at implementing the main scope of the project by facing issues like Risk factors and external and internal mechanisms of defence of the organism, and Behaviours for good health (lifestyles). The booklets describing the activities carried out during the first three years of the project are available through the InterAcademyPartnership for Health web site: http://www.iamp-online.org/content/health-science-education-compulsory-primary-schools

Philippe Bousquet
Philippe Bousquet is a professor of environmental physics at the University of Versailles Saint-Quentin en Yvelines (UVSQ) and a researcher at the laboratory of climate and environmental sciences. Among these training activities, he piloted the training component of the laboratory of excellence of the federation of research on global climate of Ile de France (IPSL).

Climate sciences and education in France: challenges, actions, future
The implications of climate change in our life will increase inexorably during the next decades as impacts of a changing climate become more and more visible and important. There is a huge challenge to train all components of the society (from general public to policy makers) to reach a minimum of understanding on climate sciences, climate change and its impacts, mitigation and adaptation to climate and environmental changes. It implies most academic disciplines and all education levels from elementary to higher education and professional training. It implies also to train the key society relays such as teachers, journalists, stakeholders, communicants, local to national authorities.
In this presentation, I will review these challenges and present few examples of existing initiatives to address the climate question at an education level. I will also present the analyses and the recommendations for the future proposed by a working group which met in 2016 and 2017 on behalf the French ministry of environment.
Creating an international Centre for Climate Change Education, a joint initiative of La main à la pâte and IPCC

The Paris Agreement, which entered into force on 4 November 2016, has placed a particular stress on the importance of primary and secondary education, life-long learning and public awareness (Art. 12). Education to climate change should involve traditional scientific disciplines (physics, chemistry, biology, geology) on par with social sciences (geography, economics).

In formal education, teachers need to be accompanied through high quality pedagogical resources providing them with accurate knowledge, pedagogical tools, turnkey protocols, global or local projects… allowing them to develop students’ scientific awareness, critical thinking, developping the abilities to understand complex systems and to discern facts from opinions. An interdisciplinary, inquiry-based pedagogical approach seems to be required, in order to motivate and empower students to imagine alternative scenarios, make decisions, and change their behaviour.

At present, pedagogical resources on climate change with these characteristics are, at best, infrequent and, when they exist, unknown to the majority of educators. This is not to say that nothing exists, both in formal and non-formal education, especially through the involvement of NGOs.

In order to fill this specific gap, the Foundation La main à la pâte is fostering an international initiative for Climate Change Education, to begin in 2018. A potential Centre would be created, and closely linked to IPCC and La main à la pâte. This Centre would be in charge of identifying existing resources, adapting them to a variety of local contexts, developing new ones and defining strategies to disseminate them widely, both in developed and developing countries.

Teaching Climate Change in School

Climate change is largely absent from school science curricula in the Mediterranean region. Children don't receive any academic formation and they have no credible outlet to ask their own questions. In Tunisia until now, international attempt to educate the kids have relied on scare tactics that generate fear, which can inhibit the desire to learn more and take action. Today’s students will be tasked with managing tomorrow’s climate change impact. Jobs demand linked to mitigation tactics and adaptation plans are on the rise and will continue to expand as the effects of climate change progress.

Simplifying the teaching of the physical phenomena responsible for past, present and future climate changes will make the approach less conceptual for students. When teaching climate change, a good science curriculum should empower students to ask their own questions, find and understand the answers themselves. After all, we know that students learn best when they can figure things out for themselves!
Gabrielle Zimmermann, a PhD in zoology, has been a member of the La main à la pâte team since 2010. Mostly attached to the production of the La main à la pâte pedagogical resources, she is author of several pedagogical projects including ”Biodiversity in school”, ”The Ocean, my Planet and Me”, and the upcoming ”Scientific minds, Critical thinking”.

How to teach biodiversity: the experience of a large-scale project by La main à la pâte
The La main à la pâte foundation proposes a wide range of educational projects related to sustainable development, related to issues such as biodiversity, climate, ocean and habitat. These projects have been implemented in over 100,000 classes within the last 10 years and most of them have been translated into several languages.
Through the example of the projects ”Biodiversity in School” and ”The Ocean, my Planet and Me”, this presentation will focus on how to approach with the pupils the concepts and contemporary issues related to biodiversity.
During this presentation, we will examine the pedagogical approach of these pedagogical projects: all of them are designed with an interdisciplinary, collaborative and inquiry-based pedagogical approach. They allow students develop their understanding of environmental phenomena and mobilize this knowledge to imagine alternative scenarios and means of action.
Through turnkey class protocols (including detailed class activities supplemented by a pedagogical and scientific background), these projects are making science more accessible for all classes by helping teachers implementing concrete and interdisciplinary activities, in a more confident and self-sufficient attitude. They are free of charge for the teachers.
In addition, these projects include tools to support and accompany the professors, including specific training courses, in distance training sessions and additional resources (through collaborative websites), field support (based on the action of the La main à la pâte Pilot Centers).

Sergio Carrà
Sergio Carra’ is member of the “Accademia Nazionale dei Lincei” and of the “Academiae Europaeae”. He won the ”Antonio Feltrinelli” award. University ”Blaise Pascal” of Clermont-Ferrand conferred to him the honorary degree on Physic and the University of Genova the honorary degree on Chemical Engineering. His research interest is focused on molecular thermodynamics, chemical kinetics, catalysis, simulation of chemical processes and modeling of advanced material synthesis. He is co-author of about 450 papers on qualified journals.

The world in an alembic: problems and initiatives for a sustainable future
In the 2015 Conference on Climate (COP 21) the agreement has been reached on how to face the danger on global warming due to the anthropic activities. The implications are examined on the basis of models able to simulate the influence of the actions to be taken, by accounting for the required deep changes in the production and management of the energy and in the human behaviour. However if the scientific part of the program can be pursue thanks to the known technologies, conversely the required strong global commitment raises doubts on the existence of the political conditions needed to achieve the goal.
Developing potential with hands-on activities: from teacher-training to outreach

This talk will focus on two tracks: one is an effort by UNESCO to “train the trainers” using active learning techniques, a project that has so far reached over 1000 teachers from 60 developing countries. The program is continually evolving, especially regarding follow-up actions and involves teaching optics and photonics as a relatively low cost example of implementing inquiry-based methods in high school physics classes and first years undergraduate courses in physics. The project is titled Active Learning in Optics and Photonics (ALOP) and is supported financially through a continuing grant provided by the International Society for Optics and Photonics (SPIE). The second part has to do with bringing active learning in optics from teacher-students in a workshop setting to actual students of the targeted age groups as a form of outreach. The use of the term outreach means that we do not necessarily bring the project into the classroom but instead make it a voluntary activity for the students on a day off. This ensures that we have dedicated participants and avoids conflicts with the standard curriculum as we try to get it established. A pilot project involving hands-on optics is being carried out in Islamabad and Pakistan’s KPK region, including schools and universities in the Swat Valley (home of Nobel Peace Prize recipient Malala), and is directed exclusively at high school girls and female undergraduates. The program is designed to be run by local early-career scientists as volunteer facilitators, using donated equipment and is easily scalable. ..

Coding and computational thinking in the school curriculum

Coding and - more generally - computational thinking are becoming key-points in the educational systems of many countries worldwide, as they foster many of the competences that have been identified as crucial for knowledge in the 21st century. Learning how to program a computer is not only a basic skill for accessing the growing demand for IT jobs. It is primarily the opportunity to turn students into epistemologists, as Seymour Papert pointed out in his work as pedagogist and computer scientist.

Thanks to the increasingly numerous software tools, educational models and experiences, coding has become easy to learn even in the early school years and gives to students the opportunity to approach STEM disciplines in a creative and conscious way.
Maurice TCHUENTE
Maurice Tchuente is pro-chancellor, Univ. of Buea, emeritus professor Univ. of Yaounde I. His research fields are parallel algorithms, cellular automata theory and social networks mining, with more than 100 papers in indexed journals and proceedings of international conferences. He served as: research fellow at CNRS and IRD France, Minister of Higher Education, Rector of the Univ. of Dschang, Ngaoundéré, and Douala, interim rector, Pan African University, member of UNU/IIST, AUF and IAI scientific boards, and invited prof. at ENS-Lyon, Univ. of Orsay, Rennes 1, Metz, Chile, Ouagadougou.

Distance education for teachers: lessons learnt from IFADEM
IFADEM is an initiative of the Organisation internationale de la Francophonie and the Agence universitaire de la Francophonie, that aims at improving through distance education, the skills of primary school teachers for teaching French or in French. Beyond the pedagogic aspects, IFADEM supports national efforts for the definition and implementation of continuing education. On the other hand, the objective of CESAME is to develop the professional education of school teachers dealing with science, so that they can practise inquiry based pedagogy. This is to be achieved in partnership between trainees, trainers and scientists through face-to-face personal contacts as well as distance follow-up activities. Therefore IFADEM and CESAME have similar objectives and execution strategies. They differ only in the disciplines tackled, i.e. French and science. We present some lessons learnt from IFADEM and that can help to implement CESAME with respect to governance and the use of ICT.

David RIOS
AXA ICMAT Chair in Adversarial Risk Analysis. Member Royal Academy of Sciences of Spain. Formerly has held positions at Duke, Purdue, SAMSI, IIASA, CNR-IMATI, UPM, URJC and Paris Dauphine. Specialist in Decision Analysis, Risk Analysis and Bayesian Statistics, as well as its applications.

Exploring science with low cost social robots
I shall describe how social robots may be used to support IBSE. The emphasis will not be on learning programming and robotics but rather on exploring scientific concept through low cost devices. We shall also make a reference to special needs education.
Atinuke Adebanji

Atinuke Adebanji is an Assoc. Professor of Statistics at KNUST, Ghana. She received a Ph.D. in Statistics from University of Ibadan, Nigeria. She has been active in academics for over 15 years and made several contributions. Her current research involves space of time modeling of maternal and child health indicators.

Curing computational thinking deficiency with a CESAME seed

Promoting science education has been shown to be the main driver of economic development and the Ghanaian landscape is strewn with different interventions and well-intended policies to improve the teaching and learning of mathematics and science. These however have not stemmed the dwindling performance in mathematical sciences at the Basic and High school level. There are spatial and socio-economic disparities in the performances. While some regions report very impressive results, others show dismal statistics. Candidates have often been found deficient in problem solving questions (computational thinking). This study examines what it would take to grow a CESAME in such a diversified educational system and how it can improve the computation thinking skills of the basic school pupils.

Moctar Touré

Dr. Moctar Touré is a soil scientist and a science management specialist.

Agricultural education in Senegal: challenges, opportunities and options

Agriculture is going through a testing transformative process influenced by both climatic and socio-economic factors. Chief among them Youth unemployment which is linked to an incapacitated educational system, disconnected from the sector’s emerging needs and growth opportunities. The disconnect between government policies, agricultural industry and secondary education is cited as one of the main issue steering youth and teachers away from farming careers. If the agricultural education profession is going to grow the following requirements must be addressed: (i) improving image of agriculture and its education (ii) attracting and maintaining qualified teachers and (iii) sparking interest and enrollment of new students. The use of new ITC, more informed linkages between the education system and industry, and increased institutional networking constitute paths forward.
Aissetou Dramé-Yaye

In past nine years (until Oct 2016): Executive Secretary of the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE). Before that, had worked as a programme Officer at the Forum for Agricultural Research in Africa (FARA). Experience with curriculum and project development, linking universities with private sector.

Challenges and opportunities in agricultural education and training in Africa: the ANAFE experience

Regional specialized networks such as the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE) were established, to support agriculture and rural education. The reason behind this was that agricultural education in Africa was facing serious problems affecting the quality and relevance of training programmes offered. Linking universities with agriculture and forestry colleges and other non academic training institutes, strengthening week education institutions, fostering partnerships and making peer pressure work positively, were the main achievements of ANAFE. By contributing to bringing agricultural education institutions to NEPAD and its CAADP programme, ANAFE became a key actor in international and African discussions on education policy, agricultural training and research development. The African Union Agenda 2063 and the NEPAD STISA offer African frameworks for relevance and harmonization of agricultural education and rural training in Africa.

Michel Sedogo


État des lieux, enjeux et perspectives en matière d’Education et de formation agricole et rurale au Burkina Faso

Le Burkina Faso est un pays confronté à des conditions agro-écologiques relativement difficiles en raison de la pénurie climatiques et de la pression anthropique croissante. Il est situé au cœur du Sahel africain et son développement socio-économique est fortement tributaire du secteur agricole. Un des grands défis à relever est de nourrir une population en pleine croissance (3,1% par an), majoritairement rurale (77%), analphabète et caractérisée par sa jeunesse avec 47% ayant moins de 15 ans. Cela nécessite que de profondes mutations puissent s’opérer au niveau de l’agriculture burkinabè, notamment à travers la formation de cette jeunesse aux métiers agricoles. Or l’enseignement au Burkina Faso, en particulier au niveau du cycle supérieur reste très général. En dépit des multiples reformes du système éducatif, force est de reconnaître que les politiques de formation agricole restent inadaptées. Le ratio étudiants /enseignants est de 111 alors que la norme préconisée par l’UNESCO est de 25. En outre, il existe d’autres contraintes telles que l’inadaptation et la disparité des curricula, le manque d’infrastructures, l’absence de système de formation pédagogique et le faible lien avec les entreprises agricoles et agroalimentaires. Ces contraintes ne permettent pas de préparer les apprenants à faire face aux exigences de la modernisation de l’agriculture. Devant cette situation, il a été élaboré une stratégie nationale de formation agricole et rurale (SNFAR) pour la période 2015-2025 qui met l’accent sur l’éducation de base en milieu rural, l’enseignement et la formation, professionnels et techniques des jeunes et des adultes, l’Enseignement- recherche-innovation-développement (ERID) au service du milieu rural. À terme, ce dernier volet de la stratégie permettra de donner des contenus pratiques aux formations dispensées dans les universités et écoles professionnelles agricoles.
Michel DRON

Education in Agronomy in french speaking countries involving France and Africa : history and lessons for the future
One of the goals of France colonization within the 18 and 19 centuries had been to take profit of the natural resources collected within the colonized regions of Africa on one side and on the other side to use natural landscapes to grow tropical crops that France couldn't cultivate within its own territory. These crops included bananas, oil palm trees, coconut trees, pineapple, coffee, cocoa and so on. To be successful France sent its own engineers in agronomy and started to train workers to work on the fields for different tasks. And then when came up the independences of these countries, France did cooperate to help these countries to follow up, in interesting commercial conditions for itself, the production and transport of these crops. This did require the specific training of agronomists within these countries. At this period from 1950 towards mid 1980's, a very tight collaboration was going on between the French agronomy education and the schools which had been created in several of these countries (Morocco, Senegal, Tunisia, Algeria, Madagascar and so on). Very positive as well as serious concerns, of this period, for the African agriculture will be discussed and used to make propositions for the future, for Africa in general.

Didier ROUX
Didier Roux is a physical-chemist who has worked at the CNRS for 25 years. Since 2005, he is Research, Development and Innovation Vice President of Saint Gobain. He is a member of the French Academy of Sciences. He has been professor at the College de France (2016-2017, Technical Innovation chair).

Saint-Gobain : Research and Education
Saint-Gobain is a global company (180 000 employees, producing products in more than 60 countries and developing research in many centers all over the world). After a brief presentation of the Saint-Gobain Company, we will describe the strategy of Saint-Gobain in terms of research and development. In particular how we handle the growth in emerging economies. We will focus on the challenges that we are facing in terms of Education and hiring talents.
Katherine Blanchard

Katherine Pedersen Blanchard has been with the Smithsonian Science Education Center for five years during which she has managed professional development workshops, leadership institutes, and the Smithsonian Science Education Academies for Teachers. The focus of her work has been expanding the Center’s mission both internationally and within the US by working with teachers, schools, and districts to change school and community culture to one of hands-on science education. Prior to coming to the Smithsonian, Katherine worked for theatre companies in Belgrade, Serbia, and Santa Fe, New Mexico, and completed a Fulbright Fellowship teaching at the University of Belgrade. Katherine holds an MA in International Education from The George Washington University.

Leadership and Assistance for Science Education Reform (LASER): the infrastructure for independent, sustainable, and locally relevant Science Centers.

For over 30 years, the Smithsonian Science Education Center (SSEC) has been working in partnership with local schools, school districts, and ministries of education, on a long-term, ongoing basis to improve science and STEM education programs through our Leadership and Assistance for Science Education Reform (LASER) model. This 5-pillared model creates the infrastructure necessary to build local capacity, local ownership, and sustainability, and ultimately to create a culture shift toward more inquiry-focused, hands-on and object-driven science education. From 2010-2015, the SSEC tested this model through a grant from the U.S. Department of Education. Through this presentation, you will learn about the LASER model and its history, about how the SSEC assessed the efficacy of the LASER model in systemically transforming science education.

Paula Döge

Paula Döge is psychologist and completed her PhD in cross-cultural developmental psychology in 2014. Since two years, she works at the ‘Stiftung Haus der kleinen Forscher’ in the research and development unit, which provides the scientific basis for the educational program and supports external research projects.

The ‘Haus der kleinen Forscher’ Foundation – One way to foster STEM learning across Germany

The ‘Haus der kleinen Forscher’ programme is Germany’s largest early childhood education initiative in the STEM fields. It supports the professional development of early childhood educators and primary school teachers to engage in IBSE. This initiative empowers STEM trainers to offer Continuous Professional Development (CPD) courses directed at educators and teachers within more than 200 networks across Germany. Moreover, the Foundation provides brochures and inquiry cards, online learning offers and a website with STEM-related games. The main aim is to foster children’s curiosity about and enthusiasm for STEM. Early childhood education and care centres, after-school centres and all-day primary schools can apply for certification as a ‘Haus der kleinen Forscher’ (Little Scientists’ House) recognising their commitment to inquiry-based STEM education.
Olivier QUINLAN
Oliver is a writer, researcher and educator. He has been a school teacher, a university lecturer, and run digital education and research programmes for UK charities. He is Senior Research Manager at The Raspberry Pi Foundation, leading the foundation’s research into learning and teaching in digital making and computing.

Learning through digital making
The Raspberry Pi Foundation works to put the power of computing and digital making in the hands of people all over the world. We run education programmes, competitions, volunteer led clubs, affordable hardware and free software. This talk will look at the range of ways we are trying to help people to discover the power and potential of digital making, and to acquire skills and attitudes to digital technology that lead them to better lives and a positive impact.

Teresa FERNANDEZ DE LA VEGA
María Teresa Fernández de la Vega, a former judge, made history in 2004 by becoming the first female Deputy Prime Minister of Spain, a position she combined with that of Minister of the Presidency and Government Spokesperson until late 2010. Today she is a permanent member of the Spanish Council of State and President of the Women for Africa Foundation.

Women as protagonists in the house of science
The Women for Africa Foundation (WFA) shows its full support to the CESAME initiative. In fact, WFA is already very committed with the promotion of African women researchers in Science, Technology, Engineer and Mathematics (STEM) in the African continent, with its project Science by Women. WFA is willing to participate to CESAME by offering part of its centre Nador Lighthouse, located in Nador (Northern Morocco), a great building which will be inaugurated in 2018 which could be one of the Sciences Houses.
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