21Century Teaching & Learning

Organized by:
Regiduria d'Educació de l'Ajuntament de Barcelona
Introduction

Giving boys and girls the opportunity to identify real problems, to find viable results, where are several possible solutions, and drive their own learning, will prepare students for the kinds of real life problems and situations they will find in jobs of the 21st century.

This development model uses analysis, independent research, brainstorming, test solutions, encourages to taking risks without fear and to learn from failure which provides young people with effective tools to face new and unknown learning situations, where the parameters of the problem are not well defined and are ambiguous as they will find in the real world.

STEAM Barcelona teaching and learning in the 21st century aims to bring together in Barcelona some of the most cutting-edge, successful and evaluated projects in the field of research, methodology and practice of STEAM in Europe and the United States. This conference also seeks to highlight those pedagogical innovations that, in this field, are being developed today in Catalonia.

Mark these dates on your calendar!!!

EXPLORE the benefits of experimental methods in STEAM education & the outstanding opportunities for exchange.

SUBMIT your favorite programs, your best experiences!

KNOW how to obtain or extend a practical guide for schools to incorporate STEAM & approach their everyday challenges.

COME share & discuss their innovative tools & make heard your voice and experience in the debate.

TAKE PART to discuss best practices & share experiences with other colleagues interested in STEAM

ATTEND training sessions & gather new ideas to implement them, why not? Monday early morning!!!!
FRIDAY APRIL 17th

8.45  Registration

9.30  Opening

**Gerard Ardanuy**
Councillor for Education

He was elected city councillor in 2007. Currently he is Presiding Councillor of the Eixample District and the CiU Municipal Group spokesperson on education, employment and the knowledge society.

He has been a Barcelona Commonwealth of Municipalities councillor since 2007. He is also a member of the Casa Àsia Board of Trustees, the Barcelona Municipal Institute of Education (IMEB) and the Municipal Social Welfare and Consumer Affairs Councils.

**Carmen Fariña (TBC)**
New York City Schools Chancellor and Head of the New York City Department of Education.
Has spent over 40 years working at virtually every level of the New York City's school system to ensure children receive a quality education. During her career, she distinguished herself as a model educator and principal who inspired others across the school system to adopt teaching practices she had pioneered.

She is a former teacher, and Deputy Chancellor. She is known as a skeptic of the ability of competition and standardized testing as a means of improving schools.
10.00  Why Project Based Learning and how to apply it?

**Cindy Johanson**
Executive Director, Edutopia, George Lucas Foundation, San Rafael, CA, USA

Well-designed project-based learning (PBL) has been shown to result in deeper learning and engaged, self-directed learners. PBL puts learning into practice in ways that sharpen focus and foster the sense of purpose and accomplishment so essential to continued individual success. It teaches through doing rather than simply teaching to the test. This session will highlight five core elements of successful PBL used by teachers, administrators, and schools. Through real-world examples and recommended web resources, the audience will gain an understanding of PBL and how to apply it.

*Cindy Johanson* has more than 25 years experience leading the design of digital services with a focus on education. Johanson oversees Edutopia, produced by the George Lucas Educational Foundation. Edutopia is a leading source of inspiration and information about what works in K-12 education. Previously, Johanson served as senior vice president of interactive and education for America’s Public Broadcasting Service where she launched the award-winning pbs.org. Cindy can be reached on Twitter: @cinjo

10.45  Coffee Break

11.15  What does it mean to turn STEM to STEAM?

**Mike Petrich (TBC)**
Co-Founder of Tinkering Studio, the Exploratorium

The Tinkering Studio is primarily an R&D laboratory on the floor of the Exploratorium, but whenever possible we try to share our projects, activities, and developing ideas following an “open source” model. Learn how you too can enjoy our activities in your classroom, kitchen, garage, and community. Our work with artists, tinkerers, and makers of all stripes is critical as we attempt to demystify the process of making, and to infuse our work with new ideas. The Tinkering Studio promotes thinking with your hands while experimenting with art, science, technology, and delightful ideas. At the Exploratorium!
Mike Petrich With initial training in fine arts and photography, has investigated, for 20 years, a public as diverse as museum visitors, primary school students, Tibetan monks, persons deprived of liberty or postgraduate researchers. How people develop themselves, personal entertainment unique in the world and how environments can be designed to encourage learning and deep thinking that has led to a graduate degree in educational technology design, and last instance on a leadership role in the Tinkering Studio.

12.00 LET THEM BE SCIENTISTS!
Wendy R. Hawkins
Executive Director of Intel Foundation

For 25 years at Intel, Wendy Hawkins has worked with educators, families, corporate colleagues, and government leaders around the world on ways to make science education more accessible and effective. Empowering teachers to move beyond textbooks and standardized tests, and allowing students to ask authentic questions, seek novel answers, and see themselves as makers and inventors is transformative to an entire generation of young scientists and engineers. How can we all work together to create this environment for our children?

Wendy Ramage Hawkins Executive Director of the Intel Foundation, an organization that operates worldwide with annual investment of $45 million in STEM education and gender minorities, Intel employee volunteerism and education, and in response to disasters worldwide. He has managed numerous global educational programs, national and local, including Intel® Teach a teacher professional development initiative that has reached more than 10 million sententants worldwide. Wendy is also responsible for the Intel Science Talent Search, and the International Science & Engineering Fair Intel.

12.45 Applying STEM Barcelona
Meghan Groome
NY Academy of Science

Dr. Meghan Groome is the Executive Director of Education and Public Programs at the New York Academy of Sciences which includes the Global STEM Alliance, STEM Afterschool Mentoring Program, Science Alliance, the NeXXt Scholars Program, Science Teachers Initiative, and a portfolio of special projects. Dr. Groome is also the Director of Science &
the City, the public gateway to the New York Academy of Sciences.

Dr. Groome is the Principal Investigator and Co-Investigator on a $2.95M collaborative grant between the Academy and the State University of New York (DRL 1223303), a Co-I on an NSF conference grant on Girls and math identity and a Co-I on a $5M STEM C grant on the Billion Oyster Project with the NYCDOE, Pace University, the Harbor School and a consortium of other partners.

13.30  Lunch Break

14.30  **The Big Van Theory**

Cosmic Rays! Bacteria that produce electricity? Bacteria form armies! What exists beyond genetics? The Big Van Theory, Theory Furgonetón, is a group of scientific researchers from day to night monologists scientists from different fields: physics, chemistry, mathematics... Through theatrical monologue genre, these scientists take to the stage to disclose, in an entertaining and fun, diverse subjects and phenomena of science. A show to learn and diffracted laughing. But there is more: workshops, communication courses, case... Get on the van of science TheBigVanTheory.

15.00  Exchanging STEM education experiences and knowledge – a reality in Europe

**Agueda Gras Velázquez**

Science Programme Manager at European Schoolnet, Brussels, Belgium

It is not easy for any organization the right hand know what the left hand. The same is true among school teachers, scientific and educational projects other stakeholders. How do you stay up to date on what is happening in science education in Europe? Where you going to share your experience? Scientix the community for science education in Europe began as a community project. Today, as a professor of STEM say, is a community of people. How does the exchange? What are the advantages of not only sharing what you or your school
or your organization is doing, but also what teas “Competitors” are doing?

Agueda Gras-Velázquez, Science Programme Director of the European Schoolnet (EUN) is also responsible for managing Scientix (community for science education in Europe, and coordinates pilot Ingenious a strategic alliance between major industries and ministries of Education In his six years at EUN, Agueda has participated in over 20 projects and 10 of Commission funding private funding. He sits on the advisory board of a number of education projects marc7PM program.

He was co-author of several works in the area of Science Education and Research and has a doctorate in astrophysics from Trinity College Dublin.

15.20  Science Education for Responsible Citizenship

Charyl Ryan
Senior Lecturer in Education The University of Winchester

The science education should focus on skills with an emphasis on learning through science and STEM to STEAM go to link science with other subjects and disciplines.

Charly Ryan oordinador of the Report of the European Commission, “Science Education for Responsible Citizenship” to be published

Charly's research and teaching has been related to design, evaluation and implementation of programmes, teaching aspects of science pedagogy, supporting classroom research and development, and finding ways to bring such developments to a variety of audiences. One focus is the need to concentrate on student learning, development and control, and their links with assessment. Another is to develop the roles of speaking and listening, and of writing, for developing understanding.

16.00  Coffee Break

16:30  Panel: 6 Successful Local Case Studies
17.30    Results SteamNET programs in the UK

Yvonne Baker
President and Executive Director of MyScience National Science Learning Centre

After years of work, evidence of a first-year performance evaluation demonstrates operations and programs SteamNET great success and its impressive array of results. The independent evaluation of our programs, conducted by the National Foundation for Educational Research, shows its suitability. The results included a positive impact on teachers and staff and volunteers and also a very positive impact among students.

Yvonne Baker is president MyScience executive, director of the National Science Learning Centre and head of the regional network of Science Learning Centres, which provide inspiration and innovative professional development for science teachers across the UK. MyScience also operates the National STEM Centre which brings together national organizations that work within STEAM communities and is building the largest collection of open resources for teachers in terms of Steam in the UK.

18.15    The future role and value of play

Michael Renvillard
Director at LEGO Foundation Programmes & Partnerships

The LEGO Foundation created and share the innovative research on the impulse transformer game and creativity in learning to act as a critical resource for educators, parents and opinion leaders from around the world. We have a large academic network and work with leading institutions including MIT in the United States and the University of Cambridge in the UK. Academic research on the LEGO Foundation used to provide tools, and experiences a significant commitment to and knowledge about the transformative power of play.

Michael Renvillard is program director and director of the Foundation Partnerships LEGOLE has been a member of the Board of the Board of Kraft Knowledge, c consultant on EU projects and programs ECSITE head of the Association of Museums European Science.
SATURDAY, APRIL 18th

9.30   Responsible Research and Innovation, a new context in science education

**Ignacio López Verdaguer**
Deputy Director Science and Environment Area at Obra Social laCaixa.

Today, there is evidence that we have to involve the general public in decisions about the shape and direction of research and innovation to contribute to an economy smart, sustainable and inclusive growth of our societies. How does this new paradigm Governance Research and Innovation in Education of STEAM? The need for more specialists STEAM is key to the future, but not enough: we also need scientifically literate citizens, institutions that can cope with the complexity of technological and scientific connecting better with the needs of society. In this talk I will discuss Responsible Research and Innovation in relation to scientific education and the efforts made in this regard by the “la Caixa”.

**Ignacio Lopez Verdaguer**, Director of the Department of Science Foundation Bank “La Caixa” has a degree in Physics from the University of Barcelona and has done management studies (PMD) at the University of Navarra IESE. Professional development has been linked in science in society and non-formal education activities of science. EC is the coordinator of the project (FP7) RRI Tools that promotes Responsible Research and Innovation in Europe and member of the Advisory Board Responsible Industry EC (FP7) project.

10.15   How to Engage, Encourage & support more female students to study STEAM

**Gail Cardew**
Director of Science & Education at Royal Institute

How to encourage and support women to study science, technology, engineering and math? Since early 2013 the Royal pioneering institutions committed to bringing science to the general public working with the government on how to encourage more women to study and pursue a future in science and engineering, and in this sense is vital to involve and connect girls with cutting edge research, and bring science alive and social students to exci-
ing career options open to everyone.
Gail Cardew is responsible for the communication of science at the Royal Institution, the activities of scientific education and science policy. One representative of the Royal Institution of the Scientific Committee of Parliament. Parliamentary.

10.45 Science in the K-12 Schools Oh... My... do we have it WRONG!

**Dr. Ioannis Miaoulis**
President and Director the Boston Science Museum

Although humans do most of the objects with which interact and use every day during their lives, the current curriculum focuses very little on how the world is made or designed by man: Feathers, cars, pills, buildings, all a result of technology and the results of the process of engineering design. Most educators claim that science is the discipline that teaches children about the world around them. But science curricula focus on the natural world that is only a small part of our day to day. Children spend an enormous amount of time learning things that are totally irrelevant to their lives and to become technologically literate adults. Ioannis (Yannis) Miaoulis, will discuss how our education system has missed the point and talk about an important initiative introduirl'humà made the world and engineering schools worldwide.

**Ioannis (Yannis) N. Miaoulis**, is since 2003 President and Director of the Science Museum in Boston, one of the largest and most visited scientific centers of the world. He was formerly Dean of the Faculty of Engineering at Tufts University, in 2004, launched the Center for Technological Literacy® (NCTL®) to improve knowledge of engineering among people of all ages and inspire future engineers and scientists. The NCTL’s curricula have reached 78,000 teachers and 6.5 million students. Miaoulis earned bachelor’s and doctorate in mechanical engineering and a masters in economics at Tufts University, and a masters in mechanical engineering at MIT. He has published more than 100 papers and holds two patents.

11.00 Coffee Break
Marina Umaschi Bers
Tufts University Professor; Developer of the KIBO robot & CoDeveloper of ScratchJR

Marina Umaschi Bersin, professor of Child Development and Computer Science at Tufts University in Boston, MA. Directed interdisciplinary research group consisting DevTech design and study of innovative learning technologies. In her work highlighting her research on technologies for children 4 to 7 years old. His philosophy and theory as well as its pedagogical approach, curriculum and assessment methods is in his books “Blocks Robots: Learning with Technology in the Classroom Early Childhood” (2008; College Press for the teacher ) and “designing digital experiences for Positive Youth Development: From the site playground games” (2012, Oxford)

Joan Cruz
Telefónica Foundation Director in Spain

Head of Territorial Coordination ( Institutional Relations ). From Barcelona, and in close collaboration with the heads of Projects and Areas of Fundación Telefónica, I coordinate the relationship with the territorial responsible for Telefónica and the various institutions at regional and local level (governments, municipalities). At the same time, as part of that role, I exercise the role of spokesman for the Foundation to policymakers and the media at local level. In parallel, the FT team in Barcelona, we launched and directed projects Friendly Schools (2009-2013), cultural exchange between schools in Spain & Latin America and Think Big Schools, creativity and youth development (2013- present).
14:00 Electronics in the Classroom

**David Cuartielles**

David Cuartielles teaches interactive technologies at Malmö University’s School of Arts and Communication, and is one of the co-founders of the open source platform Arduino. Recent publications include: Professional Android Open Accessory Programming with Arduino, and Mobile haptic technology development through artistic exploration.

14:45 How our brains learn engineering skills

**Chris Rogers**

Professor of Mechanical Engineering at Tufts University and co-directs the Center for Engineering Education and Outreach

In this talk, I will present an overview of the research going on at Tufts and other places understanding how our brains learn engineering skills (design, modeling, human factors, etc) and how teachers around the world have used this knowledge to bring engineering in at all ages. Mostly, I will show videos of the amazing things kids (of all ages) have made when given the opportunity to lead their own learning.

Chris Rogers is a professor of Mechanical Engineering at Tufts University and co-directs the Center for Engineering Education and Outreach (www.cee.o.tufts.edu). He and his graduate students have spent the last 18 years working with LEGO Education and National Instruments on the development of the Mindstorms product, studying the learning as well as developing new learning technologies. He also has done research in turbulence, aircraft noise, musical instrument design, wafer manufacturing, fire control, robotics, and genetics. Finally, he has flown over 700 parabolas on NASA’s 0-g aircraft without getting sick.
15.30 **Round table: Barcelona Open Challenge for schools**

Monica Alonso, Begonya Folch, Dani Jimenez, Laura Rubio, Francesc Sabaté, José Luis Touron

Moderador: Mariona A. Cíller

16.00 **Playground! STEAM Hands On**

Try out a parallel carousel of fast, fun and accessible experiments to take back to your school

- Arduino
- Ateneus de Fabricació (TBC)
- Camp Tecnologico
- CodeClub (TBC)
- ClauTic (TBC)
- BQ (TBC)
- EduCaixa
- CreaCiència, Dani Jimenez
- FabKids, FabLab Barcelona
- FunLab (TBC)
- Infonomia, Educació
- La Mandarina de Newton (TBC)
- LEGO, Education
- MakeSpace Madrid
- Petit Talents
- Fundación Telefónica
- RepRap BCN (TBC)
- Vailets HackLab (TBC)
- Ultralab
Organized by:
Regiduría d'Educació de l'Ajuntament de Barcelona.

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