FOCUS ON: Learning in the 21st Century at the EUROSCIENCE OPEN FORUM - ESOF2014

About EuroScience

EuroScience (ES) is an association established in Europe in 1997 with headquarters in Strasbourg (France). It was created based on the model of the American Association for the Advancement of Science (AAAS). A non-profit grassroots organisation Euroscience was from the outset an association of individuals open to research professionals, teachers, students, science administrators, policy-makers, etc. and generally to any citizen with vested interested in science, technology or humanities and their links with society. EuroScience represents not only European scientists of all ages, disciplines and nationalities but also from the business sector and public institutions such as universities and research institutes.

EuroScience Open Forum - ESOF¹

ESOF is the biennial pan-European meeting dedicated to scientific research and innovation created by EuroScience. At ESOF meetings leading scientists, researchers, young researchers, business people, entrepreneurs and innovators, policy makers, science and technology communicators and the general public from all over Europe discuss new discoveries and debate the direction that research is taking in the sciences, humanities and social sciences. ESOF is unique in that it is both international and multidisciplinary. ESOF takes place every two years, in a major European city with established track record in sciences.

ESOF presents and discusses the frontiers of scientific and technological research in Europe, contributes to the development of a European Scientific Identity together with bridging the gap between science and society and stimulates policies to support scientific research.

Science Programme

The Science Programme is the very core of ESOF and consists of plenary and keynote lectures by world class researchers, statesmen, business leaders, and interactive sessions and workshops with engaging formats for debating the latest research results in various fields of knowledge selected from eight broad themes.

In 2014 the eight themes of the Science Programme were:

- The Healthy Society
- A Revolution of the Mind - Brain research and cognitive neuroscience

¹ http://www.euroscience.org/esof.html
Learning in the 21st Century

The aim of this scientific theme was to explore what are the skills and knowledge needed in the future and how the educational process might support scientific research and technological development. Well-educated and knowledgeable citizens are essential for inclusive and vibrant societies. This scientific theme was introduced for the first time in the programme, obviously showing the raising importance given to the development of human resources necessary in our modern society. Discussions revolved around the future of national educational systems and the question how science and technology offer ways to improve our ways of learning.

Significant sessions in the "Learning in the 21st Century" theme

MOOCs: a disruptive innovation for scientific and technical education in Europe?

Online courses have been already one of the main topics of the European University Association (EUA) conference earlier this year and it looks like it will continue to be among the major initiatives to be handled by DG EAC in the following years (open educational resources). MOOCs-Massive Open Online Courses have disrupted higher education by offering quality teaching from the best universities to all and for free. The session analysed whether MOOCs address students’ expectations of high quality teaching and assessment. It also explored the extent to which MOOCs can overcome the challenges of the labour market in the STEM (science, technology, engineering and mathematics) fields, where Europe is supposed to have a shortage of highly qualified people. It also looked to the existence of "European" MOOCs model and to the business perspective of employing potential MOOC graduates.

As MOOCs are currently on the agenda of the EC (within Open Educational Resources), and their importance for a revolutionary change of how higher education is provided has complex consequences (costs, quality, participation, the social acceptance of degrees earned like this, etc.), MOOCs will continue to be an important topic in the agenda of the EP, too.

Computing - a 21st Century literacy

The session addressed several challenges with a particular focus on the integration of computer thinking in science curricula. Further on, it took into review several achievements in this field in certain European countries, as well as the US and the way how computing is on one side penetrating almost all aspects of science and technology (e.g. the Nobel laureates in Chemistry in 2013 were all computer modellers), and beyond. The questions which were mainly put included the way how to scale computing education to a national and international level, the way humans develop an understanding of model-based thinking and the development and use of abstractions, as well as the changes needed to current pedagogy.

Computer literacy it is an issue for several EU policies and particularly pedagogical aspects and will continue to be subject of debate.
**Engineering for children: a new way of teaching science**

The central topic of the session was to present innovative ways of addressing engineering education in an era when the promotion of interest in scientific careers and the development of a culture of innovation among young people is a challenge.

The approach was to start early and address primary schools, as the introduction of engineering into the curricula of formal and non-formal education could be a solution. It was stated that interest in scientific topics can be encouraged with the use of engineering design processes on challenges that are relevant to children’s lives.

Three aspects for making change happen are important: curricula development, teacher training and advocacy for introduction of engineering into the curricula.

The session was centred on the ENGINEER project (partly funded by the EU 7th Research Framework Programme) which supports the widespread adoption in Europe of innovative methods of science teaching and the introduction of engineering in schools. The project is based on the proven — Engineering is Elementary (EiE) program developed by Boston’s Museum of Science (BMOS) since 2003-04 and now widely used in primary schools throughout the U.S. Evaluations of EiE have found that incorporating engineering in science teaching, using inquiry-based pedagogic methods, results in highly desirable impacts on students and teachers, raising students’ interest in science and engineering. BMOS plays an instructional and advisory role in ENGINEER.

This presentation addressed the vertical curriculum structure of training and education to the aim of catching more and more youngsters from an early age and maintaining their interest for STEM fields, thus producing a larger pool of candidates for these types of careers.

The approach, which in fact is based on a research project, but fully educational in nature, may be considered at the EP level within the context of curricular changes in EU member states and improvement of teaching quality at all levels, i.e. in respect how innovative tendencies can be observed. It may also be subject of a broader approach, i.e. to what extent research supported by the EU contributes to attainment of goals in education and culture.

**Accelerated learning for success**

The organisers of this session addressed researcher training in Europe, based on certain Marie-Curie networks in particle accelerator technique and the experience accumulated with them. In other words, the topic targeted doctoral training. The aim was to see how more job-ready researchers can be trained.

This sounds quite fashionable, but there were interesting statements put forward. According to the main speaker Carten Welsch from University of Liverpool we face a significant dilemma in researcher training: while some decades ago almost all doctoral students were trained for an academic career, to be pursued in a university or a research institute, this is not the case anymore. It looks like only 10% will end up in a traditional research based institution, while the bulk (90%) will have to get a job mostly in industry. However, all over Europe doctoral training programmes are completely inappropriate for this aim, as training is still targeting ONLY a career in a research institution. As a consequence, if it employs them, industry starts their training from scratch, which is obviously a huge waste of resources.

The projects in the session addressed the curricular changes institutions concerned introduced to face this challenge. The tendency is positive in this respect; however its institutionalisation across the EU is a matter of concern. According to Carten Welsch, following these experiences, the University of Liverpool (the only one to his knowledge) decided to reshape, if relevant, doctoral education in other fields as well.
The point here is that doctoral training takes more and more importance all across Europe. We are faced already for some decades with a proliferation of this training, which is part of the depletion of social status of all kinds of qualification levels and degrees. We are not only facing a massification of higher education (one of the pillars of the EU current strategy), but also a massification of doctoral training and apparently training programmes across Europe are completely unfit to tackle the needs. There are also voices according to which there is growing unemployment among PhD graduates, simply because of their over qualification, i.e. a qualification not adjusted to the societal needs.

The Italian Presidency of the EU also handles doctoral training as a priority, although too little has been done yet at EU level in order to tackle the issues associated.

Is higher education the best it can be?

This session was organised for the European Parliament and it was included in this ESOF2014 theme, too. It was jointly organised by the EP (Pol-Dep B and STOA), Elsevier Publishing, Technopolis and DG EAC in the EC. It was designed to be an interactive session, i.e. organized around roundtables (a total of 6), each of them having a different topic of discussion. The topics were as follows:

- How do you choose your institution?
- What role does the EU have in supporting industry, universities and researchers to ensure researchers across the EU (and beyond) are offered capacity-skills training in research publishing?
- Are you equipped to teach entrepreneurship and use new modes of learning?
- Better education for better research performance
- Should the sharing of research data be made mandatory?
- What does innovative doctoral training look like?

The venue was the Glyptotek Hall of the Carlsberg Museum.

Britta Thomsen (former MEP, S&D) concluded that among the current policy goals of the European Union one can find higher education and its enhancement of educational quality as a pillar of the Youth on the Move flagship initiative of the Europe 2020 strategy. Higher education is also a subject of another pillar in this strategy, namely the Innovation Union. In this respect it is an imperative to overall better match the degrees and qualifications awarded to the needs of the society. A direct link between education and training in higher education with the needs of a high-technology economy is a must.

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