



CONCLUSIONS - "INSPIRING THE NEXT GENERATION"

How to Harness the potential of MATHEMATICS, SCIENCE AND TECHNOLOGY to drive Innovation and Competitiveness in Europe

INTRODUCTION

The European Round Table of Industrialists (ERT), an informal forum bringing together around 45 chief executives and chairs of major multinational companies of European parentage, has identified increasing young people's interest in Mathematics, Science and Technology (MST) as essential for sustainable economic growth in Europe, and reaching the targets set in 2000 by the European Community and laid out in the Lisbon 2010 Agenda. As a result, ERT decided to explore ways of increasing young European's interest in MST education and careers with the ultimate aim of advance Europe's competitive position. To help guide the ERT in shaping an appropriate response to the problem, it organised a conference entitled, "INSPIRING THE NEXT GENERATION", on 2 October 2008, in Brussels. The event brought together high-level representatives from academia, business, government and the teaching profession providing a platform to share experiences and gather feedback on possible shared approaches to tackle the potential shortfall in MST-trained people in the region. By hosting the event, ERT was looking for genuine collaboration to give the necessary impetus for ERT companies to support the educational base.

José Manuel Barroso, President of the European Commission, gave a keynote presentation. Other governmental representatives included Marc Foucault, Directeur des Relations européennes et internationales de la Coopération, Ministère de l'Éducation Nationale, France; and Mariano Gago, Minister of Science, Technology and Higher Education, Portugal; Janez Potočnik, Commissioner for Research and Odile Quintin, Director General DG Education and Culture. From the world of academia, speakers included Professor Svein Sjøberg, University of Oslo; Professor Jonathan Osborne, Kings College London; Marc Durando, Executive Director European Schoolnet; and Doug Brown, UK Department for Children, Family and Schools; and Caroline Jenner, CEO JA-YE; and from industry, Leif Johansson, Vice Chairman ERT and CEO Volvo; Jorma Ollila, Chairman ERT, Chairman Nokia, and Chairman Royal Dutch Shell; and Hans van der Loo, Head European Union Liaison, Shell International; amongst others. The event was chaired by Andrew Dearing, Secretary General the European Industrial Research Management Association (EIRMA).

KEY ISSUES

The event provided a unique and stimulating opportunity to bring together, “industry and education: the two cornerstones on which Europe’s future will be built” said President Barroso. Many ideas and issues were raised during the day and although there wasn’t consensus on all points, discussions focused on the following themes (to reflect the engaged nature of the discussions, quotations from speakers and participants have been included):

- **Understanding supply of and demand for MST graduates in Europe** - There is an apparent gap between school education in Europe and the skills business requires to remain competitive, “the rate of change in industry has largely outpaced our education systems.” In order to ensure its competitive position, Europe needs a much larger percentage of MST graduates. This gap is being addressed by the European Commission since 2000 with an increase in graduates in MST subjects being one of the five education benchmarks of the Lisbon Agenda. However, although the benchmark has already been passed and the number of graduates has increased by twice that in the US and four times that in Japan, the problem has not been solved. The number of MST graduates is still too small as growth of MST skills in emerging countries, such as China for example, is faster than that of more developed regions, like Europe. “The situation is very complex. We need to look at MST in each country and in each area;” for example, whilst there is a strong increase in computer sciences, there is less in pure mathematics and statistics, engineering and life sciences. In physical sciences, there has actually been a reduction.
- **Jobs of the future will require more people to follow MST careers** - Looking at demand today is only part of the equation as, “we can’t know with complete certainty what jobs will be around in 2020, but we can try to define the sets of skills companies will need.” There are no exact numbers with regard to industrial demand for MST skills and being too prescriptive of the skills needed can also be detrimental, for example, the dot.com boom of the 1990s needed many less IT people than was anticipated. What is certain is that MST subjects play a key role in growing adequate Research & Development (R&D) capability, ensuring economic and productivity growth, and in other areas that are key to Europe’s future competitive position. Europe therefore needs more technically-driven, high-skilled people in order to push back the frontiers of technology and drive innovation forward. Indeed, it is expected that jobs of the future will require higher skills; by 2020, it is predicted that there will be around 20 million high-skilled jobs and 30 million medium-skilled jobs in Europe. In addition, with, “more than 50 percent of the European workforce working behind a computer screen today,” there should be no doubt about the importance of basic MST competences being absolutely necessary for the entire workforce of the future. Finally, now is the time to act as, “education systems change direction very slowly, so we won’t see change for ten to 15 years down the line”.
- **The central role of teachers and school systems**– There are some schools and classes across Europe that are bucking the trend with results far above the

average. In all of these cases, it is teachers who are making the difference. Teachers need support and many lack recognition. The way MST subjects are taught does present a challenge for teachers, "don't lock mathematics into a tunnel, it's one of the most important and transferable subjects, but it needs to be 'humanised'." The school system has an influence on MST career choices; often by the age of 14 most students will have already taken choices that may exclude them from MST careers.

- **Students have a misleading image of MST careers** - Across Europe, negative attitudes toward MST subjects exist and negative stereotypes of scientists, engineers, researchers etc. can be found, with the result that preference is given to other subjects. This is most often due to a lack of understanding about what a career utilising these subjects entails in reality. Students today don't always have a meaningful understanding of MST careers. "School science classes don't show how MST is important for living and don't boost curiosity, so students don't see how MST can increase their career possibilities." As a result, too many young Europeans opt out of MST subjects at an early age. Not only is this exacerbating the shortfall in MST graduates, but it limits their options, creating barriers to career change in the future. Guidance counsellors/officers in schools have an important role to play in shaping perceptions of MST careers. Industry has not been sufficiently engaged in explaining what industry does.
- **The choice of MST careers fails to tap into youth interests** - Research suggests that today's youth find attitudes, values and interests more valuable in making their choices. They won't make their choices, "because it is good for the labour market and they may earn a good salary." They are more interested in 'who they will be' rather than 'what they will do'. "All students want to do something meaningful that fits their values and ideas, but they don't think they will find it in MST." This is more marked in developed countries, where there has been a significant decline in interest in MST careers, with young people less positive towards MST careers than adults.
- **Gender disparity in MST careers** - There is a significant gender issue in the MST area, with an insufficient number of girls taking up or being encouraged to take up these subjects. Too often career advisers with little knowledge themselves of the opportunities offered by MST still call on more traditional thinking that MST is more a male domain. There is also a real lack of female role models in this area, "what girls see as role models are more in humanities and teaching, especially at primary school and secondary school level."
- **What can Europe learn from other regions on enhancing MST careers?** With the figures showing India and China outstripping Europe, Japan and the US in MST graduates, it is important to understand and learn from their experiences. In the US, there have been demonstrable successes in encouraging student interest in MST. Are the reasons that the US authorities undertake numerous activities to enhance the role of scientists, such as Ask a Scientist?

- **European business is removed from MST education** - “The children I teach don't know who you (industry) are. Roll your sleeves up and come into the classroom! If they know who you are and what you do, they may come and work for you.” To date, industry has not played a big enough role in education to help boost MST-based competencies. Although some partnerships exist at the university level, business is not used to getting involved in primary and secondary education establishments. And whilst senior management are often involved, there is a lack of middle management interest. However, the presence of industry in education is considered by some with suspicion, and in some cultures is even rejected.

ADVICE FOR EFFECTIVE INDUSTRY ENGAGEMENT WITH SCHOOLS

The event led to a number of clear recommendations of what industry should take into consideration when seeking to develop industry-school collaboration to encourage more students to take up MST careers:

Define industry's role: High-level involvement from industry is crucial. Business must be clear in its role that it is not for commercial gain and neither is it only about “filling empty seats in industry”, but as a true societal partner. And it's not about teaching teachers how to teach. It's about providing a meaningful context. Business has a clear role in helping schools understand what MST career opportunities really are. There is a need to empower schools as institutions and encourage them to take the initiative. If scale is to be achieved, it must be done carefully and in the right way or more harm will be done than good.

Provide context and tell stories: To answer the challenge of 'we don't know who you are', companies need to provide a meaningful understanding of careers in MST as a way to look at the future of industry and provide role models. These role models should not only target students, but address teachers too to provide meaningful updates of what they do. We need to make students aware that an education in MST provides options. We need to engage young people by age 14. We need to tell more stories of what it means to be working in this industry, talk to any engineer or scientist and they are never bored. They are fully engaged in what they are doing. What the job is like on a daily basis and how it helps serve people interest people. Communicating that is very important.

Build on existing best practice: In terms of business/education partnerships, measures need to be defined; best practice identified and rolled out across Europe for all aspects of society. A European body should be created to act as an umbrella and coordination centre. ERT is supporting existing schemes and should work to expand them to all European countries at a quicker speed than is currently happening and encourage effective legislation to make that happen. Best practice can also lead to identifying common success factors for industry/education partnership schemes, such as customisation, programmes tailor made to fit local circumstances; targeting of a very young audience (four year-olds and up); sustained efforts that continue over a

substantial period; they involve the personal commitment of the involved companies' CEOs; and they use a networked approach across regions.

Better targeting: To attract more engineers or scientists, we have to target the maths-able; we have to be more selective about our target group. There is little point in selling MST to young people to become an engineer or a scientist; they want flexibility sold to them. They need to be told that doing MST will open up many more career pathways. And we need to illustrate this. We also need to define young females and young males in sharper niches not just as boys and girls.

Engage with teachers - Business can contribute to enhancing the role of teachers by providing in-service training on MST topics, resources and contexts, helping provide pupils with access to role models and career prospect information, and enabling teachers to 'tell the story' of the role MST skills play in the world. This does not mean industry taking on the role of teaching teachers how to teach, but providing access to the contextual knowledge of MST and the opportunities these subjects open up.

Address all stakeholders: Need to address all stakeholders, everyone in the community. Create meeting places – both physical and non-physical - that can be replicated at different levels - local, national and European -, creating a complete concept that drives best practice.

Measurement: We need to create new instruments to analyse labour market requirements in order to be able to train and prepare people with the right skill sets for when new jobs (that we cannot predict now) come on stream. There need to be more studies of how young people make choices and what those choices are based on. The ERT will engage with the OECD for more accurate metrics of supply and demand.

WHAT NEXT?

Based on the multi-stakeholder meeting and to answer the invitation to partnership that resulted from the meeting, ERT member companies will begin looking into how they can partner with the relevant stakeholders to:

1. Help create a European coordination body to support business/education initiatives.
2. Engage with the OECD to establish indicators that can help better guide decision making both for governments and business.
3. Act as a catalyst for business/education initiatives at national and local levels.
4. Continue to take leadership on promoting MST careers and engage with European and national stakeholders.

For further information visit www.ert.eu or contact:

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