SCIENCE EDUCATION PLATFORM

Research Output n. 6: " The present and future science applications in Europe: fore sighting future applications as scenarios

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Foresighting careers in Science

Now more than ever, there is a strong need to support global, collaborative science and innovation to deliver social, economical and political impact. As the world…is faced with increasingly complex challenges and opportunities, shrinking numbers of science students, and a public hungry to understand the rationale behind political decisions, the challenge of ensuring this impact should not be underestimated (Sackett, 2009).

These challenges faced by educators and governments all over the world can be taken on by individuals who through the use of foresighting try to develop knowledge about ways in which to face long term challenges cause by human induced changes in the earth's environment, world epidemics and decreasing number of students studying basic sciences. When reviewing the challenges faced Sackett (2009) suggests four themes for exploration. These are:

- Climate change, Energy, Water and Environment;
- Science as an Engine for Innovation in Commerce, Industry and the Arts.
- National Health, Well-being and Security; and
- Knowledge Generation, Skills and Perception in a Global World.
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Meeting these challenges will require individuals with imagination, foresight, and the ability and willingness to approach science in different ways. Collaboration and appropriately trained individuals not only in the knowledge of science but also in skills required to work together are needed.

Castle (2011) describes foresighting as "gaining momentum as a social science research method to help anticipate issues arising from emerging technologies, influence policy making and shape a desirable future." For Castle (2011) foresighting enables you to put things within a context, it does not enable you to predict the future but it gives you the knowledge with which to shape a desirable future. "With foresight

you can take a longer-term view – usually at least ten years away and you can explore alternative futures and construct multiple scenarios." (Castle, 2011).

In this short review, members of the SEEP network were asked to foresight future science careers. They were asked to think about the job prospects which were available in the area of science 20 years ago, what developments in science careers they had seen happening over the past 20 years, and what science careers they envisaged would be important in the next 20 years. This foresight was important in order to provide educators with knowledge from which to advice students taking up science subjects in schools with the aim of taking up future careers in science. Six partner countries (see Table 1) responded to the call for information.

Table 1: SEEP partner countries who responded to foresight questionnaire

University of Nicosia, Cyprus
Bupnet, Germany
Gozo College Boys Secondary School, Gozo
Greece
University of Malta, Malta
Bacescu, Romania

Job prospects available in science 20 years ago….

Not many job prospects available and not many science degrees from which to choose. Job prospects mainly as a University professor *(University of Nicosia, Cyprus).*

The main jobs in science were in the University as teachers and professors. Also there were jobs in private research institutes and huge companies had their own research departments. With science subjects people also chose to become teachers, journalists and authors *(Bupnet, Germany).*

Twenty years ago there were very few jobs related to science. The ones available were mainly in health related fields and in teaching *(Gozo College, Gozo).*

The job prospects available in the area of science in Greece twenty years ago were firstly in the educational field and science graduates made their living as teachers in high schools. Secondly, the other opportunities available were in the industrial and manufacturing companies available (for e.g. fertilizer production companies, pharmaceutical industries, industrial manufacturing of electronic material, companies that dealt with the mining of oil deposits and deposits in general, meteorological, geological and astrophysical services, radio electronic companies etc.). Thirdly, in the medical field (biologists, biophysicists, biochemists etc…) and lastly by the domain of research (quantum physics, astrophysics, elementary particle research, nuclear physics etc.) *(Greece).*

Twenty years ago, the jobs in science where related to the traditional profession. With science subjects you could become a teacher, a doctor, a pharmacist, an engineer or an architect. There was no diversification into different branches of science and very little jobs in science related fields which did not have to do with education, health or engineering *(University of Malta, Malta).*

The jobs available were mainly in the area of industry such as engineers, chemists, textile and food industry *(Bacescu, Romania).*

Job developments in the area of science in the last 20 years…

Many different kinds of jobs have developed in science in the last 20 years. Mainly in research, in teaching and in software design *(University of Nicosia, Cyprus).*

There have been increased connections between private companies and Universities so many science students are sponsored by private companies to continue their studies in specific areas of interest chosen by the companies. This ensures that they

have future employees for their company. The number of different jobs in the area of science have increased from 150 to thousands *(Bupnet, Germany).*

In the last twenty years various jobs in the area of science have been created. These new jobs are mainly in the area of food industry, pharmacy, waste treatment, water treatment, engineering, quality control and fish farming *(Gozo College, Gozo).*

Now in 2012, brand new prospects of employment, concerning science department graduates, have been arisen. Due to the generalized usage of personal computers and the application of new technologies in most aspects of our everyday life, as well as the necessity of preserving our environment and the decrease of oil resources, different needs of science research and application have emerged. Science graduates can be absorbed in industry by e.g. companies and services that are dealing with alternative and renewable sources of energy, companies that manufacture computers, software and hardware etc. Owing to the decode of the DNA, the development of genetic engineering, the successful creation of clones ,the discovery of new elementary particles, the breakthroughs in space travels and other scientific achievements in the late 20th and the early 21st century, new research realms and sectors have been deployed *(Greece).*

The major job developments have taken place in the area of mobile telephony, engineering and thermal technicians *(Bacescu, Romania).*

Nowadays, students studying at the University of Malta have a wide range of opportunities and they can study science which then branches into various areas of industry and research. For example medicine branches into genetic engineering, with chemistry you can go into forensic science, you can study combined sciences such as chemistry with materials and find a job in industry and there has been a boom in the area of computing and Information Technology *(University of Malta, Malta).*

Job prospects which will be available for students in the next 20 years…

University of Nicosia, Cyprus

- Genetics.
- Mobile technologies.
- New media and virtual realities.

Bupnet, Germany

- Digital evolution.
- Virtual realities.

Gozo College, Gozo

- Farming quality of soil.
- Air pollution and control.
- Intensive farming specialist.
- Sea treatment and fish preservation.
- Elderly health care.
- Special individual health therapy.

Greece

- Nano-mechanics.
- Robotic industry.
- Conquest of space.
- Human health.
- Environmental science research.
- Renewable forms of energy.

University of Malta, Malta

- Information Technology.
- Mobile Telephony.

- Alternative Energies.
- Medical Health care.
- Medical Imaging.
- Environmental science.
- Educational Technologies.
- Cultivation of the sea and fish farming.

Bacescu, Romania

- IT Engineers.
- Web design.
- Medicine.
- Medical equipment engineer.
- Technician in renewable energy.

Present and future applications of science in Europe

A number of clear trends have emerged from the responses of the partner countries of SEEP who responded to the questionnaire. It is very clear from the data presented that 20 years ago, the careers available in the area of science were very limited and generally provided opportunities only in teaching (mainly in secondary schools and University), and traditional jobs such as medicine and engineering.

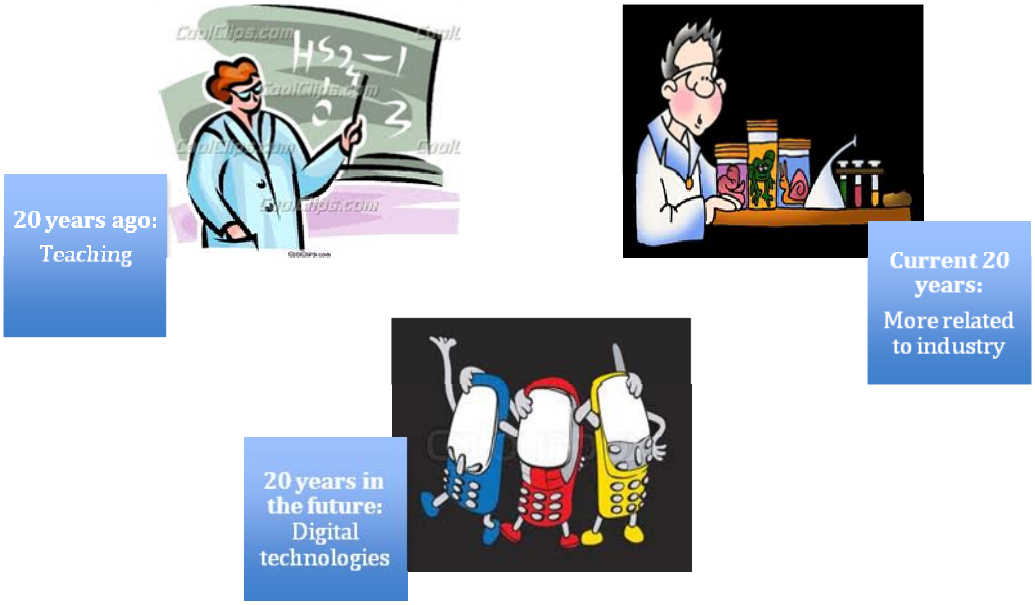
The last 20 years however have seen new developments in the area of science careers. The major developments mentioned have taken place in the area of mobile telephony and communication, health care and engineering related projects. These are very similar to the science careers and themes identified by Sackett (2009).

The major themes for science careers which have been foresighted by members of SEEP who participated in the study include:

- Mobile telephony.
- Digital technologies, virtual realities and robotics.
- Health care.

- Environmental research including new technologies in agriculture, air control and sea farming.
- Energy, including renewable forms of energy.

New developments in science careers should also be based on internships with industry so that science students have a clear focus and study science with an aim rather than studying science just for the sake of studying science.



Advice which can be given to students…

1. Clarify reasons why you are interested in following a career in science.
2. Understand what science is and what your role as a scientist would be.
3. Focus on special field of interest at an early stage.
4. Do an internship in area of special interest.
5. Become an expert in your area of interest.
6. Focus on areas which have a humanistic application and will help create a better world.

7. There will always be a variety of jobs in science since the world keeps modernising and it will always need science students to take care of innovations.
8. Have a passion for anything that you choose to do!

References

Castle, D. (2011). Emerging method: Foresighting. *Genome Canada, Impact, Genomics and Society.* Retrieved November 1, 2012 from http://www.genomecanada.ca/en/ge3ls/newsletters/winter-2011/foresighting.aspx

Sackett, P.D. (2009). Meeting global challenges, collaboratively. *Science Alert*. Retrieved November 1, 2012, from http://www.sciencealert.com.au/opinions/20092209-19800.html