STRENGTHENING THE LINKS BETWEEN RESEARCH AND EDUCATION THROUGH A STEM SUMMER SCHOOL PROGRAM

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Abstract

The global development of the society requires a constant updating of the objectives that education pursues, as well as the ways in which they are achieved. STEM education is an area undergoing a process of advanced transformation, both at the level of objectives and methodologies, with a strong social, economic and knowledge impact.

Research-based education is a well-established term especially in the higher education system. More and more studies and key policy documents argue that education has to be based on the cutting edge research, while many universities are claiming to place the approach at the core value they believe in. However, different theoretical and methodological perspectives on the subject of research-based education combined with challenges related to the use of different resources and the necessary knowledge on behalf of teachers could make it very difficult to properly use it in the pre-university classroom.

Much more natural is to test and assess the research-based teaching and learning outcome in an out-of-the-class setup, such as summer programs for students or extra-curricular activities.

In the present study we will describe how a science and technology summer school program could be planned and used as a testbed (pilot) for developing a research-based methodology to teach STEM subjects to highschool students.

There are some elements that makes Science and Technology Magurele Summer School unique in the national landscape, mainly because containing the most important ingredients: linking education to a real research environment, being conducted by researchers and builds on existing research on the field.

A group of 40 highschool students selected based on previous results and interest in the topics has been "exposed" to science for one week, organized in small groups and working together with mentors (researchers) inside high level research laboratories of research institutes and universities research centers. They had the chance to learn how research is conducted and produces new knowledge, conduct own research as a part of their studies or participate in research projects of the academic staff.

16 themes have been proposed to students to choose from, with topics ranging from engineering to artificial intelligence, from robotics to biotechnology. All the proposed projects tackled a real challenge with a proven impact on daily life, for example how to attack a tumor cell using a high beam laser, how to improve earthquake buildings resistance using antiseismic elements, how to build and launch an environmental monitoring capsule in the stratosphere and measure important parameters as temperature, altitude, position, radiation, pollution, etc.

To evaluate the initiative a set of input, process and output indicators that can provide insights to the effects of the link between education and research have been used and assessed. In parallel feedback was collected from a group of teachers to whom methodologies have been presented and who were able to monitor the students at work. The results encourage the extension of the programme, of the topics proposed and period.

Keywords: STEM education, research-based, education.