"Physics & Industry": Development and study of a model for promoting excellence among under-achieving students

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Under-achieving students are characterized by deficiencies in knowledge and skills, low image and under-realization of academic potential. Research suggests promoting such students by challenging them in the context of supportive environments. The present research investigates the "Physics and Industry" program as a context to promote the development of such students.

The program, carried out originally with students from high socio-economic background, aims to promote excellence among physics students who study physics at the level of 5 credit-points for the matriculation exams. The program lasts 18 months and is carried out in regional classes at the Davidson Institute of Science Education. The program counts towards 40% of the matriculation score in physics. Teams of 2 students carry out a design project dealing with an authentic technological problem. They are tutored by expert physics teachers and engineers from the Electro-Optics Industry. The program gives students the opportunity to expand their physics knowledge and skills on issues which are not treated by ordinary teaching and to get an in-depth glance on the hi-tech industry.

In recent years we started to implement the program with students from low socio-economic background. We realized the need to tailor the program to these students and developed a new version of the program based on a pilot study carried out in 2007-2008; recent research on the "regional class"; and the literature about pedagogical methods recommended for under-achieving students. We are presently studying the learning processes of students in the new version of the program and its effectiveness in developing:

1. Abilities and skills such as self-regulated learning, expertise in project situated learning; ability of dealing with open-ended problems.
2. Students' perceptions on: self-efficacy; science and the learning of science; learning by doing projects.
3. Students' views about: science and technology; hi-tech industry; the "Physics & Industry" program.
4. Creativity