

Abstract

The present thesis investigates whether Nanotechnology and its applications are of interest to Greek high school students and the feasibility of introducing this field in Secondary Education, under the assumptions that pupils should be able to participate actively and share positive results, without being charged with extra work outside their usual curriculum. The thesis attempts to answer the above questions through bibliographic research, the development of a special questionnaire and the application of the project “Matter in Nanometers”.

The bibliographic research lists 31 proposals for the introduction of Nanotechnology in High School, 23 of which originate in the USA. Their working hypothesis is that Nanotechnology will play an important role in daily life in the near future, because of its many applications, and that citizens may have to face important decisions. 11 out of 31 proposals deal with teacher training, 13 focus on “Science for everyone” approaches, 10 aim at motivating older students to follow a career in Science and 9 of them are dedicated course proposals. While some of the 31 proposals belong to more than one category, most are characterized as non-typical educational settings, taking advantage of existing University Open Portals, Exhibitions, Science Museums and web pages offering suitable teaching materials.

The study of those proposals led us to create: a) a questionnaire and b) a project. The 15-item questionnaire aims to record the awareness, attitudes and interest of the public towards Nanotechnology. It was administered to 273 people aged 15 – 35 years, belonging to 5 different groups, according to their education and field of studies. Results showed that: a) knowledge of non-specialists about nanotechnology is incomplete; b) participants exhibited a cautious attitude towards Nanotechnology and c) both students and specialists were genuinely interested in participating in a project about Nanotechnology. Given these results, a project of 24 hours in 8 weeks was designed. It was applied in a group of 18 students of the 1st class of the 1st Experimental High School of Thessaloniki “Manolis Andronikos”, in the context of the compulsory subject “Project work”. Students followed lectures, visited the LTFN Nanotechnology lab of the Aristotle University of Thessaloniki, performed three experiments in small groups and searched the web about an application of Nanotechnology of their choosing (group work). Their homework consisted of a written report of the whole project, one for each group, which was presented during the School Festival Day.

Results from students’ reports, our class notes during the project and students’ and teachers’ viewpoints suggest that it is feasible to introduce aspects of Nanotechnology in Secondary Education. Also, students through carefully designed project work may acquire and maintain key – competences for lifelong learning and active citizenship skills, which are important goals of modern science curricula. More conclusive results may be reached if the project is applied to larger numbers of students, which is our suggestion for future research. Science departments in Universities could organize teachers’ training programs for the application of similar projects in secondary schools. The school course “Project work” is an excellent opportunity for this, with the additional benefit that students aren’t charged with extra work. Finally, it should be investigated whether it is possible to introduce Nanotechnology into the classroom within the conventional Physics, Chemistry and Biology courses. That would represent an excellent opportunity for bringing a modern topic of science and technology, relevant to everyday life, into school science.