

Abstract

Nanotechnology: Assessment of secondary student's and teacher's knowledge, and examination of alternative ways for integrating it in secondary curricula

The present study explored the integration of Nanotechnology and Nanosciences (N&N) in the programs of studies of secondary education both at an international and at a national level. Specifically, the study first looked at the degree to which Nanotechnology has been included in the program of studies of several countries, as well as at the procedures and the methods through which this inclusion was implemented.

Specific foci of the study have been the educational level at which Nanotechnology is introduced in each educational system (primary or secondary education), the nature of the Nanotechnology courses in the programs of studies (obligatory or optional course), the type of school in the context of which nanotechnology is being taught (ordinary or summer school), and the methodological approach used for the teaching of Nanotechnology (traditional or interdisciplinary / cross-curricular approach). Moreover, special programs and applications that are on the interest of educators and parents can be found on the internet and can be used for familiarizing their students or their children with basic concepts and applications of Nanotechnology have been reported.

On the basis of the information gathered from the review of the international status of Nanotechnology two questionnaires (one for students and one for teachers) were constructed by the present researcher, in order to investigate the knowledge on and the attitudes toward nanotechnology held by Greek secondary teachers and students. The student questionnaire comprised of 15 Likert –type and closed questions, whereas the teacher questionnaire included 17 Likert –type and closed questions. Both questionnaires included questions on basic concepts and common uses of Nanotechnology, and explored specifically participants preferences regarding training schemes for their familiarization with Nanotechnology, as well as their ideas regarding the most appropriate ways of teaching nanotechnology and integrating it in the program of studies of secondary schools.

The 886 students who participated in the study were attending the 3rd Gymnasium class and the 1st, 2nd, and 3rd Lyceum class of secondary schools situated in Thessaloniki and Kozani. It was found that most of the students participating in the study were not familiar with basic concepts of Nanotechnology, that students' gender and grade had no effect on the answers, and that students were positive toward the introduction of Nanotechnology in the program of studies and their attendance of courses on Nanotechnology, especially if instruction would include experiments. However, students appeared unwilling to attend summer programs on Nanotechnology.

The 176 teachers who participated in the study were teaching Physics, Chemistry, Mathematics, Informatics and Biology. It was found that those working in Lyceums were more knowledgeable regarding Nanotechnology than their counterparts working in Gymnasias, with teachers of Physics and Chemistry and Biology appearing to possess more knowledge on the subject than teachers of Mathematics & Informatics. Irrespective of their specialty, teachers agreed that Nanotechnology should be integrated in the program of studies of secondary schools, and should be taught through experiments and interactive simulations. Moreover, teachers showed interest in attending summer trainings on Nanotechnology or follow postgraduate studies (Masters Degree) on this subject