GEOschools Interest research on Geosciences content and teaching strategies in secondary schools in Europe

GEOschools: Έρευνα ενδιαφέροντος για τη Διδασκαλία των Γεωεπιστημών στην Ευρώπη

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Abstract: A research is organized in the frame of the European project GEOschools to investigate the interest of students and teachers in the context and teaching strategies of geosciences in secondary schools. A questionnaire was designed as the main data-collection instrument and based on the results of a comparison on geosciences curricula and school textbooks content analysis among five European countries (Austria, Greece, Portugal, Italy and Spain), which are the partners of GEOschools project.
The questionnaires were distributed in around 20 schools in each participating country. Specifically, a sample of 1749, 14 to 17 year-old children and 58 teachers, was surveyed in schools across Greece, Italy, Portugal and Spain in order to identify existing geosciences interests. From the interpretation of data resulting from the organisation, conduct and evaluation of questionnaires, the general interest by students and teachers in geosciences is confirmed. The most interesting subjects in total score for students from all countries are Palaeontology and Natural hazards. Teaching strategies also raise high interest.

Key words: Geology, Curricula, High School.

Περίληψη: *Στο πλαίσιο του ευρωπαϊκού προγράμματος GEOschools οργανώθηκε «'Ερευνα ενδιαφέροντος» μαθητών/τριών και εκπαιδευτικών σχετικά με τη διδασκαλία των γεωεπιστημών στη Δευτεροβάθμια Εκπαίδευση.*
Η έρευνα στηρίχθηκε σε ερωτηματολόγιο που σχεδιάστηκε από τους εταίρους του προγράμματος λαμβάνοντας υπόψη τα αποτελέσματα της σύγκρισης των αναλυτικών προγραμμάτων σπουδών των γεωεπιστημών και της ανάλυσης περιεχομένου των σχολικών εγχειριδίων που είχε προηγηθεί στις πέντε χώρες (Αυστρία, Ελλάδα, Ιταλία, Πορτογαλία και Ισπανία) που συμμετέχουν στο πρόγραμμα. Στην έρευνα συμμετείχαν 1.749 μαθητές και μαθήτριες ηλικίας 14 έως 17 ετών και 58 εκπαιδευτικοί. Τα αποτελέσματα κατέδειξαν το ενδιαφέρον των μαθητών και των εκπαιδευτικών για τις γεωεπιστήμες. Τα πλέον ενδιαφέοντα θέματα είναι η Παλαιοντολογία και οι Φυσικές Καταστροφές. Επίσης οι στρατηγικές διδασκαλίας συγκέντρωσαν μεγάλο ενδιαφέρον.

Λέξεις κλειδιά: *Γεωλογία, Γυμνάσιο, Λύκειο, Διδακτική, Αναλυτικά Προγράμματα.*

INTRODUCTION

One of the main aims of GEOschools project was to investigate the interest that secondary school students and teachers have on geosciences content and teaching strategies (Calonge, 2012; Fermeli et al., 2011).

The research took place in 4 European countries (Greece, Italy, Spain and Portugal) based on a series of questionnaires which were distributed in schools in each participating country.

A questionnaire was designed as the main data-collection instrument and based on the results of a comparison on geosciences curricula among five European countries (Austria, Greece, Portugal, Italy and Spain), which are the partners of GEOschools project.

The questionnaires were distributed in schools in each participating country. Results from this research concerning Greece, Italy, Portugal and Spain are presented in this paper. Specifically, a sample of 1764, 14 to 17 year-old children and of 58 teachers were surveyed in school across Greece, Italy, Portugal and Spain in order to identify existing geosciences interests.

SAMPLE

The sample for this research was 1749 students of Secondary Schools from Greece (31.68%), Italy (35.67%), Portugal (16.24%) and Spain (16.41%), during the academic year 2011-12 (TABLE I). Schools were both state and private from different geographical regions (cities, suburbs, rural and isolated areas) in order to have as much as possible representative sample.

The students were 46.82% boys and 53.18 % girls (TABLE II). There were 53.62% students under 14 years old, 32.11% 15 years old and 14.27% over 16 years old (TABLE III). According their last year school grade we have had 27% with a grade between 10-13/20, 34% with 14-16/20 and 39% with 17-20/20 (TABLE IV).

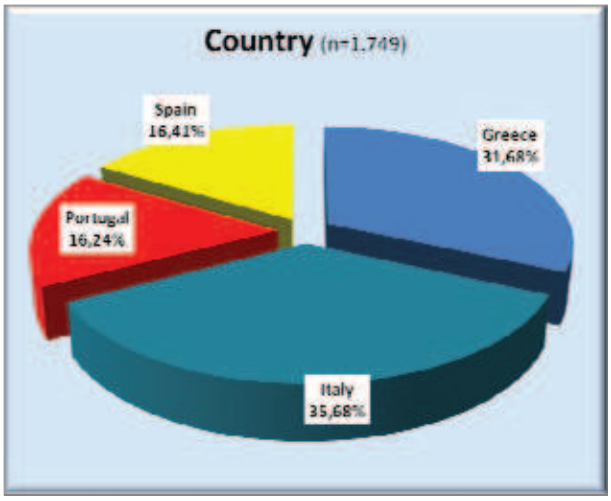
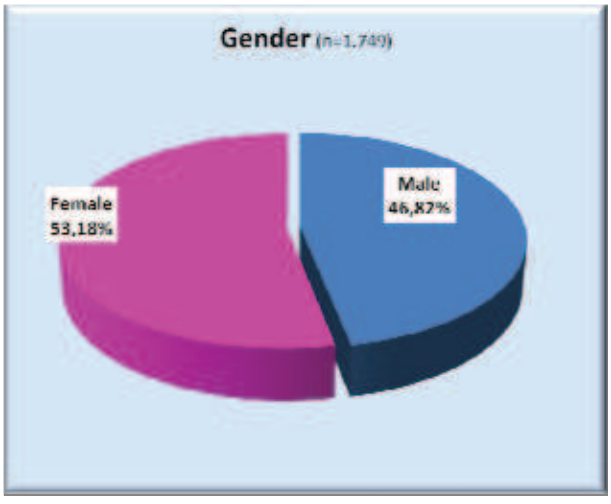


TABLE I. *GEOschools Interest research - Students' demographic statistic data by participating country (Greece, Italy, Portugal and Spain), (n=1749).*



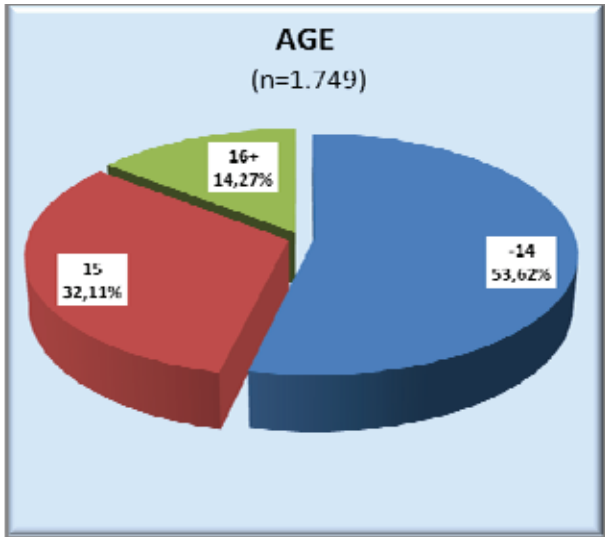


TABLE II. *GEOschools Interest research - Students' Demographic statistic data by gender (n=1749).*

QUESTIONNAIRE

The questionnaire was designed by the GEOschools partners. After taking into consideration the results of the comparison research of the geosciences curricula from the GEOschools partner countries. The questionnaire contains a whole of 190 questions (Calonge, 2011a; Calonge, 2011b).

TABLE III. *GEOschools Interest research - Students' demographic statistic data by age (n=1.749).*

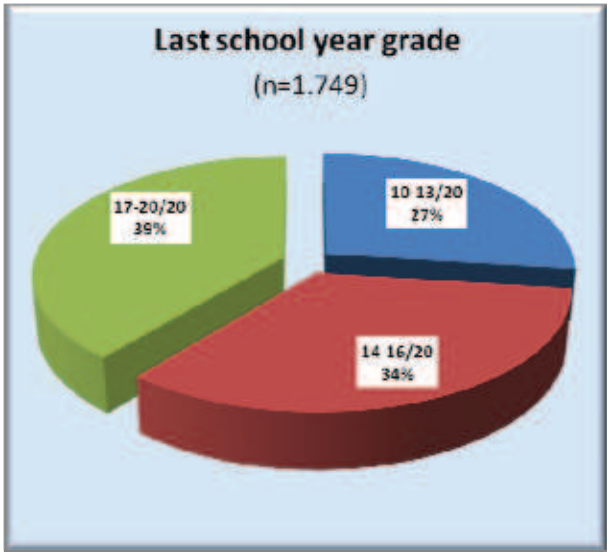


TABLE IV. *GEOschools Interest research - Students' demographic statistic data by Students' last year school Grade (n=1749).*

The research fieldwork, i.e., the completion of questionnaires in schools, was done during 2011-2012. Questionnaires were distributed personally to students and its completion lasted 50 minutes, and took place at the end of the school day.

RESEARCH RESULTS

From the interpretation of data resulting from the organisation, conduct and evaluation of questionnaires, the general interest by students and teachers in geosciences is confirmed.

-Students

The most interesting subjects in total score for students from all countries are "Palaeontology" (3.73) and "Natural hazards" (3.71) and the less interesting "Geological maps" (2.05) and "The measure of time" (2.85) (TABLE V).

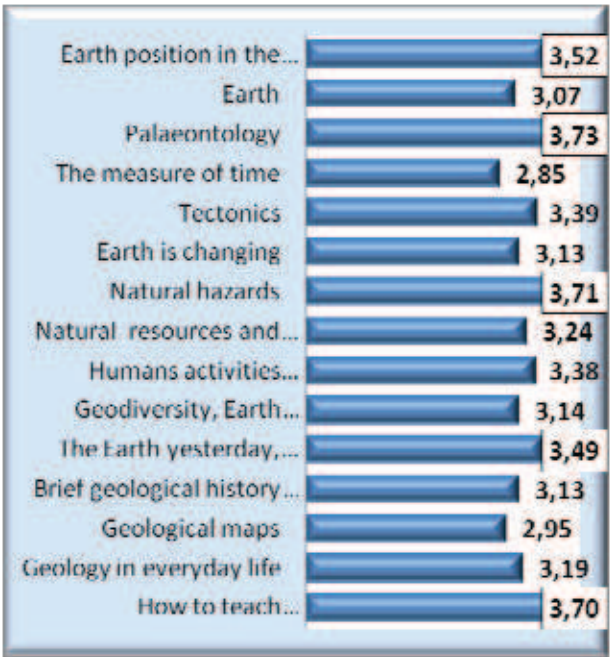


TABLE V. Students' total score in the 15 topics of the research.

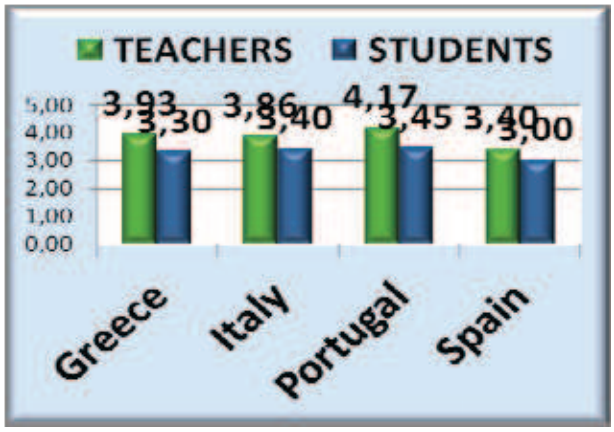


TABLE VI. Students' total score in the 6 high scored topics by gender.

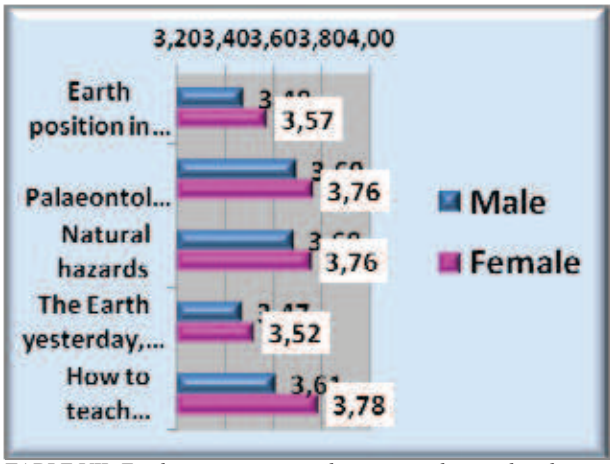


TABLE VII. *Total score comparison between teachers and students in Greece, Italy, Portugal and Spain.*

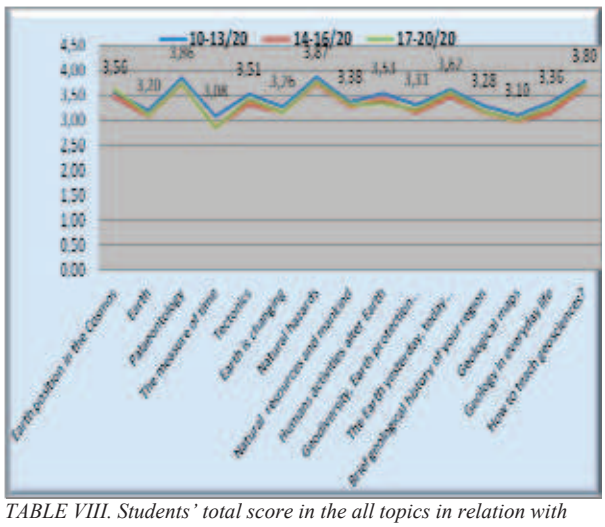


TABLE VIII. Students' total score in the all topics in relation with school year grade.

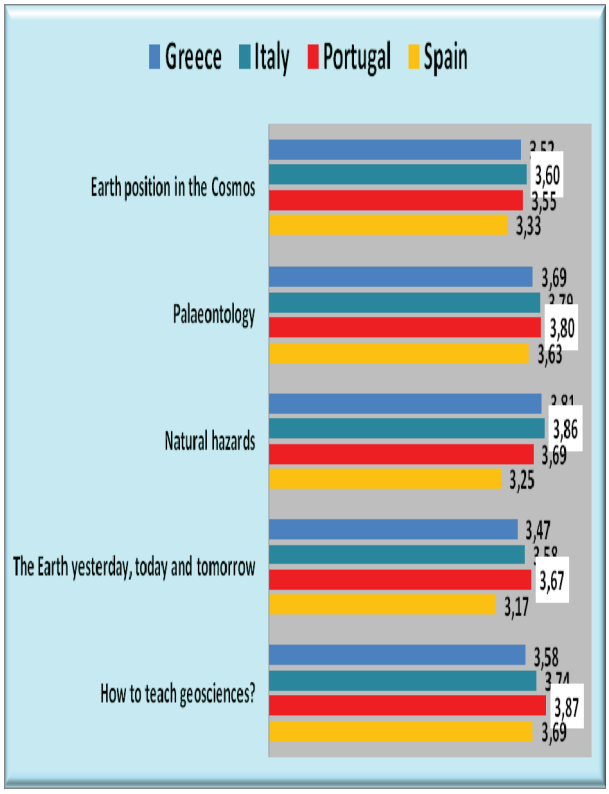


TABLE IX. *Students' total score in the 6 high scored topics by country.*

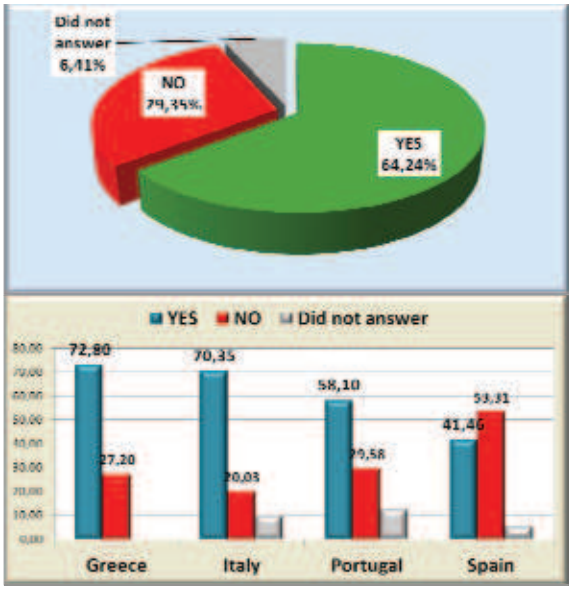


TABLE X. Students' opinion concerning teaching geosciences at school: a. Total score, b. By country (Students n=1749).

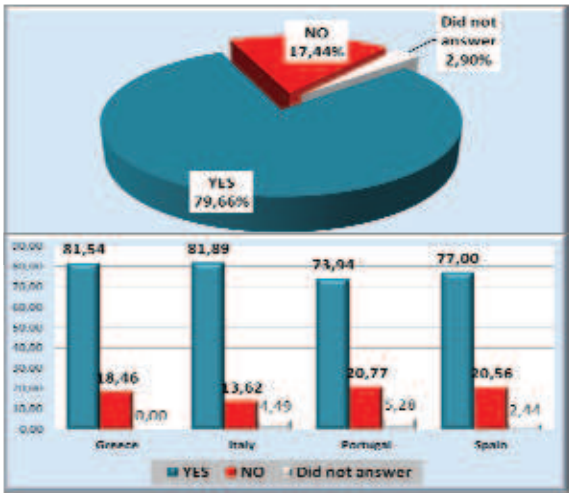


TABLE XI. Students' opinion concerning how much useful is geology for other sciences: a. Total score, b. By country (Students n=1749).

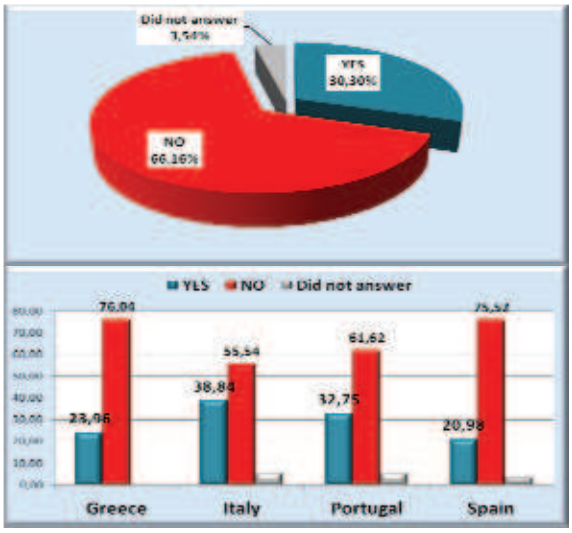


TABLE X11. Students' opinion concerning how much usuful is geology for everyday life: a. Total score, b. By country.

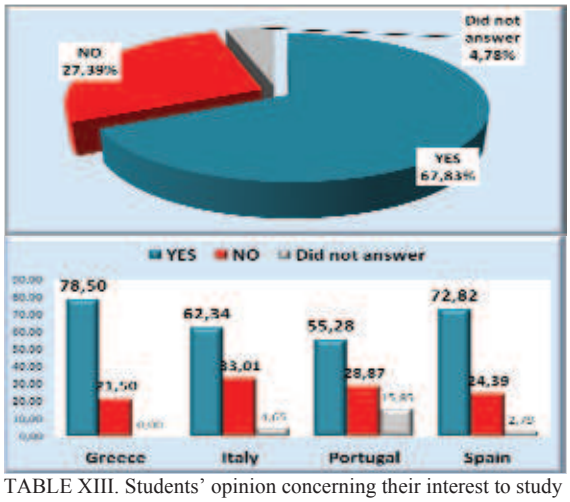


TABLE XIII. Students' opinion concerning their interest to study geology at the university: a. *Total score, b. By country (Students n=1749).*

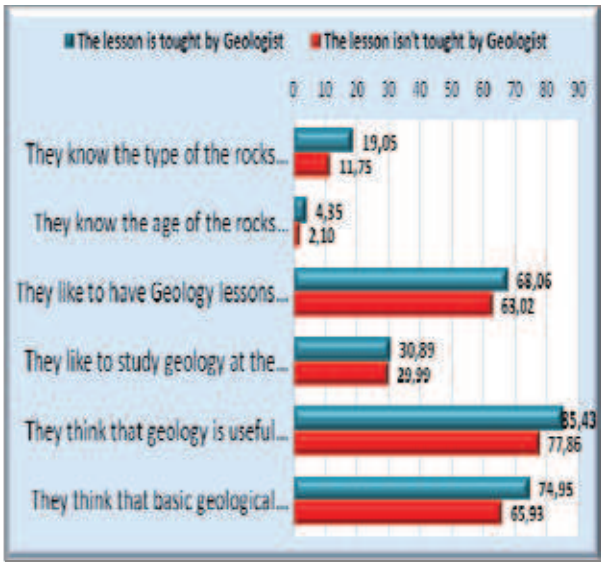


TABLE XIV. Students' interest in corelation with teachers specialization.
(They know the type of the rocks of their region.
They know the age of the rocks of their region.
They like to study geology lessons at school.
They like to study geology at the university.
They think that geology is usuful for other scientists and technisians.
They think that basic geological knowledge are usuful for everyday life of people.)

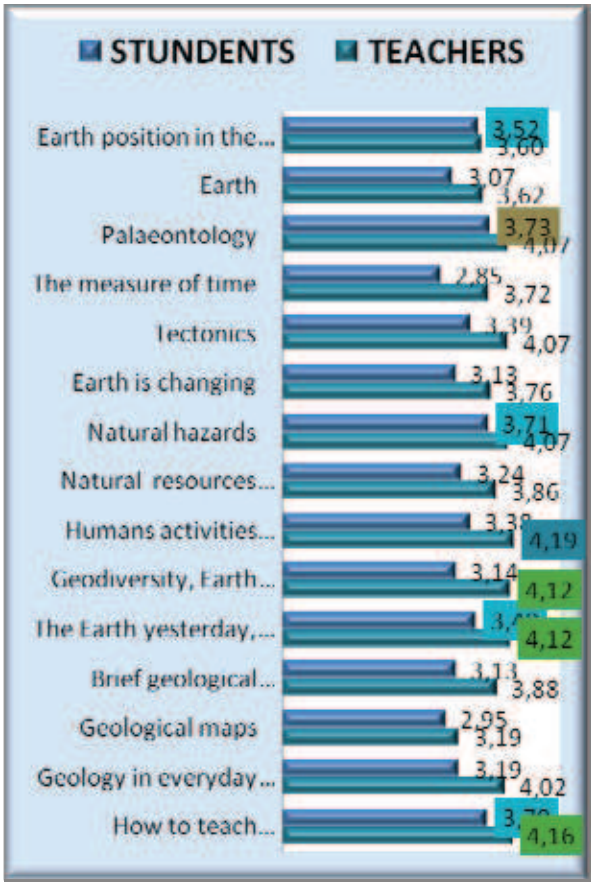


TABLE XV. *Total score comparison between teachers and students in the 15 topics of the research.*

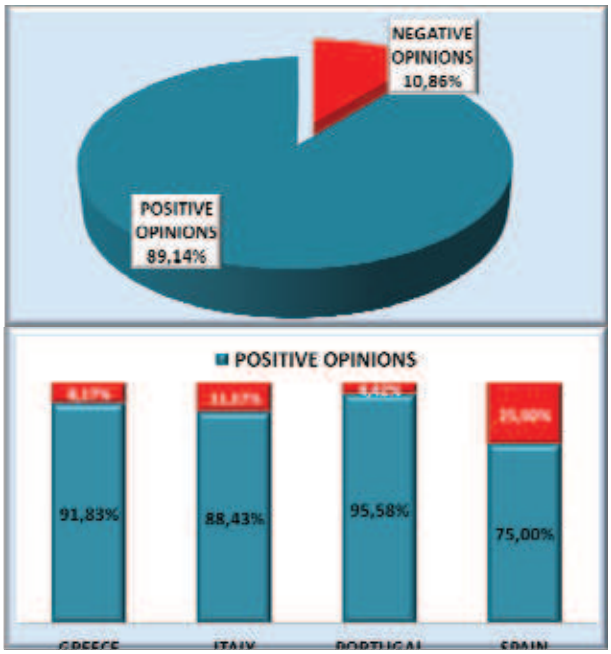


TABLE XVI. Students' general opinion on Geology (positive, negative): a. *Total score, b. By country (Greece, Italy, Portugal & Spain).*

As a whole, the total interest of students in all topics is higher in students from Portugal (3.45), followed by Italian (3.40), Greek (3.30) and Spanish students (3.00). Results also shown that teaching strategies raise high interest as it was one of the three higher selected topics of the research (TABLE VIII). Specifically, students have chosen from the 17 suggestions of teaching strategies "Experiments", "Simulations" and "Fieldwork" as the most interesting teaching strategies (Fermeli et al., 2012a; Fermeli et al., 2012b).

In the topic of Palaeontology students from Portugal give the highest rate (3.80). Students from Italy (3.70), Greece (3.69) and Spain (3.63) follow after. In the topic "Natural hazards" students from Italy give the highest score (3.86), followed by students from Greece (3.81), Portugal (3.69) and Spain (3.25) (TABLE V).
Concerning the connection between the rate that students give to the different subjects and their school grade there is not any a significant difference (TABLE VIII). But there is a significant difference on the rate of the topics by gender. Both groups have been high rated the same topics; however the girls have given a higher rate than boys (TABLE VI). There is also a connection in relation with the specialization of the teacher who taught them geosciences at school (TABLE XIV).

There are also some results concerning:
-The interest of geology teaching at school. 64.25% of students like to attend geology lessons at school (TABLE X).
-Importance of geology for other sciences. 79.76%% of students believe that geology is important for the development of other sciences (TABLE XI).

-Importance of geology in everyday life.
30.30 % of students believe that geology is useful for everyday life (TABLE XII).

-Their interest to study geology at the university.
67.83% of the students would like to study geology at university level (TABLE XIII).

Generally, students have a positive opinion for geosciences in 89.14% (TABLE XVI).

-Teachers

The most interesting subjects for teachers from all countries in total score are "Geodiversity, Earth protection and sunstainable development" (4.12), "The Earth yesterday, today and tomorrow" (4.12) and "Humans activities alter Earth" (4.10) and the less interesting are the "Geological maps" (3.19). Teaching strategies raise also a high interest between teachers (4.16) (TABLE XV).

As a whole, the total interest of teachers in all topics is higher than students. Teachers from Portugal give the highest rate (4.17), followed by Greek (3,93), Italian (3.86) and Spanish teachers (3.40) (TABLE VII).

CONCLUSIONS

Students' results, point directly to linking the higher interest of students on those topics having a higher social impact (geological hazards and disasters, origin of life, origin and evolution of mankind…) should perhaps make us think on the convenience to drive the curricula contents and teaching strategies towards these "interest topics" rather than trying to follow an excessively rigid, or academic, development of teaching programs.

The challenge would be how to combine a good structural and conceptual teaching of Earth Sciences with permanent links to attractive interesting topics, i.e. making Earth Sciences something present and related to daily life or, in other words, decode the most spectacular and interesting topics so they can get the basic scientific concepts that lie behind. This could be expressed as how to build pleasure or delightful learning from good, academic teaching.

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Abstract Book

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