

# Exploring Students' Views and Experiences in the Greek Primary and Lower Secondary Education Mathematics Class. Class Teachers versus Subject Teachers: Similar or Different?

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**Abstract** Foundation skills in mathematics seem to have a major impact on individuals' life chances and they are provided in primary education (ISCED 1) whereas lower secondary education (ISCED 2) is designed to build on the learning outcomes of the primary level. The way mathematics is taught and learned seems to be influenced by a wide range of factors such as national policies and curricula, teachers and teacher education, the quality of teaching, etc. In this context, this paper discusses the results of a research carried out in 2015-2016 on first year students of lower secondary education so as to explore their views on and experiences towards teaching as is actually practiced in primary and lower secondary education while investigate the similarities and differences between the ways mathematics is taught in the Greek lower secondary education level in comparison to primary education.

**Keywords:** *mathematics teaching/learning, primary education, secondary education, subject teacher*

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## 1. Introduction

Proficiency in mathematics is considered to be a strong predictor of positive outcomes in adult life as it is believed that influences young adults' abilities to pursue higher education as well as their expected future earnings. More specifically, according to the OECD's new Survey of Adult Skills (2014: 6) poor mathematics skills severely limit people's access to better-paying and more-rewarding jobs whereas people with strong skills in mathematics are more likely to see themselves as actors in rather than as objects of political processes. Competence in mathematics has been identified at EU level as one of the key competences for personal fulfilment, active citizenship, social inclusion and employability in the knowledge society of the 21st century (Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning). Concerns about low student performance, as revealed by international surveys, led to the adoption in 2009 of an EU-wide benchmark in basic skills which states that "by 2020 the share of 15-year-olds with insufficient abilities in reading, mathematics and science should be less than 15 %" [8].

In Greece, the performance of the 15 year old students in PISA, the Programme for International Students

Assessment, which aims at measuring how well students, at the age of 15, are prepared to meet the challenges they may encounter in future life, by focusing on domain-specific cognitive areas (Reading, Mathematical and Scientific literacy) was low in all aforementioned areas in 2012, compared to the other countries. The poor results of the Greek students especially in Mathematics hit the headlines and no matter what one thinks of the PISA test as a tool for measuring the outcomes of education systems, further research within the Greek educational context is essential in order to identify factors that affect Greek students' poor performance. In this context, a research was conducted in order to expose the views and attitudes of the students who have attended the first grade of Greek junior high schools towards mathematics teaching as is actually practiced in both levels of education while investigate the similarities and differences between the ways mathematics is taught in the Greek lower secondary education level in comparison to primary education.

The research was carried out in 2015-2016 in both public and private secondary schools situated in Athens and the peripheries of Greece, and the results presented here are based on 383 questionnaires completed by first year students attending public junior high schools located in the Athens area. More specifically, students were asked to indicate their views in relation to the problems they faced in lower secondary education compared to those in primary school as well as identify similarities and

differences in mathematics teaching in both levels. Undoubtedly, one major difference between the two levels of education is that in the Greek compulsory education system, mathematics is taught by the class teacher in primary education whereas in secondary education mathematics is taught by teachers who hold a university degree/specialization in the specific subject. As a matter of fact, in primary education the class teacher is responsible for all subjects except for Physical Education, and Music and Foreign Languages, subjects that are taught by teachers of respective specialization. In the case of Music and Physical Education, if there are no teachers of respective specialization, then the subjects are taught by the teacher of the class. However, does this fact affect mathematics teaching and learning and if yes, how and to what extent?

Interestingly, for the last ten years and especially during the economic crisis period, there has been a lot of controversy over the subject teachers' presence in primary education. A prominent Greek university teacher and former Minister of Education [1] argues that subject teachers should also teach in primary education, at least in the last two grades because primary teachers teach all subjects in the curriculum without having strong subject-matter background in one discipline and specialization is nowadays sine qua non; however, this argument was put forward at a time when there was a shortage of primary school teachers and abundance of subject teachers. Other education authorities as those who are currently in charge of the Greek Ministry of Education believe that there is so much specialization in primary education that the emotional and pedagogic relationship between the primary teacher and the students has been lost. As a matter of fact, this year the Greek Ministry of Education decided to reform the primary and secondary education system by shortening the weekly school hours by 5 hours (from 30 to 25) in primary education and by 3 hours (from 35 to 32) in secondary education to lighten the students' burden while increasing the number of days of schooling during a calendar year. This decision has triggered public debate among educators, parents, politicians and the media who see as the main reason behind this reform teaching staff shortages than an actual desire to improve school life for students. It seems, however, that there is no research data available on how subject specialization is related to learning outcomes and students' achievement. Thus, it is interesting to find out how students view and experience teaching in primary and lower secondary education in general and in mathematics particularly in the lower secondary education in comparison to primary education.

## 2. Theoretical Framework

At school, and also in wider society, mathematics is considered to be "a difficult and abstract subject which involves learning a lot of processes and formulae that not only appear to be unconnected with each other but also seem irrelevant to students' lives" [2]. Results from international research suggest that a range of factors affect the learning of mathematics. Negative attitudes towards

mathematics and a lack of confidence in "being good at it" seem to have a negative impact on students' achievement, that is, apart from the cognitive factors, affective factors (attitudes, beliefs, emotions) play, according to research literature, an important role in the learning of the subject. As a matter of fact, research has highlighted that attitudes play a crucial role in learning mathematics [9] that is why an effort has been made to enhance students' positive attitudes through effective teaching strategies. Research in mathematics education confirms that in several education systems, students who had positive attitudes showed better achievement than those who had negative attitudes. Also, achievement was higher among students who perceived the value of mathematics in their lives and their future, that is, there is a correlation between attitudes towards and achievement in mathematics [4].

The results of international surveys, as well as other research evidence indicate that low achievement in mathematics is a complex phenomenon (as stated in [2]). Thus, at national level, collecting evidence on students' performance or investigating the factors contributing to underachievement can help identify the causes of low achievement and propose measures to address it. In this framework, research efforts have been put forward in several countries to assess the teaching of mathematics by examining students' attitudes toward the subject [5].

## 3. The Research

The research presented here was carried out between March and April during the 2015-2016 school year. Data was collected by the authors themselves through a questionnaire given to a sample of students attending the first grade in public junior high schools. The reason why the particular school population became the focus of our research is because their experiences from primary school were still fresh in their minds whereas they had already gained new experiences as students in the lower secondary education.

### 3.1. The Objectives of the Research

The research set out to investigate the students' opinions and attitudes towards:

- Problems they faced in primary (ISCED 1) and lower secondary education (ISCED 2).
- Approaches and methods used by class teachers in ISCED 1 and subject teachers in ISCED 2.
- Forms of teaching chosen for the subject of mathematics by educators in ISCED 1 and ISCED 2.
- Class teacher/subject teacher and student relationships.

Obviously, another objective of the research was to investigate possible differences found in the teaching of mathematics in the two levels.

### 3.2. The Sample

The sample was made up of 383 students of the first grade of lower secondary education (13 years old), that is, 240 boys and 143 girls, attending public junior high schools located in the Athens area.

**Table 1. Gender**

	Gender	
	Count	%
Boy	240	62.7%
Girl	143	37.3%

**Table 2. Grades**

	1st term average	
	Count	%
10-12.5	19	4.9%
12.6-15	47	12.2%
15.1-18.5	210	54.9%
18.6-20	107	28.0%

It is obvious that boys outnumbered girls (62.7% versus 37.3%). The first term average for the majority of the students (54.9%) ranged from 15.1 to 18.5 as lower secondary schools in Greece use a 0–20 scale where the passing grade is 10 out of 20. Interestingly, 28% of the students got from 18.6 to 20 as term average.

### 3.3. The Variables

While designing and constructing the questionnaire, the following 29 variables were set so as to serve the research objectives:

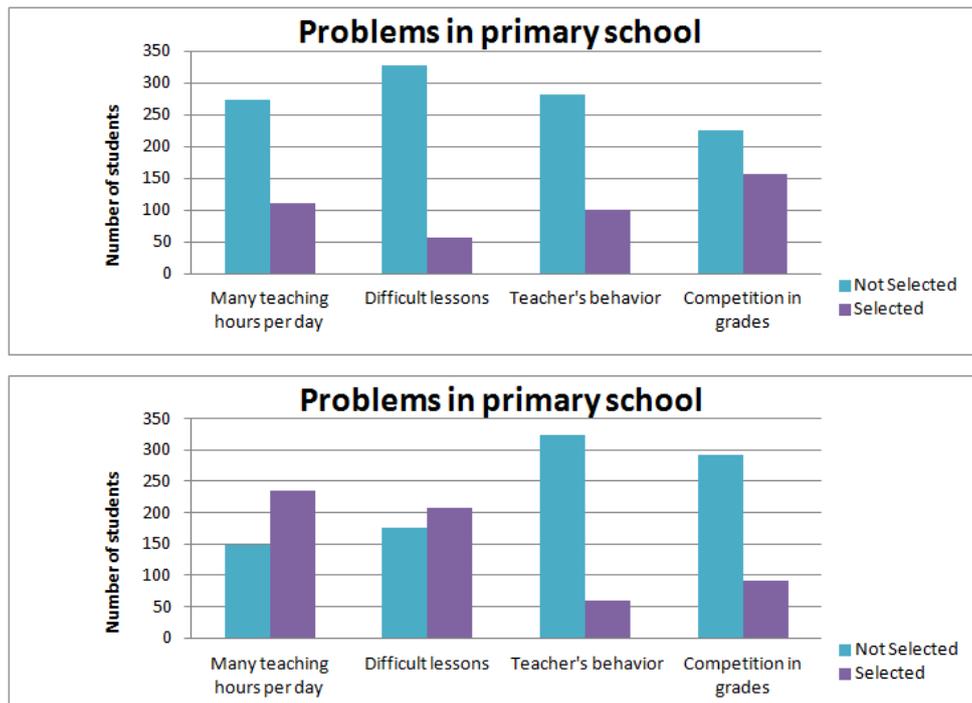
- A. General data
  - 1. Gender
  - 2. 1st term average
  - 3. School location
- B. Problems faced in ISCED1 and ISCED 2
  - 4. ISCED 1 – too many teaching hours per day
  - 5. ISCED 1 – difficult subjects
  - 6. ISCED 1 – teachers’ behavior
  - 7. ISCED 1 – competition for grades
  - 8. ISCED 2 - too many teaching hours per day
  - 9. ISCED 2 - difficult subjects

- 10. ISCED 2 – teachers’ behavior
- 11. ISCED 2 - competition for grades
- C. Methods of teaching Mathematics in ISCED1 and ISCED 2
  - 12. ISCED 1 Class teacher –By giving lectures
  - 13. ISCED 1 Class teacher – By checking students’ understanding through questions/exercises/etc.
  - 14. ISCED 1 Class teacher - In cooperation with students
  - 15. ISCED 1 Class teacher - By assigning group work
  - 16. ISCED 2 Subject teacher – By giving lectures
  - 17. ISCED 2 Subject teacher - By checking students’ understanding through questions/exercises/etc.
  - 18. ISCED 2 Subject teacher – In cooperation with students
  - 19. ISCED 2 Subject teacher - By assigning group work
- D. Forms of teaching Mathematics in ISCED1 and ISCED 2
  - 20. ISCED 1 – Form of teaching/interaction with students
  - 21. ISCED 2 - Form of teaching/interaction with students
  - 22. Which students did the class teacher address most?
  - 23. Which students did the subject teacher address most?
- E. Class teacher/subject teacher and student relationships
  - 24. ISCED 1 Class teacher – Interest in students’ problems
  - 25. ISCED 1 Class teacher – Communication with parents
  - 26. ISCED 1 Class teacher – Only teaching duties
  - 27. ISCED 2 Subject teacher - Interest in students’ problems
  - 28. ISCED 2 Subject teacher - Communication with parents
  - 29. ISCED 2 Subject teacher - Only teaching duties.

## 4. The Research Findings

### 4.1. Descriptive analysis of survey data

- 1. Problems faced in ISCED1 and ISCED 2



**Figure 1.** Problems in school levels

**Table 3. Problems at school**

ISCED 1	Selected		Not Selected	
	Count	%	Count	%
Primary School -Many teaching hours per day	110	28.9%	273	71.1%
Primary School -Difficult subjects	56	14.5%	327	85.5%
Primary School - Teachers ' behavior	101	26.5%	282	73.5%
Primary School - Competition for grades	157	41.0%	226	59.0%
ISCED 2				
ISCED 2	Selected		Not Selected	
	Count	%	Count	%
Secondary School -Many teaching hours per day	235	61.4%	148	38.6%
Secondary School -Difficult subjects	208	54.2%	175	45.8%
Secondary School – Teachers' behavior	60	15.7%	323	84.3%
Secondary School - Competition for grades	92	24.1%	291	75.9%

Research results showed that a significant percentage of the students (41%) reported that the competition for grades was the greatest problem they had to face in primary school and this was confirmed to a certain extent by primary school teachers who blame parents for putting pressure on children to earn perfect grades at school. Also, 28.9% of the students complained that the teaching hours were too many while 26.5% of the students complained

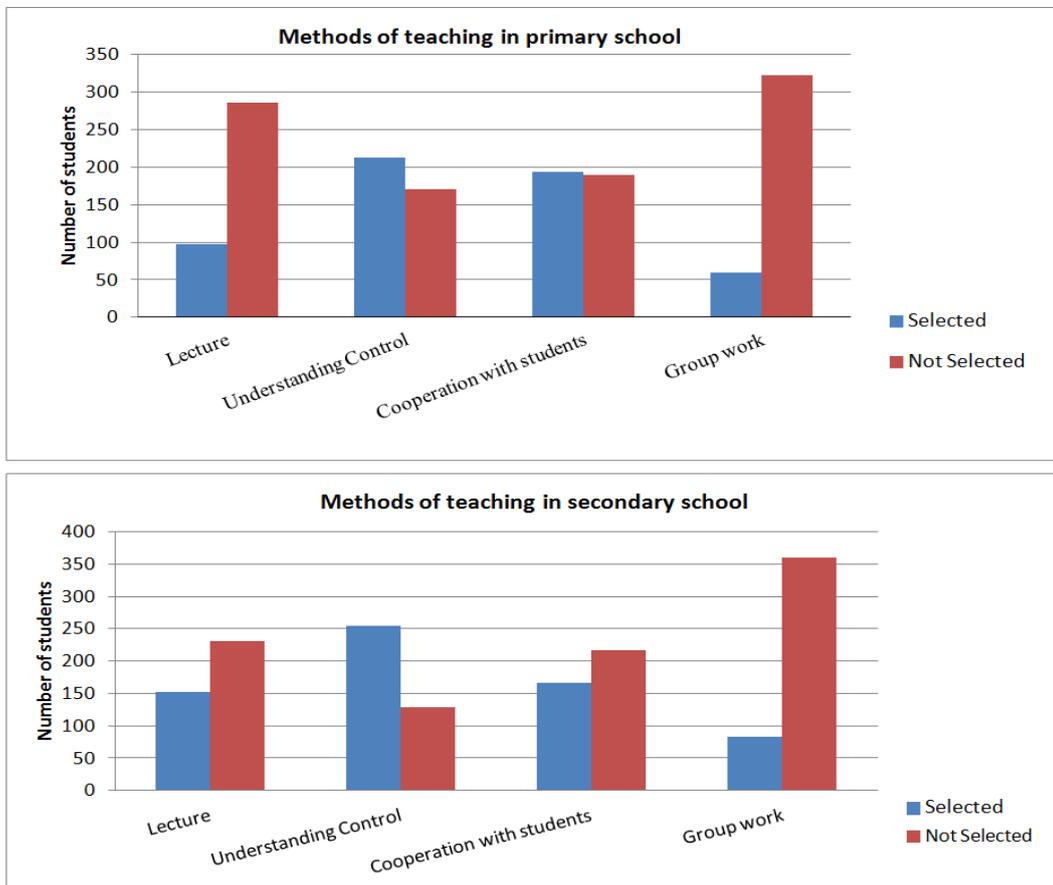
about the class teachers' behavior.

As far as the lower secondary education is concerned, the great majority of students (61.4%) complained that the teaching hours were too many and 54.2% of students complained that the subjects were difficult; however, they did not think that either competition for grades or teachers' behavior constituted a problem.

2. Methods of teaching Mathematics in ISCED1 and ISCED2

**Table 4. Methods of teaching Mathematics**

ISCED 1	Selected		Not Selected	
	Count	%	Count	%
Class teacher – By giving lectures	97	25.3%	286	74.7%
Class teacher – By checking students' understanding	212	55.4%	171	44.6%
Class teacher – In cooperation with students	194	50.6%	189	49.4%
Class teacher – By assigning group work	60	15.7%	323	84.3%
ISCED 2				
ISCED 2	Selected		Not Selected	
	Count	%	Count	%
Subject teacher - By giving lectures	152	39.8%	231	60.2%
Subject teacher – By checking students' understanding	254	66.3%	129	33.7%
Subject teacher - In cooperation with students	166	43.4%	217	56.6%
Subject teacher - By assigning group work	83	6.0%	360	94.0%



**Figure 2. Methods of teaching in school levels**

As far as primary school is concerned, more than half of the students (50.6%) stated that class teachers used to cooperate with students and 55.4% answered that teachers checked their understanding through questions, exercises etc. while teaching mathematics. However, 25.3% of the students reported that a teacher-centred approach was used, that is, class teachers gave lectures and only 15.7% remembered the class teacher to implement group work in the classroom and encourage active learning.

In lower secondary education, cooperation with students was slightly lower (43.4%) than in primary education (50.6%). In addition, the subject teacher (39.8%) used a

teacher-centred approach to mathematics more than class teachers (25.3%). Very few subject teachers (6%) assigned group work to students. However, the vast majority of subject teachers (66.3%) checked their students' understanding of concepts and procedures through questions, exercises etc..

3. Forms of teaching Mathematics in ISCED1 and ISCED2

As is evident from Table 5, the forms of teaching educators used and the interaction that took place in both levels were almost identical. They preferred to teach through dialogue; as a matter of fact, subject teachers in lower secondary education (54.2%) a little bit more than class teachers (47%) in primary education.

Table 5. Forms of teaching Mathematics

	Students talk more		Teachers talk more		Dialogue	
	Count	%	Count	%	Count	%
ISCED1/ Primary School – form of teaching/interaction	37	9.6%	166	43.4%	180	47.0%
ISCED 2/ Secondary School – form of teaching/interaction	37	9.6%	138	36.1%	208	54.2%

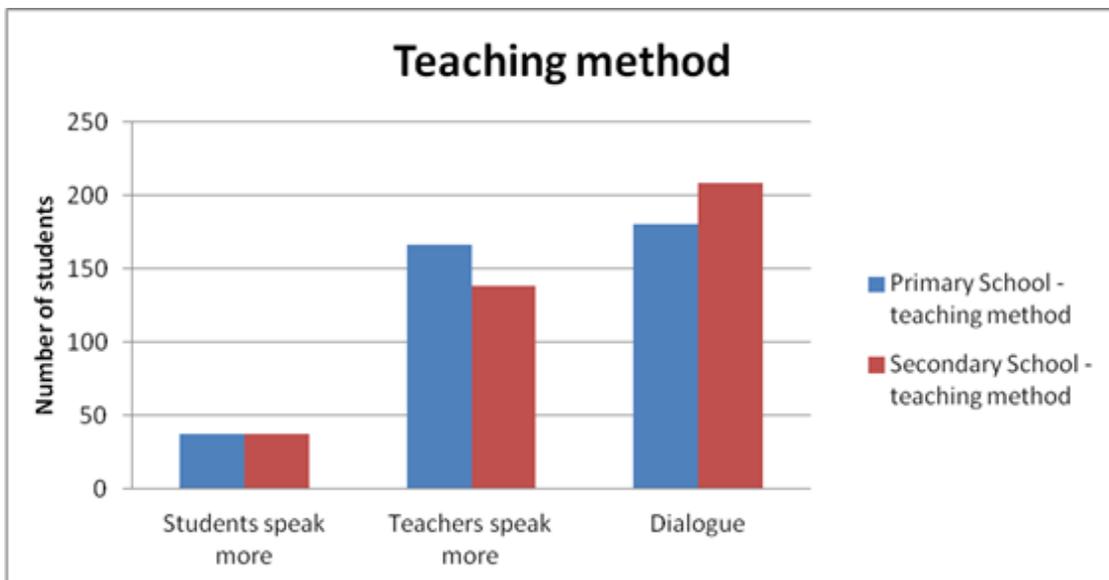


Figure 3. Teaching Method

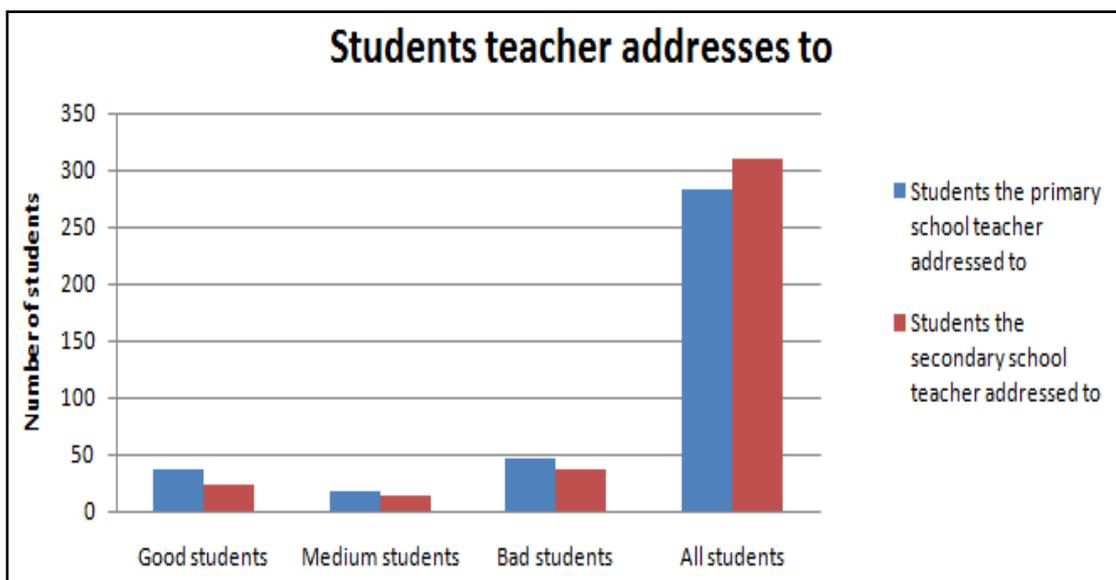


Figure 4. Students teacher addresses to

Table 6. Students teacher addresses to

		Students the primary school teacher addressed to	Students the secondary school teacher addressed to
Good students	Count	37	23
	%	9.6%	6.0%
Medium students	Count	18	14
	%	4.8%	3.6%
Bad students	Count	46	37
	%	12.0%	9.6%
All students	Count	282	309
	%	73.5%	80.7%

As shown in Table 6, both good and weak students were almost equally addressed by their teachers in both levels.

4. Class teacher/subject teacher and student relationships

As illustrated in Table 7, almost four out of ten students (42.2%) recognized that their class teachers took interest in their personal problems and more than half (61.4%) that there was communication between their teachers and their

parents. In lower secondary education, however, three out of ten students (31.3%) stated that the subject teachers were interested in their personal problems and almost half of them felt that there was communication with their parents. A significant percentage of the students (almost 35%) thought that educators in both levels were constrained to their teaching duties.

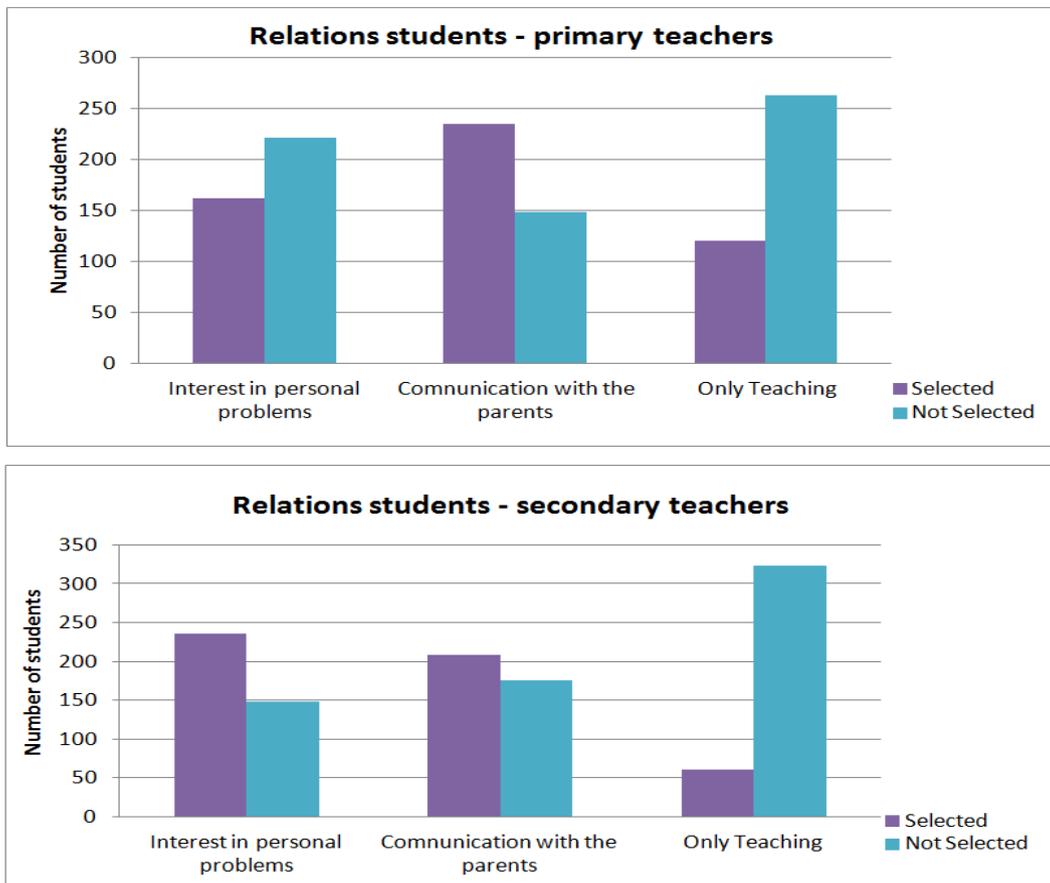


Figure 5. Relations students - teachers

Table 7. Class teacher/subject teacher and student relationships

ISCED 1	Selected		Not Selected	
	Count	%	Count	%
Primary School Class Teacher - Interest in personal problems	162	42.2%	221	59.8%
Primary School Class Teacher - Communication with the parents	235	61.4%	148	38.6%
Primary School Class Teacher - Only teaching duties	120	31.3%	263	68.7%
ISCED 2	Selected		Not Selected	
	Count	%	Count	%
Secondary School Subject Teacher -Interest in personal problems	235	31.3%	148	68.7%
Secondary School Subject Teacher -Communication with the parents	208	56.6%	175	43.4%
Secondary School Subject Teacher- Only teaching duties	60	36.1%	323	63.9%

### 4.2. Inductive Analysis of Survey Data

To further investigate the variables and determine the statistically significant results we chose the crosstabulation tables with variables that refer to both education levels (ISCED 1 & ISCED 2) and we conducted a chi-square ( $X^2$ ) test for independence. In Table 8, only pairs of variables whose correlation is statistically significant are shown.

1. Problems faced in ISCED1 and ISCED 2

As illustrated in Table 8, competition for grades is perceived as a serious problem by primary school students whereas this is not the case in secondary education as is confirmed by the chi-square test for independence ( $X^2 = 12,622$ , Df = 1, P-value < 0,001).

2. Methods of teaching Mathematics in ISCED1 and ISCED2

As shown in Table 9, class teachers' cooperation with students positively as is confirmed by the chi-square test for independence ( $X^2 = 6,563$ , Df = 1, P-value = 0,010).

In Table 10, it becomes evident that despite low percentages, in primary education group work seems to

be more frequent than in secondary education and this is confirmed by the chi-square test for independence ( $X^2 = 7,918$ , Df = 1, P-value = 0,005).

3. Class teacher/subject teacher and student relationships

As shown in Table 11, the class teacher in primary school seems to take more interest in students' personal problems in comparison to the mathematics teacher in lower secondary education and this is also confirmed by the chi-square test for independence ( $X^2 = 8,368$ , Df = 1, P-value = 0,004).

Table 12 illustrates that the class teacher in primary school communicated more with parents than the mathematics teacher in lower secondary education and this is confirmed by the chi-square test for independence ( $X^2 = 21,209$ , Df = 1, P-value < 0,001).

Finally, the mathematics teachers in lower secondary education are more constrained to teaching compared to the class teachers in primary education, also confirmed by the chi-square test for independence ( $X^2 = 7,616$ , Df = 1, P-value = 0,006) (see Table 13).

**Table 8. ISCED1/ Primary School – Competition for grades \* ISCED 2/ Secondary School – Competition for grades**

		ISCED 2/ Secondary School - Competition for grades		Total
		selected	not selected	
ISCED 1/ Primary School - Competition for grades	selected	69	88	157
	not selected	23	203	226
Total		92	291	383

**Table 9. ISCED1/ Primary School – Cooperation with students \* ISCED 2/ Secondary School– Cooperation with students**

		ISCED 2/ Secondary School - Cooperation with students		Total
		selected	not selected	
ISCED 1/Primary School -Cooperation with students	selected	111	83	194
	not selected	55	134	189
Total		166	217	383

**Table 10. ISCED1/ Primary School – Group work \* ISCED 2/ Secondary School Group Work**

		ISCED 2/ Secondary School - Group work		Total
		selected	not selected	
ISCED 1/Primary School -Group work	selected	14	46	60
	not selected	9	314	323
Total		23	360	383

**Table 11. ISCED1/ Primary School – Interest in personal problems \* ISCED 2/ Secondary School - Interest in personal problems**

		ISCED 2/ Secondary School - Interest in personal problems		Total
		selected	not selected	
ISCED 1/Primary School -Interest in personal problems	selected	78	84	162
	not selected	42	179	221
Total		120	263	383

**Table 12. ISCED1/ Primary School – Communication with parents \* ISCED 2/ Secondary School – Communication with parents**

		ISCED 2/ Secondary School - Communication with parents		Total
		selected	not selected	
ISCED1/ Primary School - Communication with parents	selected	180	55	235
	not selected	37	111	148
Total		217	166	383

**Table 13. ISCED1/ Primary School – Only teaching \* ISCED 2/Secondary School – Only teaching**

		ISCED 2/Secondary School – Only teaching		Total
		selected	not selected	
ISCED1/Primary School – Only teaching	selected	69	51	120
	not selected	697	194	263
Total		138	245	383

## 5. Conclusions and Suggestions for Further Research

In this paper, the views and attitudes of students in the first year in lower secondary education were explored regarding the:

Problems they face in ISCED 1 and ISCED 2 [3]

Students identify “competition for grades” as a basic problem in primary education and also the “too many teaching hours” and “teachers’ behavior” but to a far lesser extent. In lower secondary education, students identify the “too many teaching hours” and the “difficult subjects” as problematic to a large extent whereas “competition for grades” and “teachers’ behavior” are not so serious.

Methods used by class teachers and subject teachers to teach mathematics in ISCED 1 and ISCED 2 [3]

In primary school, the class teacher cooperates with students and checks their understanding; however, a large percentage of teachers prefer to give lectures. In lower secondary education, “cooperation with students” is not as frequent as in primary education. In addition, the mathematics teacher uses more teacher-centred approaches than the class teacher in primary school. Again, mathematics teachers check students’ understanding. Although group work percentages are rather low in both levels of education, in primary education is preferred more than in lower secondary education.

Forms of teaching chosen by class teachers and subject teachers to teach mathematics in ISCED 1 and ISCED 2 [3]

As far as the forms of teaching are concerned, there is no great difference. Educators in both levels choose the dialogue method which seems to be a little more preferred in lower secondary education than in primary education. Students believe that educators address both good and weak students equally.

Relationships developed between them and class teachers/mathematics teachers [3].

Students recognize that class teachers in primary education take interest in their personal problems and that there is communication between teachers and their parents. This is true for mathematics teachers in lower secondary education but to a lesser extent.

Students believe that a significant percentage of educators in both levels are interested in teaching the subject only with the mathematics teachers in lower secondary education to be more constrained to teaching duties than the class teachers in primary education.

Having identified the aforementioned differences in mathematics teaching/learning in the Greek compulsory education, it would be interesting to find out how and to what extent these differences affect achievement in mathematics, especially, since according to research literature, achievement in mathematics is a complex phenomenon and affective factors, that is, attitudes, beliefs, emotions, play an important role in the learning of the subject.

As already mentioned, in Greece, as happens in most countries around the world, teachers in primary schools

are the so called generalists. They teach most subjects in the curriculum, including mathematics, without having strong subject-matter background in one discipline and specialization. In the lower secondary school the situation is different. The teachers are subject-matter specialists, that is, mathematics is taught by mathematics teachers. Teacher guides have been written for educators who teach mathematics, especially for primary teachers, which contain detailed information about the subject content, suggest teaching and learning tasks, strategies for facilitating mathematics learning and teaching, how to assess and assessment tasks. There is no doubt that foundations in the subject are laid in primary education. It is in this level that students’ perceptions of themselves as learners of Mathematics -regarding their competence, attitude, interest and motivation- are built. The transition from class teachers in the primary school to subject teachers in the lower secondary school may reflect on the mathematics performance of the students. Reforms in mathematics education and the redesign of the curricula have been suggested worldwide and locally, in Greece. One of them suggests the teaching of mathematics in the last two grades of primary education by specialist subject teachers. This could be done on an experimental basis on the grounds that the subject content is quite demanding and the students are mature enough (already at the age of ten). Then, this research study could be repeated and the discussion could meld together the new findings and compare and contrast them with the ones presented in this paper.

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