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Studies in the Field of Computing from a Sociological Point of View: The Case of Greek Universities before the Onset of the Financial Crisis

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Abstract: The age of globalization is closely associated with the society of knowledge and information. In this context, the need of the citizens to be technologically literate in order to be able to respond to the rapid and multidimensional changes occurring in the social and economic reality is indispensable at the national and international levels. This entails that university studies in the academic field of information and communication technologies (ICT) attract the interest of a great number of people, because these studies are associated with the satisfaction of the needs and demands of the work force in the contemporary age of post-modernity. This paper is a sociological approach and interpretation of the flow of university studies in Greece in the field of computing at the end of the first decade of the year 2000, and just before the economic crisis remarkably influenced the social and financial life of the country with unpredictable consequences in the relation between university degrees and the work force. Specifically, we will be occupied with the approach of the following questions. In the field of computing, is the grouping of the departments formed according to their scientific specialization and their high or low demand on the basis of the students' earned grade in the National Entrance Examinations in them? What is the effect of the gender variable in the realization of the undergraduate and postgraduate studies in the field of computing in the case of Greek universities? Is the students' choice of departments of high demand determined by the economic and cultural capital of their families in relation to the earned high grade requirement?

Keywords: Greece, Computer Science, Informatics, Computer Engineering, Sociological Approach, Gender, Cultural Capital, Economic Capital

INTRODUCTION

At the end of the first decade of the 21st century, the invasion of Information and Communication technology (ICT) is noticeable in all areas of contemporary social reality, and this development explains why the contemporary era is defined as the 'knowledge and information society' (Castells 2000).

The attempt to establish a 'knowledge society' across Europe constitutes an official target of the European Union, following the decision taken by E.U. leaders in Lisbon, in 2000. This decision was based on the expectation that, by taking advantage of ICT in the productive process, Europe would be able to compete with the world's strongest economies, such as those of the USA and Japan, and hence meet the requirements for economic growth and prosperity (Rodrigues 2005). The need for citizens to adapt to the requirements of the rapid and multidimensional changes taking place in the labor market has inevitably affected the fields of both

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market and education (Hingel 2001; Radaelli 2003). As a result, lifelong learning programmes were introduced, aimed at equipping employees with basic ICT skills, as well as at the development of undergraduate and postgraduate studies in the field of Computing (European Commission 2000, 2003). This evolution influenced the Greek higher education and new Departments in the field of Computing were established during the first decade of 2000. Such as new Departments on Computing was founded in the University of Piraeus, the Harokopio University of Athens, the Ionian University and the University of Central Greece. Indeed, ICT studies in Greek Universities began to attract a great many students since, it seems, they are directly related to the demands of the labor market.

The papers which focus on higher education in Computing deal with studies that examine the impact of gender and race on the fields of studies and teaching. More specifically, what emerges from the findings of these particular papers is that both internationally and in Greece women are underrepresented both as postgraduate and undergraduate students, and as teachers in the field of Computer Sciences (Burke, and Mattis 2007; Cantwell Woilson 2002; European Commission 2009; Galpi 2002; Kiopa et al. 2009; Lambiri-Dimaki 1995; Rees 2001; van Anders 2004; Vitsilaki-Soroniati et al. 2001). Moreover, many studies concerning the USA suggest solutions in order to face the problem of the under representation of women in the field of academic teaching in Computing. Both the interest and the effectiveness of the administrators, mainly in American universities, are assessed by the research papers on the realization of these actions (Bilimoria et al. 2008; GAO 2004; Scragg, and Smith 1998; Stewart et al. 2004; Stockard et al. 2008).

The purpose of this study is to attempt a sociological approach to and interpretation of university studies in the field of Computing, in Greece, at the end of the first decade of the 21st century. This research was conducted before the great impact of the financial crisis on social and economic life in Greece, and its unpredictable consequences for the relationship between university degrees and the job market, had been felt. In particular, in this study we are going to examine the status of the University Departments that offer studies in computing according to their specialization, as well as the impact of the social and financial capital of the students' families on the decision to study in departments of computing specialization which are considered prestigious and promise better career prospects. We are also going to examine the impact of gender on the completion of undergraduate and postgraduate studies in Computing.

The paper begins with some theoretical notes, followed by the context of the study in which the research questions and methodology are presented. In the next unit the findings and their discussion are cited, and the project concludes with the results section.

Theoretical Points

The events that took shape in the domain of the economy and the labor market during the last decades of the 20th century influenced the orientation of scientific research just as much as the formulation of studies in higher education (Beck, and Young 2005). According to Bernstein (2000) a shift occurred from traditional 'pure' academic disciplines, which he called 'singulars', such as medicine and engineering, to new scientific regions which were derived from the recontextualization and the combination of cognitive elements from the singulars. One such change occurred in the area of studies in computing. In particular, in contemporary university studies, through the process of recontextualization, there emerged from the field of Computing disciplines such as Computer Engineering, Telecommunications, Informatics, electronic engineering and Telematics. This change, which came about as a consequence of the demands of the economy and the labor market, seems to have brought about further changes in the status of those scientific regions, and by extension, the status of the University Departments which offer those regions. The creation of new departments in the area of computing and the ensuing consequences for the social hierarchy of the departments, as well as the apportionment of students within

the departments, within the framework of a particular society, is an issue of particular interest for sociological study.

According to Bourdieu (1989, 212–225), all the universities of a country, together form a field (champ), which is made up of the Small and Big Schools. Moreover, the positions within the field of the university, such as the student or the teaching staff, as well as the relationships which develop within that field, are influenced by the distribution of the various forms of capital to the individuals who hold those particular positions. The division between 'big' and 'small' university departments and schools is important since it shapes a 'social border' between the 'Great and Small doors', in other words, between those who come from the upper and lower social strata and can be admitted to Departments or Schools with either high or low prestige (Bourdieu 1989, 198–199).

A student is influenced in his/her choice of one particular area of studies by the 'practical sense' he/she possesses. This concerns a system of principles of judgement, differentiation, evaluation and preferences, which the student has acquired during the process of his/her socialization, as well as a system of intentions, forms of perception, assessment and action, in other words, a habitus which results from the embodiment of his/her objectified history (Alexander 2000, 39–41; Bourdieu 1987, 76; Chauviré, and Fontaine 2004, 49–52; Grenfell 2008, 50–65). Indeed, the habitus constitutes a form of practical sense and reason, which orientates the action of each person in specific conditions (Bourdieu 2006, 49).

The concepts of economic and cultural capital help us understand the social differentiation of students, who choose to study in the field of Computing and are admitted to departments in high or low demand and consequently with high or low status. The economic capital is made up of money–possessions and whatever else can be converted into money or financial resources (Chauviré, and Fontaine 2004, 12–16). Cultural capital refers generally to each person's 'culture' and can be detected as the embodied form of lasting and internalized preferences and intentions, as the possession of cultural goods (such as paintings, books) and as educational qualifications and characteristics (Bourdieu 1994, 82–83). The family constitutes the basic factor in the accumulation and transfer of the different forms of capital to the children, a fact which has an effect on their preferences and choices for studies (Bourdieu 2000, 126–129). Hence, it is to be expected that those who go through the 'Big door' into the field of Computing in the greek university, that is to say, into schools with the highest entry requirements and consequently in the highest demand, will, to a large extent, be those from socially superior strata whose families possess economic capital and a high level of education.

In the developed western world, as well as in Greece, women outnumber men as far as the number of students who study at university level in general is concerned, but are themselves outnumbered in areas of study connected with the assumption of positions of high responsibility and social prestige (Arnot 2004; Sianou-Kyrgiou 2010a). For example Rombinson and Mcllwee (1991) use the term 'culture of engineering' to emphasize the domination of men in that particular field of studies, and especially in studies that focus on the area of the sciences and technology. This is because women seem to orientate themselves towards university studies in the domains of the humanities and social sciences, education and health sciences (Arnot 2004; Sianou-Kyrgiou 2007).

The Context of the Study

In this study we will deal with the approach to the following research questions:

1. In the field of computing, is the grouping of departments formed according to their scientific specialization and their high or low demand on the basis of the students' grade in those subjects in the National Entrance Examinations?

2. Is the students' choice of departments in high demand determined by their families' economic and cultural capital, and specifically in its institutional form, in relation to the high grade requirement achieved?
3. What is the effect of the gender variable on the realization of undergraduate and postgraduate studies in the field of computing in the case of Greek universities?

To find an answer to the above questions, we drew on and processed evidence, information and numerical data from the websites of the Ministry of Education, the Departments of Computing at Greek Universities and the Hellenic Statistical Authority. Specifically, we drew data from these sources concerning the operation, the realization of the undergraduate and graduate courses and entry requirements to the specific Departments. Also these research sources offered us reliable information and data on the gender of the students and their parents' educational level and occupation.

Results–Discussion

The admission of Greek students into the university is based on their degree of success in the national written examinations which take place at the end of every school year. The entry requirements for each university department are determined according to the difficulty of the topics on the examination papers and the appeal of the various University Departments for potential students. The highest mark a candidate in the national exams can achieve is 20000 points. The Departments which have very high entry requirements, such as Medicine, possess a correspondingly high social status, because Greek citizens consider them very important, which is why they attract the interest of the top students. Table 1 presents a hierarchical listing of Departments which offer studies in the field of Computing, based on the entry requirements for the academic year 2008–2009. At the top of the listing are the most popular Departments, which have the highest entry requirements.

Table 1: Departments in the Field of Computing and Entry Requirements for the Academic Year 2008–2009

No.	Departments	Entry Requirements
1	Electrical and Computer Engineering, national Technical University of Athens	19089
2	Electrical and Computer Engineering, Aristotle University of Thessaloniki	18566
3	Electrical and Computer Engineering, University of Patras	18110
4	Electrical and Computer Engineering, University of Thrace	17665
5	Informatics and Telecommunications, University of Athens	17351
6	Computer Engineering and Informatics, University of Patras	17124
7	Informatics, Aristotle University of Thessaloniki	17099
8	Applied Informatics, University of Macedonia (Thessaloniki)	16894
9	Informatics, Athens University of Economics and Business	16687
10	Computer & Communications Engineering, University of Thessaly	16742
11	Electronic and Computer Engineering, Technical university of Crete	16615
12	Informatics, University of Piraeus	16243
13	Informatics and Telematics, Harokopio University of Athens	16185
14	Engineering Informatics and Telecommunications, University of Western Macedonia (Kozani)	15887
15	Computer Science, University of Ioannina	15677
16	Informatics, University of the Ionian	14757
17	Computer Science and Biomedical informatics, University of Central Greece	14538
18	Computer Science, University of Crete	14512
19	Computer Science and technology, University of the Peloponnese	14172
20	Information and Communication Systems Engineering, University of the Aegean	13519

From the study of the evidence in Table 1, the following emerge:

- Studies in the field of Computing are offered by 20 Departments, which belong to 18 of the 23 Greek universities. This fact reveals the interest of the majority of universities in developing studies in Computing in order to attract students and present a modern face. Hence we observe the founding of Departments in the area of Computer Science/Informatics not only by Universities that basically have a technological orientation, but also by Universities that have a different scientific orientation such as the Athens University of Economics and Business and the University of Piraeus, where the basic subject of study is economics, and the Harokopio University of Athens and the University of the Ionian in Corfu, whose studies belong to the field of humanistic sciences.
- The cognitive subject matter of many Departments arises out of the 'regionalization of knowledge' (Bernstein 2000, 9), in other words, the creation of composite cognitive regions

which arise out of the recontextualization of the scientific regions of engineering, Information science, and Computers. In particular, from the study of the information which is supplied in the sites of the Departments in Table 1, regarding the objectives and the orientation of their studies and the clarification of their scientific character, their classification emerges as follows: Electrical and Computer Engineering (E.C.E.), Electronic and Computer Engineering (El.C.E.), Computer Engineering and Informatics (C.E.I.) and Computer Science or Informatics (C.S.). In the last category we include Departments whose name reveals an interdisciplinary orientation, such as the Department of Computer Science and Technology at the University of the Peloponnese, although the weight given to their studies through the formation of their curriculum is from Computer Science or Informatics.

- From the entry requirements for the Departments in Table picture begins to form of the existence of some important Departments which attract students with the highest marks. These are the 4 E.C.E. Departments which are run at the National Technical University of Athens, the Aristotle University of Thessaloniki, the University of Patras and the University of Thrace, which, together with the Departments of Medicine, Law and Architecture, could be regarded as constituting the big Schools, in the case of Greece.
- The grouping of the remaining departments based on a consideration of the specialization of their studies and their entry requirements, can be carried out as follows: i) El.C.E. at the Technical University of Crete, which nevertheless, exhibits great cognitive interrelation with the E.C.E Departments, ii) C.E.I.-1, which is made up of the three Departments of the Universities of Patras, Thessaly and Western Macedonia, which have medium to high entry requirements (17124, 16742 and 15887 points respectively), iii) C.E.I.-2, which refers to the Department that is the most geographically isolated and difficult of access of all the Departments of the University of the Aegean, based in Mytilini, which also has the lowest entry requirements of all the Departments which offer studies in Computing (13519 points), iv) C.S.-1, which is made up of the Departments that offer studies in the area of Computer Science and run in Athens and Thessaloniki (the University of Athens, the Aristotle University of Thessaloniki, the University of Macedonia in Thessaloniki, the Athens University of Economics and Business, the Harokopio University of Athens and the University of Piraeus), and, finally, v) C.S.-2, which is made up of the Departments of Computer Science that run at the peripheral universities (the University of Ioannina, the University of the Ionian in Corfu, the University of Central Greece in Lamia, the University of Crete and the University of the Peloponnese in Tripoli).

In Table 2 we present the percentage proportion of first year undergraduate students who were admitted to Departments offering studies in Computing in the academic year 2008–2009, in relation to the educational level of their parents. In order to read the evidence presented in Table 2, it should be pointed out that the first number in each cell corresponds to the educational level of the father, while the second number, which is in brackets, corresponds to the educational level of the mother.

Table 2: First Year Undergraduate Students by the Educational Level of their Parents (%)

Parents' Education	E.C.E. Father (Mother)	El.C.E. Father (Mother)	C.E.I.-1 Father (Mother)	C.S.-1 Father (Mother)	C.S.-2 Father (Mother)	C.E.I.-2 Father (Mother)
Doctoral degree	14,0 (8,3)	6,1 (6,9)	4,4 (2,9)	8,6 (4,8)	7,5 (4,6)	5,3 (3,0)
Tertiary education	52,2 (53,2)	44,3 (34,4)	46,3 (45,7)	47,6 (45,0)	43,4 (39,8)	40,8 (34,4)
Senior High School	24,4 (31,2)	32,8 (45,0)	42,9 (43,5)	29,2 (37,3)	32,3 (39,7)	29,0 (47,8)
Junior High School	4,7 (4,2)	9,2 (3,8)	3,5 (2,3)	8,1 (6,4)	8,8 (5,0)	11,8 (5,3)
Primary School	4,7 (3,1)	7,6 (9,9)	2,3 (5,6)	6,5 (6,5)	8,0 (10,9)	13,1 (9,5)

Study of the evidence in Table 2 reveals that both parents of students admitted to the E.C.E. Departments with the highest entry requirements in the academic year 2008–2009, possess extremely high educational qualifications. To be more precise, 66.2% of the particular students' fathers and 61.5% of their mothers have completed university studies. These percentages include the 14% of fathers and 8.3% of mothers who hold a doctoral degree. Consequently, admission to the popular E.C.E. Departments, whose graduates have better prospects for professional success compared with graduates from other Departments which offer studies in Computing, is connected to the existence of very high cultural capital, in its institutionalized form, on the part of the family. Of course, a relatively high level of institutionalized cultural capital, though to a lesser degree than at the E.C.E. Departments, appears to be held by the parents of students who choose to study computing in all categories of Departments, according to the classification we have applied here. Specifically, a large percentage of the students' fathers possess a tertiary level title in the case of the Departments C.S.-1, C.S.-2, C.E.I.-1 and El.C.E. (56.2%, 50.9%, 50.7% and 50.4% respectively, including the category of those who hold a PhD). In addition, the educational level of the fathers of students who study computing is higher than that of their mothers (C.S.-1: 56.2% fathers with a tertiary level degree, among whom 4.8% have a doctoral degree, as against 49.8% of the mothers, of whom 4.8% are holders of a doctorate; C.E.I.-1: 50.7% and 48.6% of mothers are tertiary level graduates, of whom 4.4% and 2.9% respectively hold a doctorate; C.S.-2: 50.9% of fathers and 49.8% of mothers are tertiary level graduates, of whom 7.5% and 4.6% respectively hold a doctorate; El.C.E. 50.4% of fathers and 41.3% of mothers are tertiary level graduates, of whom 6.1% and 6.9% respectively hold a doctorate; C.E.I.-2: 46.1% of fathers and 37.4% of mothers tertiary level graduates, of whom 5.3% and 3% respectively are holders of a doctorate). In the C.E.I.-2 and El.C.E. Departments which operate on the Greek islands, the majority of students' mothers are Senior High School graduates (C.E.I.-2 47.8% and El.C.E. 45%). Furthermore, with the exception of the E.C.E. Departments, which belong to the university elite, a high educational level is also possessed by the families of students who study in the C.S.-1 Departments, which are based in Athens and Thessaloniki, and the C.E.I.-1 Departments, whose studies are specialized in the sector of Computer Engineering. On the contrary, there is a lower percentage of students' families as far as the factor of educational capital is concerned, at the geographically isolated C.E.I.-2 Department at the University of the Aegean. In this Department, it is observed that most of the students' mothers have completed Senior High School (47.8%), while at the same time, we also detect the highest percentage of students with a father who has either a primary or secondary school literacy level

(13.1% and 11.8% respectively) in the case of the Departments which offer studies in Computing.

In Table 3 we present the percentage distribution of students who were admitted during the academic year 2008–2009 to Departments offering studies in Computing, according to the professional occupation of their parents. To aid the reading of Table 3, we should mention that in the case of each cell, the first number, which is not in brackets, refers to the father's occupation, while the second number, in brackets, refers to the mother's occupation.

Table 3: First Year Undergraduate Students by Parental Occupation (%)

Parental occupation	E.C.E. Father (Mother)	El.C.E. Father (Mother)	C.E.I.-1 Father (Mother)	C.S.-1 Father (Mother)	C.S.-2 Father (Mother)	C.E.I.-2 Father (Mother)
Senior administrative and managerial executives	3,3 (1,5)	0,8 (0,8)	1,5 (1,2)	3,3 (1,2)	5,4 (1,1)	0,6 (0,6)
Scientific professions with the highest educational level	46,0 (43,5)	26,0 (26,7)	31,8 (29,2)	30,1 (29,0)	26,6 (27,7)	26,6 (23,1)
Technological graduate professions	7,9 (3,1)	19,1 (9,9)	9,7 (2,1)	9,3 (3,2)	9,8 (7,9)	12,4 (5,9)
Armed forces	4,4 (0,3)	5,2 (0,0)	3,2 (0,3)	2,2 (1,0)	3,9 (0,2)	3,0 (0,0)
Office workers	18,4 (19,9)	13,0 (22,1)	22,3 (23,9)	19,7 (23,8)	19,3 (17,7)	16,6 (21,9)
Service providers	7,8 (7,2)	11,5 (10,7)	10,0 (9,1)	11,1 (7,2)	8,6 (8,9)	10,1 (6,5)
Industrial machinists	2,4 (0,5)	6,9 (0,0)	3,5 (0,6)	4,5 (1,5)	3,9 (1,1)	6,2 (3,0)
Skilled workmen and construction professions	5,8 (0,4)	7,6 (1,5)	10,9 (1,2)	14,5 (1,5)	11,6 (2,3)	14,6 (1,2)
Agriculture, stock-breeding	2,5 (1,4)	7,6 (4,6)	5,3 (2,1)	2,5 (2,5)	7,4 (3,2)	8,1 (2,9)
Unskilled workers	1,0 (0,6)	2,3 (1,5)	1,2 (0,3)	2,3 (1,7)	3,0 (0,2)	1,8 (0,6)
Domestic work	0,0 (20,5)	0,0 (22,1)	0,0 (27,1)	0,0 (25,7)	0,0 (27,7)	0,0 (32,5)
Unemployed	0,5 (1,1)	0,0 (0,0)	0,6 (2,9)	0,5 (1,7)	0,5 (2,0)	0,0 (1,8)

From the analysis of the evidence in Table 3 it emerges that the families of students in the E.C.E Departments seem to possess, in addition to high cultural capital in its institutionalized form, correspondingly high economic capital. We conjecture that this is because the work of the majority of the parents is highly paid since they belong to the upper social classes (senior managerial and administrative executives in the public or private sector: fathers 3.3% mothers 1.5%) and to the higher middle class (scientific professionals such as doctors, civil engineers,

lawyers and so on: fathers 46%, mothers 43.5%). Here we should point out that in Greece there is the institution of the private tutorial school, which is considered by university candidates an essential prerequisite in order for a teenager to gain a university place. This presupposes increased economic capital on the part of the family, which plays an extremely important role especially when the objective and the choice is for the teenager to go through the 'Great door of a Big school' (Kyridis 2003; Sianou-Kyrgiou 2008; Psacharopoulos, and Tassoulas 2004). The exact opposite is the case with Department C.E.I.-2 of the University of the Aegean, which is in the least demand, and has the lowest entry requirements for studies in the field of Computing. In that Department, we observe the largest proportion of students whose fathers are farmers (8.1%) or who do manual labour as skilled or unskilled workers or as factory workers (total percentage: 22.6%). Here we also find the highest percentage of mothers who describe themselves professionally as housewives (32.5%). Moreover, the families of C.E.I.-2 students are not likely to be comfortably off economically since they practise professions that place them in the lower middle class (office workers, army staff, shop assistants and so on: fathers 42.1%, mothers 43.4%), while significant too is the presence of families from the working (fathers 20.6%-mothers 4.8%) and farming classes (fathers 8.1%-mothers 2.9%). Furthermore, with the exception of C.E.I.-2, the majority of students whose fathers are farmers are to be found in the El.C.E, Department of the Technical University of Crete (7.6%), and the C.S.-2 Departments which operate in smaller Greek cities (7.4%). In addition, in the case of C.S.-1 and C.S.-2 Departments there are high percentages of students whose fathers practise an industrial trade (21.3% and 18.5% respectively). However, the C.S.-1 Departments, which are based in Athens and Thessaloniki, are dominated by students, who, based on their parents' occupation, come from the middle class (lower middle class: father's job 42.3%, mother's job 35.2% and upper middle class: father's job 30.1%–mother's job 29%). Finally, the picture concerning the social background of students of the C.E.I.-1 is similar to that of the C.S.-1 Departments since these too are dominated by middle class students (lower middle class: father's job 45.2%, mother's job 35.4% and upper middle class–graduate professions: father 31.8%–mother 29.2%).

Table 4 presents the distribution of students in the Departments of Computing at Greek universities for the academic year 2008–2009, according to gender and level of studies.

Table 4: Undergraduate and Postgraduate Students by Gender

Departments	Undergraduate Studies		Master's Students		PhD Candidates	
	Male	Female	Male	Female	Male	Female
E.C.E.	3964	1081	305	159	945	167
(%)	(78,6)	(21,4)	(65,7)	(34,3)	(85,0)	(15,0)
El.C.E.	479	90	74	12	30	6
(%)	(84,2)	(15,8)	(86,0)	(14,0)	(83,3)	(16,7)
C.E.I.-1	1523	457	277	122	151	30
(%)	(76,9)	(23,1)	(69,4)	(30,6)	(83,4)	(16,6)
C.S.-1	2735	1221	928	452	409	140
(%)	(69,1)	(30,9)	(67,2)	(32,8)	(74,5)	(25,5)
C.S.-2	1156	459	109	62	62	10
(%)	(71,6)	(28,4)	(63,7)	(36,3)	(86,1)	(13,9)
C.E.I.-2	338	58	86	40	71	14
(%)	(85,4)	(14,6)	(68,3)	(31,7)	(83,5)	(16,5)
Total	10195	3366	1779	847	1668	367
(%)	(75,2)	(24,8)	(67,7)	(32,3)	(82,0)	(18,0)

From the study of the evidence in Table 4 it emerges that the University Departments in Computing in Greece constitute a privileged male field of study. This fact is more marked in the case of doctoral candidates, where 82% are men. The smallest proportion of female doctoral candidates is to be found in the C.S.-2 Departments, which are not based in major cities (13.9%) and in the E.C.E. Departments (15%) which have high social status in Greece. The highest percentage of female doctoral candidates is to be found in the C.S.-1 Departments (25.5%) which operate in the two largest urban centres in Greece (a building complex in the capital city, and Thessaloniki). This picture changes for postgraduate studies at Master's level where the presence of women increases significantly. So, from the total number of departments in Greek universities offering Computing, 32.3% of the post-graduate students following master's degrees are women. More specifically, the highest percentage of these women is to be found in the privileged E.C.E. (34.3%) and C.S.-1 (32.8%), departments in the large urban centres, and the C.S.-2 Departments of smaller cities (36.3%). These findings lead us to the conclusion that despite the increase in interest and endeavour on the part of women to undertake Master's studies, few manage to continue their education to the highest possible level with the preparation of a doctoral thesis. Indeed, as Bourdieu asserts (2007, 166–167) women who hold university degrees tend to work in 'middle-mediatory character professions' that have a direct relationship with the service-provision sector, such as middle level administrative staff and medical staff, while they seem to avoid entering male-dominated fields. For this reason, the preparation of a doctoral thesis, which requires time and effort and portends career prospects in positions of great prestige, responsibility and power, appears not to be among the objectives of the majority of women who study computing. In addition, the total percentage of women who follow undergraduate studies in the field of computing (24.8%) is much smaller than the percentage of women who study on Master's programmes (32.3%). To be more precise, most of the women following undergraduate studies in computing are to be found in the C.S.-1(30.9%) and C.S.-2 (28.4%) Departments and fewer in the Greek island Departments C.E.I.-2 of the University of the Aegean (14.6%) and El.C.E. of the Technical University of Crete (15.8%). Consequently, in the case of undergraduate studies, the coincidence of the factors geographically isolated location (Greek islands) and studies in the area of Computer Engineering works to discourage women from choosing to study in El.C.E. and C.E.I.-2 Departments. It would appear, then, that 'female habits' in relation to what is still today in our country a gender-based division of labour, associate the field of computing with masculinity of the machine, analytical thought and the complex and intricate structures which do not accord with the 'objective expectations and inclinations' which are still prevalent in the western world today for women (Bourdieu 2007, 115–116).

Conclusions

According to what we have examined above, we arrive at the following results:

- The number of departments which offer studies in the scientific field of Computing in Greece is very big (20 departments). This fact reveals the social demand which exists for studies in this particular field. Moreover, according to Boutang (2007) we are in a period of rapid social change where the computer and the internet are the equivalent of the steam engine of the industrial age. Furthermore, the high social demand for these departments implies a change of direction on the part of university candidates over the last few years in Greece, from schools where graduation would lead to a job in the public sector, to studies which can meet the needs of the labour market (Kyridis 2003, 133).
- The four departments of Electrical and Computer Engineering have the highest status of all the departments that offer studies in the field of Computing. This is because they admit the students with the highest grades in the entry examinations and at the same time they ensure

the best possible career prospects for their graduates. In this sense it would be possible to claim that they constitute the 'Big Schools' in other words, the 'elite' departments in the field of Computing in Greece. At this point we should point out that an important role is also played by the reputation of the Schools in the field of the university and this depends on the historicity of the universities, the high level of research teaching staff and the successful and innovative research programmes. All of these factors result in different professional prospects and career path after graduation and at the same time reflect the placing of the universities, and the Schools and departments within them, in a vertical hierarchy (Sianou-Kyrgiou 2010b).

- The students who stand out due to the simultaneous existence of high economic and cultural capital (especially in its institutionalized form), are those who opt to go through the 'Great door of the Big Schools' in other words, mainly the most popular E.C.E. Departments in the field of Computing. These students are mainly from the upper middle class and their parents possess very high level educational qualifications. The opposite is true for students who come mainly from the lower middle class where the structure of the forms of the family's capital and the habitus with which it is equipped seem to direct them to isolated, peripheral and less popular departments, like the C.E.I.-2 and C.S.-2.
- The field of Computing is not one of the first choices for studies for women either at undergraduate or doctoral level in Greece. An increase in the number of women is observed for studies at Master's level although this does not much change the overall picture that this particular field is a privileged area of study for men. The reduced presence of women in the university field of Computing in Greece follows the trends observed at an international level (Bilimoria et al. 2008; Galpin 2002). Indeed, despite the modernization of Greek society it seems that traditional ways of thinking regarding a gender-based division of labour remain largely intact. As a result, women choose to study in fields related to art and the provision of services, to be more precise, in the Social and Humanistic Sciences, in the Health sciences and in Fine Arts (Sianou-Kyrgiou 2007). In other words, fields of studies which bolster traditional stereotypes and are claimed to suit better the female character (Bourdieu 2007, 172).

To conclude, it seems that in the case of Greek universities a field of elite schools is taking shape in the area of Computing. These schools recruit a fitting clientele by means of economic and cultural privileges which are features of the personalities of the majority of their students (Bourdieu 1996, 139–142). Furthermore, in the male dominated field of Computing, the 'structure of distances' survives between the sexes as far as the choice of studies at undergraduate and postgraduate level is concerned, a fact which influences their future career prospects (Bourdieu 2007, 167–168).

REFERENCES

Alexander, Jeffrey. 2000. *La reduction Critique de Bourdieu*. Paris: Les éditions du cerf.

Arnot, Madeleine. 2004. *Reproducing Gender?* Athens: Metaihmio.

Beck, John, and Michael F.D. Young. 2005. "The Assault on the Professions and the Restructuring of Academic and Professional Identities: a Bernsteinian analysis". *British Journal of Sociology of Education* 26(2): 183–197. doi: 10.1080/0142569042000294165.

Bernstein, Basil. 2000. *Pedagogy, symbolic control and identity: theory, research and critique* (rev. edn). Lanham: Rowman and Littlefield.

Bilimoria, Diana, Simy Joy, and Xiangfen Liang. 2008. "Breaking barriers and creating inclusiveness: Lessons of organizational transformation to advance women Faculty in Academic Science and Engineering". *Human Resource Management* 47(3): 423–441. doi: 10.1002/hrm.20225.

Bourdieu, Pierre. 1987. *Choses dites*. Paris: Les éditions de minuit.

Bourdieu, Pierre. 1989. *La noblesse d' état–Grandes écoles et esprit de corps*. Paris: Les éditions de minuit.

Bourdieu, Pierre. 1994. *Texts on Sociology*. Athens: Delfini.

Bourdieu, Pierre. 1996. *The Inheritors*. Athens: Kardamitsa.

Bourdieu, Pierre. 2000. *Practical Reason*. Athens: Plethron.

Bourdieu, Pierre. 2006. *Practical Sense*. Athens: Alexandreia.

Bourdieu, Pierre. 2007. *Masculine Domination*. Athens: Pataki Editions.

Boutang, Yann Moulier. 2007. *Le Capitalisme Cognitif, La Nouvelle Grande Transformation*. Paris: Editions Amsterdam.

Burke, Ronald J., and Mary Mattis. 2007. *Women and minorities in science, technology, engineering and mathematics: Upping the numbers*. Northampton, MA: Edward Elgar Publishing.

Cantwell Wilson, Brenda. 2002. "A Study of Factors Promoting Success in Computer Science Including Gender Differences". *Computer Science Education* 12(1–2): 141–164. doi: 10.1076/csed.12.1.141.8211.

Castells, Manuel. 2000. "Materials for an exploratory theory of the network society". *British Journal of Sociology* 51(1): 5–24. doi: 10.1111/j.1468-4446.2000.00005.x.

Chouviré, Christiane, and Olivier Fontaine. 2004. *Le vocabulaire de Bourdieu*. Paris: Ellipses.

European Commission. 2000. *eEurope 2002. An Information Society for All. Action Plan Prepared for Feira European Council*, 14.06.2000.

European Commission. 2003. *Communication from the Commission. The role of the universities in the Europe of knowledge*. COM (2003) 58, 05.02.2003.

European Commission. 2009. *She figures 2009. Statistics and indicators on gender equality in science*. Luxembourg: Publications Office of the European Union.

Galpin, Vasthi. 2002. Women in Computing around the World. *Women and Computing* 34(2): 94–100. doi: 10.1145/543812.543839.

GAO. 2004. *Gender Issues. Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX*. United States Government Accountability Office.

Grenfell, Michael. 2008. *Pierre Bourdieu, Key Concepts*. North Yorkshire: Acumen.

Hingel, Anders. 2001. *Education Policies and European Governance*. Brussels: European Commission Directorate General for Education and Culture.

Ilias, Aristidis, and Maria Kordaki. 2006. "Undergraduate Studies in Computer Science and Engineering: Gender Issues". *ACM Special Interest Group for Computer Science Education Bulletin* 38(2): 81–85. doi: 10.1145/1138403.1138439.

Kiopa, Agrita, Julia Melkers, and Zeynep E. Taynildiz. 2009. "Women in academic science: Mentors and career development". In *Women in science and technology*, edited by K. Prpic, L. Oliveira, and S. Hemlin, 55–84. Zagreb: Institut for Social Research, Sociology of Science and Technology Network of the European Sociological Association.

Kyridis, Argyris. 2003. *Inequality in Greek education and access to university*. Athens: Gutenberg (in Greek).

Lambiri-Dimaki, Ioanna. 1995. *Educational tendencies in Greece with emphasis in Higher Education from the 1960's to 2000*. Athens: Papazisis (in Greek).

Martin, Allan. 2003. "Towards e-literacy". In *Information and IT literacy: Enabling learning in the 21 st century*, edited by Allan Martin, and Hannelore Rader, 3–23. London: Facet.

Psaharopoulos, George, and Stergios Tassoulas. 2004. "Achievement at the higer education entry examinations in Greece: A Procrustean approach". *Higher Education* 47(2): 241–252. doi: 10.1023/B:HIGH.0000016444.59253.a6.

Radaelli, Claudio. 2003. "The Europeanization of Public Policy". In *The Politics of Europeanization*, edited by Kevin Featherstone, and Claudio Radaelli, 27–56. Oxford: Oxford University Press.

Rees, Teresa. 2001. "Mainstreaming gender equality in Science in the European Union: the 'ETAN' report". *Gender and Education* 13(3): 243–260. doi: 10.1080/09540250120063544.

Rombinson, Gregg J., and Judith S. Mcllwee. 1991. "Men, women, and the culture of engineering". *Sociological Quarterly* 32(3): 403–421. doi: 10.1111/j.1533-8525.1991.tb00166.x.

Rodrigues, Maria Joao. 2005. *The Debate over Europe and The Lisbon Strategy for Growth and Jobs*. Background Paper 2005.10.21. Accessed November 25, 2011 from http://www.iee.umontreal.ca/activitieseng_fichiers/PROGRAMME/THE%20DEBATE%20OVER%20EUROPE.pdf

Scragg, Greg, and Jesse Smith. 1998. "A study of barriers to women in undergraduate Computer Science". In *Proceedings of the 29 th SIGCSE Technical Symposium on Computer Science Education*, 82–86. Atlanta, GA.

Sianou-Kyrgiou, Eleni. 2007. "Choice of studies for Higher education and gender inequality". In *Book–Essays*, edited by Eleni Maragoudaki, 63–77. Ioannina: University of Ioannina (in Greek).

Sianou-Kyrgiou, Eleni. 2008. "Social class and access to higher education in Greece: supportive preparation lessons and success in national exams". *International Studies in Sociology of Education* 18(3): 173–183. doi: 10.1080/09620210802492757.

Sianou-Kyrgiou, Eleni. 2010a. *From the university to the labour market*. Athens: Metaihmio (in Greek).

Sianou–Kyrgiou, Eleni. 2010b. "Stratification in Higher Education, Choice and Social Inequalities in Greece". *Higher Education Quarterly* 64(1): 22–40. doi: 10.1111/j.1468-2273.2009.00427.x.

Stewart, Abigail J., Danielle LaVaque-Manty, and Janet E. Malley. 2004. "Recruiting Female Faculty Members in Science and Engineering: Preliminary Evaluation of one intervention model". *Journal of Women and Minorities in Science and Engineering* 10(4): 361–375.

Stockard, Jean, Jessica Greene, Priscilla Lewis, and Geraldine Richmond. 2008. "Promoting Gender Equity in Academic Departments: A study of Department Heads in Top-Ranked Chemistry Departments". *Journal of Women and Minorities in Science and Engineering* 14(1): 1–27.

van Anders, Sari M. 2004. "Why the academic pipeline leaks: Fewer men than women perceive barriers to becoming professors". *Sex Roles* 51(9–10): 511–521. doi: 10.1007/s11199-004-5461-9.

Vitsilaki-Soroniati, Chryssi, Laoura Maratou-Alipranti, and A. Kapella. 2001. *Education and Gender*. Athens: K.E.Th.I. (in Greek).

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