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ABSTRACT

The objective of this study is to examine factors influencing student achievement in Greece at the end of secondary schooling with special emphasis on the national examination, based on which selection in higher education is determined. The identification of these factors and their hierarchical contribution to achievement is investigated in a model which includes three subsequent stages involving: (1) achievement of applicants, (2) achievement of all successes in higher education, and (3) achievement of successes in university education. The data on which this study is based are derived from a 10 percent random sample of high school students throughout Greece. Factors addressed include in-school achievement, national examination achievement, school and teacher characteristics, personal characteristics, family characteristics, previous school achievement, and aspirations (curriculum track). Results show that achievement in high school is related more to previous school attainment and less to family social characteristics or personal characteristics while achievement in the national entrance examination is related primarily to curriculum track, previous attainment, followed by family social characteristics. Statistical tables reflecting multiple regression and correlation analyses on all factors are appended. (Author/EGS)

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FACTORS AFFECTING STUDENT ACHIEVEMENT IN THE GREEK EDUCATIONAL SYSTEM

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Paper presented at the American Educational Research Association annual meeting, April 23-27, 1984.

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"Factors affecting student achievement in the Greek educational system".

Dr. Georgia K. Polydorides

Abstract

The objective of this study is to examine factors influencing student achievement at the end of secondary schooling with special emphasis on the national examination, based on which selection in higher education is determined. The identification of such factors is expected to clarify educational policy issues regarding the selection system with respect to the stated goal of equality of educational opportunity.

Factors affecting achievement are identified at three succeeding levels involving applicants, total successes in higher education and successes in university education. Thus, the stratification pattern, according to which students are differentiated to successes and subsequently allocated to the hierarchical division of higher and university education, is identified.

Results show differentiation of the relative importance of secondary factors, while the primary factors are consistently instrumental in explaining achievement at all three levels.

Factors affecting student achievement in the Greek educational system.

Dr. Georgia K. Polydorides

Introduction

Demand for university education never seized to be excessive in Greece. Ever since the fifties the number of applicants is more than the number of successes. The need for selection will continue and entrance examinations will persist appearing as the most accute issue in Greek educational policy making.

The selection system, as the crucial point in the reproduction of the university-educated labor force, is the central focus of social and political conflict. This becomes apparent by the fact that all governments in the last twenty years have introduced changes or reforms in this specific part of the educational process. Moreover, the present government took office in 1981 having as one of the major promises in its campaign platform the abolition of the country wide (Panhellenic) entrance examinations at the end of secondary schooling.

Entrance examinations have not been abolished and are unlikely to be replaced by another process of selection. The only visible possibility is that, due to social pressure and social demand, the number of successes might grow even more[1], as each new government will continue changing or "reforming" the selection process, which, in my view, will persist as a system of examination of one type or another[2].

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1. This has been the major "reformist" policy measure in the last twenty years the other being the transformation in 1980 of entrance examinations to graduation examinations at the end of secondary schooling. This meant that all graduates of general secondary schools could automatically be considered as applicants to higher education.
2. For a description of the 1980 and recent changes in the selection process see Georgia K. Polydorides "School based evaluation and external examination evaluation in the Greek educational system".
Resources in Education, December 1984, ED 247252.

Focus and objective

Given this course of possible events, research on the factors which affect student performance at the end of secondary schooling becomes of paramount importance. This is even more so, since educational policy decisions are accompanied by declarations of promoting equal access to higher education.

But Greece, at the moment, is lacking not only substantial research regarding equality of opportunity and factors affecting student performance, but, it is also lacking a genuine operational definition of equality of educational opportunity. The research project from which this study draws its data and statistical analysis is set forth to work on the first and, in so doing, to state and clarify the second[3].

The objective of this study is to examine factors influencing student achievement at the end of secondary schooling with special empasis in the national examination on the basis of which selection in higher education is determined. The indentification of such factors and their hierarchical contribution to student achievement is expected to clarify educational policy issues regarding the selection system with respect to the goal of equality of educational opportunity.

Preoccupation with equality of educational opportunity in the rhetoric presenting and promoting [illegible]eral reforms has been accepted so far without real challenge. And that is inevitable since there have been no systematic attempts to identify factors influencing achievement scores on the basis of which policies presented as geared to promote educational opportunity could be evaluated and, probably, disputed[4].

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3. Research Project on the Evaluation of the Selection System for Higher Education, K.E.M.E. Greece, in progress. The author is the senior researcher and author of the Research Report.

4. Polydorides (1984), op. cit.

Conceptual scheme and methodology

The identification of factors affecting student performance and their hierarchical contribution to achievement is investigated in a model including three subsequent stages involving:
- first, achievement of applicants
- second, achievement of all successes in higher education and
- third, achievement of successes in university education.

In this way we are able to identify the factors resulting in the stratification processes which differentiate:
- first, successes and failures
- second, successes to university and the rest of higher education and
- third, successes in university disciplines stratified in a hierarchical way.[5]

The value of achievement scores (either in-school or in the external national examination), as the dependent variable, is expressed by the relationship $Y=f(x)$, where $f(x)$ is a function of the independent variables on which information has been obtained and are listed below. The multiple regression equation gives an estimate of the change expected in the dependent variable, as each factor increases by one unit, ceteris paribus.

The data on which the study is based are derived from a 10% random sample of students from all lyceums (upper secondary schools) of the country and includes:
- in-school achievement as a DV
- national examination achievement as a DV
- school and teacher characteristics as IV
- personal characteristics as IV
- family characteristics as IV
- previous school achievement, cramming school attendance as MV
- aspirations (curriculum track) as MV

5. See Polydorides (1984), for a description of the way in which applicants are "allocated" to specific disciplines according to their overall score.

Analysis and findings

The regression analyses of applicants' scores have shown that achievement in high school is related more to previous school attainment and less to family social characteristics or personnal characteristics[6]. Achievement in the national entrance examination is related primarily to curriculum track, previous attainment (but less than achievement in high school is), followed by family social characteristics. (Tables 1,2,3 and 4)

The most important social background variables appear to be parent's occupational category "teacher"[7].

School's educational infrastructure characteristics appear to have a small relationship to achievement in the national examinations and almost none to achievement in high school. The latter is obviously due to the fact that score variability within schools is larger than between schools, while at the same time, indices of educational infrastructure are identical for students in the same school[8].

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6. This, of course, was expected and it coincides with findings in other parts of the world.
   See for example:
   - William H. Sewell and Robert M. Hauser, "Causes and Concequences of Higher Education:Models of the Status Attainment Process". American Journal of Agricultural Economics, Vol. 54, No. 5, December, 1972.
   - Duane F. Alwin, "Socioeconomic Background, Colleges, and Post-Collegiate Achievements" in Sewell,W.H. et.al (eds) Schooling and Achievement in American Society. New York: Academic Press, 1976.
   - Mwenene Mukweso et. al. "Education and Occupational Attainment from Generation to Generation: The case of Zaire" Comparative Education Review Vol. 28, No. 1, February 1984.
7. Detailed results are not shown in this paper.
8. For a comprehensive discussion on this issue and examples of efforts to overcome the related problems see Sewell, W.H. et. al. (eds) (1976), Chapters VII, VIII, IX, XI.

More detailed findings of the study[9] have indicated that girls have better performance in language related subjects while they appear to do worse (than boys) in mathematics subjects, a finding which supports international research results[10]. It is worth stressing that rank of birth is not an important determinant of achievement.

As research findings from other parts of the world show (unlike results in the U.S.), rank of bith does not affect achievement when the impact of the number of children and socio-economic characteristics of parents are accounted for. More important, in the cases where a small relationship is identified, it is a positive one[11].

As the reader may observe in tables 2 and 3 there are some interesting differentiations, in the relationships of the factors examined with achievement, among the different types of communities. Family characteristics appear to correlate more with achievement in "major cities" and "cities" both in the national examinations and in senior high school; (it is interesting that personal characteristics are more important in the cities, towns and villages, and Thessaloniki).[12]

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9. These are not presented in the tables included in this text but are important points in the overall study.

10. See for example Langer, Philip et. al. "Age of Admission and Trends in Achievement" in American Educational Research Journal Spring 1984, Vol. 21, No. 1, where differences in achievement in mathematics are presented for girls and boys separately.

11. This indicates the "strategic planning" of the Greek family to exploit as much as possible all the available resources. For example, in the rural areas, the first child is quite early involved in the family production scheme and subsequently owns the larger portion of the family land. The second and the third child are to be more educated and strongly encouraged (if not imposed upon) to aspirations of white collar future employment.

12. Polydorides, G. "Educational differences among students and the 'cultural' potential of the city", paper presented at the Vth World Congress on Comparative Education, Paris July 2-6, 1984(a).

Cramming school attendance is correlated more with achievement in the cities (both in the entrance examination and in senior high) while tutoring is related more to achievement in senior high in major cities. In Athens, cramming school attendance is related to achievement in the national examination (but far less than it is in the cities) while private tutoring is related negatively to achievement in senior high.

Interestingly the factors which influence achievement and, therefore, determine the stratification patterns according to which students are differentiated to successes or failures and, subsequently, allocated to the hierarchical division of higher and university education are more or less the same (Table 5). They are differentiated though, as we proceed to the subsequent levels of the overall stratification scheme, in terms of the degree to which they affect achievement at each level.

As it is shown in summary table 5 previous in-school attainment is the most important determinant of the stratification of students at all levels. In the case of the national examinations it is superceded by curriculum track (see also table 1).

At the level of stratification of applicants in successes and failures, sex (girls:negative effect) and cramming school attendance are the next important variables regarding achievement in the national examinations; sex (girls: positive) and father's education are the next important variables regarding achievement in high school.

At the level of stratification of all successful students in higher education, cramming school attendance and father's education are the next important variables regarding achievement in senior high; sex (girls: negative) has a stronger influence on achievement in the national examination and work (negative) has a stronger influence than sex when the total score[13] is examined.

13. The total score is a sum of the national examination scores and grade point averages in senior high school multiplied by specific coefficients. Polydorides (1984).

Finally the stratification of university successes in the hierarchy of scientific disciplines (overall score) is influenced (besides achievement in junior high and curriculum track) by father's occupation, work (negative) and sex (girls: negative).

We point out that, although we observe differences in the relative importance of the factors examined, there exist no considerable differences in the mean achievement scores among the different types of communities (Table 6). This is indicated by the fact that "community type" was not identified as an important factor affecting achievement at any level.

Discussion

The most important finding in this study is that previous attainment in school is a major determinant of the way high school graduates are stratified in the scheme described in this paper. As much as this was to be expected, there are two points that need to be stressed. First that in Greek public opinion cramming school attendance, tutoring, educational infrastructure and community type hold an undisputed importance, which implies that previous attainment is superceded by these factors. Second, that, although previous attainment is found to be an important determinant of achievement internationally, it is less than it is in Greece.

Within this line of explanation previous attainment "absorbs" the effect of family social characteristics, with which it is correlated even more than achievement at the end of secondary schooling is[14].

The differences in the factors which affect achievement in senior high school and achievement at the national examination point to the fact that curriculum track should be a factor of

14. Polydorides (1984), table 1. This is also to be expected: But it seems that in Greece social characteristics, after they have played their inevitable role in defining early school attainment, they do not persist, their role is lessened and indirect.

major concern. The findings indicate that there is a serious difference at the level of difficulty adopted in the science track of the national examination. So an important inequity is structured within the selection system which has considerable educational and social consequences. Because students from both tracks are allowed to apply to certain fields of study without any attempt from the part of the Examination Committees to standardize or "correct" their scores.

Two other major findings relating to the equality of opportunity issue have to do with sex and social background in a contradictory way. Achievement in school is infuenced by social characteristics more than achievement in the national examination is. So, from the point to view of the stated policy goal of educational equality, recent trends in increasing the coeffiecient multiplying the G.P.A. to enter the total score are not justified. On the contrary they contradict stated educational policy. On the other hand, girls do better in G.P.A. than in the national examination and, from this view of the equality issue, the increased importance of G.P.A.'s has resulted in the influx of women in higher and university education in recent years.

Thus by opening up the "black box" of the selection system and examining the three stage stratification process of which it consists of, we have been able to identify specific factors related to specific policy decisions. And, in general, we have been able to "understand" the selection mechanism much better than when comparing the "before" and "after" situation, as it is normal practice in related work in the country. Even more, we have been able to identify factors which promote or hinder equality of educational opportunity at each one of the successive stages in the selection process separately. At the same time we question the importance of certain factors which have disoriented public opinion with respect to their contribution to educational success.

Table 1. Separate factors affecting achievement. Multiple regression R^2's, applicants 1980.

independent variable	achievement in national exam R^2	achievement in senior high R^2
age[1]	0.000	0.000
sex (woman)	0.013**	0.010**
work (not working)	0.043**	0.044**
father's occupation	0.029**	0.042**
mother's occupation	0.019**	0.026**
father's education	0.032**	0.051**
mother's education	0.037**	0.053**
number of siblings[2]	0.004**	0.008**
rank of bith[3]	0.005**	0.007**
community type[4]	0.007**	0.006**
achievement in junior high[5]	0.280**	0.493**
achievement in senior high[6]	0.415**	
cramming school attendance	0.017**	0.020**
educational infrastructure	0.027**	0.017**
curriculum track[7] (type 1)	0.383**	0.234**

** F significant at 0.01

1,2,3,4: These variables were not finally included in the overall multiple regressions.

5. 9th grade

6. 11th grade

7. type 1: humanities, type 2: science.

Table 2. Correlation coefficients University entrance examinations achievement scores. Successes 1981

variables	Athens region[1]	Thessaloniki region[2]	major cities[3]	cities[4]	towns and villages[5]
1. Achievement					
Senior High (12th grade)	0.73**	0.70**	0.68**	0.64**	0.63**
Senior High (10th grade)	0.51**	0.53**	0.50**	0.48**	0.54**
Junior High (9th grade)	0.46**	0.45**	0.38**	0.52**	0.41**
Primary (6th grade)	0.20**	0.23**	0.22**	0.25**	0.26**
2. Family character.					
father's education	0.05	0.15	0.24**	0.12	0.11
mother's education	0.05	0.08	0.26**	0.19*	0.13
older sibling's educ.	0.06	0.16	0.15	0.27*	0.19
number of siblings	-0.007	-0.12*	-0.08	-0.09	-0.04
father's occupation (income proxy)	0.12**	0.21*	0.22**	0.25*	0.07
mother's occupation (income proxy)	0.15*	0.42**	0.31*	0.11	0.20
number of rooms	0.02	-0.12	0.10	0.15	0.17
number of cars	-0.01	0.10	0.12	0.03	0.01
TV	0.004	0.13	0.25*	0.04	0.27*

** significant 0.01
* significant 0.05

1. It includes the center of Athens and Piraeus, and the Suburbs
2. It includes the center of Thessaloniki and the suburbs
3. It includes Patra, and five major cities
4. It includes the cities (except 1,2,3 above)
5. It includes the rest of each county.

Table 2. (continued)

	Athens region	Thessaloniki region	major cities	cities	towns and villages
3. School's educational infrastructure					
teachers per perm. post	0.01	-0.24**	0.02	-0.07	0.08
students per teacher	-0.03	-0.06	-0.20*	-0.12	-0.03
students per teacher of exam. courses	-0.05	-0.06	-0.22**	-0.13	0.02
students per class	-0.04	-0.02	-0.18*	-0.10	-0.04
average teacher experience (years)	0.05	0.02	-0.12	-0.07	0.01
classes per teacher: exam.courses:humanities	-0.03	-0.22**	—	-0.05	0.10
classes per teacher exam.courses:science	-0.03	-0.06	-0.13	0.10	0.06
4. Cramming schools and tutoring					
cramming school,months	0.10*	0.10	-0.05	0.21*	0.15
private tutoring,months	-0.04	-0.07	0.15	-0.06	-0.04
cram.school, hours	0.10*	0.08	-0.09	0.30**	0.15
priv.tutor., hours	-0.08	0.05	0.24**	-0.06	-0.04
cram.school, cost	0.14*	0.12	0.03	0.30**	0.10
priv.tut.,cost	-0.09	0.05	0.15	-0.07	-0.03
total number of hours	0.08	0.10	0.02	0.29**	0.13
total cost	-0.03	0.09	0.16	0.13	0.04

source: Research Project on the Evaluation of the Selection System for Higher Education. (K.E.M.E., Greece) in progress.

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Table 3 Correlation coefficients. Achievement in Senior High School (12th grade). Successes 1981

variables	Athens region[1]	Thessaloniki region[2]	major cities[3]	cities[4]	towns and villages[5]
1. Achievement					
University Entr. Exam.	0.73**	0.70**	0.68**	0.69**	0.63**
Senior High (10th grade)	0.66**	0.76**	0.61**	0.69**	0.72**
Junior High (9th grade)	0.54**	0.64**	0.52**	0.67**	0.60**
Primary (6th grade)	0.20**	0.35**	0.25**	0.28**	0.37**
2. Family character.					
father's education	0.10*	0.17*	0.23**	0.25**	0.17*
mother's education	0.10**	0.17*	0.30**	0.26**	0.06
older sibling's educ.	0.09	0.17*	0.52**	0.36**	0.06
number of siblings	-0.09*	-0.18*	-0.18*	-0.08	-0.08
father's occupation (income proxy)	0.12**	0.22**	0.29**	0.35*	0.07
mother's occupation (income proxy)	0.10	0.32**	-0.03	0.20	0.14
number of rooms	0.02	-0.11	0.11	0.13	0.13
number of cars	-0.04	0.06	0.16	0.09	-0.05
TV	0.05	-0.11	0.12	0.10	0.22*

** significance 0.01
* significance 0.05

1. It includes the center of Athens and Pireaus, and the Suburbs
2. It includes the center of Thessaloniki and the suburbs
3. It includes Patras and five major cities
4. It includes th cities (except 1,2,3 above)
5. It includes the rest of each county.

Table 3 (continued)

variabl..	Athens region	Thessaloniki region	major cities	cities	towns and villages
3. School's educational infrastructure					
teachers per perm. post	0.07	-0.14	-0.[illegible]	0.03	-0.01
students per teacher	-0.02	0.08	-0.16*	-0.04	-0.02
students per teacher of exam. courses	-0.04	0.07	-0.14	-0.04	0.02
students per class	-0.03	0.10	-0.16	-0.08	0.04
average teacher experience (years)	0.003	0.09	-0.004	-0.02	0.07
classes per teacher; exam.courses:humanities	0.02	-0.15	-	-0.06	0.13
classes per teacher exam.courses:science	-0.02	0.04	-0.08	-0.02	0.03
4. Cramming schools and tutoring					
cramming school, months	0.05	0.06	0.07	0.2	?
private tutoring, months	-0.10*	-0.01	0.26**	-0.15	?
cram.school, hours	0.04	0.05	0.02	0.29**	0.11
priv.tutor., hours	-0.09	0.06	0.27**	-0.07	-0.03
cram.school, cost	0.07	0.04	0.08	0.30**	0.02
priv.tut., cost	-0.10*	0.04	0.24**	-0.08	-0.02
total number of hours	0.01	0.07	0.11	0.27**	0.09
total cost	-0.01	0.06	0.26**	0.12	0.001

source: Research Project on the Evaluation of the Selection System for Higher Education. (Κ.Ε.Η.Ε., Greece) in progress

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Table 4. Multiple regression R^2 S. All successes, 1981

equation	achievement in the exam	achievement in senior high
achievement in school[1]	0.490**	
achievement in school[2]	0.260**	0.468**
personal charact.	0.077**	0.084**
family character.[3]	0.036*	0.042**
family character.[4]	0.027**	0.039**
educational infrastr.	0.016*	0.006
cramming school att.[5]	0.023**	0.025**
cramming school att.[6]	0.026**	0.012*
city size	0.014**	0.022**

** significance 0.01
* significance 0.05

1. It includes all school achievement variables occuring prior to the dependent variable.
2. It includes school achievement variables through the 10th grade.
3. Father's and mother's occupation variables are expressed as dummies.
4. Father's occupation is expressed as a proxy of father's income (income of males by occupational category, 1977 survey of the N.S.S.G.
5. Independent variable measures reffer to unit values per student.
6. Independent variable measures reffer to totals per student.

Source: Research Project on the Evaluation of the Selection System for Higher Education, (E.E.M.E. Greece) in progress

Table Factors affecting achievement at subsequent stages in the selection process for higher education Multiple R^2's. Summary table.

equation	R^2	significant independent variables
DV: achievement in senior high sample: applicants, 1980	0.494**	-achievment in junior high -work (negative) -sex (girls: positive) -farther's education -cramming school attendance[1] -curriculum track[2]
DV: achievement in the entrance examinations sample: applicants, 1980	0.402**	-curriculum -track (type 1: positive) -achievement in junior high -sex (girls: negative) -educational infrastructure -cramming school attendance -not working
DV: achievement in senior high sample: all successes in higher education, 1980	0.408**	-achievement in junior high curriculum -track (type 1: positive) -cramming school attendance -father's education
DV: achievement in the entrance examinations sample: all successes in higher education, 1980	0.270**	-curriculum track -(type 1: positive) -sex (girls: negative) -achievement in junior high -father's education -cramming school attendance -work (negative)
DV: total score[3] sample: all successes in higher education, 1980	0.243**	-curriculum track -achievement in junior high -work (negative) -sex (girls: negative) -cramming school attendance
DV: achievement in senior high sample: successes in university education, 1981	0.537**	-achievement in junior high -curriculum track -work (negative) -cramming school attendance
DV: total score sample: successes in university education, 1981	0.446**	-curriculum track (type 1: positive) -achievement in junior high -father's occupation -work (negative) -sex (girls: negative)

1. In months
2. Type 1: humanities
   Type 2: science, technology
3. See footnote 13 in text.

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Table 6 **Means.** Successful applicants to University Education 1981

variables	Athens region[1]	Thessaloniki region[2]	major cities[3]	cities[4]	towns and villages[5]
1. Achievement					
University Entr. Exam.	8576	8436	8578	8629	8508
Senior High (12th grade)	18.08	17.12	18.21	18.33	18.04
Senior High (10th grade)	17.39	17.36	17.52	17.76	17.29
Junior High (9th grade)	17.52	17.43	17.49	17.79	17.39
Primary (6th grade)	9.83	9.82	9.68	9.73	9.55
2. Family character.					
father's education	12.06	10.27	9.10	9.33	6.80
mother's education	10.42	8.74	7.93	7.98	5.96
older sibling's educ.	14.26	13.92	13.48	13.88	13.11
number of siblings	1.08	1.21	1.33	1.39	1.52
father's occupation (income proxy)	214755	200178	190460	179714	151254
mother's occupation (income proxy)	154200	154358	133147	120953	95482
number of rooms	3.88	3.23	3.11	3.89	3.71
number of cars	0.68	0.80	0.60	0.73	0.41
TV	0.96	0.99	0.96	0.96	0.85

1. It includes the center of Athens and Pireaus, and the Suburbs
2. It includes the center of Thessaloniki and the suburbs
3. It includes Patras and five major cities
4. It includes the cities (except 1,2,3 above)
5. It includes the rest of each county.

Table 6 (continued)

variables	Athens region	Thessaloniki region	major cities	cities	towns and villages
3. School's educational infrastructure					
teachers per perm. post	1.01	1.05	1.00	1.00	1.09
students per teacher	10.85	10.85	13.05	10.74	8.55
students per teacher of exam. courses	14.82	15.15	17.26	14.55	11.78
students per class	18.60	18.06	21.22	16.68	12.32
average teacher experience (years)	10.88	13.02	12.24	10.05	7.73
classes per teacher; exam.courses:humanities	1.27	1.26	1.26	1.25	1.26
classes per teacher exam.courses:science	1.16	1.14	1.16	1.18	1.30
4. Cramming schools and tutoring					
cramming school,months	7.24	6.90	11.84	10.99	6.25
private tutoring,months	3.09	2.49	3.28	2.41	1.86
cram.school, total hours	308	303	405	384	209
priv.tutor., total hours	99	45	57	34	34
cram.school, cost	22934	16979	28166	24180	14650
priv.tut.,cost	29475	19907	25768	13798	9754
total number of hours	356	347	463	417	243
total cost	52410	36885	51934	37980	24403

Source: Research Project on the Evaluation of the Selection System for Higher Education. (I.E.M.E., Greece) in progress.

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