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ABSTRACT

In the Netherlands, girls and boys have equal educational opportunities but girls take less advantage of these opportunities than boys. This paper investigates the effects of a new mathematics curriculum on girls' choice of mathematics, attitudes toward mathematics, achievement in mathematics, choice of university study, and achievement in the university. A total of 44 schools as the experimental group, and 41 schools as the control group, were selected and matched on the variables of location, size, and ratio of boys to girls. Conclusions are as follows: (1) the new mathematics curriculum leads to more mathematics choice in high school by girls; (2) there is no attitude change toward mathematics; (3) the new mathematics curriculum does not lead to a smaller difference in achievement level between boys and girls than the old curriculum; and (4) the pretension of the new curriculum to make a better fit between high school and university cannot be supported. (YP)

The influence of a New Mathematics Curriculum on girls' choice of, attitudes toward and achievement in mathematics in Secondary Education and University

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INTRODUCTION

In the Netherlands girls and boys formally have equal educational opportunities: compulsory education is of the same duration for girls as for boys, and both have admission to all courses and facilities. But in fact girls take less advantage of these opportunities than boys: in senior high school the courses of study chosen by boys and girls show a sex-typed pattern; girls more frequently choose languages and humanities; boys more frequently choose sciences. In vocational education boys tend to follow technical education, girls domestic and administrative education. At university girls more frequently study languages, humanities, arts and law, boys more frequently study sciences, technics and economics. It turns out that on the labour market knowledge of science and technical training offer the best chances for a job and a successful career.

Sex-typed educational and professional careers are partially developed under influence of the existing distribution of professions between men and woman in our society. Besides this, there are also factors within education and the educational structure that influence the unequal participation of girls and boys in subjects and studies. Education does not strive after sex differences consciously, but - consciously or not - takes them for granted.
Formally pupils and students can make free choices. But in making choices they will anticipate their future position in society. Since girls generally don't have in mind a future directed solely towards a job and a career, they will choose their courses and studies on the basis of interest instead of on the basis of professional opportunities more often than boys do (Russell, 1979; Compaan and de Kat, 1982). In practice, this means that in senior high school girls choose courses that have a clear "in daily life applicable" character, like languages, geography, history or biology (Veeken e.a., 1982). With these courses chosen in high school, their further educational and professional career is limited. This is especially the case with the subject of mathematics. Nearly all university studies after high school - except languages - require mathematics for admission. So do all technical and economical vocational studies.

We must conclude that one of the main reasons why girls have less opportunities for a successful career than boys (actually as opposed to formally), is due to the fact that girls don't take mathematics in high school and this is partially due to the great freedom of choices that exists in the educational structure.

This is one of the reasons why there are plans to make mathematics compulsory for all pupils in secondary education just like Dutch language and English already are. Another reason is that mathematical skills are considered important for everyone. However, promoting compulsory mathematics is only useful if at the same time actions are taken to make the subject more attractive and "life-like" for pupils and especially for girls. This is why there are a lot of new developments in mathematics today. One of these developments is the change of the mathematics curriculum in academic high school.

The New Mathematics Curriculum

In grade 10 of academic high school pupils have to choose the courses of study they plan to do during the last two years of secondary education.

Until august 1985, generally two mathematic programs could be chosen: math I and math II. Math I could be chosen without math II, but math II not without math I. Math I was designed for pupils who have positive attitudes toward mathematics and who are expected to study sciences, technics, agriculture or medicine at university. Math II was designed for pupils who want a broader foundation of mathematics. This is a very small group of pupils, who will also follow a science study at university.

The design of the traditional mathematics curriculum offered two important problems.

The first problem concerned the mathematical education of pupils who are interested in humanities or economics at university. These studies consider mathematical knowledge and aptitude as necessary for some of their subjects. But most of their students hadn't had mathematics at high school. So universities had two choices: either require math I or take special actions for students without math. What happened was that math I became a critical filter for admission to almost all university studies.

Pupils who wanted to study humanities had to choose math I, even if they didn't like it and found it too difficult. These pupils had big problems with math I, which was too theoretical for them and contained many parts that were not relevant for their future. The second problem concerns the mathematical knowledge of pupils who followed science, technics or agriculture at university. These pupils missed special abilities, since training of these abilities was not included in the math I program nor in the math II program.

These dissatisfactions with the old math curriculum have resulted in a curriculum change.

Math I, which is now called math B, will remain with the addition of geometry. Math II will disappear and a new math program - math A - has been developed.

Math B will be compulsory for pupils who want to study sciences, technics or agriculture and will consist of analysis and geometry.

Pupils who will choose for humanities or economics have to follow math A or math B. Math A has a strong applicable character and consists of simple analysis and applicable analysis, matrix counting and applications, probability counting and statistics and computer science. Math A is especially designed for preparation to humanities and economics.

Pupils with a lot of interest in mathematics can take both programs. So the most important objective of the new math program is to make a better fit between secondary education and university. A side objective is to make math more attractive for pupils, especially girls, so that they choose it more often, get better results in and a more positive attitude toward this subject. This objective is to be achieved by math A. In August 1981 two grammar schools started with the experimental new math program in grade 11 and 12. In August 1983 10 schools and in August 1984 another 40 schools were added to the experiment. Pupils in grade 10 of these schools already received a program which prepared them for the new curriculum so that they knew what they are choosing for at the end of grade 10. In august 1985 the new curriculum was implemented in all high schools. In august 1983 we started a researchproject in order to investigate the effects of the new math program in the experimental schools.

This paper will answer the following research questions.

1) what is the effect of the new mathematics curriculum on girls' choice of mathematics?
2) What is the effect of math A on girls' attitudes toward mathematics?
3) What is the effect of the new mathematics curriculum on girls' achievement in mathematics?
4) What is the effect of the new mathematics curriculum on girls' choice of university study?
5) What is the effect of the new mathematics curriculum on girls' achievement in university?

THEORETICAL FRAMEWORK

In the Netherlands very little research has been done on the problem of girls and mathematics although the problem here is as serious as in the U.S. Therefore, it is necessary to concentrate on American research for explaining the fact that girls do not choose mathematics as frequently as boys. At present it is clear that biological factors can not explain the phenomenon. Social and psychological factors play the most important role. Petersen (1979) concludes that sex differences in mathematical choices and achievements are the result of biological predispositions which are, partially or completely, realized by psychological features of pupils developed during socialization. Differences in psychological features between boys and girls explain the extent to which they want to or can exert themselves to achieve well in a subject. These psychological features also explain the differences in math choices made by boys and girls. Such differences in psychological features between boys and girls have been shown repeatedly. At a very early age children show sex stereotypes (Kohlberg, 1966; Kuhn et al, 1978). In grade two of primary school children consider verbal skills as female and spatial and mathematical skills as male (Dwyer, 1974; Nash, 1975). Adults also tend to consider mathematics as a male domain (Tangri, 1982; Parsons, 1984). Sex stereotyping of a subject appears to influence achievement in mathematics (Montemayor, 1974; Stein at al, 1971; Fennema and Sherman, 1977). The results of research by Stein and Bailey (1973) show that girls make higher demands on themselves when they are confronted with tasks they consider as appropriate for their own sex than when they are confronted with tasks they consider as appropriate for boys. So girls make fewer demands on themselves for mathematical tasks and this low achievement motivation influences their achievements. It is evident that girls also will not choose a sbuject they consider as not appropriate for their sex. Fox (1977) concludes almost the same. She showed that girls have less self-confidence in regard to mathematics. A strong relationship has been found between self-confidence and mathematics achievement both for girls and for boys. More girls than boys have an extreme lack of self-confidence, and these feelings hinder learning of mathematics and contribute to avoiding it as soon as possible. So, presently if given a choice, girls will not choose mathematics. (Fox, 1977; Armstrong, 1979; Sherman, 1979; Tobias and Weisbrod, 1980). The perception of usefulness of mathematics in later life seems to be an important predictor of choice of mathematics by girls (Armstrong, 1979; Sherman, 1979; Stallings, 1980; Kelly, 1978). In addition girls conceive mathematics as being more difficult than boys do (Kremers, 1981; Parsons, 1984). In regard to liking mathematics, the research results are not clearly evident. For the Dutch situation, Kremers (1981) found that boys like mathematics more than girls, whereas Aiken (1976) did not find this to be the case. In summary, girls have a different attitude toward mathematics than boys do, which causes girls to tend to drop mathematics as soon as possible. However, girls are not born with these attitudes, and these attitudes are not unchangeable. Parsons (1984) concludes that it is possible to influence these attitudes by making mathematics more attractive and "life-like". The New Mathematics Curriculum and especially math A is supposed to do this, so we can assume that girls who are offered the new curruciulum will choose mathematics more often, get better results in and acquire a more positive attitude toward mathematics than girls who are offered the traditional curriculum. But the choice of math A or math B has consequences for admission to universiity studies. For the social sciences and economics, math A or math B is compulsory. For science studies, technics and agriculture math B is compulsory. At the moment of choice of courses for the last two grades of high school students already have to choose for further studies. If girls choose only math A, they enclude themselves from more further studies than girls who follow the traditional math I, which gives admission to all university studies. We assume that girls, when they choose mathematics in high school, mostly choose math A, so they will make their choice opportunities worse than they were before. So girls who have followed math A will choose social science studies and economics more often than girls who have followed the old math I program.

It is difficult to make assumptions about the effects of the new math curriculum on achievement in university. Math A pretends to make a better fit between high school and social studies and economics, math B pretends to make a better fit between high school and science studies, technics and agriculture. It is not assumable that girls profit either more of less by this than boys.

METHOD

Subjects

Forty.four of the 52 schools who used the experimental New Mathematics Curriculum co-operated in the research project. A comparative group of 41 schools with the old program was selected and matched with the experimental group on the variables of location, size, and ratio of boys to girls. The pupils in grade 11 and 12 of these 85 schools were the research subjects. In the schoolyear 1984/1985 information was collected in grade 11 about the mathematic programs followed. Part of the pupils in grade 11, only those who followed math A or math I, also filled in a questionnaire about their attitudes toward mathematics. Also their achievements in grade 11 were asked. From the pupils in grade 12 names and adresses were collected. In the schoolyear 1985/1986 all pupils in grade 12 were asked about their results on the exams in mathematics and about university studies they wanted to choose. Part of the pupils in grade 12, the same as in the schoolyear 1985/1986, filled in the attitude questionnaire again. The pupils, of whom the names and adresses were collected, were sent a questionnaire about the mathematics program they had followed in high school, their results on the exams, the university study they had choosen and their achievement in university.

Instruments

Almost all variables were quite simple to measure. Only for the variable 'attitudes toward mathematics' was a written questionnaire developed. At the beginning the questionnaire consisted of five subscales:

- interest in mathematics
- perceived usefulness of mathematics
- perceived difficulty of mathematics
- self confidence in mathematics
- mathematics as a male subject.

For the construction of the questionnaire the items and scales of existing instruments were used (e.g. Parsons, 1984; Fennema and Sherman, 1978; Ernest, 1976; Fox, Tobin and Brody, 1979). The questionnaire consisted of 60 items with four response categories:

- agree
- partly agree
- partly disagree
- disagree

Categories received the scores 4, 3, 2 and 1 respectively.
Table 1 presents the results of an analysis of the reliability of the subscales.

<u>Insert Table 1 About Here.</u>

It can be concluded that the subscales are reliable.

Table 2 shows the relationships between the pairs of subscales.

<u>Insert Table 2 About Here.</u>

The subscales of perceived difficulty, selfconfidence, and interest correlate relatively highly with each other. The subscales of perceived usefulness and math as a male domain show a low, respectively negative correlation with the other subscales. For this reason perceived difficulty, self confidence and interest are considered as one dimension of attitude toward mathematics, referred to as 'own perceived abilities'. The other two subscales remained as separate dimensions of attitude toward mathematics.
After removal of 18 items with an item-rest correlation which was too low, the total number of items in the questionnaire was 42. The eventual reliability coefficients of the three remaining subscales are presented in Table 3.

<u>Insert Table 3 About Here.</u>

RESULTS

Choice of mathematics

The figures of mathematics choices by girls and boys under the new and traditional curricula are presented in Table 4.

Insert Table 4 About Here.

Boys follow only math I more frequently than girls ($X2 = 5.75$; $df = 1$; $p < .025$). Boys also follow math I as well as math II more frequently than girls ($X2 = 294.51$; $df = 1$; $p < .001$).

Table 5 gives information about which program boys and girls choose under the new curriculum (math A, math B or both A and B).

Insert Table 5 About Here.

Girls choose only math A significantly more frequently than boys do (Chi-square = 160.97; $df = 1$; $p < .001$). Boys more frequently than girls do take two programs, math A and math B (Chi-square = 408.23; $df = 1$; $p < .001$).

Comparison between table 4 and 5 shows that girls who are offered the new math curriculum, significantly more frequently choose mathematics than girls, who are offered the old curriculum ($X2 = 48.16$; $df = 1$; $p < .001$). The same is true for boys ($X2 = 23.29$; $df = 1$; $p < .001$).

Attitudes toward mathematics

In testing the hypotheses concerning attitudes toward mathematics the three dimensions mentioned earlier each form a dependent variable. The independent variables are math program followed (math A or math I) and sex of the pupils.

The mean scores on the attitudes scales of the pupils in grade 11, schoolyear '84/'85 can be found in table 6.

Insert Table 6 about here.

There is a significant multivariate effect of program on attitudes toward mathematics ($F = 3.72$; $df = 2$; $p < .03$). This effect can be attributed to the subscale male domain ($F = 7.04$; $df = 1$; $p < .01$). Pupils who follow math A consider mathematics less as a male domain than pupils who follow math I. In both groups girls consider math less as a male domain than boys, but this effect is not substantial ($F = 2.67$; $df = 1$; $p < 10$). Taking achievement in mathematics as co-variable in the design does not change the results.
The mean attitude scores of the same pupils one year later are shown in table 7.

Insert table 7 about here.

Now there is no significant multivariate effect of program followed. But the results on the univariate test on the three subscales separately shows that there is a significant effect of sex cn usefulness ($F = 8.23$; $df = 1$; $p < .004$). Boys perceive mathematics as useful more than girls; this is the case for math I as well as for math A. For own abilities there are two small effects: 1) of program ($F = 4.44$; $df = 1$; $p < .02$) and 2) of sex ($F = 5.32$; $df = 1$; $p < .04$). Boys perceive their own abilities as more positive than girls; girls as well as boys who follow math I, perceive their own abilities as more positive than girls and boys who follow math A. Controlling the results for achievement in mathematics does not make any difference.
In order to test the effect of program and sex on changes in attitudes between grade 5 and 6 we did a multivariate analysis of variance with sex, program and the factor time as independent variables. We found a significant effect of time and program. In order to interpret this effect we tested the contrasts of the attitude scores between grade 5 and grade 6 with univariate F-tests. The results are in tabel 8.

Insert table 8 about here

There is a clear effect of time on usefulness. Pupils in grade 12 perceive mathematics less as useful than pupils in grade 11. For girls this is slightly more the case than for boys. There is no difference between math A and math I.

For male domain there is an effect of program. Pupils in grade 12 - girls as well as boys - who follow math I perceive mathematics less as a male domain than when they were in grade 11. For pupils, who follow math A, this is not the case.

Concerning own abilities, there is an important effect of time. Pupils in grade 12 perceive their own abilities as less positive than when they were in grade 11. Although the effect from sex and program are not substantial they are interesting: Boys who follow math I are more positive in grade 12 than in grade 11, girls who follow math I are less positive in grade 12 than in grade 11. Boys and girls who follow math A are less positive in grade 12 than in grade 11 and this decline in attitude is stronger for girls than for boys.

Achievement in mathematics

Concerning the effects of sex and math program we asked the examresults of all pupils who followed one or two math programs. Not all schools who cooperated in the researchproject sent in these results. For each school a mean achievement score has been computed for boys and girls separately. In this way we controlled for differences in achievement level between schools.

Because the content of the different mathematics programs are very dissimilar it was necessary to obtain standardized scores for comparing pupils' achievement between programs. So we compared the programs on differences in scores between boys and girls at the schoollevel. The results are in table 9.

Insert table 9 about here

The only effect on the difference in achievement scores between math I and math A comes from sex ($F = 5.09$; $df = 1$; $p < .03$). This means that the difference between boys and girls who follow math A is the same as between boys and girls who follow math I. The same results are found for the comparisons between math I and math B ($F = 28.84$; $df = 1$; $p < .001$). Concerning the comparison between pupils who follow math I as well as math II and pupils who follow math B there is an effect of program ($F = 20.55$, $df = 1$; $p < .001$) as well as of sex. ($F = 3.84$; $df = 1$; $p < .05$). This means that the differences between boys and girls, who follow math I as well as math II, are bigger than the differences between boys and girls, who follow math B. Here we must make a remark: the total amount of girls who followed math I and II is very small (only 43 girls against 284 boys). At every school there are only one or two girls who follow math I and math II. At five schools there are no girls who follow math I and II.

Choice of university studies

From 479 pupils who went to university after high school we have data about their high school math program, their math achievement at the end of high school, the university study chosen and about passing their exams in the first year of study in university.
In table 10 are the data about proportions of girls and boys who have taken sciences, medicine or agriculture, social studies or economics, and languages, art or law.

Insert table 10 about here

We see that boys choose science more often than girls and that girls choose languages more often than boys. In regard to medicin and social studies there are not such large differences between boys and girls. Comparing these data with the data of the total population of boys and girls, who follow the different university studies, it appears that more male science students and more female language students sent in their data. So we have to be careful with generalizing the results. First, we analysed the effects of math program and sex on choice of university study. It turns out that girls who followed only math A choose social studies significantly more often than boys and girls who followed math B or math A and B (see table 11).

Insert table 11 about here

The same is true for boys (see table 12) but it is contrary to what was expected, more the case for boys than for girls (see table 11 and 12).

Insert table 12 about here

Furthermore it appears that there is no difference between pupils who followed only math I and pupils who followed only math A in regard to choice of social studies compared to choice of other studies.
One remark has to be made: pupils who have chosen science are left out of the comparisons, because it is not possible to choose science for pupils who have only had math A.
Concerning the choice of science studies it turns out that boys who followed math I in high school choose science studies less often than boys and girls who followed math B or math A and B. The same is true for boys. (see table 13 and 14).

Insert table 13 about here

Insert table 14 about here

Succes in university

In regard to science at university there is no difference between pupils who followed math I or math I as well as II and pupils who followed math B or math A and B in passing their first year exams at once. This is true for girls and boys. There is also no difference in achievement level (mean exam results) between math I/math I + II and math A + B students nor between boys and girls.

In regard to social studies girls significantly more frequently pass their first year exams at once than boys do. (see table 15).

Insert table 15 about here

There is no difference in achievement level between boys and girls who passed their first year exams at once.
There is also no difference between pupils who followed math I and math A, either for girls or for boys. Concerning achievement level in statistics, an important subject in the social studies, there is no difference between boys and girls, nor between pupils who followed math A and those who followed math B, nor between pupils who followed math I and those who followed math A at high school.

CONCLUSIONS

In the first place it can be concluded that the new math curriculum leads to more mathematics choice in high school by girls. But, as was expected, girls more frequently choose math A, whilst most boys choose math B or math A as well as B. This means that, already two years before end of high school, girls take the risk to excluding themselves from science studies at university. THe risk is greater than in the case of the old curriculum in which taking only math I gave admission to all university studies, including science. In that regard it is striking that there is no difference between proportions of girls who followed only math I and those who followed math A in choice of science at university. The same is true for boys. Apparently pupils already know in grade 11 of hi^h school which university study they want to choose. They fit their choice of math program to their choice of university study. This conclusion also can be supported by the fact that pupils, girls as well as boys, who followed math B in high school, take science at university more often than pupils who followed math I.

In the second place it can be concluded that math A does not lead to a more positive general attitude toward mathematics than mach I. There is only a small effect of program on perception of math as a male domain. Pupils who follow math A perceive math less as a male domain than pupils who follow math I. This is not so strange considering the fact that mostly girls follow math A. Probably math A will be considered as 'female math . Furthermore it is striking that all pupils, girls as well as boys, perceive math as less useful when they are in grade 12 than when they are in grade 11. For girls this is slightly more the case than for boys.

The new math curriculum does not lead to a smaller difference in achievement level between boys and girls than the old curriculum. There is even a bigger difference between boys and girls who followed math B than between those who followed math I and math II. This finding can be explained by the suggestion that girls, who follow math I as well as II under the old curriculum are those girls who are very much interested in mathematics, more than girls who choose math B in the new situation.

In the last place it can be concluded that the pretension of the new curriculum to make a better fit between high school and university can not be supported by the results. Concerning science, pupils, girls as well as boys, who follow math B or math A and B in high school do not gain better results in university than pupils who followed math I or math I as well as math II. The same is true for social studies and pupils who followed only math A or only math I. There is only a difference between girls and boys. Girls do better in social studies than boys.

Concerning succes in university it is interesting to give some results of a log linear analysis we did to predict the effects of sex of pupils, math program followed in high school, math achievement in high school and choice of university study. It appears that boys, who followed math I as well as math II, with a mean math achievement of 5 or 6 who chose science, have the least chance to pass their first year exams ($p = .16$). The best chance to pass their first year exams have girls, who followed math B in high school, with a mean achievement of 9 or 10, who chose medicine at university ($p = .99$).

In regard to students who choosed social studies, boys who followed math A and B at high school, with a mean achievement of 5 or 6 have the least chance to pass their exams for statistics ($p = -2.66$). The best chances have girls who followed math B, with a mean achievement of 9 or 10 ($p = 1.00$). In following publications we will report more about this finding.

In general, it appears that achievement in math at high school is the best predictor of succes in university, and a better predictor than math program. Besides that, girls do better in all university studies, except science, than boys. Further research is needed to detect factors that can explain these findings.

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Table 1: Coefficients of Reliability of the 5 Subscales

Subscales	Coëff.Alpha	Mean	Stand.dev.	N-items
1. Interest	.91	25.4	5.4	10
2. Usefulness	.77	27.8	3.6	15
3. Difficulty	.95	25.3	6.0	13
4. Selfconfidence	.77	32.1	4.6	13
5. Male domain	.88	34.2	4.9	9

Table 2: Relationships Between the 5 Subscales

Subscales	1	2	3	4	5
1. Interest	-				
2. Usefulness	.34	-			
3. Difficulty	.59	.26	-		
4. Self confidence	.56	.27	.78	-	
5. Male domain	.04	-.05	.03	-.07	-

Table 3: Coefficients of Reliability of the 3 Eventual Subscales

Subscales	Coëff.Alpha	Mean	Stand.dev.	N.-items
1. Perceived own abilities	.95	77.5	14.6	29
2. Usefulness	.75	25.5	4.1	10
3. Male domain	.77	9.6	1.9	3

Table 4: Mathematics Choices by Girls and Boys grade 11, under the old math program, schoolyear 1984/1985

Math. choice	boys	girls	total
only math I	55%	59%	57%
math I + math II	31%	8%	20%
no math	14%	33%	23%
total	100%	100%	100%
	n=2046	n=1845	n=3891

Table 5: Math Program Chosen by Boys and Girls under the New Math Curriculum (grade 11; 1985).

program chosen	boys	girls	total
Math A	28%	47%	37%
Math B	23%	15%	20%
Math A and B	39%	15%	27%
No Math	10%	23%	16%
Total	100%	100%	100%
	n=2245	n=2014	n=4259

Table 6: Mean attitudescores grade 11, schoolyear 1984/1985

		Usefulness	Male domain	Own abilities	N
Math A	boys	2.52	3.23	2.56	99
	girls	2.47	3.32	2.55	168
Math I	boys	2.53	3.10	2.57	126
	girls	2.52	3.19	2.56	146

Table 7: Mean attitudescores, grade 12, schoolyear 1984/1985

		Usefulness	Male domain	Own abilities	N
Math A	boys	2.48	3.23	2.48	100
	girls	2.34	3.27	2.42	170
Math I	boys	2.44	3.22	2.58	127
	girls	2.35	3.28	2.48	136

Table 8: Univariate F tests on contrasts grade 5-grade 6

Independent variable	Dependent variable	F	df	p
Time	Contrast usefulnes 5-6	36.78	1	.000
Sex		3.62	1	.06
Program	Contrast male domain 5-6	4.78	1	.03
Time	Contrast own abilities 5-6	23.78	1	.000
Sex		3.56	1	.06
Program		3.24	1	.05

Table 9: Mean achievement scores at school level for the different math programs, grade 1?, schoolyear 1985/1986

	boys			girls			
	mean	sd	n	mean	sd	n	n schools
Math I	6.47	.45	612	6.22	.40	530	26
Math I+I	7.32	.60	284	7.29	.73	43	21
Math A	6.47	.43	317	6.33	.46	460	29
Math B	6.91	.54	504	6.41	.63	234	21

Table 10: Proportions boys and girls in different university studies; schoolyear 1985/1986

University studies

	science	medicine	social studies	languages	N
boys	42%	12%	35%	11%	278
girls	14%	19%	30%	37%	201

Table 11: Proportions boys with math A only, following social studies or other studies (excluding science) compared with proportions boys with A + B and girls with A + B

	other studies	social studies	n
boys, math A only	26%	74%	27
girls, math (A +) B	61%	39%	31
boys, math (A +) B	32%	68%	37

$X^2 = 9.0$; df = 2; p = .01.

Table 12: Proportions girls with math A only, following social studies or other studies (excluding science), compared with proportions boys with (A +) B and girls with (A +) B.

	other studies	social studies	n
girls, math A only	56%	44%	57
girls, math (A +) B	61%	39%	31
boys, math (A +) B	32%	68%	37

$X^2 = 7.0$; df = 2; p = .03

Table 13: Proportions boys with math I and math (A+)B following science and other studies.

	science	other studies	n
math I	32%	68%	68
math (A+)B	70%	30%	95

$X^2 = 20.5$; df = 1; p = .000.

Table 14: Proportions girls with math I and math (A+)B following science and other studies.

	science	other studies	n
math I	17%	83%	46
math (A+)B	52%	48%	24

$X^2 = 8.6$; df = 1; p = .003

Table 15: Proportions boys and girls in social studies who passed their first year exams at once.

	at once	not at once	n
boys	50%	50%	50
girls	74%	76%	34

X^2 = 3.7; df = 1; p = .05