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Signaling, Incentives and School Organization in France, The Netherlands, Britain and the United States: Lessons for Education Economics

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Abstract

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Keywords

education, achievement, school, performance, primary, secondary, math, science, American, Dutch, French, grade, teacher, student, quality

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Despite similar standards of living, the secondary education systems of France, the Netherlands, Britain and the United States produce very different levels and patterns of achievement. In primary school, Americans do not lag behind their European counterparts. Reading ability varies little across these four countries. However, when 14 year olds were compared at the beginning of the 1980s, the French and Dutch were about 1.3 to 1.5 grade level equivalents ahead of the Americans in math and science. At the end of secondary school, performance differentials appear to be even larger.

What causes differences in secondary school achievement across these four nations? The first two sections of the paper describe the achievement differences among the four countries and examine the proximate causes of the differentials. I conclude that these achievement differentials are caused by differences in the quality of teachers and of student time and effort inputs devoted to academic achievement.

There remains, however, the key question: why do students, teachers, parents, school administrators and voters in America place a lower priority on academic achievement than their counterparts abroad? Why, for example, is student engagement in learning lower in the U.S. than in France and the Netherlands? It turns out that **signaling theory, game theory and agency theory have much to contribute to the understanding of these phenomena**. These connections are laid out in Section 3. The fundamental cause appears to be the structure of incentives for learning and for the high quality teaching of demanding material. American employers reward credentials, but they fail to recognize and reward what is actually learned in school. Admission to the best colleges depends on measures of relative performance--rank in class and grades--and aptitude tests which do not assess what is taught in school; not external assessments of competence in particular subjects. Only one of the fifty states has a system of subject specific external exams similar to the Bac, the GCSE and the Dutch exams. The result has been grade inflation and students selecting undemanding courses where it is easy to get a high grade. Students pressure each other not to study, because they are being graded on a curve. Teachers are pressured to keep failure rates low, so passing standards are effectively forced down by peer pressure against studying. The final section summarizes the analysis and then comments about implications for economic analysis of educational policy.

I. DIFFERENTIALS IN ACADEMIC ACHIEVEMENT

The differences in achievement levels at age 13, 14 and 15 are summarized in Table 1. The table presents data from studies conducted in the 1980s and 1990s comparing France, the Netherlands, England, Scotland, Sweden and the United States.

Table 1
Achievement in Lower Secondary School

	1982 IEA Math Age 13-14 % Correct	1991 IEA Reading Age Adjusted			1983 IEA Science Age 14-15 (not adj for age)		Adj. for Age Diff	1991 IAEP Mathematics Level Age 13 % Correct		Gain Age 9 to Age13	1991 IAEP Science Level Age 13 % Correct		Gain Age 9 to Age 13
		Age 9	Age 14 Mean	(SD)	Mean	(SD)		Mean	(SD)		Mean	(SD)	
France	53.9	526	533	(68)	---	---	---	64.2	(20.3)	---	68.6	(17.1)	---
Netherlands	57.1	494	523	(76)	63.7	(16.1)	62.2	---	---	---	---	---	---
England	47.1	---	---	---	55.9	15.7)	62.2	60.6	(21.4)	29.8	68.7	(17.5)	18.7
Scotland	48.4	---	---	---	---	---	---	60.6	(20.3)	26.5	67.9	(16.5)	20.8
United States	46.4	543	528	(85)	53.7	(16.7)	53.7	55.3	(20.9)	25.4	67.0	(16.4)	17.2

Column 1 is a weighted mean percent correct for students in the grade where the majority have attained 13:00 to 13:11 years by the middle of the school year from the Second International Mathematics Study (McKnight et al 1987, p. 124). The French, English, and American students all had the same mean age, 14.1. Mean age was 13.9 for Sweden, 14.0 for Scotland and 14.4 for Netherlands. Adjusting for the greater age of the Dutch students would have lowered their percent correct by about 2 points.

Columns 2, 3 & 4 are the age adjusted means and standard deviations of the overall reading score in the IEA reading study (Elley 1992, pp. 108-9).

Columns 5 & b are the percent correct and standard deviation for 9th graders on the full 50 item IEA science test (Postlethwaite and Wiley, 1992, p. 60 & 74). An estimate of how U.S. students would have performed on the full test was made by subtracting 1.1 percentage points (the average difference between core and full test scores for England, the Netherlands) from the U.S.'s core test score. The mean age of students differed a great deal. Mean age was 14:2 for England, 15.3 for the United States and 15:6 for the Netherlands.

Column 7 is an estimate of scores for the full 50 item IEA science test for students who are 15.3 years old, the mean age of U.S. students. The age gradient used was the average for Sweden (4.3) and Italy (7.4), the two countries for which it was available.

Columns 8, 9, 11 and 12 are the mean percent correct and standard deviation from the 1991 IAEP study of mathematics and science achievement of 13 year olds (IAEP, 1992a 1992b).

Columns 10 & 13 are the increase in the percent correct on items common to the tests given to 9 and 13 year olds.

Mathematics: In the 1981/82 study of mathematics achievement of 13-14 year olds conducted by the International Association for the Evaluation of Educational Achievement (IEA), Dutch and French 13-14 year olds ranked number 2 and 3 (behind only Japan). Of the 17 industrialized nations participating in the study of 13-14 year olds, Americans were ranked 12th, English 11th and Scots 10th (McKnight et al. 1987). After adjustment for small differences in mean age, American 14 year olds scored about 40 percent of a U.S. standard deviation (or roughly 1.3 U.S. grade level equivalents) below French and Dutch students of comparable age. The 1991 International Assessment of Educational Progress (IAEP) mathematics study obtained similar results. The gap between French and American 13 year olds was 45 percent of a U.S. standard deviation (about 1.5 U.S. grade level equivalents). British students were about half way between the French and the Americans (IAEP 1992a).

The performance gap between the American and European students grows even larger during upper secondary school. Evidence of this can be found in Table 2. The Americans who participated in the Second International Math Study were high school seniors in college preparatory math courses like trigonometry, precalculus and calculus. This very select group, representing 13 percent of American 17-18 year olds, got 39.8 percent of the questions correct. The 6 percent of English students studying mathematics at A level got 59.8 percent correct McKnight et al 1987). Substantial proportions of French and Dutch secondary students specialize in mathematics and science (20 percent of French youth are in the mathematics and science lines known as C, D or E of the lycee general) and the questions they are asked on their final examinations suggest that these students achieve at a very high level.

Table 2
Achievement at the End of Upper Secondary School

	1982 IEA Mathematics Final Yr. of Sec. Sch.			1983 IEA Science--Final Year of Upper Secondary School: Physics			Chemistry			Biology			Total
	Percent Correct	%Age Group	%Time Math	Percent Correct	%Age Group	Hrs/ Week	Percent Correct	%Age Group	Hrs/ Week	Percent Correct	%Age Group	Hrs/ Week	Science Hmwk
France	---	---	---	---	---	---	---	---	---	---	---	---	---
Netherlands	---	---	---	---	---	---	---	---	---	---	---	---	---
Belgium	50.0	10	20	---	---	---	---	---	---	---	---	---	---
Finland	60.6	15	14	37.9	14	2.0	35.9	16	1.0	50.2	41	2.0	3.1
Norway	---	---	---	54.1	10	5.0	44.3	6	5.0	55.4	4	5.0	---
England	59.8	6	21	62.4	6	5.1	69.3	5	5.2	62.4	4	5.2	7.2
Scotland	42.8	18	17	---	---	---	---	---	---	---	---	---	---
United States	39.8	12	14	45.3	1	5.0	37.7	2	5.0	38.1	12	5.0	2.8

Column 1 is a weighted mean percent correct for students in the final year of secondary school from the Second International Mathematics Study (McKnight et al 1987, p. 124). The mean age was 17:8 for the US, 18:1 for England, 16:9 for Scotland, 18:6 for Finland, 19.2 for Sweden and 18:3 for Belgium. Column 2 is the share of the age cohort in advanced mathematics courses included in the study. Column 3 is the share of school time spent in mathematics classes.

Columns 4, 7 & 10 give the percent correct for students studying each science subject in the final year of secondary school. Column 5, 8 and 11 are the proportions of the age cohort taking each science subject in the final year of secondary school [for the U.S. it is the share of students taking their second year of the subject7. Columns 6, 9 and 12 are the number of hours per week spent in classes in each science subject. (Postlethwaite and Wiley, 1992, p. 6, 36, 37 & 69).The mean age was 17:5-17:10 for the U.S., 18:0 for England, 18:7 for Finland and 18:11 for Norway.

Science: In the 1983 IEA study of science achievement of 14-15 year olds, the Netherlands ranked 3rd and the U.S. ranked last among 17 industrialized countries. After a rough adjustment for age differences, American students lagged slightly more than half a standard deviation (about 1.5 U.S. grade level equivalents) behind English, Dutch students. While a big gap is visible at age 14-15 no such gap is visible at age 10-11 (Postlethwaite and Wiley 1992).

The 1991 IAEP science study found that at age 9 American students were ahead of students in Scotland England and most other European countries (data for France and Netherlands is not available for this age). By age 13, English, Scotch and French students were ahead, though the differences were small and not statistically significant (IAEP 1992b).

Few American upper secondary students study science in depth (see Table 2). Only 1 or 2 percent of the age cohort take two years of physics or two years of chemistry. Despite the highly selected nature of this group (many of whom were taking the subject for Advanced Placement college credit), only 47.5 percent of the questions were answered correctly on the IEA physics exam and only 37.7 percent were correct on the IEA chemistry exam. The 4 or 5 percent of the age cohort of English youth who in their 13th year of schooling were studying these subjects for their A levels got 62.4 percent and 69.3 percent correct respectively (Postlethwaite and Wiley, 1992).

Reading: In the 1990/91 IEA study of reading achievement, age adjusted scores indicate that Swedish and American 9 year olds were reading about two-thirds of a U.S standard deviation better than Dutch 9 year olds and about .18 SDs better than French 9 year olds. However, by age 14 differences between the four countries (see column 3 of Table 1) were small.

II. TEACHER QUALITY, TIME, AND ENGAGEMENT:
The Proximate Causes of Achievement Differentials

American elementary school students do not lag far behind their counterparts in Europe. Indeed in reading they are substantially ahead. What then caused the large deficits in achievement in mathematics and science <u>at the end</u> of secondary school? Why does achievement lag in math and science and not in reading? This section of the paper examines the proximate causes of the achievement differentials. It is organized around six proposed explanations of achievement differentials across countries:

1) Diversity
2) Restricted access to secondary education

3) Teacher quality and salaries
4) Priority given to academic achievement
5) Time devoted to instruction and study
6) Engagement--Effort per unit of scheduled time

2.1 Diversity

Non-Hispanic whites score about .45 grade level equivalents (GLE) higher than the overall U.S. average on NAEP reading tests, about .56 GLE higher on NAEP mathematics tests and .98 GLE higher on NAEP science tests. If all French and Dutch students are compared to the 77 percent of American students who are neither black nor Hispanic, the European advantage is smaller. For mathematics at age 13, the gap would be about 0.9 grade level equivalents in both 1982 and 1991. In science, U.S. white 13 year olds were about one-half GLE behind the Dutch in 1983 and about .6 GLE ahead of French 13 year olds in 1991. But, are these fair comparisons? The U.S. is not the only country challenged by ethnic diversity. The share of the students who are taught in a language different from their own mother tongue is 6 percent in both France and the United States, 5 percent in Scotland, 12 percent in Canada, 15 percent in Northern Italy and 20 percent in Switzerland (IAEP 1991a). If one is to adjust scores for the demographic and socio-economic background of students, why not hold parent's education constant as well. If this were done, the French/Dutch lead over the U.S. would increase.

2.2 Access--Numbers of Students and Graduates

It is sometimes said that low achievement is the price one must pay for greater access. However, only the United Kingdom exhibits the expected tradeoff between achievement levels and enrollment ratios (see Table 3). The 17 and 18 year olds preparing for A level exams achieve at high levels, but they represent a decided minority of the age cohort. British secondary school completion rates were high in OECD data because passing one or more GCSE exams at age 16 was counted as completion. If one or more A level exams had been the definition of secondary school graduation, the graduation rate would have been 28 percent (Government Statistical Office 1992, p. 8).

Table 3
1991 Enrollment and Completion Rates

	France	Nether -lands	United Kingdom	United States
Percent Enrolled FT in Secondary School[1]				
At age 16	92.0%	97.2%	62.4%	90.2%
At age 17	86.4%	90.0%	43.1%	74.7%
At age 18	57.2%	67.4%	12.3%	21.1%
At age 19	31.6%	41.5%	3.4%	5.0%
Secondary Diplomas Awarded/Population of Theoretical Completion Age[2]	75.8%	82.2%	74.4%	75.5%
FT Equiv. Enrollment in Tertiary Education[3]				
Age 18-21	26.6%	19.5%	16.0%	33.4%
Age 22-25	12.7%	14.0%	4.8%	13.5%
Age 26-29	4.0%	4.0%	2.2%	6.2%
First-degree Graduates from Universities/ Pop. of Theoretical Completion Age[4]	16.3%	8.3%	18.4%	29.6%
FTE Years in School betw Age 16-29[5]	4.6 yrs	4.9 yrs	2.3 yrs	4.1 yrs
School Enrollment Rate Age 5-29[6]	57.7%	55.2%	52.7%	55.2%

[1] OECD, Education at a Glance, 1993, p. 117.
[2] OECD, 1993, p. 176 & NCES, 1992, p. 107. The US data does not include GED certificates. The labor market does not view the GED as equivalent to a high school diploma. GED certified high school equivalents are paid 6 percent more than high school dropouts but 8 to 11 percent less than high school graduates.
[3] OECD 1993, pp. 129 & 131.
[4] OECD 1993, p. 179.
[5] Calculated by summing the ratios of FTE enrollment to population for one year age groups from age 16 to 29. (DECD, 1993, pp. 117, 129 & 131).
[6] OECD 1993, p. 108.

American youth no longer spend considerably more time in school than French and Dutch youth (see Table 3). Not only are graduation standards higher, graduation rates are higher as well. In 1991 graduation rates were 82.2 percent in the Netherlands, 75.8 percent in France and 75.5 percent in the United States. The large proportions of 18 and 19 year olds attending secondary school in France and the Netherlands indicate how high graduation standards are made compatible with high graduation rates. Students having difficulty with the fast paced curriculum do not drop out; rather, they repeat grades and thus gain extra time to prepare for the demanding external exams. Many participate in vocational programs and apprenticeships that currently account for 54 percent of French and 70 percent of Dutch upper secondary students (DECD 1993, p. 119).

The benefit of the early completion of secondary school in the U.S. is that large numbers of students enter tertiary education at a young age. However, some of the material covered during the first two years of college in the United States is covered in upper secondary school in France and the Netherlands. Despite lower college attendance rates in France and the Netherlands, larger shares of 18-21 year olds in France (52.2 percent on a FTE basis) and the Netherlands (56.4 percent) are enrolled in school (either secondary or tertiary) than in the United States (40.4 percent). **Between age 16 and 29, the average American spends 4.1 FTE years in school, British youth spend 2.3 years, French youth spend 4.6 years and Dutch youth spend 4.9 years** (OECD 1993, pp. 117, 129 & 131). These statistics contradict the widely held belief that the American education system, despite all its faults, at least achieves higher levels of participation than continental systems. Yes, more bachelor degrees are awarded in the U.S., but there is doubt that the BAs awarded by America's second rank universities represent the same standard of achievement as comparable European degrees? Hard evidence on this issue is not available.

2.3 Teacher Quality and Compensation

The quality of the people recruited into teaching is very important. The teacher's general academic ability and subject knowledge are the characteristics that most consistently predict student learning (Hanushek 1971, Strauss and Sawyer 1986, Ferguson 1990, Ehrenberg and Brewer 1993, Monk 1992).

Secondary school teaching is not a prestige occupation in the United States and it apparently does not attract the kind of talent that is attracted into the profession in France and the Netherlands. Since university admission standards are higher in Europe, the university graduate pool from which European secondary school teachers are recruited is better educated on average than the college graduate pool out of which American teachers are recruited.

Furthermore, American teachers are generally not the most talented members of the pool of college graduates. In 1977-78 the Math Scholastic Aptitude Test (SAT) score of intended education majors was .38 standard deviations (SDs) below the overall average, one SD below engineering majors and 1.2 SDs below majors in the physical sciences. The Verbal SAT of intended education majors was .30 SDs below the overall average (NCES 1992, Table 124). In this respect, Britain is similar; entrants into programs preparing primary school teachers have significantly lower A level grades than average for university entrants (O'Leary 1993).

In France, by contrast, almost all secondary school teachers have passed rigorous subject matter examination. In 1991 only 31.3 percent of those who took the written exam for the *Certificat d'Aptitude au Professorat de l'Enseignement du Secondaire* (the most common of these examinations) passed it. The best teaching jobs go to those who pass an even more rigorous examination, the Agregation Externe, which had a pass rate of 17.7 percent in 1991 (Ministere de 1'Education Nationale et de la Culture, 1992 p. 205 & 206). French and Dutch secondary school teachers tend to be recruited from the middle (not the bottom half) of a pool of graduates of tertiary education which is in turn a highly selected sample of the nation's population.

Furthermore, American teachers are often not very expert in the fields they teach. Recent college graduates recruited into math or science teaching jobs spent only 30 percent of their college career taking science and mathematics courses. Since 46 percent had not taken a single calculus course, the prerequisite for most advanced mathematics courses, it appears that most of the math taken in college was reviewing high school mathematics (LACES 1993b, p. 428429). The graduates of the best American universities typically do not enter secondary school teaching because the pay and conditions of work are relatively poor.

Compensation: The high academic standards for entry into upper secondary teaching in France and the Netherlands are sustainable only if wages and conditions of work are attractive. Data on the relative compensation of secondary school teachers is presented in Table 4. American upper secondary teachers start at a wage that is 14 percent below that of the average worker and after 15 years of experience they earn only 33 percent more.[1] Starting salaries are equally low in England. However, in France starting salaries are 6 percent above the all worker average and in the Netherlands they are 39 percent higher. In France, England and Scotland upper secondary school teachers with 15 years of experience are paid 61 to 63 percent more than the average worker and in the Netherlands they are paid 132 percent more. By contrast, American primary school teachers are paid almost as much as their Dutch and French counterparts.

Table 4
Teacher Compensation and Conditions of Work

	France	Nether-lands	Eng-land	Scot-land	United States
Compensation- -Teacher/All Employees[1]					
Upper Sec. Teacher--Start.	1.06	1.39	.87	.91	.86
Mid Career (15 yrs)	1.61	2.32	1.63	1.61	1.33
Lower Sec. Teacher--Start.	.95	1.12	.87	.91	.86
Mid Career (15 yrs)	1.44	1.58	1.63	1.61	1.33
Primary Sch. Teacher-Start.	.93	.97	.87	.91	.84
Mid Career (15 yrs)	1.34	1.39	1.57	1.61	1.30
Teacher Class Contact Hrs/Yr[2]					
Upper Secondary School	532	943	776	887	825
Lower Secondary School	706	943	776	887	748
Primary School	875	1014	1013	950	1098
Class Size[3]					
Upper Secondary	29	24	16	15	25.6
Lower Secondary	24	28	16	20	26.8
Primary	23	25	25	20	24.0
Sec. School Students/Teachers[4]	14.0	15.9	14.7	14.7	15.5
Sec. School Expenditure/student Relative to GDP per capita[5]	28.%	24.7%	28.0%	28.0%	29.4%
Share of Staff not Classroom Teachers[6]	36 %	20 %	---	---	47%

[1] Compensation of secondary teachers was calculated by multiplying their salary by the ratio of compensation to wages for manufacturing workers. This estimate of teacher compensation was then divided by average compensation of all workers. The figure for French upper secondary teachers is a weighted average of salaries for Agrege (20%)
and others (80%). (Nelson and O'Brien, 1993, pp. 73, 74, 90 & 91).
[2] Mean number of students in each class. (Nelson and O'Brien, 1993, Table IL2.)
[3] Mean number hours teaching a class per week times the mean number of weeks in the school year. (Nelson and O'Brien, 1993, Table 11.3. & IL4.) Time devoted to preparation, in service training and to non teaching activities are not included in this total.
[4] The ratio of the number of full-time-equivalent pupils enrolled in public and private secondary schools to the number of full-time-equivalent secondary school teachers (OECD 1993, p. 104).
[5] Data on expenditure relative to GDP per capita is from DECD, Education at a Glance, 1993, p. 95.
[6] Share of all staff employed in publicly funded elementary and secondary schools and ministries of education that are not classroom teachers. The non-teaching staff includes administrators at all levels, teachers aides, guidance counselors, librarians, nurses, custodial staff, food service workers, bus drivers, and clerical workers. The Dutch figure is for all three levels of schooling (DECD 1993 p. 100). The French figure is for secondary education only (Ministere de l'Education Nationale et de la Culture 1992, p. 184). The U.S. figure is for public elementary and secondary schools and does not include people working for State Departments of Education (LACES 1992, p. 88). In the U.S. teachers aides account for 8.8 percent of school staff.

The lower pay in the United States is not compensation for more attractive conditions of work (see Table 4). French secondary school teachers are in front of a classroom only 532 hours per year. Their American counterparts teach 825 hours per year. Teaching hours are similar to U.S. levels in England and Scotland (776 and 886 respectively), but class sizes are substantially smaller. Dutch upper secondary teachers are the only group that clearly have heavier teaching loads than American teachers (Nelson and O'Brien 1993). (see Table 4).

When the salaries of college graduates are compared, education majors in the U.S. come out at the very bottom. Starting salaries of U.S. mathematics and physical science majors who entered teaching were 42 percent below the salaries of those who obtained computer programming and system analyst jobs and 35 percent below the starting salaries of those obtaining jobs in mathematics or physical science (LACES 1993b, p. 26). University graduates who majored in physical science earned 78 percent more and economics majors earned 92 percent more than education majors over the course of their working lifetime (Kominski and Sutterlin 1992). Since Americans with university training in mathematics and science can earn much more outside of teaching, those with talent in these areas are difficult to recruit into high school teaching. This results in most teachers being poorly prepared in science and mathematics. This may help explain why American students lag behind French and Dutch students in mathematics and science, but not in reading. The fact that American primary school teachers are almost paid as much as French and Dutch teachers may also help explain why American 9-10 year olds compare favorably to their counterparts abroad.

There is a deeper question, however. **Why are the academic standards for entry into secondary school teaching in the U.S. set so low? Why are salaries so low?**

2.4 Priority Given to Academics

The four countries have similar student/teacher ratios and similar ratios of expenditure per student to per- capita GDP (see table 4). So, how are American school budgets allocated, if not into high teacher salaries? The money freed up by paying low salaries is used to hire additional non-teaching staff. Non teachers account for nearly one-half of the employees in public education in the U.S, but only one-fifth of employees in the Netherlands and only 36 percent of secondary education employees in France (see the bottom row of Table 4). These staff perform services (such as bus transportation, sports activities, before and after school day care, counseling and occupational training) which are provided by other governmental organizations or the private sector in some other nations. The money also pays for the more attractive buildings, sports facilities, large school libraries, the numerous computers and colorful texts that are typical of American secondary schools. In part, this reflects the fact that books, computers and buildings are cheaper (relative to teachers of constant quality) in the United States. American spending patterns also reflect different goals. Academic achievement is the over arching goal (some would say the only goal) of French and Dutch secondary schools. In the U.S., academic achievement must compete with other goals. American schools are also expected to foster selfesteem, to provide counseling, supervised extra-curricular activities, musical training, health services, community entertainment (eg. interscholastic sports), drivers education and to do all this in a racially integrated setting. These other goals require additional staff and different kinds of staff. They may not be served by hiring teachers with a strong background in calculus or chemistry, so resources get diverted from paying the high salaries necessary to recruit teachers thoroughly educated in chemistry. Unlike France, selection into teaching is not based almost solely on competence in the subject matter.

The question remains, however, **Why do American school administrators give academic achievement lower priority than French and Dutch administrators?** This question will be taken up later in the paper.

2.4 Time Devoted to Instruction

Many studies have found learning to be strongly related to time on task (Whey 1986, Walberg 1992). How do the five countries differ in the time that students spend in classrooms and doing homework? Table 5 reports the results of a variety of studies that compare time devoted to instruction. While estimates vary across studies, the pattern for secondary school students in the 1980s and 90s is that French, Dutch and Scottish students spent 5 to I S percent more time in school than U.S. students. English students, by contrast, spent 6 to 9 percent less time in school than U.S. secondary school students.[2]

Table 5
Student Time--Instruction and Homework

	France	Netherlands	England	Scotland	United States
Total Hours of Instruction/Year					
Primary Sch.-1971[1]	918	1040	900	1040	900
5th Grade in 1982[2]	---	---	984	---	1070
4th Grade in 1991[5]	840	975	---	---	954
Secondary Sch-1971[1]	775	1120	900	1080	900
9th Grade in 1982[2]	---	1007	1025	---	1141
8th Grade in 1982[3]	1187	1000	896	1067	1008
9th Grade in 1991[5]	1030	1092	---	---	792
Age 13 in 1991[4]	1073	---	960	1031	1003
Hours of Homework in All Subjects					
Hrs/wk--9th Grade in 1982[2]	---	8.4	6.0	---	9.6
Hrs/wk--8th Grade in 1982[3]	8	5	5	3	5
Hrs/wk-12th Grd Math Stud (1982)[3]	---	---	---	---	9
Hrs/wk-12th Grd Sci Stud (1982)[2]	---	---	11.5	---	9.8
Hrs/wk in 4th Grade (1991)[5]	.53 hrs	.13 hrs	---	---	1.89 hrs
Hmwk GT 2 hrs/day-Age 13 (1991)[4]	55%	---	30%	15%	30%
Hrs/Wk on Language Arts-4th Grade[5]	9 hrs	7 hrs	---	---	11 hrs
# LangA Hmwk Assign/wk Grd 9-1991[5]	1.6	.4	---	---	2.3
Time Devoted to Mathematics					
Math Share--8th Grade (1982)[3]	12%	10%	13%	14%	14%
Hrs/wk Math Instr-Age 13 (1991)[4]	3.83	--	3.17	3.50	3.80
Hrs/wk Math Hmwk--Age 13 (1991)[4]	1.93	--	1.27	1.00	1.52
Hrs/wk Math Hmwk--8th Gr (1982)[3]	4.0	2.0	1.0	2.0	3.0
Time Devoted to Science					
Science Share--5th Grade (1971)[1]	8%	2%	3%	3%	7%
Science Share--5th Grade (1982)[2]	---	---	4%	---	10%
Science Share--9th Grade (1971)[1]	8%	7%	8%	5%	10%
Science Share--9th Grade (1982)[2]	---	25%	10%	---	20%
Hrs/wk Science Instr-Age 13-1991[4]	2.90	---	3.23	3.00	3.88
Hrs/wk Science Hmwk-Age 13-1991[4]	.68	---	.97	.65	1.06

[1] First International Science Study, Passow, Noah, Eckstein and Mallea, 1976. 262,268.
[2] Second International Science Study, Postlethwaite and Wiley, 1992, 14-33.
[3] Second International Mathematics Study, Robitaille and Garden, 1989, pp. 36 & 79.
[4] International Assessment of Educational Progress, 1992a & 1992b.
[5] Lundberg and Linnakyla (1992, pp. 20-25. 57-59) analysis of the 1991 International Association for the Evaluation of Educational Achievement study of Reading.

Differences in instruction time may explain some achievement differentials between countries. But they do not explain the generally poor showing of U.S. secondary school students in mathematics and science. While American students spend less total time in school, they get more mathematics and science instruction time than French, Dutch and Scottish students. Heavy European time commitments to foreign language study tend to crowd out mathematics and science instruction. In lower secondary school, British students study one foreign language and French and Dutch students generally study two. In America, by contrast, few lower secondary school students study a foreign language and, by the end of high school, graduates have taken an average of only 1.46 years of foreign language (NCES 1992, p. 131).

European students learn mathematics and science more thoroughly than American students even when they spend less time on it. For example, in the IAEP study, mathematics instruction time was the same in France and the U.S., yet French students knew about 1.47 U.S. grade level equivalents more mathematics than American students. In science, by contrast, instruction time was one hour per week less in France, yet Americans still lagged about one-third of a U.S. grade level equivalent behind French students. **Why does an hour of instruction in French and Dutch classrooms produce more learning than in American classrooms?** Could heavier homework assignments be the explanation?

<u>Homework:</u> Harris Cooper's (1989) meta-analysis of randomized experimental studies found that students assigned homework scored about one-half of a standard deviation higher on post tests than students not receiving homework assignments. The impact of homework on the rate at which middle school students learn was also significant, though somewhat smaller. Non-experimental studies employing IEA and IAEP data come to similar conclusions.

French lower secondary school students spent more time doing mathematics homework and homework of all types. For example, 55 percent of their 13 year olds reported doing over two hours of homework a night, compared to 30 percent in the United States and England and only 15 percent in Scotland.[3] This is consistent with their lead in mathematics achievement. In science, however, there is no evidence that Dutch and French students got more homework than American students. Furthermore, English and Scottish lower secondary school students do less homework (and have less instruction time) in mathematics and science than American students and yet outperform them. **Why does an hour of instruction and homework time have larger learning effects in England, France and the Netherlands than in America?**

2.5 Engagement--Effort per Unit of Scheduled Time

Classroom observation studies reveal that American students actively engage in learning activities for only about half the time they are scheduled to be in a classroom. A study of schools in Chicago found that public schools with high-achieving students averaged about 75 percent of class time for actual instruction; for schools with low achieving students, the average was 51 percent of class time (Frederick, 1977). Overall, Frederick, Walberg and Rasher (1979) estimated 46.5 percent of the potential learning time is lost due to absence, lateness, and inattention.

Just as important as the amount of time participating in a learning activity is the intensity of the student's involvement in the process. At the completion of his study of American high schools, Theodore Sizer (1984) characterized students as, "*All too often docile, compliant, and without initiative* (p. 54)." John Goodlad (1983) described: *"...a general picture of considerable passivity among students*... (p. 113)." The high school teachers surveyed by Goodlad ranked "lack of student interest" as the most important problem in education. Sixty-two percent of 10th graders agree with the statement, "I don't like to do any more school work than I have to" (Longitudinal Survey of American Youth or LSAY, Q. AA37N).

Formal studies comparing ratios of on-task time to scheduled time are not available. Nevertheless, people who have visited classrooms in France or the Netherlands and the U.S. report that European teachers are less likely to be talking about extraneous matters and European students are more likely to be paying attention and doing what they have been assigned. My school visits in France and the Netherlands generated similar impressions.

Assuming these impressions are correct, **Why is time on task higher in France and the Netherlands? Why do French and Dutch secondary school mathematics and science teachers apparently expect more of their students than American teachers?**

III. SIGNALLING AS ULTIMATE CAUSE

External Examinations as Standard Setters

When questions such as those placed in bold type above are put to French citizens and educators, they point to the high standards and pervasive influence of the *Baccalaureat*? In 1992, 71 percent of the age group took a Bac exam and 51 percent passed. Thirty-eight percent of the Baccalaureate awarded were *Bac Technologigue or Bac Professionel* (ie. in vocational lines) (Ministere de L'Education Nationale 1993). This was a major accomplishment, for Bac exams are set to a very high standard. The three-year *lycee* programs that prepare 43 percent of the age cohort for the exam for the *Bac General* are quite rigorous. Bac Exams in mathematics, history/geography and French are set and marked by 23 regional *academies*. School based assessments are used for other subjects (Madeus and Kellaghan 1991, p. 17). The Bac exams taken in one's area of concentration are roughly comparable to the AP exams taken by American students seeking college credit for high school work. Cornell University, for example, generally awards advanced placement credit to recipients of the *Baccalaureat General.*

The payoff to higher education is high, so access to university is highly prized. A Bac is necessary for university admission and the line pursued and the mentions obtained on the exam influence which university program one can enter.[4] About 10 percent of those obtaining a Bac General enter special programs which prepare them for the exam that regulates admission to the elite *Grandee Ecoles*. The job market also rewards young people who have passed the Bac. There are alternative lower level examined qualifications for employment such as *the Brevet d'Enseignment Professionnel* (BEP) and the *Certificat d Aptitude Professionelle* (CAP), but the *Baccalaureat* confers greater access to preferred jobs. In 1987, unemployment rates for 15 to 24 year olds were 37 percent for those without a diploma, 22 percent for those with CAPS or BEPs, 18 percent for those with a Bac and 10 percent for university graduates (Ministere de l'Education 1992b, p. 25).

Dutch university graduates earn 65 percent more than secondary school graduates at age 45 to 64 (DECD 1992, 1993), so access to higher education is highly prized in the Netherlands as well. Examinations set by the Ministry of Education influence access to postsecondary education, so the high achievement of Dutch students in mathematics and science can be explained in the same way.[5] In both France and the Netherlands questions and answers are published in newspapers and available on video text. The published exams signal the standards that students and teachers must aim for.

Nine-tenths of English youth now take the General Certificate of Secondary Education (GCSE) exam at the end of 11th grade and an increasing number take A levels two years later. Scotland also has a system of external examinations. For the United Kingdom as a whole, the ratio of the number of school leavers passing at least one A level (or the Scottish equivalent) to the number of 19 year olds was 23 percent in 1991 (Government Statistical Service 1993, p. 8). Completing an A level qualification lowers unemployment rates for 25-34 year olds from 16.9 to 6.9 percent and graduating from university lowers it further to 4.3 percent. University graduates earn 66 percent more than secondary school graduates at age 45 to 64 (DECD 1992, p. 111). Performance on GCSE and A level examinations and the equivalent Scottish exams determine whether one can continue one's schooling and which university and program one can enter.

Grades on the GCSE and A level exams are included on resumes and requested on job applications, so employment opportunities depend on school results as well (Raffe 1984). These examples suggest that external examinations in secondary school subjects which serve important gate keeping functions contribute to higher levels of academic achievement. In the United States, by contrast, admission to the best colleges depends on teacher assessments of **relative** performance--rank in class and grades--and **multiple choice format aptitude tests** that **are** not keyed to the courses taken in secondary school.

Of the 50 states, only New York has a system of achievement exams where students are required to write essays and solve long mathematics problems. This appears to have raised achievement levels in New York State. When the family income, parental education, race and gender of SAT test takers are controlled, New York State has the highest adjusted mean Scholastic Aptitude Test score of the sample of 38 states with an adequate numbers of test takers to be included in the study (Graham and Husted, 1993). This benefit occurs despite that fact that Regents exam grades account for less than half of the course grade and influence only the type of diploma received. A passing score on Regents exams is not necessary for admission to non-university higher education and employers ignore exams results when they make hiring decisions.

External assessments of achievement that directly affect access to preferred educational and job outcomes clearly increase student rewards for studying. They also change the **structure** of rewards for learning and, therefore, the incentive environment of students, teachers and administrators. I will argue that the structure of rewards for study is at least as important as their size. These issues will be discussed under seven headings:

3.1 Peer group norms
3.2 Teacher incentives
3.3 Administrator incentives
3.4 Competition among upper secondary schools
3.5 High standards in the external exams
3.6 *Redoublement*, grade repeating, as Mastery Learning and an Incentive to Study
3.7 Choice of Specialization as Goal Setting

3.1 Peer Group Norms

In the United States, the peer group generally tries to discourage academic effort. No adolescent wants to be considered a "nerd, brain geek, or grade grubber" or to be "acting White," yet that is what happens in most classrooms to students who study hard and are seen to study hard. Because the school's signals of achievement assess performance relative to fellow students through grades and class rank, not relative to an external standard, peers have a personal stake in persuading each other not to study.

An important reason for peer pressure against studying is that pursuing academic success forces students into a zero-sum competition with their classmates. Their achievement is not being measured against an absolute, external standard. In contrast to scout merit badges, for example, where recognition is given for achieving a fixed standard of competence, the school's measures of achievement assess performance relative to fellow students through grades and class rank. Students who study hard for exams make it more difficult for close friends (other members of the class) to get an A or be ranked at the top of the graduating class. Since devoting time to studying for an exam is costly, the welfare of the entire class is maximized if no one studies for exams which are graded on a curve. The cooperative solution is "no one studies more than the minimum." Participants are generally able to tell who has broken the "minimize studying" code and reward those who conform and punish those who do not. Side payments and punishments are made in a currency of friendship, respect and ridicule that is not limited in supply. For most students the benefits that might result from studying for the exam are less important than the very certain costs of being considered a "brain geek" or "acting White," so most students abide by the "minimize studying" "don't raise your hand too much" norm.

The peer norms that result are: "*It is OK to be smart. You cannot help that. But, it is definitely not OK to study hard to get a good grade.*" This is illustrated by the following story related by a Cornell undergraduate:

> *Erroneously I was lumped into the brains genus by others at [high] school just because of the classes I was in. This really irked me; not only was I not an athlete but I was also thought of as one of those "brain geeks." Being a brain really did have a stigma attached to it. Sometimes during a free period I would sit and listen to all the brains talk about how much they hated school work and how they never studied and I had to bite my lip to keep from laughing out loud. I knew they were lying, and they knew they were lying too. I think that a lot of brains hung around together only because their fear of social isolation was greater than their petty rivalries. I think that my two friends who were brains liked me because I was almost on their level but I was not competitive (Tim 1986).*

Note how those who broke the 'minimize studying' norm tried to hide the fact from classmates. They did not espouse an alternative "learning is fun and important" norm.

The costs and benefits of studying vary across students because interest in the subject varies, ability varies and parental pressure and rewards vary. This heterogeneity means that some students break the "minimize studying" norm. When they are a small minority, they cannot avoid feeling denigrated by classmates. In the top track and at schools where many students aspire to attend competitive colleges, they are numerous enough to create a sub culture of their own with its own norms denigrating those who do poorly on tests or who disrupt classroom activities. This is the structural basis of the "brains" and "preppie" cliques found in most American high schools. Most high school students, however, are in cliques that denigrate studying. At some school awards ceremonies, "some in the crowd jeer 'Nerd! '" as students are called to come up to receive an award (Suskind, 5/26/94, p. 1).

Peer pressure was discussed in my interviews of school staff and students in England, the Netherlands and France. The French educators I interviewed reported that peer pressure not to study occurred sometimes, but only in some lower secondary school classes, not at the lycee serving upper-middle class students that I visited. It appeared mild by American standards. In upper secondary schools particularly in the math-science line, the peer pressure was to excel. Discussions with English and Dutch students and educators produced similar observations.

3.2 Teacher Incentives

Most American secondary school teachers do not feel individually accountable for the learning of their students. The lack of accountability for learning stems from: (1) the rarity of examinations assessing student achievement in particular subjects relative to an external standard, and (2) the fact that most secondary school students receive instruction in a given subject from many teachers. Only coaches, band conductors and teachers of advanced placement classes are exceptions to this norm. They teach in environments where student achievement is visible to parents and colleagues and as a result feel accountable for outcomes. In France and the Netherlands, by contrast, upper secondary students are in small classes that take most subjects together and generally remain intact for two or more years. Fewer than three teachers share responsibility for preparing each class for the external exams in the subject. In the Netherlands where schools are small, many subjects are taught by only one teacher. Since important rewards accrue to those who pass or do well on these exams, everyone takes them very seriously. The number of students taking and passing each exam is public knowledge within the school and among parents. Exam results influence teachers' reputations. Responding to such informal pressures, upper secondary school teachers strive to prepare their students for the external exam.

American teachers are also expected to insure that most of their students pass, but they are free to accomplish this goal by lowering the passing standard. Teachers who set expectations too high get in trouble. For example, Adele Jones, an Algebra II teacher in Georgetown Deleware, was fired because she failed too many of her students (42 percent one year and 27 percent the next). When students started picketing the school carrying "hastily scrawled signs with such slogans as *'I Failed Ms. Jones' class and It Was My Fault'* and *'Just Because a Student is Failing Doesn't Mean the Teacher Is'* (Bradley 1993, p. 19)," the national news media took notice. The principal of the school justified his decision with the following:

> *"I have made it very clear that one of my goals is to decrease the failure rate, to make sure the kids feel good about learning, stay in class, stay in school and do well .... Math is just a big body of knowledge; what is Algebra ll across the nation anyway?" he asks. When he taught band, he adds, he certainly didn't expect kids to finish the year as musicians--but he did want them to know more about music than ...before....The talk about preparing students for college struck him as "ludicrous. " Instead the goal should be to keep students studying math (Bradley, Sept 19, 1993 p. 19, 20).*

Senior Norman Kennedy said, however, the students who flunked Ms Jones class*, "were sleeping. They don't want to learn. They goof off, and they talk.*" At the hearing Walter Hall Jr., a student who had flunked the course, testified:

> *"I guess some of it could be attributed to a lack of study, because I wasn't really like into the books hour after hour, But in the rest of my classes, 1 was doing fairly well, and it was only testing that gave me a problem. "* He added that his parents had wondered how he could be getting such good grades in most classes without studying (p. 20).

Many teachers report being pressured to pass students. When asked "Is there pressure on your teachers to pass students who don't earn a passing grade?", 58 percent of local teacher union leaders in New York State responded YES.

> *Some school districts have a policy that each teacher's student grades are printed out and distributed among the faculty. Those teachers with the lowest student averages are singled out for "discussions" about why their students are lower. (New York State United Teachers, March 3, 1994, p. 2).*

Ms. Jones is unusual; most teachers realize that they must limit their failure rate. More commonly, the struggle over expectations plays out in the privacy of the classroom. Theodore Sizer's description of Ms. Shiffe's biology class, illustrates what sometimes happens:

> *She wanted the students to know these names. They did not want to know them and were not going to learn them. Apparently no outside threat--flunking, for example--affected the students. Shiffe did her thing, the students chattered on, even in the presence of a visitor ....Their common front of uninterest probably made examinations moot. Shiffe could not flunk them all, and, if their performance was uniformly shoddy, she would have to pass them all. Her desperation was as obvious as the students' cruelty toward her. (1984 p. 157-158)*

Some exceptional teachers are able, through the force of their personalities, to induce their students to undertake tough learning tasks. But for all too many, academic demands are compromised because the bulk of the class sees no need to accept them as reasonable and legitimate.

3.3 Administrator Incentives

External assessment changes the incentives facing school administrators. In the U.S. locally elected school boards and the administrators they hire make the thousands of decisions that determine academic expectations and program quality. When there is no external assessment of academic achievement, students at a school and their parents benefit little from administrative decisions that opt for higher standards, more qualified teachers or a heavier student work load. The immediate consequences of such decisions--higher taxes, more homework, having to repeat courses, lower GPA's, less time for fun courses, a greater risk of being denied a diploma--are all negative. When student learning is not assessed externally, the positive effects of choosing academic rigor are negligible and postponed. Since college admission decisions are based on rank in class, GPA and aptitude tests, not externally assessed achievement in high school courses, upgraded standards will not improve the college admission prospects of the school's graduates. Graduates will do better in difficult college courses and will be more likely to get a degree, but that benefit is uncertain and far in the future. Maybe over time the school's reputation and, with it, the admission prospects of graduates will improve because the current graduates are more successful in local colleges. That, however, is even more uncertain and postponed.

Few American employers pay attention to a student's achievement in high school or the school's reputation when they make hiring selections (Bishop 1993, Hollenbeck and Smith 1984). Those that do pay attention to achievement use indicators of relative performance such as GPA and rank in class rather than results on an external exam as a hiring criterion. Consequently, higher standards do not benefit students as a group, so parents as a group have little incentive to lobby strongly for higher teacher salaries, higher standards and higher school taxes. Employers who recruit from a local high school are often the only group with a real interest in general increases in achievement. Since, however, they pay a disproportionate share of school taxes, they tend to support only the policy options that do not cost additional money.

In many European countries, by contrast, the record of each school in the external examinations (the numbers passing or getting high grades) is published in local and national newspapers. Recent reforms in England and Scotland, for example, have resulted in schools publishing annual reports that contain the grades received by last year's students in each examined subject. These reports are now sent to parents of current and prospective students. The school league tables have important effects on school reputations. Administrators seeking to strengthen their school's reputation are thus induced to give teaching effectiveness (as assessed by the external exam) first priority.

3.4 Competition among Upper Secondary Schools

For generations French and Dutch upper secondary schools have faced a competitive environment that is similar in many ways to the one faced by American colleges and universities. Funding has been on a per student basis, so schools experiencing an increase in applications have had an incentive to expand up to the capacity of their physical plant. Schools with strong reputations get more applications than they can accept and are, in effect, rewarded by being allowed to admit the "best" from their pool of applicants.

In the U.S. access to quality teaching and supportive peers depends on the parent's ability to buy or rent a home in a suburb with excellent schools. In France and the Netherlands access to the top upper secondary schools depends primarily on achievement in lower secondary school. This means that parents who want their child to attend the best upper secondary schools must make sure their child studies hard in lower secondary school.

The Netherlands has three types of general secondary school--the VWO, the HAVO and the MAVO--and a system of lower vocational schools, LBO/LEAOs and KVBOs, which prepare students for both occupation specific and general education exams. The first year curriculum is supposed to be the same in all schools so that students can transfer between schools at its conclusion. In succeeding years, however, curricula and rigor diverge. Rigor and work loads are greatest at the six year VWOs, somewhat less demanding at the five year HAVOs and still less demanding in the four year MAVOs. These schools also differ in the foreign languages offered and the standard to which they are taught. The LBOs devote considerable time to occupationally specific curricula, so less time is available for general studies. Advise to parents about which type of school is appropriate for their child is based on the pupil's record in primary school. Parents have the right, however, to select the type of school and which school of that type their child will enter. There are three parallel systems of education--a locally administered public system, a Catholic system and a Protestant system--so parents have a great deal of choice.

About a decade ago English and Scottish parents were given the right to send their children to schools outside the normal attendance area. Two years after choice became operational in Scotland, 9 percent of pupils entering secondary school nationally (11 to 14 percent in urban areas) attended a school outside their cachement area (Adler and Raab 1988). Scottish parents who made this choice appeared to be behaving rationally for they tended to choose schools that were more effective than the school in their own cachement area. An analysis of school choice in the Fife Education Authority found that the schools chosen by those leaving their cachement area had better examination results than would have been predicted given the pupil's primary school test scores and family background and the average SES of pupils at the school.[6] Consequently, the free choice of schools that prevails in our four European nations generates a competitive pressure on schools to excel that doesn't have any counterpart in the U.S. outside of cities with magnet schools.

3.5 Standards of the External Exam

External examinations at the end of secondary school are probably necessary if high achievement levels are to be attained, but they are not sufficient. Effects will be small if the exams are easy, are taken by only a small minority of students, or do not generate substantial rewards for successful students. British youth have lower achievement levels than French and Dutch youth. One possible explanation for this is that the passing standard of the GCSE is lower than for the Bac and the Dutch exams, and the more difficult A levels are taken by only a small minority.

High passing standards on external exams are clearly associated with high achievement levels. Does this reflect a cause and effect relationship? Yes, but causation runs both ways. High passing standards on medium and high stakes exams are politically sustainable only when most students taking the exam are able to meet or surpass the standard. At present, the median pupil in Britain is not expected to learn the entire times tables up to 10 X 10 until age 11. If the GCSE mathematics exams were made more demanding without strengthening mathematics teaching, failure rates might rise to politically unacceptable levels.

Does the passing standard also influence student effort? Yes it does. In High School and Beyond data, those taking more rigorous courses learned a good deal more between sophomore and senior year, even though their grade point average suffered as a result (Gamoran and Barends 1987). Kulik and Kulik's meta analysis (1984) of the educational literature found that students randomly assigned to skip a grade or to a compressed and accelerated curriculum score 75 percent of a standard deviation higher on tests (a few years later) than the matched non-accelerated students. Repeating a grade effectively lowers learning goals and reduces the retained child's achievement a few years later by about 30 percent of a standard deviation (Holmes 1989).

Over a hundred experimental studies have been conducted of the effect of goal difficulty on various kinds of achievement. The effects are quite large: on highly complex tasks like school and college course work, specific hard goals raised achievement by 47 percent of a standard deviation (Wood, Mento and Locke 1987). In the laboratory and field settings used by psychologists conducting this research, the subjects have generally accepted the goal set for them by the researcher. Achievement goes up, but the probability of failing to reach the goal rises as well. In most studies more than two-thirds of those in the "hard goal" condition failed to achieve their goal (Locke 1968 p. 163-165). Most of the studies examine behavior over relatively short periods of time. One would imagine, however, that if such experiments lasted a couple of years, those who consistently failed to achieve their goal might lower their goals or give up altogether.

Stedry (1960) found that when subjects who had already set their own goals were assigned even higher goals by the study director, they rejected the assigned goal and achievement did not rise. This appears to be what happens in American secondary schools. Most students reject the goals teachers set because the rewards for success are small. Others reject them because they appear unattainable.

How do European education systems induce students in upper secondary schools to set difficult learning goals and work toward them? They do not, as some have proposed for the U.S., set a single high yea-nay standard that everyone is expected to meet. Young people are too different from each other for such a policy to work.[7] When exams are graded pass-fail and the same passing standard applies to all, many students are able to pass the standard without exertion and will, therefore, not be stimulated to improve by the need to pass the exam.[8] Many other students will calculate that they are now so far behind and the effort required to achieve the standard is so great, the costs of the effort are larger than the possible reward. They will reject the goal of meeting the standard. When the variance of performance is large, only a few students will find the reward attached to a single absolute passing standard an incentive to study (Kang 1985). External exams need to signal the level of a student's achievement, not just whether the exam was passed. Dutch external exams are graded on a 1 to 10 scale. Excellence on the *Baccalaureat* exams results in the award of a *Mention Tres Bien*, a *Mention Bien* or a *Mention Assez Bien*. Once information on performance levels becomes available, employers and institutions of higher education will tend to base their selection decisions on it. Graduates with the strongest exam results have options not available to those with weak results, and the outcome is a system of graduated rewards. When the variance of achievement is high, incentives for effort are stronger on average under a graduated rewards system than under a single large reward attached to achieving a fixed standard (Kung 1985).

The English GCSE and Scottish "Lowers" Examinations are taken by 90 percent of 16 year olds. As recommended by Kang's model, they generate substantial and graduated rewards for learning what appears on the exams. Indeed the rewards for doing particularly well on these external exams, while smaller than those in France, appear larger than those in the Netherlands.[9] **Why then are English and Scottish 13 year olds assigned less homework than their American and Dutch counterparts? Why is their achievement in mathematics and science at age 13 significantly lower than in the Netherlands?** As the time for the exam approaches in Britain, teacher demands and student effort increase substantially. At age 13, however, standards are low**. Why do the backwash effects of the secondary school graduation exams extend further back in the pupil's schooling in the Netherlands and France than in Britain?**

3.6 *Redoublement* as Mastery Learning and an Incentive to Study

One explanation for low British standards for 10-13 year olds is the lack of **immediate** rewards for doing well in classes. The external exams are three to six years away. Students are promoted to the next grade no matter how well they do in the previous grade. Those who fall behind inevitably slow the pace of the class in succeeding years. Primary school teachers do not feel accountable for how well students do on exams taken after four years of attendance at a secondary school. Secondary schools tend to be large and the teachers who handle the first year students also lack a sense of accountability for performance on exams that are more than three years in the future.

The situation is very different in France and the Netherlands. Pupils who fail more than one of their courses are generally required to *redoubler* or "to repeat the grade." In 1990 Dutch *redoublement* rates were 7.5 percent per year in academic lower secondary schools, 5.1 percent per year in LBOs, the vocational lower secondary schools, and 13.3 percent per year in academic upper secondary schools (Central Bureau Voor De Statistiek, 1993 pp. 19, 20 & 29). French rates of *redoublement* ranged from 6.8 and 11.0 percent per year during the four years of general lower secondary education, ranged from 12.1 to 18.4 percent per year in the three year academic upper secondary schools and averaged 8.4 percent per year in the first two years of vocational upper secondary schools (Ministere de 1'Education Nationale et de la Culture 1992, p. 77, 93 & 99. According to H. D. Lewis, the "basic motivation is to help the child himself, to ensure that the pupil is sufficiently well prepared so that he may fully benefit from work at a more demanding level (1985 p. 5)" For French teachers, *redoublement* is a form of Mastery Learning, a way of allowing some students extra time to achieve very demanding learning goals. Consequently, at age 19, 31.6 percent of French and 41.5 percent of Dutch youth are still in secondary school compared to 3.4 percent in Britain and 5 percent in the United States.

Redoublement is not something that is inflicted only on children from lower class backgrounds. Often high aspirations can be achieved only by *redoublement*. The two Dutch professors with grown children with whom I have discussed this matter both had a child who was required to *redoubler*. In France selective upper secondary schools serving upper middle class communities have grade repeating rates that are nearly as high as schools serving lower income communities. For example, *Lycee Charlemagne*, an upper secondary school serving one of the richest neighborhoods in Paris, asked 14 percent of its entering class to repeat the year in 1992.

For French and Dutch teenagers, the threat of having to redoubles is a strong incentive to study. When I asked how the students who must redouble feel about it, I was told that they feel "**dishonored**." Since *redoublement* is a public event, parents also feel stigmatized, so they have an incentive to see that their child studies hard. In the Netherlands, students struggling with the fast paced VWO or HAVO curricula are often given a choice: either repeat the year or transfer to a less demanding school. At the VWO I visited in the Netherlands, one third of the entering class transfers to a HAVO or a less demanding VWO before the beginning of the third year. VWOs offer a fast paced six year university preparation program. Parents who want their child to enter a VWO are generally accommodated even when primary school teachers advise against it. The child's performance in school determines whether the parents' aspirations are realized or whether a transfer to a less demanding type of school is necessary. Being forced to transfer to a HAVO or a MAVO does not foreclose university attendance. With good grades at the end of the five year HAVO program the student can transfer to a VWO, complete the final two years and then enter a university. In addition, numerous vocationally oriented higher education options are open to HAVO and MAYO graduates and transfers to university are feasible with good grades.

While other routes to university are possible, pupils who choose the fast track in 7th grade, a V WO, do not want to be forced "to get off the train." Students in the Netherlands and France are formed into classes which take most subjects together and which remain intact for two years and sometimes longer. Friendships tend to develop within this class. When I asked a Dutch student who, despite long hours of study, had been required to repeat a grade, why she had studied so hard, she responded ***"I wanted to stay with my class!"*** Students do not want to have to repeat the grade because it threatens to sever the friendships they have made in the class. Apparently, trying to keep up academically (i.e. accepting the academic goals of the school) is viewed positively by peers because it is an expression of commitment to the group. Those who refuse to study are apparently seen as rejecting the group. In these two countries peer pressure seems to encourage lagging students to study, not discourage them as in the U.S.[10]

3.7 Choice of Specialization as Goal Setting

All education systems give upper secondary students (and their parents) the right to select a specialty and the right to choose the rigor and difficulty level of either the school, the academic program or specific courses.

In France four academic lines--literature and languages (A), economics and social science (B), mathematics and physical sciences (C), and biology (D)--have roughly equal numbers of students and together account for most of the *Baccalaureat Generales* awarded. The Mathematics-Physics-Chemistry line (C) is the most difficult, carries the greatest prestige and gives one the best chance of being admitted to a preparatory school for one of the elite Grandes Ecoles. Admission to the C line within a lycee is generally highly competitive. The Netherlands has a similar though less elaborated system of specialization within general upper secondary education. As in France the math-science line has the reputation of being the most difficult.

In France and the Netherlands, picking one's school and specialization effectively sets a specific learning goal. The prevalence of grade repeating and transfers to easier schools suggests that most students and parents initially set very difficult goals. The goal setting literature tells us that working toward a specific and difficult goal leads to greater effort and performance than being told to "do your best" or setting easy goals. Thus the continental European pattern of setting highly ambitious goals, maximizes average achievement levels even while it increases the number of students who fail to achieve the goal they initially set. **Why do French and Dutch parents select secondary schools and programs that are so challenging that many must repeat grades to keep up or transfer into easier programs and schools?** There are three reasons. First, the goal selected is visible to parents, relatives and neighbors and going for difficult goals confers prestige. Second, achieving difficult learning goals is rewarded by admission to preferred universities and fields of study and access to better jobs. Finally, the choice is generally made by the parent, not the child. Parents are better informed about the long term benefits of achieving difficult goals and their own prestige rises when their child attends a selective school or pursues a difficult line of study. Parents may view the extra studying necessary in a rigorous specialty as a plus not a minus.

In America, by contrast, selecting difficult goals generates much weaker rewards. Everyone in the neighborhood attends the same school. Students select individual courses, not programs or schools. Subjects are taught at vastly different levels, but the rigor of these courses is not well signaled to parents, relatives, neighbors, employers and colleges. Admissions staff at selective colleges learn how to read the transcripts of high schools they recruit from and they evaluate grades in that light. However, many colleges have, historically, not factored the rigor of high school courses into their admissions decisions. Almost no employers do. Consequently, most students not aspiring to attend a selective college avoid rigorous courses and demanding teachers. As one student put it:

> *My counselor wanted me to take Regents history and I did for a while. But it was pretty hard and the teacher moved fast. I switched to the other history and I'm getting better grades. So my average will be better for college. Unless you are going to a college in the state, it doesn't really matter whether you get a Regent's diploma. (Ward, 1994)*

Another student who had avoided the harder courses even though she was sure she could do the work explained her decision with, "*Why should I do it,* [the extra work,] *if I don't have to?*" (Ward 1994) Some students, the minority who want to attend selective colleges, sign up for demanding courses. Most students choose courses that have the reputation of being fun and not requiring much work to get a good grade. Teachers know this and adjust their style of teaching, assignments and grading standards with an eye to maintaining enrollment levels.

IV. SUMMARY AND LESSONS

In the Netherlands and France, learning in secondary school is assessed by difficult subject-specific external examinations and doing well on these exams generates very large rewards for the student. The reputations of teachers and schools are also affected by student achievement on these exams. Parents base their selection of the upper secondary school their child will attend and which academic or vocational program he/she will pursue, in part, on these reputations. Parents tend to set difficult goals for their children, so most students are placed in programs of study that for them are very demanding. Students are formed into classes which take all their subjects together, remain intact for two years or more and become the student's circle of friends. Students who are not progressing at the rate necessary to succeed on the external exam are asked either to switch to an easier curriculum or to repeat the year. Students do not want to be forced to sever the friendships they have developed in the class, so they are strongly motivated to keep up with their studies.

In the United States, students are ranked relative to their classmates, not assessed against an external criterion, so they pressure each other not to study. Teachers are expected to pass almost all students, and if the class fails to study hard, the teacher is forced to lower the passing standard of the course. Subjects are taught at vastly different levels, but the rigor of the courses and the learning achievements that result are not well signaled to parents, neighbors, colleges and employers, so rewards for setting difficult goals are small.

The French and Dutch models of secondary education combine in one system many of the most drastic reforms that have been proposed for the United States:

1. Externally set subject-specific achievement exams taken by almost all secondary school graduates which supplement not displace teacher assessment of students. Grades on the external exams need to matter to the student, but they need not be the sole or primary determinant of desired outcomes such as college admissions and access to the best jobs.

2. Parental choice of upper secondary school and special field of study with money following students.

3. Mastery learning with teeth (those who fail two subjects in secondary school are required to either repeat the grade or transfer to a less demanding school or program).

4. Secondary teaching is available only to those who demonstrate very high levels of competence in their subject. High entry standards are sustained by offering high wages and good working conditions.

5. High standards for admission to the next stage of education.

This system of incentives and school organization appears to work for France and the Netherlands. A similar system, lacking only the externally set exit exams, also works well in undergraduate education in the United States. At the secondary level, however, such reforms are controversial. Successful implementation of any one of these reforms would be a major political undertaking? Implementation of the whole package of reforms is politically infeasible at present. Yet the analysis suggested that when, in Britain, just two elements of the package--mastery learning with teeth and attractive teacher salaries--are missing and a third element, school choice, is only recently introduced, achievement levels were substantially lower than in the Netherlands and France. Consequently, from a practical policy point of view the message is not very positive. School climates and educational standards do not change rapidly and easily. France and the Netherlands have not discovered a cheap and painless route to higher achievement.

The important lesson is that incentives--both their strength and structure--matter. There are less controversial ways of increasing the rewards for academic achievement, so the analysis should not cause American reformers to despair. Reforms tailored to the American context have a greater chance of successful implementation than an effort to replicate the French or Dutch systems of secondary education.

President Clinton, former President Bush and most of the nation's governors support the development of a system of voluntary European style achievement examinations for upper secondary students. Everyone recognizes, however, that the decentralized character of American education and the controversial nature of specifying and assessing what young people should know and be able to do requires a slow consensus building approach. Consequently, it will probably be decades before external examinations in specific subjects are widespread in the United States. School cultures are resistant to change, so significant improvements in achievement will take even longer.

Lessons for Economic Analysis of Education Issues

Much of the economic research on elementary and secondary education has employed a production function paradigm. Conventionally, test scores measuring academic achievement are the outputs, teachers are the labor input and students are goods in process. Even though I have written papers in this tradition myself, I am concerned that many of the inputs that conventionally appear on the right in these models are really endogenous and that severely biased findings may result.

This paper points in different directions. Schools are viewed as worker managed organizations producing multiple products. In the classroom/school team production unit, students are as much workers as the teachers. Students are also consumers who choose which goals (outputs) to focus on and how much effort to put into each goal. The behavior of each of the system's actors (teachers, administrators, school board, students and parents) depends on the incentives facing them. The incentives, in turn, depend upon the cost and reliability of the information (signals) that are generated about the various outputs of the system. I think the discussion above demonstrate the relevance of agency theory, game theory, signaling theory and other elements of economic theory to the understanding of how schools and students operate. I am sure I have only scratched the surface. Deeper plowing of these furrows will, I predict, yield a large crop of new insights into education and education policy.

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ENDNOTES

1 . Since many countries fund pensions and medical insurance through mandated social security taxes, it is essential to include both voluntary and compulsory contributions for these purposes in the measurement of teacher compensation. Compensation of secondary teachers was calculated by multiplying their salary by the ratio of compensation to wages for manufacturing workers. This estimate of teacher compensation was then divided by average compensation of all workers. (Nelson and O'Brien, 1993, pp. 37, 74 & 93).

2 . Estimates of total amount of time students in a country spend in school seems to depend on whom you ask and how the question is worded. The data quality problem was dealt with by calculating an average across studies. The total instruction per year for each country was first expressed as a ratio to the U.S. level. Then a mean ratio was calculated by averaging the ratios from the studies that provided a comparison with the U.S. Sources are given in Table 5's footnotes.

3 . The educational excellence movement in the U.S. caused a substantial increase in homework assignments and the time spent on homework between 1980 and 1990. In 1982 27 percent of 13 year olds and 30 percent of 17 years olds reported not being assigned any homework. Another 11.5 (6.0) percent of 17 (13) year olds reported not doing it. By 1990 only 5-6 percent of 13 and 17 year olds reported getting no homework and only 4 to 8 percent reported not doing what was assigned (National Center for Education Statistics 1993 p. 351-2).

4 . While the Bac is a necessary first step to getting a university education, it is not sufficient because failure rates in university are quite high.

5 . The Ministry of Education sets an exam which has both essay and multiple choice components. The multiple choice component which represents half the written paper is graded centrally. The essay component is marked by the student's own teacher and by a teacher from another school with the aid of a marking scheme supplied by the Ministry. Oral components are administered by the student's teacher.

6 . Analysis of data on out of cachement school selections for the Fife LEA found that the Type B school effect estimates (measures of how well each school does compared to others serving pupils of similar ability and social background) are significantly and substantially higher at the schools selected by parents choosing to leave their cachement area. My summary sentence sounds different from Willms and Echols (1993) summary of their own results because they unaccountably base their conclusions on estimates of school effects from models which did not control for the pupil's ability when entering secondary school and which they acknowledge are biased. Luckily they also present results based on correctly specified models with controls for initial ability in Table 3 of the paper.

7 . On the criterion referenced IAEP mathematics scale, 15-17 percent of American 13 year olds have better mathematics skills than the average 17 year old student, and 7-9 percent of 13 year olds score below the average nine year old (LACES 1992). The variance of achievement is roughly comparable in Europe and East Asia (IAEP 1992a 1992b).

8 . In the U.S. minimum competency tests are taken in ninth or tenth grade and most students pass them on the first sitting. Thus for the great majority of students, such exams have no further effect on incentives to study. Incentives effects are focused on the small minority who fail them on the first round.

9 . In the U.K., access to 6th form programs preparing for university, vocational technical programs of various kinds and employment depend on the student's performance on the GCSE and Scottish lowers. Since A level results are not available at the time initial university admission decisions are made, GCSE results influence which university and which field of study a student is admitted to. In the Netherlands the passing standard is high, but exceeding it by a large margin generates few rewards because the external exam results are only part of the student's overall grade and access to the most popular university fields of study is on a first-come first-serve basis. In addition, there is much less variation in the quality and reputation of Dutch universities than of British universities.

10 . One would not expect the study effort of primary school pupils to be influenced by the prospect of being retained. The hypothesis of significant threat induced incentive effects applies to students in small secondary schools or large schools organized into small classes which take most subjects together and remain intact from year to year. Since most American students are in large high schools where peer relationships are not tied to taking particular courses, failing two courses does not sever peer relationships the way it does in Europe. Consequently, one would not expect the threat of failing courses to be the powerful motivator that it appears to be in France and the Netherlands. The argument against retention is that it effectively lowers the learning goals being set for the student in subsequent years. Within-school cross-section studies have established that subsequent learning is reduced by retention (Holmes 1989). It also, apparently, increases the risk of dropping out before graduation (Grissom and Shepard 1989). Consequently, it is doubtful that higher retention rates would increase achievement levels at a given age in the U.S.