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INFLUENCES ON ACADEMIC ACHIEVEMENT ACROSS HIGH AND LOW INCOME COUNTRIES: A RE-ANALYSIS OF IEA DATA*

STEPHEN P. HEYNEMAN
WILLIAM A. LOXLEY
The World Bank

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Previous international studies of science achievement put the data through a process of winnowing to decide which variables to keep in the final regressions. Variables were allowed to enter the final regressions if they met a minimum beta coefficient criterion of 0.05 averaged across rich and poor countries alike. The criterion was an average across all countries because the original idea was to identify those variables which were thought to be "important" across all societies taken together. The question is whether this process tended to omit school variables which may have had strong effects within one country but not across the average of many countries. We have re-entered variables for each country separately, using the same minimum entry criterion of 0.05 as before, but within each country separately. Using only variables which have been found to be "important" in that particular society, we get different results, and the changes are of two sorts: they tend to increase significantly the variance explained by school effects, and this increase tends to be greatest in the "poorer" countries.

THE IEA

The International Association for the Evaluation of Educational Achievement (IEA) was organized in 1958 and housed within the UNESCO Institute of Education with two basic purposes. One was to develop internationally valid evaluation instruments which "conceived of the world as one big educational laboratory where a great variety of practices in terms of school structure and curricula were tried out" (Comber and Keeves, 1973:10). The second was to design a survey of educational facilities and practices as they existed in this world "laboratory" and go beyond the purely descriptive aspects to identify those particular characteristics in curriculum, pedagogy, and school physical facilities which might explain why some students perform better than others (Husén, 1979).

The task was ambitious. The amount of material from which the IEA could draw conclusions was as large as had ever been previously acquired in the social sciences. Three hundred experts, representing 20 countries and 14 languages, participated in the design, validation, and administration of the instruments. By 1973 the IEA had gathered data on a sample of 10,000 schools, 50,000 school teachers, and had

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recorded test scores in six subjects on approximately 260,000 students at ages 10 and 14, and at the fourth year of secondary school.[1] These data included approximately 500 independent variables, many of them potentially capable of manipulation by policy. For instance, 45 questionnaire items referred to either the opportunity to read or the amount of reading materials available. The influence of any of them could have been analyzed in three separate age groups in as many as 21 countries and against all six subjects tested. Between two and three thousand correlation (or regression) coefficients could have emerged just to gauge, for example, the influence of reading on student achievement. Clearly some strategy had to be designed by which the number and variety of variables could be narrowed down to manageable portions. Thus the first task which faced the IEA studies was how to choose what to analyze.

DATA REDUCTION

At the time, there were very few precedents from which one could draw experience. The IEA was the first attempt to predict the effect of schools and student background across countries. Although the IEA studies were designed prior to methodological breakthroughs of the Coleman and Plowden Reports, still the analyses of IEA data were strongly influenced by the desire to test the same questions and techniques about school versus home which these earlier published reports had pursued so creatively and which touched off such intensive debate.[2] Curiosity about the impact of school quality in the aggregate, and the understandable need for speed and efficiency, together acted to determine the manner by which the IEA studies proceeded to reduce the amount of data. The procedure decided upon was basically a three-step process.[3] First, student background variables were selected (in a between student analysis) if they attained a correlation coefficient (with achievement) which was larger than twice their standard error. Second, the effects of these student background variables and the type of school program[4] were partialed out before the school and teacher quality variables were entered into a regression with Science, Reading Comprehension and Literature Scores. The resulting standardized regression (beta) coefficient was noted for each variable. Third, when this beta coefficient *averaged across all 18 countries* in the sample exceeded 0.05, the variable was then selected for inclusion in the later analyses (Comber and Keeves, 1973:245).[5] This last step proved to be the most critical. In order to be included in the final pool, a variable—such as the Number of Science Teachers per School, for example—had to be a sizable predictor of science achievement in Germany as well as in India.

THE IEA CONCLUSIONS

Initial conclusions based upon the international sample of IEA countries roughly parallel those of previous single nation studies, in particular the Equality of Educational Opportunity Study of the United States (Coleman et al., 1966) and the Plowden Study of the United Kingdom (Children and Their Primary Schools, 1967; Peaker, 1971). Higher academic performance is commonly found among children from privileged economic back-

[1] An in-depth discussion of sampling and test design can be found in Thorndike (1973) and Purves (1973).

[2] The Coleman Report was published in 1966 and the Plowden Report in 1967. The "official" nine volumes of the IEA Six Subject Survey were published between 1973 and 1976.

[3] The process for the selection of variables was not as well documented as it could have been. In some instances variables were kept if they were "favorite sons" and slight variations may also have occurred from one age group to the next. The three-step process is, in general, a fair characterization of the analysis of Population II (14 year olds) achievement in science.

[4] Grammar versus comprehensive schools, for example.

[5] Twenty different countries participated in the IEA survey; 19 in the Science Achievement Survey; and 18 in the Population II Science Achievement Survey. Israel and France were the two countries not participating in the Population II sampling. Since we will be discussing the Population II in the Science Survey exclusively, we will refer to the number of participating countries as 18.

grounds (Thorndike, 1975), and the sum total of this influence—a summary measure of parental education, occupational prestige, and other indicators of home circumstances—is somewhat larger than the sum total of influence resulting from the measured effects of school and teacher quality.[6] In one re-analysis of IEA data however, the generalizability of this conclusion was questioned. It was shown that the association between "pre-school influences" and academic achievement diminished in linear fashion with the national per capita income of the countries in the IEA sample—the poorer the country the weaker the association (Heyneman, 1976; 1980).[7]

UNANSWERED QUESTIONS

If pre-school influences in the IEA study are only marginal in low income IEA countries (Iran, Chile, India, and Thailand),[8] then conversely, should not the influence of School Quality be higher? Negative correlations have emerged between national per capita income, for example, and the impact of school and teacher quality on student achievement,[9] but neither correlation coefficient was statistically significant.[10] Consequently, the case for there being systematically higher school effects in the low income IEA countries has never been quite as conclusive as the case of systematically lower pre-school effects.

One of the unanswered questions pertaining to this issue is whether too many variables—particularly those measuring school quality—were eliminated from the regressions in Iran, Thailand, Chile, and India because the average regression coefficients for them were less than the agreed upon 0.05 value averaged across all 18 countries in the IEA sample. Was it possible that some variables with strong influences on science achievement in low income countries were eliminated because those same variables had less effect on achievement in the more numerous high income countries?

IEA SCIENCE ACHIEVEMENT: A REANALYSIS

This question has been approached here by re-submitting the IEA raw data to a new process of selection (see Appendix A). Instead of requiring a minimum regression coefficient averaged across all countries, the procedure has been to submit each potential influence to the same test of importance, but in each country separately. This process is somewhat more arduous. We analyzed all appreciable school and teacher variables which predict science achievement in Germany, for example; and these have then been placed on a final list to be entered in a regression as an aggregated block of School Quality for Germany alone. The same process was applied to the United States, to India, Sweden, and to each of the 18 countries in the IEA Population II science sample. Thus what we have is a new list of variables with regression coefficients greater than 0.05. Unlike the earlier IEA analyses which used the same list of school quality variables in all countries, our list is quite dissimilar from one country to the next; that a measure of school or teacher quality is strong in one locale in no way determines its strength elsewhere.

[6] Achievement in French and English as a foreign language were sometimes exceptions to this tendency.

[7] Pre-school influences consist of home circumstances, age, and sex—characteristics over which the school has no control. The influence of Home Circumstances is positively associated with national per capita income whether or not it is combined with the other pre-school variables.

[8] All countries in the IEA sample, except for India, Chile, Thailand, and Iran, will be described as "high income countries."

[9] The impact of school quality is being measured in two ways. One is the familiar R^2, the proportion of achievement variance explained by school quality (which is then correlated with per capita income). The second is the percentage *within* the R^2 due to school quality (which is also correlated with per capita income). Though this latter method poses some headaches in terminology, it does allow for the comparison of a particular block of variables across studies in different countries where the size of the R^2 might differ substantially.

[10] The correlation between national per capita income and the proportion of achievement variance explained by school and teacher quality was $r = -.04$; between national per capita income and the proportion within the explained variance attributable to school and teacher quality, the correlation was $-.41$.

The complete list of variables included in the final IEA regressions was never published. What was published was a list of ten "selected" variables, used uniformly. These revised lists are considerably longer. In India for example, in addition to the original ten, there were 19 school and teacher variables which had regression coefficients of greater than 0.05; in Chile there were 19 variables, and in Germany 18 variables were found with this level of achievement impact.

RESULTS OF THE ANALYSIS

As in the original IEA studies, preschool influences were forced into the regression first, then school variables (see Appendix B). The effect of entering the new list of school variables is quite pronounced.[11] In five countries the total amount of variance which is explained (R^2) declines from the original estimates by some amount; but the overall effect is for more variance to be explained (Table 1).[12] For Hungary the total amount of variance explained rises from 22 to 28 percent; in Italy from 21 to 23 percent; and in the USA from 30 to 35 percent. Taking an average of the regressions from all countries, together the total amount of variance explained by the earlier regressions was 30.8 percent; in the re-analyses it is 32.8 percent (Table 1).

Second, the bulk of this increase can be attributed to the increases in variance explained within the four low income countries in the IEA sample. The average increase in the proportion of variance explained for the high income countries was approximately 2.5 percent; for low income countries it was 20.0 percent.[13] Third, the lower level of achievement variance explained in the original IEA estimates is primarily due to a systematic underestimate of the effects of school and teacher quality; and this pertains to *both* low and high income countries. In high income countries the new list of School Quality variables increases the level of variance explained by 34 percent (from 8.5 percent to 11.4 percent). In low income countries the differences are more pronounced; there the portion of science achievement explained by School Quality jumps from 11.5 percent to a new estimate of 20.8 percent. This is an increase of about 80 percent.

Nevertheless, there are substantial differences in the degree to which the effects of school and teacher quality characteristics were underestimated in earlier regressions. The revised lists of variables measuring school and teacher quality have made a substantial difference in the results from Italy, Hungary, Chile, and India but have had only a moderate impact on the results from Thailand, and no impact at all on the results from Iran. In Hungary the percentage of variance explained by teacher and school quality has increased from 5.0 to 13.0 percent. In Italy it increased from 6 to 13 percent.[14] To our knowledge this makes Italy the first example of an industrialized country in which the effects of school quality appear to outweigh the effects of home background and other pre-school influences. Nevertheless, in both India and Chile the change is even more evident. As a result

[11] Our listings for home circumstances and other ascriptive characteristics mirror those of Comber and Keeves. In one or two instances we deleted a variable when we found that it contained insufficient variance. Sibling size—because of inconsistent signs—was not inserted in the block for home circumstances. Otherwise, the pre-school block in every country was identical to that of Comber and Keeves both in construction and in the way it was entered into our regressions.

[12] Thailand was the only low income country in which the total amount of variance explained (R^2) declined. This decrease was attributable entirely to preschool and school track. In England 77 percent of the students did not report whether or not they were enrolled in a general, academic or vocational school track. Therefore, unlike Comber and Keeves, we did not include the variable school track in England's regression. This contributed to a decrease in the total variance explained from 47 percent to 39 percent.

[13] A fairly substantial amount of the increase in variance explained in high income countries is due to the results from Italy and Hungary.

[14] The Italian sample contains one anomaly. Population II was supposed to contain 14 year olds; but in Italy 7 percent of this sample was either over or under age by an excess of two years. If one were to consider Population II in Italy as an undifferentiated unit and not select out this 7 percent, the proportion of variance attributable to school effects would rise above our figure of 13 percent to a higher estimate of 18 percent. Our more conservative estimate is attenuated because we restricted the Population II sample in Italy to 15 years or younger.

Table 1. Percentage of Science Achievement Explained by Four Groups of Variables IN 18 IEA Countries: Original and Revised Estimates[a]

COUNTRY (Ranked by GNP Per Capita 1971.)	Preschool Variables		School Track		School Program		School Variables		Total Explained	
	Original	Revised	Original	Revised	Original	Revised	Original	Revised	Original	Revised
India	3	2.7	0	.5	10	—	8	28	21	31
Thailand	9	6	3	0	—	—	23	26	35	32
Iran	5	8	1	0	—	—	9	9	15	17
Chile	13	8	4	6	—	—	6	20	23	34
Hungary	14	14	0	0	3	1	5	13	22	28
Italy	11	8	2	2	2	0	6	13	21	23
Japan	23	21	—	—	—	—	4	9	27	30
England	23	20	15	—	2	4	7	15	47	39
Scotland	28	29	1	0	9	10	9	14	47	53
New Zealand	17	15	—	—	12	10	8	9	37	34
Netherlands	19	22	—	—	15	9	10	11	44	42
Finland	22	20	0	1	6	4	10	9	38	34
Australia	16	17	1	0	7	8	11	7	35	32
Flemish Belgium	8	12	2	2	—	—	12	16	23	30
French Belgium	—	20	—	2	—	—	—	13	—	35
Germany	18	17	2	5	—	—	14	14	34	36
Sweden	18	19	—	—	—	—	7	6	25	25
USA	21	21	—	—	2	1.5	7	12.5	30	35
Average (Mean)	15.8	15.5	1.8	1.0	4.0	2.6	9.2	13.6	30.8	32.8

[a] Original estimates derived from Comber and Keeves (1973). French-speaking Belgium was not included in the published results from Comber and Keeves and therefore is represented by dashes here. All other dashes indicate that a variable was not a relevant factor for the country in question.

of the revised list of variables, in both of those countries the impact of school and teacher quality increases by approximately a multiple of three—from 6.0 percent to 20 percent in Chile, and from 8.0 percent to 28 percent in India.[15] Furthermore, of the variance in science achievement which can be explained in Chile, 59 percent is attributable to school and teacher quality; and in India, 90 percent is attributable to school and teacher quality. The statistical effect of school and teacher quality is higher in India than in any other country in the world on which there is data.

Whatever the reason for the lack of significant change in the school effect estimates for Thailand and Iran, these exceptions do not seem to counter what we suspected, namely, that the impact of school quality in low income IEA countries was artificially attenuated by the way variables were originally chosen for the regressions. When the impact of the revised figures for the impact of School Quality is re-correlated with per capita income, the coefficients jump both in size and in statistical significance. Previous figures ($r = -.04$ and $-.41$), are now superseded by stronger levels of negative association [$r = -.37$, $p < .05$ (with total variance); and $r = -.67$, $p < .001$ (within the explained variance)].[16] This lends confidence to what we could not be as sure of before—that the poorer the country the more impact of School Quality.

CONCLUSION

It is not our intent to imply that the directors of the IEA studies erred in choosing their methods of data reduction or in their analysis. They were faced with recalcitrant problems of data management and the techniques which they devised have, by and large, set a high standard of quality for future cross-national research efforts. Nevertheless, future IEA and—other international educational evaluations—will increasingly focus on those countries which were left out of previous analyses, countries in Africa, Latin America, Asia, and the Middle East. When contemplating the manner by which these new studies should be conducted, it might be wise to incorporate the lessons from the past. One of them should be not to limit one's concern to just those variables which are "important" across all societies, for if we do we will miss seeing intersocietal differences of significance. Rather, a recommended approach would be to follow the one explored here—variables should be allowed to enter the final regressions if they meet a minimum entry criterion for each individual country. This technique is indeed more cumbersome, but not to apply it may seriously underestimate the level of influence of those characteristics which are not highly intercorrelated with one another, namely, the elements of school and teacher quality.

The search for school characteristics—alterable by policy—which influence school achievement will likely have no single outcome. Elements of schools and teachers which deserve investment differ from one country to the next. This complexity should be no surprise nor should it be a handicap to research.[17] The com-

[15] The difference between the original (8 percent) and the revised (28 percent) estimates for the effect of schools in India deserves some explanation. Ninety-one percent of the students in the India sample had been enrolled in an academic track with an emphasis upon courses in the social sciences and humanities. This variable (school program) originally explained 10 percent of the achievement variance—in addition to the 8 percent explained by school and teacher quality. We have omitted this school program variable from our regressions because we felt that the distribution (91 versus 9) constituted an inappropriate level of invariance. Thus 10 percent of the Comber and Keeves variance in achievement due to school "program" might now be explained by "school and teacher quality." This would, if true, alter the estimate from 8 percent to 18 percent. Our estimate is 28 percent. We submit that our higher figure is due not just to the reassignment of school program to the School Quality Block, but also to the exclusion of additional school physical facilities and teacher quality variables from the earlier regressions.

[16] As in the original correlations with per capita income, results from the Primary School Quality Project in Uganda have been entered here along with the results of the IEA studies. This allows for five low income countries instead of the original four in the IEA sample. For the differences and similarities between the IEA and Ugandan data sets, see Heyneman, 1976; Heyneman and Jamison, 1980.

[17] The World Bank's Research Committee is sponsoring research of this kind in 16 low income countries: Egypt, Iran, Thailand, India, Chile, Uganda, Paraguay, Mexico, Philippines, Colombia, Bolivia, Brazil, El Salvador, Peru, Argentina, and Botswana.

plexity of disentangling the impact of these various school and teacher qualities in each country separately should not prevent us from incorporating the lessons of these IEA analyses of school and teacher quality "blocked" in the aggregate. Despite the current ambiguity in many high income countries as to whether the impact of school quality on academic achievement makes "no difference," no such ambiguity exists in low income countries. The fact is that when data on school and teacher characteristics are allowed to express the full measure of impact in their country of origin, these characteristics in low income countries can explain between two and three times the amount of achievement variance that they can in high income countries; and the poorer the country in economic terms, the more impact on achievement school quality and teachers seem to have.

APPENDIX A

Treatment of Missing Cases

There is no way of knowing from published sources how Comber and Keeves treated missing cases in their analysis. We used pairwise rather than listwise deletion of missing cases, (see Kim and Curry, 1977, for a discussion of the best procedure). In some instances where the number of missing cases was less than 25 percent, we substituted sample mean values in their place. By doing so, we kept the overall N value respectably close to the total sample size. This would not have been possible had we employed listwise deletion techniques. In running both pairwise and listwise regression equations however, we find that the former procedure yields, on average, lower R^2 values. From this we conclude that the pairwise analysis reported in this paper may represent a small error in the direction of a conservative (i.e., downward) bias when estimating achievement variance.

In addition, while it is true that we were handling close to 30 school variables at a time in each regression run (i.e., with some 450 correlations holding the potential for yielding matrix singularity) it is also true that our large sample sizes (in the thousands) mitigated against such an occurrence. The ratio of variables entering the equation with sample size, always exceeded 1:10. The 1:10 ratio is generally considered the absolute minimum limit, below which regressions should not be performed.

INITIAL CLEANING AND RE-CODING

Variables were removed from consideration in any country if: (a) they were badly skewed (i.e., if they had little or no variance), or (b) if missing cases exceeded 25 percent. In this we were slightly less conservative than Comber and Keeves who used a limit of 20 percent. Also, in some cases where a variable was trichotomized initially, if there seemed to be too few cases in the lower or upper category, we took the liberty of creating a dichotomy.

DATA REDUCTION

School variables were selected for inclusion in each country's regression equation in the following way: First, after controlling for pre-school variables, we determined whether or not each school variable, taken separately, had an appreciable impact on achievement of (beta) .05 or better. All school variables meeting this criterion were then placed together and subjected to a stepwise regression analysis for each nation. The result was a new list containing considerably more variables than did the list of ten selected school variables reported by Comber and Keeves (1973:206). This new list of variables was then entered in the regressions for each country separately and its effects compared with the effects of pre-school, school track and/or school program influences.

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APPENDIX B School and Teacher Variables Qualifying for the Final Regressions in Each Country[a]

Variable	Countries in Which Used
Number of students in laboratory classes	1, 2, 4, 9, 11, 12, 13, 15, 16, 17
Time reading science text in class	1, 2, 3, 4, 5, 6, 7, 9, 13, 17, 18
Percent of teachers in school teaching science	1, 2, 8, 10, 11, 15, 16, 18
Number of science teachers in school	2, 4, 5, 7, 9, 10, 12, 14, 15, 16
Class size—science	2, 5, 10, 14, 15, 16, 18
Homework in science, requires textbook	2, 3, 8, 13, 14, 16, 17, 18
Total enrollment—boys	4, 5, 6, 7, 9, 10, 16, 18
Use of textbooks in science class	1, 6, 8, 9, 10, 13, 18
Hours science preparation (teacher)	2, 3, 4, 10, 12, 16, 18
Years of general science study (student)	6, 10, 12, 15, 16, 18
Hours preparing reading lessons (teacher)	1, 4, 6, 8, 9, 10, 11, 18
Budget for science equipment	3, 5, 6, 8, 12, 16
Number of teachers in school	2, 3, 4, 7, 9, 14, 16
Science teacher's age	1, 3, 6, 9, 10, 11, 16
Hours per week—prepare lessons in science	1, 3, 7, 10, 16, 18
Hours per week marking papers in science	1, 9, 13, 14, 15, 18
Years of biology study (students)	3, 5, 8, 9, 11, 16
Hours of instruction in general science (students)	1, 2, 3, 6, 9, 16, 18
Time spent on laboratory work in general science	1, 2, 3, 6, 8, 9
Average age of reading teachers in school	1, 4, 9, 10, 14, 18
Use of individual reading materials (teachers)	1, 8, 10, 12, 17, 18
Use of individual reading instruction	5, 6, 10, 12, 18
Annual budget for teaching materials	6, 8, 9, 11, 17
Average hours school per week	1, 5, 14, 16, 18
Frequent use of audio visual materials	3, 4, 14, 15
In-service training (chemistry)	4, 9, 10, 16, 17
In-service training (biology)	2, 4, 8, 9, 16
Hours science preparation outside school time (science teacher)	1, 4, 13, 16
Years of study by student (chemistry)	3, 12, 16, 17
Hours homework per week general science	1, 7, 10, 11, 13, 14, 16
Number reading teachers from school in sample	5, 6, 9, 10, 12, 17
Years of primary & secondary education (reading teachers)	1, 9, 10, 14, 18
Years of post secondary education (reading teachers)	1, 4, 5, 8, 10
Budget for salaries of classroom teachers	4, 5, 7, 11, 18
Number of laboratory assistants	6, 9, 10, 13
Number of years of secondary education (science teachers)	8, 17
Years of post secondary education (science teachers)	1, 2, 3, 4, 7, 14, 18
Read subject matter journals (science teachers)	6, 9, 10, 18
Semesters training in chemistry	4, 7, 15, 16
Semesters training in biology	1, 4, 9, 12, 13, 16
In-service training in physics	1, 4, 11, 14, 15
Years of physics study by students	6, 15

APPENDIX B (Continued)

Variable	Countries in Which Used
Class size (biology)	9, 11, 14, 15
Class size (chemistry)	5, 8, 9, 16
Hours instruction per week in chemistry	2, 4, 5, 12
Student time on laboratory work in chemistry	2, 3, 9, 15
Years teaching in current school (reading teacher)	5, 18
Frequency of audio-visual usage in reading class	1, 5, 9, 18
Bookcorner in classroom	6, 9, 11, 12
Hours of instruction in teaching reading	1, 4, 5, 9, 18
Hours of homework per week in reading class	3, 4, 15, 17
Budget for school maintenance	1, 7, 11, 16
Annual budget for books	1, 4, 5, 16
Remedial teaching in reading	4, 7, 9, 10, 18
Use of printed drill in science class	3, 4, 14
Use of individualized material in science	6, 9, 16, 18
Semesters training in physics	4, 7, 9, 14
Hours instruction per week in biology	2, 6, 9, 15, 17
Time on laboratory work in biology	1, 3, 5
Time on laboratory work in physics	5, 9, 15
Laboratory workbook used in science	3, 8, 15
Years teaching experience for reading teacher	5, 10, 12
Use of printed drill in reading class	9, 10, 18
Number of books in bookcorner	3, 10
Number of *new* books placed in bookcorner this year	8, 9, 18
Teacher uses standardized reading test for student evaluation	8, 10, 18
Class size in language class	8, 9, 17
Hours instruction per week in language	1, 14, 17
Percent of male teachers	2, 18
Number of librarians	1, 18
Admission criteria—prior achievement	2, 6
Admission criteria—entrance exam	2, 11
Remedial teaching in science	8
Number of weeks in school year	1, 6, 10
Years teaching experience (science teacher)	12, 13
Read teaching journals (science teachers)	15, 16
Teaching criteria—textbooks	14
Semesters training in other sciences	1, 18
Class size—physics	2, 11
Hours homework (biology)	4
Hours homework (chemistry)	14, 16
Hours instruction (physics)	2, 5
Hours per week marking papers (reading teachers)	5, 9
Dictionary for each student	6, 9
Teacher reads aloud in class	3
Total enrollment (girls)	4
Annual budget (non-teaching salary)	11
Number of language assistants	9
Remedial teaching in school language	4
Science teaching is specialized	11
University degree in science	4, 5
Teacher support for extracurricular science	13
In-service training (geology)	18
Hours homework in physics	17
Reading teacher's gender	5
University degree in mother tongue (reading teacher)	5
Proportion of time employed by reading teacher	12
Use of textbooks by reading teacher	15
Student buys textbook in mother tongue	11
Highest grade science is compulsory	15

[a] The following seven preschool variables were inserted in each country-specific regression prior to the block of school and teacher variables: Father's Education, Mother's Education, Father's Occupation, Number of Books in Home, Use of Dictionary in Home, Sex of Student, and Age of Student. Track and type of program were only included in those countries where such variables were relevant.

Countries are identified, by number, as follows: 1. India, 2. Thailand, 3. Iran, 4. Chile, 5. Hungary, 6. Italy, 7. Japan, 8. England, 9. Scotland, 10. New Zealand, 11. Netherlands, 12. Finland, 13. Australia, 14. Fl. Belgium, 15. Fr. Belgium, 16. Germany, 17. Sweden, 18. United States.