Data Bank Manual

INTERNATIONAL PROJECT FOR THE EVALUATION
OF EDUCATIONAL ACHIEVEMENT

Phase I:
International Study of
Achievement in Mathematics:
A Comparison of Twelve Countries

Data Bank Manual

by Richard M. Wolf

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The International Project for the Evaluation of Educational Achievement (IEA) is a cooperative research project which has so far involved twelve countries. All of them have participated in the design and execution of the project. A study of the outcomes, both cognitive and non-cognitive, of the instruction in mathematics was carried out between 1961–65. It is reported in T. Husén *et al.*, *International Study of Achievement in Mathematics: A Comparison of Twelve Countries* I–II. New York: John Wiley & Sons, Inc., 1967. The first of these volumes gives a detailed account of how the study was designed, problems, hypotheses, sampling procedures, data collection and data processing. The second comprises the outcomes of the international analyses. The various instruments—achievement tests, attitude inventories, questionnaires—were, of course, primarily devised in order to provide data for the testing of the hypotheses advanced by the participating researchers. However, special national data were also collected through the questionnaires and, although not utilized in the international study, were, in some cases, included in national analyses.

All the countries have shared the costs of the study. Thus, the data collection has been financed within each country. The data are therefore the property of the respective National Centers. However, in order to process the data efficiently they have been brought together at the University of Chicago's Computation Center and filed onto magnetic tape. One of the by-products of this has been the creation of a data bank which is described in this Manual. The participating countries have decided to make this data collection available to interested scholars who want to carry out methodological studies and exploratory substantive studies going beyond what is already presented in the report of the mathematics study. As mentioned above, some variables have not been included in the international analyses. Many important educational questions which require access to cross-national data can be answered from the data bank.

It might seem somewhat unfortunate that a fairly elaborate set of procedures has to be followed in order to get access to these data, but the necessity of this might be appreciated when realizing that the data belong to each participating country. It is our hope that this will not deter scholars from making use of the data bank.

The present Manual relating to the mathematics phase of the IEA project has been prepared by Dr. R. M. Wolf, who was in charge of the data processing of the mathematics study.

It is anticipated that the IEA project will cover new subject areas, such as science, reading comprehension, literary appreciation, English and French as foreign languages, and civics.

Torsten Husén
Chairman, IEA Project

Center for Advanced Study in the Behavioral Sciences,
Stanford, Calif., 1966

IEA Data Bank

INTRODUCTION

The IEA Study of Mathematics Achievement represents one of the first major attempts to carry out an empirical study of educational problems on an international scale. The data collected in this study have been analysed for the purpose of preparing an international report (see Husén, T., *et al. International Study of Achievement in Mathematics: A Comparison of Twelve Countries*, Volumes I and II) as well as for purposes of national analyses. The results presented in the two volumes of the international report represent the answers to only a fraction of the questions which may be asked of the data. There is little doubt that many additional questions will be raised on the basis of the results of this first study.

Some of the questions that will be raised will require additional studies. However, other questions might well be answered on the basis of data collected in the present study. Since the master file contains every response from every individual tested in connection with the IEA Study (about 50 million responses in all), there exists a record which is available for interrogation.

The existence of a data repository with the data in an organized and readily accessible form can greatly stimulate international and national educational research. As additional international studies are undertaken, the new data that are collected may be added to the data bank so that questions that could not be answered on the basis of data gathered in the present investigation or a single future one might be answered when the data from the two are combined. Such questions, which may not even be formulated as yet, could be answered in a short time with the use of an electronic computer.

The purpose of this manual is to describe the nature and organization of this data repository, the policies and procedures for using the data, and some of the analyses that can be made.

The IEA Study

The IEA Study is a cross-national investigation of achievement in mathematics. The twelve participating countries were: Australia, Belgium, England, Federal Republic of Germany, Finland, France, Israel, Japan, Netherlands, Scotland, Sweden and the United States. The study involved the testing of approximately 150,000 students in over 5,000 schools in the twelve countries. Representative samples of students in several selected target populations were tested. In addition, data were secured from the teachers of students tested and from the chief school official in each participating school. Almost all these data are available for study.

A description of the procedures used in the study is presented in detail in T. Husén *et al.* However, a brief summary of the target populations, the sampling and weighting procedures, and the instruments used in the study is given below. In addition, Appendix A contains a glossary of variables included in the study and the coding scheme for the variables.

TARGET POPULATIONS

1*a:* All pupils who are 13.0–13.11 years old at the date of testing. (Israel and Germany did not sample this population.)

1*b:* All pupils at the grade level where the majority of pupils of age 13.0–13.11 are found.

3*a:* Pre-university mathematics students—students in the pre-university year studying mathematics as an integral part of their course for their future training or as part of their pre-university studies.

3*b:* Pre-university non-mathematics students—those studying mathematics as a complementary part of their studies or not studying mathematics at all. (Australia and Israel did not sample this population.)

In addition, six of the countries (England, Israel, Japan, Scotland, Sweden and the United States) tested students at one or two additional points in the secondary school program (Target population 2). Detailed description of each of these intermediate populations can be found in the full international report (see Chapter 9, Vol. I).

SAMPLING AND WEIGHTING

Elaborate procedures were used to select the samples from each country for target populations 1*a*, 1*b*, 3*a* and 3*b*. The sampling of the intermediate populations, while checked, was not supervised as closely by the international sampling expert. A full description of the sampling procedures is set forth in Chapter 9, Volume I of the international report. Evidence relating to the success of the sampling enterprise may also be found there.

Since a multi-stage sampling plan was used in all countries, the estimates of error are *not* those that would be obtained through use of simple random sampling procedures. Intensive analysis of the present data has shown the standard errors to be approximately twice the simple random sampling standard error for the number of students tested (see Chapter 9, Vol. I). It must also be borne in mind that all estimates of error for student variables were based on weighted statistics.* These were obtained by using formulae for weighted means, standard deviations and correlations.** The weighting factor for each student is carried as an element in the student's vector of observation in the working file (see Appendix A —Variable Glossary).

* Student weights were obtained in the following way.
For any target population in any country:
X = Total number of pupils tested,
Y = numbers of pupils in the population,
N_k = number of pupils in the kth strata in the population (see Chapter 9, Vol. I),
n_{ki} = number of pupils tested in the kth strata and the ith subsample (see Chapter 9, Vol. I), and

$$w_{ki} = \frac{XN_k}{4\,Yn_{ki}},$$

w_{ki} is the students weighting factor. It is stored in the student vector (see Appendix A).

** These formulae are as follows:

Mean:
$$\bar{X}_w = \frac{\Sigma\, w_i X_i}{\Sigma\, w_i},$$

Standard deviation:
$$S = \sqrt{\frac{\Sigma\,((X_i - \bar{X}_w)^2\, w_i)}{\Sigma\, w_i - 1}},$$

Correlation
$$r_{xy} = \frac{\Sigma\,((X_i - \bar{X}_w)(Y_i - \bar{Y}_w)\, w_i)}{\sqrt{\Sigma\,((X_i - \bar{X}_w)^2\, w_i)}\,\sqrt{\Sigma((Y_i - \bar{Y}_w)^2\, w_i)}},$$

where
w_i = the weight for the ith student,
X_i = the value of the X variable for the ith student,
Y_i = the value of the Y variable for the ith student.

INSTRUMENTS USED

The following instruments were used in the present study:

1. *Mathematics Tests*

A mathematics test battery was administered to each of the target populations. Item responses as well as part and total scores are available for study. Both raw scores and scores corrected for guessing have been computed. While the test batteries administered to each target population differ, there are several sets of overlapping items which can be used to link one target population with another, thus enabling the study of the mathematics performance of several target populations on a common set of test items (see Chapter 5, Vol. I). The actual items and their statistics are set forth in Appendix II of Volume II of the international report.

2. *Student Questionnaires*

Each student completed a personal background questionnaire. Data obtained from this questionnaire are available for processing along with certain indices derived from combining several questionnaire items. However, national option items or items collected purely for national purposes are generally not available for processing (see Chapter 7, Vol. I).

3. *Student Opinionnaire*

Students completed an opinionnaire composed of sixty-five items. Seven scale scores—two descriptive and five attitudinal—have been computed. In addition, responses to individual items or various combinations of items are available for processing (see Chapter 6, Vol. I).

4. *Teacher Questionnaire*

Each teacher whose students were tested in the present study completed a personal background questionnaire. In addition, teachers in most of the countries rated each item in the mathematics test battery thus indicating the amount of opportunity afforded his students to learn what was being tested by any particular item. Questionnaire and item responses are available for study either individually or in relation to other variables from other instruments. National option items and national use items are generally not available for analysis (see Chapter 7, Vol. I).

5. *School Questionnaire*

The chief official of each school participating in the present study completed a questionnaire which provided information on the characteristics of the school. Except for national options and national use items, these data are also available for study (see Chapter 7, Vol. I).

ORGANISATION OF DATA

The study contains three major types of data: student, teacher and school data. Appendix A sets forth the glossary of variables for each of these three types of data. The data are stored in two forms. The first is the most detailed and consists of each individual's responses to each item on each instrument. This is the *master file* for the IEA Study and occupies little more than one half of one reel of magnetic tape. Since various summarizations, e.g., test scores, attitude scale scores, were needed for use in a large number of analyses, a set of working files was developed—one for each target population. Appendix A also contains the glossary of variables for these *working files*. Both the master and working files are available for processing.

An investigator may choose to use data from either the master or working file for any or all countries included in the study. However, since student weights are stored only on the working file, analyses intended to give results that are representative of a population should use data from this file. Any one or all target populations may be studied. Furthermore, because of the coding procedures that were followed, it is possible to link any student with other students in his class, with his teacher and his school. Thus, it is possible to compare student performance in different types of schools or under different types of teachers. There is maximum flexibility for allowing an investigator to carry out almost any analysis he desires. Although the data are organised sequentially by country on both the master and working tapes, the procedures for packing the data on the tapes and the routines for reading the tapes have been so efficiently constructed that generally no more than ten minutes are needed for reading any of the

working files or twenty minutes for reading the master file. One of the consequences of such high speed reading is that the cost of many kinds of analyses will be quite low.

PROCEDURES FOR USING THE DATA BANK

The following procedures have been established for use of the IEA Data Bank:

1. The research worker submits a request to the National Center for his country (see Chapter 2, Vol. I) specifying what kinds of analyses are to be performed, what variables are to be included in the analyses and a set of dummy tables indicating the desired format of the results.*

2. Each National Center will screen all proposals from its country and will transmit proposals that have been received and tentatively accepted to the Chairman of the IEA Project.

3. The IEA Secretariat will decide on the action to be taken on the research proposal. Such action will be dependent not only upon the nature of the proposal, but also on the qualifications of the user. Graduate students may use the IEA Data Bank, but any application must be accompanied by a supporting letter from a faculty sponsor.

4. If a proposal has been approved by the IEA Secretariat, then the investigator will be put in contact with the IEA Processing Staff at the University of Chicago. Estimates of total time required to produce the desired analysis and the costs involved will be sent to the investigator.

5. Analysis will be performed upon receipt of payment and results will be sent to the investigator.

POSSIBLE ANALYSES TO BE PERFORMED

In formulating requests for analysis of IEA data, it is recommended that careful study first be given to the international report. There are two reasons for this. First, a complete description of all variables and procedures used in the study is contained in the two volumes

* Where an investigator desires to identify the results for each country in a particular analysis, it will be necessary to secure the permission of each country involved. Requests for such permission will be handled by the IEA Secretariat (Chairman, Technical Director and Co-ordinator).

of the report. Second, it is possible that an analysis similar to the one desired is already contained in the full report. If the analysis is similar to one included in the full report, a request that refers to the analysis already performed, specifying what alterations are to be made, would greatly facilitate the new analysis.

Specific computer programs already available for use include:

1. *Univariate Statistics.*—This program will obtain weighted means, standard deviations and frequency distributions for any and all variables in the working file.

2. *Correlations.*—This program will obtain weighted correlations between as many as 54 variables from the working file at one time.

3. *Step-wise multiple regression.*—Regression analyses can be performed on variables included in the 54×54 matrix produced by the IEA correlation program. The variables appearing in the matrix already produced are noted in Appendix A.

4. *Report Generator.*—Data may be classified on certain variables such as type of school, school program and then means, standard deviations and N's for a selected student variable may be computed for each country for each level of the classificatory variables. The investigator would need to specify the variables on which classification is to be made and the categories for each classificatory variable.* At present, classification, in addition to country, is limited to two variables.

Since the report generating program can perform many types of analyses and can be used routinely and inexpensively, a request procedure has been developed to furnish such reports. Formats 1–10 (see pages 12–17) set forth the output formats of results produced by the report generator. Also, a form for requesting such analyses has been prepared (see page 19). An investigator need merely specify the desired format of results for a particular analysis by format number.

For each report, the investigator will need to specify the following:

1. Target Population on which the analysis is to be performed. (Note: If an analysis is to be carried out for several target popula-

* A maximum of four categories for each classificatory variable is permitted. It is possible to control for another variable, either level of mathematics instruction or student opportunity to learn all mathematics items, through the use of mathematics test scores that have been regressed on either of these variables.

Output Formats for Report Generator

Format 1

	Dependent Variable
	$M\sigma N$
Country A	
Subsample 1	
Subsample 2	
Subsample 3	
Subsample 4	
Average	
Error Term	
Country B	
Subsample 1	
.	
.	
.	
All Countries	
Average	
Error Term	

Format 2

	Dependent Variable	
Classificatory Variable	Low	High
	$M\sigma N$	$M\sigma N$
Country A		
Subsample 1		
Subsample 2		
Subsample 3		
Subsample 4		
Average		
Error Term		
Country B		
Subsample 1		
.		
.		
.		
All Countries		
Average		
Error Term		

Format 3

	Dependent Variable		
Classificatory Variable	Low	Middle	High
	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A			
Subsample 1			
Subsample 2			
Subsample 3			
Subsample 4			
Average			
Error Term			
Country B			
Subsample 1			
.			
.			
.			
All Countries			
Average			
Error Term			

Format 4

			Dependent Variable	
Classificatory Variable	Lowest	Second Lowest	Second Highest	Highest
	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A				
Subsample 1				
Subsample 2				
Subsample 3				
Subsample 4				
Average				
Error Term				
Country B				
Subsample 1				
.				
.				
.				
All Countries				
Average				
Error Term				

Format 5

First Classificatory Variable	*Dependent Variable*			
	Low		High	
Second Classificatory Variable	Low	High	Low	High
	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A				
Subsample 1				
Subsample 2				
Subsample 3				
Subsample 4				
Average				
Error Term				
Country B				
Subsample 1				
.				
.				
.				
All Countries				
Average				
Error Term				

Format 6

First Classificatory Variable	*Dependent Variable*					
	Low			High		
Second Classificatory Variable	Low	Middle	High	Low	Middle	High
	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A						
Subsample 1						
Subsample 2						
Subsample 3						
Subsample 4						
Average						
Error Term						
Country B						
Subsample 1						
.						
.						
.						
All Countries						
Average						
Error Term						

Format 7

First Classificatory Variable	*Dependent Variable*							
	Lowest		Second Lowest		Second Highest		Highest	
Second Classificatory Variable	Low	High	Low	High	Low	High	Low	High
	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A								
Subsample 1								
Subsample 2								
Subsample 3								
Subsample 4								
Average								
Error Term								
Country B								
Subsample 1								
.								
.								
.								
All Countries								
Average								
Error Term								

Format 8

First Classificatory Variable	*Dependent Variable*											
	Lowest			Second Lowest			Second Highest			Highest		
Second Classificatory Variable	Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$	$M\sigma N$
Country A												
Subsample 1												
Subsample 2												
Subsample 3												
Subsample 4												
Average												
Error Term												
Country B												
Subsample 1												
.												
.												
.												
All Countries												
Average												
Error Term												

Format 9

First Classificatory Variable	*Dependent Variable*								
	Low			Middle			High		
Second Classificatory Variable	Low	Middle	High	Low	Middle	High	Low	Middle	High
	M σ N	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*
Country A									
Subsample 1									
Subsample 2									
Subsample 3									
Subsample 4									
Average									
Error Term									
Country B									
Subsample 1									
.									
.									
.									
All Countries									
Average									
Error Term									

Format 10

First Classificatory Variable	*Dependent Variable*																			
	Lowest						Second Lowest						Second Highest						Highest	
Second Classificatory Variable	Low	2nd Low	2nd High	High			Low	2nd Low	2nd High	High			Low	2nd Low	2nd High	High			2nd Low	2nd High
	M σ N	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*	*M σ N*
Country A																				
Subsample 1																				
Subsample 2																				
Subsample 3																				
Subsample 4																				
Average																				
Error Term																				
Country B																				
Subsample 1																				
.																				
.																				
.																				
All Countries																				
Average																				
Error Term																				

tion to be studied. Additional copies of the request form can be obtained from the Chairman of the IEA Project.)*

2. Countries to be included in the analysis.

3. Dependent Variable.—The name and number of the variable on which results are to be obtained, e.g. Total Mathematics Score—Corrected—Student Variable Number 61.

4. First Classificatory Variable.—The name and number of the first variable on which classification is to take place, e.g., Sex of Teacher—Teacher Variable Number 7. The categories of classification must be given. For example, if School/Course/Program is used as a classificatory variable for a particular analysis of Target Population 3*a*, it might be desired to classify school programs into three categories—Academic, Vocational and General. Reference to the code for this variable in Appendix A indicates that codes 1, 2 and 3 denote an academic program, codes 4 and 5 denote a vocational program, and codes 6 and 7 denote a general program. The appropriate splitting of this variable for the desired analysis would then be 1–3/4–5/6–7 and would be so indicated on the line for the first classificatory variable on the request form.

5. Second Classificatory Variable (if desired).—The same procedure followed in establishing the first classificatory variable is to be followed.

6. Regression.—If the total mathematics test score (corrected) is used as the dependent variable, it is possible to exercise an option to regress mathematics scores on *either* the level of mathematics instruction or teacher rating of student opportunity to learn all mathematics items. This has the effect of controlling mathematics scores on either of these two variables.

In addition to the above general programs, it is possible to use the IEA data with a large number of standard *FORTRAN* coded statistical programs with a minimum of modifcations. The reason for this lies in the fact that for both the master and working files, FORTRAN addressable reading subroutines have been developed. Thus, it is possible to insert a single CALL READ statement into existing statistical programs to allow them to operate on the IEA files. This should provide a maximum of flexibility in analyzing IEA data.

* Requests should be sent to: Chairman, IEA Project, c/o Unesco Institute for Education, 2000 Hamburg 13, Feldbrunnenstrasse 70, West Germany.

Report Generator Request Form—For Use with Working Files[a]

Target Population to be studied (Circle only one) 1*a* 1*b* 2 3*a* 3*b*

Countries to be included (Check)

_____ Australia	_____ Finland	_____ Netherlands
_____ Belgium	_____ France	_____ Scotland
_____ England	_____ Israel	_____ Sweden
_____ Federal Republic of Germany	_____ Japan	_____ United States

Dependent Variable: _____ (Variable Name) _____ (Variable Number)

Output Format Number _____ (See Formats 1–10)
Number

First Classificatory Variable	_____ Variable Name	_____ Variable Number	_____ Categories of Classificatory Variable
Second Classificatory Variable	_____ Variable Name	_____ Variable Number	_____ Categories of Classificatory Variable

Regression of Total Mathematics Score (Corrected) on:

_____ Level of Mathematics Instruction

_____ Teacher Rating of Student Opportunity to Learn All Mathematics Items

(Check no more than one.)

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[a] This form is for use only with the IEA working files. If an investigator desires to use the master file, this form can be used as one basis for correspondence in setting up a particular analysis. However, additional correspondence might be required between the investigator and the IEA Processing Staff.

APPENDIX A

Variable Glossary and Coding Scheme for Master and Working Files

(1) Variable No. Master File	(2) Variable No. Working File	(3) Variable Name	(4) Code	(5) Details of Code
Part I: School Vector				
1	1	Country Number		
2	2	Target Population		
3	3	School Number		
4	4	Sub-Population		
5	5	Stratum Number		
6	6	Sub-sample Number		
7	7	Total Enrollment*		Actual Enrollment
8	8	Full Time Teachers	1	10 or less
			2	11–20
			3	21–30
			4	31–40
			5	41–50
			6	51–60
			7	61–70
			8	71–80
			9	81 or more
9	9	Number of Staff Teaching Mathematics	1	1
			2	2
			3	3
			4	4
			5	5
			6	6
			7	7
			8	8
			9	9 or more
10	10	Number of Staff with Specialist Math. Training	1	1
			2	2
			3	3
			4	4
			5	5
			6	6
			7	7
			8	8 or more
11	11	Percentage of Teachers who are Men*	1	0%
			2	1–25%

School Vector (continued)

(1)	(2)	(3)	(4)	(5)
			3	26–50%
			4	51–75%
			5	76–99%
			6	100%
12	12	Sex of School*	1	Boys only
			2	Girls only
			3	Co-ed. (taught tog.)
			4	Co-ed. (taught sep.)
13	13	Type of School*	1	Comprehensive
			2	Selective-academic
			3	Selective-vocational
			4	Takes remainder
14	14	Educational Differentiation*	1	Universally practised
			2	Generally practised
			3	Some age or grade only
			4	Not at all
15	15	Average Number of Subjects Taken*	1–9	Grade 12 — No. of subjects taken
16	16		1–9	Grade 11 — No. of subjects taken
17	17		1–9	Grade 10 — No. of subjects taken
18	18		1–9	Grade 9 — No. of subjects taken
19	19	*	1–9	Grade 8 — No. of subjects taken
20	20	Total Annual Salary Budget in US dollars		No. of US dollars in 100's
21	21	Annual Recurrent Equipment Expenditure		No. of US dollars in 100's
22	22	Special Opportunities for Able Students		National Option
23	23	Experimental Program	1	Yes
			2	No
24	24	Type of Program		National Option
25	25	Number of Hours Instruction per Year	1	800 or less
			2	801– 900
			3	901–1000
			4	1001–1100
			5	1101–1200
			6	1201–1300
			7	1301–1400
			8	1401–1500
			9	1501 or more

* Variable included in 54 × 54 correlation matrix.

School Vector (continued)

(1)	(2)	(3)	(4)	(5)
26	26	Age of Entry of Students		Age
27	27	Age of Terminal Students		Age
	28	Financial Expense per Student on Teacher's Salary*		Expense
	29	Total Financial Expense per Student*		Expense
	30	School Variability of Father's Occupational Status (Standard Deviation of Student Variable 23)*		
	31	Social Class Level of School (Mean of Student Variable 23)		
28–42	32–46	National Use		
	47	Description of Math. Teaching (School Mean for Student Variable 104)		
	48	Description of School and School Learning (School Mean for Student Variable 105)		
	49	Description of Math. Teaching and School Learning (School Mean of Student 111)		
	50	Number of Students tested (weighted)		

Part II: Teacher Vector

1	1	Country Number		
2	2	Target Population		
3	3	School Number		
4	4	Sub-Population		
5	5	Teacher Number		
6	6	Age	1	18–23
			2	24–29
			3	30–39
			4	40–49
			5	50–59
			6	60 or more
7	7	Sex*	1	Male
			2	Female
8	8	Length of Training*	1	1 year
			2	2
			3	3
			4	4
			5	5 or more
9	9	Type of Professional Training*	1	University
			2	Teacher Training College or Seminar

Teacher Vector (continued)

(1)	(2)	(3)	(4)	(5)
			3	University and Teacher Training College
			4	Other
			5	None
10	10	Type of Subject Training	1	University
			2	Teacher Training College or Seminar
			3	University and Teacher Training College
			4	Other
			5	None
11	11	Teacher Training Certificate		National Option
12	12	Subject Matter Certificate		National Option
13	13	Teaching Experience	1	Less than 1 year
			2	1–2 years
			3	3–5 years
			4	6–10 years
			5	11–15 years
			6	16–20 years
			7	21–25 years
			8	26 or more
14	14	Recent In-Service Math. Training*	1	No In-Service trg.
			2	1–3 weeks
			3	4–6 weeks
			4	7–12 weeks
			5	13 or more weeks
15	15	Number of Lectures/Short Seminars Attended	1	0
			2	1–3
			3	4–6
			4	7–9
			5	10 or more
16	16	New Mathematics In-Service Training	1	Yes
			2	No
17	17	Teaching New Mathematics	1	Yes
			2	No
18	18	Type of New Math. Teaching		National Option
19	19	Teacher Attitude Scale		National Option
20	20	Set Syllabus Restriction	1	Yes
			2	No
			3	Does not apply
21	21	Set Text Books Restriction	1	Yes
			2	No
			3	Does not apply
22	22	Set Methods Restriction	1	Yes
			2	No
			3	Does not apply

* Variable included in 54 × 54 correlation matrix.

Teacher Vector (continued)

(1)	(2)	(3)	(4)	(5)
23	23	Examinations Restriction	1	Yes
			2	No
			3	Does not apply
	24	Degree of Freedom Given Teachers*		
	25	Rating of Student Opportunity to Learn Higher Mental Process Items*[a]		
	26	Rating of Student Opportunity to Learn Lower Mental Process Items		
	27	Rating of Student Opportunity to Learn All Math. Items*		
		Rating of Student Opportunity to Learn		
	28	New Math. Items		
	29	Basic Arithmetic Items		
	30	More Advanced Arith. Items		
	31	Elementary Algebra Items		
	32	Intermediate Algebra Items		
	33	All Algebra Items		
	34	Intuitive Geometry Items		
	35	Demonstrative Geometry Items		
	36	All Geometry Items		
	37	Analytic Geometry Items		
	38	No Ratings		
	39	Calculus Items		
	40	Analysis Items		
	41	Sets Items		
	42	Logic Items		
	43	Items in Test 5		
	44	Items in Test 3		
	45–47	No Ratings		
	48	Verbal Items		
	49	Computational Items		
24–93		Rating of Student Opportunity to Learn Mathematic Test Items 1–70	1	76–100 % of students afforded opportunity to learn item
			2	25–75 % of students afforded opportunity to learn item
			3	0–24 % of students afforded opportunity to learn item
94–108	50–64	National Use		

[a] Average of percentage ratings to learn mathematics items included in this score. This procedure applies to all teacher ratings of student opportunity.

(1)	(2)	(3)	(4)	(5)
Part III; Student Vector				
1	1	Country Number		
2	2	Target Population		
3	3	School Number		
4	4	Sub-Population		
5	5	Student Number		
6	6	Stratum Number		
7	7	Sub-Sample Number		
8	8	Grade in School	1	6th year or less
			2	7th year
			3	8th year
			4	9th year
			5	10th year
			6	11th year
			7	12th year
			8	13th year
			9	14th year
				The intent of this code is to get at the year in the school system in which the student is now enrolled. Counting *after* kindergarten level, this code indicates the grade or year of the school) system in which the student is enrolled.
9	9	Sex*	1	Male
			2	Female
10	10	Age*		Age in completed maths
11	11	School/Course/Program* (Populations 1*a* and 1*b* only)	1	Academic
			2	Vocational
			3	General
11	11	School/Course/Program* (Populations 2, 3*a* and 3*b* only)	1	Academic—maths
			2	Academic—but not specialising
			3	Academic—non-math.
			4	Vocational—math.
			5	Vocational—non-math.
			6	General—math.
			7	General—non-math.
			8	Other
12	12	Math. Teacher Number 1		
13	13	Math. Teacher Number 2		

* Variable included in 54 × 54 correlation matrix.

Student Vector (continued)

(1)	(2)	(3)	(4)	(5)
14	14	Number of Students in Class	1	Under 10
			2	10–14
			3	15–19
			4	20–24
			5	25–29
			6	30–34
			7	35–39
			8	40 and more
15	15	Periods/Lessons in Math. per Week	1	1 or 2
			2	3–4
			3	5–6
			4	7–8
			5	9–10
			6	11–12
			7	13 or more
16	16	Number of Hours of Math. per Week*	1	less than 1 hour
			2	between 1 and 1:59
			3	between 2 and 2:59
			4	between 3 and 3:59
			5	between 4 and 4:59
			6	between 5 and 5:59
			7	between 6 and 6:59
			8	between 7 and 7:59
			9	8 or more hours
17	17	Hours of Schooling per Week*	1	less than 20
			2	20–22
			3	23–25
			4	26–28
			5	29–31
			6	32–34
			7	35–37
			8	38–40
			9	41 or more
18	18	Number of Hours of Math. Homework per Week*		Number of Hours (to nearest hour)
19	19	Number of Hours of all Homework per Week*		Total Hours (to nearest hour)
20		Place of Parents' Residence	1	Rural—farm
			2	Rural—non-farm or village less than 2500
			3	Small city or town-pop. 2500–15,000
			4	Medium sized city-pop. 15,000–100,000
			5	Urban centre-pop. 100,000 plus
			6	Suburban area commun, near or adjacent to urban centre

Student Vector (continued)

(1)	(2)	(3)	(4)	(5)
	20	Place of Parents' Residence*	1	Rural—farm
			2	Rural—non-farm or village less than 2500
			3	Small city or town-pop. 2500–15,000
			4	Medium-sized city-pop. 15,000–100,000
			5	Urban centre-pop. 100,000 plus- and including suburban area
21	21	Father's Education*		No. of completed years
22	22	Mother's Education*		No. of completed years
23	23	Status of Father's Occupation*		Occupation Code—(Chapter 8, Vol. I)
24	24	Father's Occupation Scientific vs Non-Scientific*	1	Scientific
			2	Non-Scientific
25	25	Mother's Employment	1	None
			2	Yes, full-time
			3	Yes, part-time
26	26	Years of Additional Full-Time Education Expected*	1	1 year or less
			2	2 years
			3	3 years
			4	4 years
			5	5 years
			6	6 years
			7	7 years
			8	8 years
			9	9 years or more
27	27	Years of Additional Full-Time Education Desired*	1	1 year or less
			2	2 years
			3	3 years
			4	4 years
			5	5 years
			6	6 years
			7	7 years
			8	8 years
			9	9 years or more
28	28	Status of Expected Occupation		Occupation Code—(See Chapter 8, Vol. I)
29	29	Expected Occupation—Scientific vs Non-Scientific*	1	Scientific
			2	Non-Scientific
30	30	Status of Desired Occupation		Occupation Code—(See Chapter 8, Vol. I)

* Variable included in 54 × 54 correlation matrix.

Student Vector (continued)

(1)	(2)	(3)	(4)	(5)
31	31	Desired Occupation—Scientific vs Non-Scientific*	1 2	Scientific Non-Scientific
32	32	Expects to Take More Math.*	1 2	Yes No
33	33	Wishes to Take More Math.*	1 2	Yes No
34	34	Extra Activities in Math.	1 2	Yes No
35	35	Description of Extra Activities in Mathematics		National Option
36	36	Level of Math. Instruction*		See Chapter 7, Volume I
37	37	Highest Number of Math. Course Taken (*a*)	60–99	Number of Subject in List**
38	38	Second Highest Number of Math. Course Taken (*b*)	60–99	Number of Subject in List**
39	39	Experimental Math. Course 1*		
40	40	Experimental Math. Course 2		
41	41	Further Education or Employment	1 2 3 4 5 6	University—full-time University—part-time Other Institute of Higher Education—full-time Other Institute of Higher Education—part-time Full-time Employment Undecided or other
42	42	Examination Taken or Planned (Pops. 3*a* and 3*b* only)	1 2 3	Yes No Undecided
43	43	Best Liked Subjects (*a*)	01–99	No. of Subject in List**
44	44	(*b*)	01–99	No. of Subject in List**
45	45	Least Liked Subjects (*a*)	01–99	No. of Subject in List**
46	46	(*b*)	01–99	No. of Subject in List**
47	47	Best Subject (*a*)	01–99	No. of Subject in List**
48	48	(*b*)	01–99	No. of Subject in List**
49	49	Worst Subject (*a*)	01–99	No. of Subject in List**
50	50	(*b*)	01–99	No. of Subject in List**
51	51	Contents of Math. Courses: 9th Grade 10th Grade	1 2	Arithmetic No Arithmetic
52	52	11th Grade 12th Grade	1 2	Algebra No Algebra

Student Vector (continued)

(1)	(2)	(3)	(4)	(5)
53	53	(Target Populations 2, 3*a* and 3*b* only)	1 2	Geometry No Geometry
54	54		1 2	Trigonometry No Trigonometry
55	55		1 2	Calculus No Calculus
56	56	Verbal Test		National Option
57	57	Creativity Test		National Option
	58	Interest in Mathematics*		
	59	Number of Hours Devoted to School Work per Week*		
	60–61	Total Mathematics Test Score*		
	62–63	Lower Mental Process Score*		
	64–65	Higher Mental Process Score*		
	66–67	Verbal Mathematics Score*		
	68–69	Computational Math. Score*		
		Student Performance on:		
	70–71	New Math. Items		
	72–73	Basic Arithmetic Items		
	74–75	More Advanced Arithmetic Items		
	76–77	Elementary Algebra Items		
	78–79	Intermediate Algebra Items		
	80–81	All Algebra Items		
	82–83	Intuitive Geometry Items		
	84–85	Demonstrative Geometry Items		
	86–87	All Geometry Items		
	88–89	Analytic Geometry Items		
	90–91	No Score		
	92–93	Calculus Items		
	94–95	Analysis (Other) Items		
	96–97	Sets Items		
	98–99	Logic Items		
	100–101	Items in Test 5*		
	102–103	Items in Test 3*		
	104	Views about Math. Teaching*		
	105	Views about School and School Learning*		
	106	Attitudes Toward Math. as a Process*		
	107	Attitudes Toward Difficulties in Learning Math.*		

Note: For all test scores, the first variable denotes the *raw* score, e.g. 60, and the second denotes the score *corrected* for guessing, e.g. 61. Only corrected scores are included in the correlation matrix.

* Variable included in 54 × 54 correlation matrix.
** See Appendix B.

Student Vector (continued)

(1)	(2)	(2)	(4)	(5)
	108	Attitudes Toward Place of Math. in Society*		
	109	Attitudes Toward School and School Learning*		
	110	Attitudes Toward Man and Environment*		
	111	Description of Math. Teaching and School Learning*		
	112	Student Weight Number 1—for Populations 1*b*, 2, 3*a*, 3*b*		
	113	Student Weight Number 2—for Population 1*a* only		
58–127		Student Response to Math. Items 1–70		
128–192		Student Response to Opinionnaire Items 1–65[a]		
193–203	114–124	National Use		

[a] The sixty-five items which comprise the Student Opinionnaire were used to form the two description and five attitude scale scores. The scale scores are available for processing on the Working Files. Here, individual item responses are available for analysis (see Chapter 6, Vol. I).

International Code for School Subjects

Code Number	School Subject
01–08	Mother Tongue—Language and Literature
09	Experimental Course for Mother Tongue
10–18	Foreign Languages
19	Experimental Foreign Language Course
20–28	Social Sciences (History, Geography, etc.)
29	Experimental Social Science Course
30–38	General Science and Biological Sciences
39	Experimental General Science or Biological Science Course
40–48	Physical Sciences (Physics, Chemistry, etc.)
49	Experimental Physical Science Course
50–58	Non-academic Subjects
59	Experimental Non-academic Course
60–68	Arithmetic and General Mathematics
69	Experimental Arithmetic or General Mathematics Course
70–78	Algebra
79	Experimental Algebra Course
80–84	Geometry
85–88	Trigonometry
89	Experimental Geometry or Trigonometry Course
90–98	Advanced Mathematics (Calculus, etc.)
99	Experimental Advanced Mathematics

Note: The tens digit was used for the international analyses of the data except where the units digit was a nine (9)—the designation for an experimental course.