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Working Paper Series

International Comparisons of Inservice Professional Development

Working Paper No. 97-11 April 1997

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U.S. Department of Education. National Center for Education Statistics. *International Comparisons of Inservice Professional Development*, Working Paper No. 97-11, by Dorothy M. Gilford. Project Officer, Mary Rollefson. Washington, D.C.: 1997.

April 1997

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International Comparisons of Inservice Professional Development

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U.S. Department of Education
Office of Educational Research and Development
National Center for Education Statistics

April 1997

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INTERNATIONAL COMPARISONS OF INSERVICE PROFESSIONAL DEVELOPMENT

INTRODUCTION

The purpose of this report is to recommend items from international comparative education studies that are related to inservice professional development (IPD) for possible inclusion in SASS 1999-2000. To justify these recommendations, the value of international comparisons and of state and nation comparisons generally are discussed, followed by a more specific discussion of their value with respect to (IPD).

This discussion is followed by sections on three relatively recent international comparative studies that have collected data on IPD and related topics such as school organization and environment: Reading Literacy Study (RLS), Computers in Education Study (CompEd), and Third International Mathematics and Science Study (TIMSS). All three studies were collaborative research projects coordinated by the International Association for the Evaluation of Educational Achievement (IEA), an independent international cooperative of research centers and departments of education in more than 50 countries. Each of these three sections describes the study, discusses the IPD-related items and a few items that are not IPD-related that are recommended for SASS. They also describe potential analyses using the recommended items and discuss items that are in both the international study and past versions of SASS that could be used in a report on states and nations.

A summary follows the sections on the three studies. It discusses the benefits and disadvantages of using items from each survey in general terms including depth of questions re IPD, timeliness of data, and number of participating countries. It also sets priorities on the items and provides a rationale for the priorities.

Because of the importance of providing context for interpreting comparisons across countries, a final section describes several of the rich sources of context data that have become available during the past two years.

PART I

VALUE OF INTERNATIONAL COMPARISONS[1]

The policy relevance of SASS data could be enhanced by making comparisons with data from other nations. A number of educators have discussed the value of international comparative education information. The most important use is considered to be improving the understanding of our own education system (Bradburn & Gilford, 1990; Plomp 1992). In the absence of absolute standards for educational systems, comparative information can contribute to setting realistic standards and to monitoring the success of educational systems. Bradburn and Gilford recognize that comparisons with other states or the nation have the advantage of comparing systems that are broadly similar. International comparisons, however, expand the range of comparison beyond the limits of national experience, and can be helpful not only for descriptive purposes, but also for monitoring. Plomp (1992) stresses that international comparisons also provide policy makers and educators with information about the range of educational quality among various national systems. Cross and Stempel (1995) note that international information provides the opportunity to resolve the failings of our system in a uniquely American way. They urge concentrating on the reasons behind countries' decisions concerning teacher training policies. Understanding their motives and expectations will help us decide what will and will not help us improve primary and secondary education in America.

Similarities in Cross-National Issues

Most developed countries are facing similar education policy issues. Several countries are involved in reform efforts and many are faced with the issue of how to provide high quality education to a multi-cultural student body. These common concerns enhance the likelihood that we can learn from the actions taken by other countries. Some of the issues relate specifically to IPD. Most countries that are members of the Organisation for Economic Co-operation and Development (OECD) are deepening inservice teaching opportunities, as are several Asian countries (Darling-Hammond, 1996). Many of them have recognized the significant role of continuous professional development as an important part of professionalism (EURYDICE, 1995; Darling-Hammond & Cobb, 1995). Several countries are concerned about the limited opportunities for advancement and promotion in teaching and are taking action to create a career path that would lead

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[1] This section summarizes the discussion of the value of international comparisons in an earlier paper (Gilford, 1996) that proposed adding items from the IEA CompEd study to SASS.

toward highly accomplished practice over the course of a teaching career. In Spain and Portugal inservice training is linked to career advancement (EURYDICE, 1995).

Several European and Asian countries have recognized the importance of giving teachers greater professional authority and responsibility and have responded by giving teachers greater professional autonomy and greater voice in creating standards for preparation, licensure, and practice.

Value of State and Nation Comparisons

During the current period of extensive reform and restructuring of the schools it is important for state policy makers to have information about the current teaching staff's involvement in the reform effort and the actions teachers are taking to upgrade their expertise in pedagogy and in their field to meet the demands of reform. Although the *SASS by State* publication (NCES, 1994) includes data about teacher characteristics and their preservice preparation, it does not include IPD data. SASS certainly has the potential to provide state data on IPD. If the recommendations in an earlier paper on measures of IPD (Gilford, 1996) to add items from international studies to SASS are implemented it would be possible for SASS 1999-2000 to provide state data on the types and extent of IPD activities, the planning and coordination of IPD, school organization for teacher learning, other growth opportunities provided to teachers, support for IPD, and the existence of a school environment that is supportive of IPD.

The policy relevance of the SASS data could be further enhanced by comparisons of state and nation data. If the recommended items are added to SASS it should be possible for states to compare some characteristics of their professional development activities with those in other countries in a format like that used in the NCES publications *Education in States and Nations* (U.S. Department of Education, 1993 & 1996). Because of the central role that teachers play in student achievement, states that have demonstrated interest in educational achievement in other countries (frequently for economic reasons) would find uses for such information.

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PART II

IEA READING LITERACY STUDY

The IEA Reading Literacy Study, conducted in 32 countries during February and March of 1991, was designed "...to measure reading literacy across nations and to describe the factors associated with reading achievement" (U.S. Department of Education, 1994). The study includes a number of questions related to IPD or to school environment that is supportive of professional development. An earlier paper (Gilford, 1996) discusses the research base concerning the relationship between school environment and IPD. More recently, Riehl and Sipple (1996) using 1987-1988 SASS data found an association between school organizational climate and teachers' professional commitment. Inclusion of school-climate questions in the 1999-2000 SASS would make it possible for states to compare the characteristics of IPD of reading teachers of 4th grade students and English/language arts/reading teachers of 9th grade students with those of other countries. Although SASS will not include achievement data, some of the reading literacy items that will be recommended are ones that are associated with high reading achievement in the IEA study and therefore are useful as indicators of desirable characteristics of IPD. Since the Reading Literacy Study (RLS) administered reading assessments designed to measure reading proficiency to nationally representative samples of students in the 32 participating countries, it would be possible to compare the IPD activities in U.S. states with those of the countries whose students performed well in the reading assessments. (Appendix A lists the 32 participating countries.) Another approach would be to compare the State data with the mean for the OECD countries that participated in RLS, as was done by Binkley and Williams for achievement scores. (U.S. Department of Education, 1996). The OECD means (or percentages) for the IPD-related variables would provide meaningful benchmarks against which to measure these IPD characteristics in states.

Explanatory Variables in the RLS

In addition to the assessment of students' reading literacy, the RLS included four sets of questionnaires--student, teacher, principal, and national--that were designed to collect data about variables that were known to influence reading achievement and that might vary across nations. An implicit model of reading achievement underlies these sets of questions. A general framework and item map for the study (U.S. Department of Education, 1994) provides a cross classification of the data items by the person or organizational unit to which they refer (students, their families, their teachers, and their schools) and what information they provide. Four information categories are

used: attributes, the kinds of environments provided, the forms of instruction used, and the reading behaviors students exhibited. Although the complete framework is not reproduced here, it is available as is a discussion of the analyses done to relate these factors to reading achievement (op. cit.). The next section identifies the IPD-related explanatory variables that are appropriate for SASS 1999-2000.

Selection of Items for SASS From the U.S. Version of the RLS Questionnaire

The questionnaires used in the United States as part of the RLS contain four types of items:

international items--items that all countries must include,

optional international items--items proposed by the international organization but not required (generally data for such items would be available for only part of the countries participating in the reading literacy study),

special national option items--items that several countries agreed to include in their questionnaires, or

U.S. items--items that were included only in the U.S. questionnaire, which would mean that no comparable international data would be available.

Only items of the first three types will be recommended for SASS since international data are not available for U.S. items. Note that the number of countries for which data will be available may be limited for the optional international items and even more limited for the special national options.

IPD-Related Items Recommended for SASS

The IPD-related items that remain after deleting the U.S. National Items and five items identified as problem items during data analysis are recommended for inclusion in SASS 1999-2000. Table I displays these items organized by relevant categories used in the RLS framework. Appendix B contains a copy of the items. They are also discussed in a later section on *Potential Analyses Using the Recommended Items,* along with findings about the items and illustrations of analyses using the items.

The item on *General Reading Interests* was also somewhat problematic. In an analysis of the international data on teachers' general reading interests, Lundberg and Linnakyla (1993) found no clear relationships between teacher readership and student achievement. As a possible explanation of this result they suggest the possibility of a strong *compliance effect*

TABLE I

RECOMMENDED ITEMS RELATED TO INSERVICE PROFESSIONAL DEVELOPMENT

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS	
ATTRIBUTES		
Teacher		
Further Education in Reading	**4T=9T[2]:**	**11**
Inservice Reading Education	**4T=9T:**	**12**
General Reading Interests	**4T=9T:**	**17**
ENVIRONMENT		
School		
School Resources	**4P=9P:**	**6[3]**
Community Resources	**4P:**	**8**
	9P:	**8**
Parent Cooperation	**4P=9P:**	**7**
Principal's Activities	**4P=9P:**	**26**
School Organization		
Principal Discusses with Teacher	**4T:**	**64**
	9T:	**41**

involved in questions related to highly valued habits. They note that the social desirability factor apparently operates differently in different countries. When they compared only a subset of countries, the economically advanced West European countries, they found that teachers in the highest-achieving countries (Finland, France, and Sweden) had a higher average level of readership than teachers in the other countries. Since comparisons of characteristics of teachers in the United States with those of teachers in West Europe would be of interest, this item has been retained.

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[2] 4T and 9T denote Teacher Questionnaire for 4th grade and 9th grade respectively. Analogously, 4P and 9P denote Principal/School Questionnaire for 4th grade and 9th grade.

[3] Some countries may not have used this question since it was an international option.

IPD-Related Items that are Not Recommended for SASS

Table II, also organized by relevant categories from the RLS framework, lists the IPD-related items that are not recommended

TABLE II

ITEMS RELATED TO INSERVICE PROFESSIONAL DEVELOPMENT THAT ARE NOT RECOMMENDED FOR SASS

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS
ATTRIBUTES	
School	
Principal's Education in Teaching Reading	**4P=9P[4]: 38**
Principal's Inservice Reading Education	**4P=9P: 39**
Teacher	
Inservice Reading Education	**4T=9T: 13, 14**
ENVIRONMENT	
School	
Teacher's Work Evaluated by Principal; Frequency	4P=9P: 27
Teacher's Work Evaluated by Principal; Procedures	4P=9P: 28
School Organization	
Teacher's Work Evaluated by Principal	4T: 63 9T: 40 (=4T:63)
Items at Staff Meetings:	4T: 67a, b, c, & e 9T: 44(=4T:67)
School Program for Improving Reading Instruction	4P=9P: 24, 25

for inclusion in SASS. The first four items in the table--*Principal's Education in Teaching Reading* and *Principal's*

[4] 4P and 9P denote School Questionnaire for 4th grade and 9th grade respectively. Analogously, 4T and 9T denote Teacher Questionnaire for 4th grade and 9th grade.

Inservice Reading Education and the two items on *Teacher's Inservice Reading Education*--are U.S. national items. International data are not available for these four items. The five remaining items, which are underlined, were identified as problem items by Marilyn R. Binkley, U.S. National Research Coordinator for the study. The question on *Items at Staff Meetings* was a structural problem. It involved interaction with the preceding item, which asked whether the school has staff meetings, and resulted in too few clear responses for many of the table cells. The three questions related to *Principal's Evaluation of Teacher's Work* were also problematic in cross-national analyses because some countries confused evaluation with supervision. The question on *School Program for Improving Reading Instruction* was ambiguous because different countries have different concepts of what constitutes a "program," which raises questions about the comparability of the country data. These five questions are not recommended for SASS.

Recommended Items that are Not IPD-Related

Table III displays two RLS items that are not IPD-related, *Books in Library* and *Total Instructional Time*, that are recommended for inclusion in SASS. They are recommended because they have been shown to be correlated with reading achievement and would be of interest in a profile of indicators related to IPD.

TABLE III

RECOMMENDED ITEMS THAT ARE NOT IPD-RELATED

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS
ENVIRONMENT	
School	
Books in Library	**4P=9P: 9**
School Organization	
Total Instructional Time	**4P=9P: 14**

The number of school library books per student[5] is an indicator that is highly correlated with reading achievement in the United States (U.S. Department of Education, 1994, p. 418-419) The correlation remains even after controlling statistically for regional differences, parental support, and class size. Elley (1992, pp. 66-67) also notes that a clear link

[5] This ratio can be computed for states and U.S. schools because the SASS school questionnaire contains a question on the number of students in the school.

between reading ability and the size of school libraries was found in previous surveys of individual countries. This relationship also holds across nations. Elley found that this relationship holds for RLS countries and that it is still significant after controlling for level of general development.

In the United States, total instructional time is also highly correlated with reading achievement. The United States report (U.S. Department of Education, 1994, pp. 315-316) includes an extensive discussion of the research that documents *time provided for instruction* as a significant factor in promoting academic achievement. The report finds that grade 4 schools offering 31 or more hours per week had significantly higher class means for the expository and document sections of the test than those offering 26-30 hours of instruction. For grade 9, the means for schools providing 31 or more hours of instruction per week instruction were significantly higher than those offering 25 or fewer hours per week, for all three sections of the test: narrative, expository, and document.

Potential Analyses Using the Recommended Items

The purpose of this section is twofold: first, to provide evidence of the importance of the recommended items and second, to illustrate the variety of analytic methods that can be used in analyzing the data. Several international and numerous national reports have been published using data from the IEA Reading Literacy Study. These reports include international data on the recommended items that could be used in comparisons with SASS data on states. The reports also use a variety of analytic methods. These methods include comparison of single-variate indicators, ratio indicators, and composite variable indicators for countries or for groups of schools within countries; correlation of school or teacher items with student achievement adjusted for home environment, comparison of country student achievement scores with scores expected for the country based on relevant indicators of national development; factor analysis for options in an item or for a construct developed from related items; and use of multilevel models. Although SASS does not collect data on reading achievement, the 1992 National Assessment of Educational Progress provides state data on reading achievement of 4th-grade students and there are plans to link the two studies.

This section first describes the international reports and national reports. It discusses selected, illustrative analyses and findings from these publications that are related to each of the eight IPD-related items and the two general items recommended for inclusion in SASS. (Comprehensive coverage of the findings and analyses in these reports is left for the author of a states and nations comparison of IPD in reading.)

International Studies

Several international publications include cross national analyses or within country analyses of the reading literacy data. The first of these (Elley, 1992) focuses on differences between countries and the various factors that may be associated with such differences. Elley recognizes that differences in achievement levels between countries may be caused not only by education policies, but may be attributable to a variety of cultural and economic factors. To eliminate the cultural and economic factors he develops a Composite Developmental Index (CDI) for each country using social and economic indicators that are considered to be beyond the control of educators. To measure the effectiveness of an education system he uses the CDI to measure the deviation of the average achievement score for the country with what would be predicted on the basis of its CDI. He also presents comparisons of the association between educational variables and literacy achievement after controlling for CDI.

Postlethwaite and Ross (1992) sought to identify the characteristics of effective schools within countries. They identify two groups of schools: "more effective schools" in which the average student reading score was higher than would be expected given students' home circumstances and "less effective schools" in which the mean level of student achievement was lower than expected. Using the items from the Reading Literacy Study they propose 56 indicators based on school characteristics, school resources, school management, teacher characteristics , and teaching methods and determine which indicators were most powerful in discriminating between the more effective and less effective schools.

Lundberg & Linnakyla (1993) study the relationship between student achievement and proximal teaching conditions, teacher characteristics, and teaching strategies. They find a number of characteristics of teachers and teaching strategies that are associated with successful instruction in reading. However, as noted above, they concluded that from the data available in the IEA study they could not identify instructional factors that might be associated with student achievement in reading literacy across all the countries in the study.

The main findings of the Reading Literacy Study, including those of these three reports, are summarized by Elley (1994). Elley's summary includes a chapter by Munck & Lundberg on a multivariate analysis of the reading literacy data for 9-year olds.

National Reports

Most, if not all, of the countries that participated in the RLS published country reports that examine the relative position

of the country with respect to reading achievement and the context of literacy instruction (classes, teachers, and school management), and discuss the policy implications of the data for the education system. These reports include interesting interpretations of the reasons for their countries' rank in the international studies. Country reports that were easily accessible include those for Germany (Lehmann et al., 1995), Hong Kong (Johnson and Cheung Yat-shing, 1995), Ireland (Martin and Morgan, 1994) and the United States (U.S. Department of Education, 1994). For purposes of comparative analysis of U.S. states with nations it would be important to obtain the country reports from Canada and New Zealand, the other two English-speaking countries that participated in the study.

Analyses Using IPD-Related Items Recommended for SASS

Further Education in Reading This teacher attribute asks how many courses the teacher has completed related to the teaching of reading since initial teacher certification: none, one, two, three, or four or more.

Martin and Morgan (1994 p. 51-53) compare this characteristic of Irish teachers with those of other countries. They compute the mean number of hours that teachers report having spent on the study of reading since initial training and note that Irish teachers report very low levels--only four countries report lower levels.

Inservice Reading Education This teacher attribute asks how many times the teacher has been to inservice teacher training courses in reading in the last three years: none, once, twice, three times, or four or more times.

Martin and Morgan (1994, p. 52-57) convert the responses to this question to a scale of 1 to 5 and compute the mean for each country. Among the 27 countries that participated in the Grade 4 tests, Irish teachers show the lowest frequency of attendance at inservice courses related to reading over the preceding three years. They note that this is not a criticism of teachers but the absence of a systematic approach to inservice. They note also a dearth of professional publications that are specifically aimed at practicing teachers. The policy relevance of this finding is evident. Similar analysis is carried out for Population B (14-year olds) teachers. This section also includes a discussion of the importance of professional development indicators, noting that a number of domains of teacher reading were found to be related to specific instructional practices.

General Reading Interests This question asks how frequently (never or almost never, about once a year, about once a term, about once a month, about once a week or more) the teacher reads

each of the following: articles on teaching, articles on reading, books on history or politics, books on the arts, books on science, novels or short stories, poems, plays, books for children.

As discussed earlier, Lundberg and Linnakyla (1993, pp. 35-38) found no clear relationships between teacher readership and student achievement across all RLS countries. On the other hand, when the comparison was limited to a subset of ten economically advanced countries, they found that teachers in the highest-achieving countries had the highest average level of readership. In many of the countries, teachers' own reading, including not only material about education but also literature, was associated with higher reader scores for 9-year olds.

Lundberg and Linnakyla (p. 89) also considered the number of countries where teaching factors discriminated significantly between effective and less effective classes and found that teacher readership did so in 17 countries. The largest number of countries for any of the 17 teaching factors considered in their report.

The national report for Germany (Lehmann et al., 1995, p. 82) tabulates the percentages of East German and West German teachers for the 3rd school year and for the 8th school year who report reading various types of subject matter at least once a month. Except for poetry and children's books, the percentages are higher for West German 3rd year teachers than for East German teachers. For all types of reading material the percentages for 8th year teachers are higher than those for 3rd year teachers and the percentages for East German teachers are higher than those of West German teachers for books on history or politics, novels or short stories, and poetry. Similar comparisons for teachers in regions of the United States would be of interest.

The national report for Ireland (Martin & Morgan, 1994) converts the frequency of reading responses into a scale of 1 to 5 for each of the types of reading materials and computes the mean value for each type. They tabulate these mean values for all countries for three types of reading material: frequency of reading articles on reading, frequency of reading articles on teaching, and total professional reading (the sum of the reading scales in all nine areas specified in the item, which gives a scale from 9 to 45). They note that only in East and West Germany do teachers read articles on teaching less frequently than Irish teachers and discuss the reasons for this finding.

School Resources The 4th-grade school questionnaire asks whether the school has certain resources and activities: school library, reading room for students, student/school newspaper or magazine, and a teacher (professional) library. The 9th grade school questionnaire adds four more activities: drama club, debating

club, literature club, and writing club.

In Hong Kong, at the primary school level it was found that schools that do not offer a reading room for students, a school newspaper, or school magazine tend to perform better than those that do. Johnson and Cheung Yat-shing (1995, p. 101) suggest that this may be due to how the facilities are used and whether they are organized in a way that will enhance teaching and learning within the school. At the secondary level, however, the relationship between achievement and the availability of such resources and a drama, debating, literature, or writing club for students was positive, At both levels the availability of a professional library for teachers was associated with better student achievement in reading literacy.

Community Resources This question asks the principal to indicate the availability (not readily available, available in neighboring town or city--less than 2 hours of normal one way travel time--, available locally--within 30 minutes of normal one way travel time) of the following resources: public library, bookstore/book department in a store, secondary level school, a higher education institution, and museum.

Postlethwaite and Ross (1992, p. 27) treat community resources as a composite indicator consisting of the nearness to the school of the four resources. They found that the more effective schools tended to be in areas within easy traveling distance of these resources and the less effective schools in more distant areas where such resources were not readily available. This indicator ranked 7th internationally among their 56 indicators in terms of its capacity to discriminate between the more effective and less effective schools, and was particularly effective in Denmark, East Germany, Indonesia, Portugal, and Slovenia.

In the United States report (U.S. Department of Education, 1994, p. 320) the responses were represented as a dichotomous variable, indicating schools with either "high" or "low" resources because of the skewness of the data. More schools scored high than low, and many schools responded that all the resources listed were available in their community. No significant relationship between community resources and class mean reading proficiency was found in either grade 4 or Grade 9.

Parent Cooperation This question about school environment asks the principal about the degree of parent cooperation with the school in terms of support for the school's educational principles or goals (compared with other schools the principal knows): much below average, below average, average, above average, much above average.

The United States report (pp. 417-418) finds a relationship between parental support for the school and the mean level of reading comprehension for fourth grade classes in the school. After adjustment for other attributes of communities, schools, principals, classes, and students that might confound this relationship, it still holds. Where parental support for schools is high, the reading comprehension of fourth grade students is enhanced, and conversely, below average parental support is associated with below average reading comprehension of the students. The authors speculate that the reason this effect seems to be confined to fourth grade classrooms is that elementary schools are more closely identified with their immediate community than are larger high schools that serve several communities.

Postlethwaite and Ross (1992, p. 34) found that degree of parent cooperation had the top rank internationally of their 56 indicators for power in discriminating between more effective and less effective schools. This indicator ranked among the five most powerful in Belgium (French), Germany (West), Greece, New Zealand, Singapore, Slovenia, Spain, Sweden, Switzerland, and the United States.

Program for Improving Reading Instruction This question asks the principal whether the school has a program for the improvement of reading instruction (teaching and learning of reading). If the answer is "Yes," it requests a description. This indicator ranked 21st internationally in its power to discriminate between more effective and less effective schools (Postlethwaite & Ross, p. 32). It ranked among the five most powerful indicators in Spain and Switzerland.

Principal's Activities This question asked the principal to rank the following activities in order of importance in his/her work as a school principal:

Representing the school at official meetings
Evaluation of staff
Contacts with local community (e.g., parents, community organizations, local industry)
Discussing educational objectives with the teaching staff
Administrative tasks concerning the functioning of the school (e.g., regulations, disciplinary duties, school budget, timetable)
Using records of students' progress
Taking care of issues of student welfare and guidance
Activities aimed at the professional development of teachers

Two of the activities, "discussing educational objectives with the teaching staff" and "activities aimed at the professional development of teachers" are relevant to a supportive environment

for IPD. Internationally, indicators for these items rank 47th and 52nd, respectively, in their power to discriminate between more effective and less effective schools (Postlethwaite & Ross, 1992, p. 46-47). In each case, the indicator is among the top five indicators in only one country--Norway and East Germany respectively.

The United States report (U.S. Department of Education, 1994, pp. 388-390) investigates a classroom-level model of the effect of principal attributes for grades 4 and 9. The report finds a significant effect in the fourth grade model--principals whose style is to promote staff development have higher levels of reading achievement in their schools.

The report for Ireland found that two of the activities were regarded as more important by principals than the others: "Discussion of educational objectives with staff" and "Administrative tasks" (Martin & Morgan, 1994, p. 59-60). They tabulate the mean rankings of the importance of these two activities and a third activity (evaluation of teachers) by principals for each country for the elementary population. The mean rankings for the item "discuss objectives with staff" range from 1.6 for Singapore to 3.5 for Iceland. The ranking for Irish principals, 2.3, is similar to that of most other countries.

Principal Discusses with Teacher This question asks the teacher to indicate whether the school principal (or deputy principal) engages in any of the following actions:

discuss explicit achievement standards for the subject that you teach?
ask for evaluation results for progress of your students in reading?
make suggestions about the choice of instructional methods in reading?
encourage contacts among teachers?
initiate activities directed at the professional development of teachers?
make suggestions about the content that must be covered in reading?

Postlethwaite & Ross (1992, p. 45) develop a composite indicator "principal engagement" from the options in this item. This indicator ranks 45th internationally and only in Denmark is it one of the top five indicators in discriminating between more effective and less effective schools.

The U.S. report (U.S. Department of Education, 1994, pp. 308-309) describes a factor analysis using data obtained from teachers' responses to a list of items describing principal/teacher interactions. They identified two factors, one of which is "staff development". This factor is based on two

questions "initiate activities directed at the professional development of teachers" and "encourage contacts among teachers." The authors found that the relationship between principal's emphasis on staff development and mean reading proficiency is negligible, which seems counter intuitive relative to the research literature. The report includes a discussion of this literature and provides some reasons for the unexpected finding.

Analyses Using Recommended Items that are Not Related to IPD

Books in School Library The principal was asked "Approximately how many books with different titles does your school library contain? As mentioned earlier, Elley (1992, pp. 66-67) found an association between large school libraries and mean achievement scores in reading. He presents a dramatic graph of reading achievement score for ninth grade students by school library size. For this graph he groups the schools in quartiles by size of school library for each country. He then computes the overall scores for schools in each quartile for each country and the mean aggregated across all countries. The graph contains lines showing the mean overall score for all countries, the mean overall score for high CDI countries, and for low CDI countries. For each of the three groups of countries there is a regular increase in average score with increases in library size (except for the highest quartile for the high CDI countries) and a marked difference between wealthier and poorer countries as defined by the CDI.

Internationally, Postlethwaite and Ross (1992, p. 30-31) found that "...school library books per student differed between more effective and less effective schools from five to ten books per student." This indicator received rank 19 among the 56 indicators they considered, in terms of its power to discriminate between the more effective and less effective schools.

Total Instructional Time The principal was asked "What is the total instructional time (in hours and minutes), excluding breaks, in a typical week in your school for all subject areas?" As mentioned earlier, total instructional time is highly correlated with reading achievement in the United States (U.S. Department of Education, 1994, pp. 315-316). Lundberg and Linnakyla (1993, pp. 20-21), also found a significant positive correlation between instructional time and student achievement within several countries in both student populations. However, when they looked at country means internationally they found only limited correlation between the country's average amount of instructional time per week and achievement. This analysis is less sensitive than the analysis carried out in the United States, which makes fuller use of the information in the distribution of total hours of instruction rather than limiting comparisons to the mean instructional time.

A Possible Analysis Using the Recommended Items

It might also be interesting to explore whether the associations between the explanatory variables recommended for inclusion in SASS have the same relationships to reading achievement for states in the 1992 National Assessment of Education Progress (Mullis et al, 1993) as the relationships found between these variables and reading achievement in the countries participating in RLS. Both studies assess students in the 4th grade. The definitions of reading used in the IEA's RLS and the U.S. NAEP differ, however, although their definitions overlap (U.S. Department of Education, 1996). Reading experts could determine whether the possible benefits from such analyses would be worth the cost.

Data Items in Both SASS and the Reading Literacy Study

Although not IPD-related, there are a number of items common to both SASS and RLS. Some of them are associated with reading achievement, others can be used as classification variables. They are mentioned here since they would require no additional data collection and they could be used in a states and nations report. These items include three teacher attributes: teacher gender, years of teaching experience, and teacher education. School attributes in both surveys include school enrollment, number of students per grade per gender, school control (public/private), urbanicity, and percent of students absent. There is one class attribute common to both surveys: class size.

The relationship between each of the three teacher attributes and student achievement in reading is discussed here as these attributes might reasonably be included with teacher IPD-related items in a report. If there is interest in the school and class attributes, information on their relationship to student achievement in reading can be found in the international and national reports on the RLS.

Teacher Gender

Postlethwaite and Ross (1992, p. 34-35) reported that in many countries nearly 100 percent of the reading teachers were female. Where this not the case, the more effective schools always had a higher proportion of female reading teachers than the less effective schools. The indicator "percent female teachers" ranked number 10 of the 56 indicators investigated in power to detect difference between more effective schools and less effective schools internationally.

In the United States, no significant association was found between teacher gender and achievement, although children in classes with female teachers in grade 4 had higher mean scores,

as did students in classes with male teachers in grade 9 (U.S. Department of Education, 1994, pp. 287-288). It was noted, however, in connection with a model of the effects of five teacher attributes on average reading achievement (pp. 393-394), that if a fairly relaxed stance with regard to statistical significance was used, teacher gender could be considered as an influence on classroom achievement in reading comprehension in elementary schools.

Teaching Experience

Both SASS and RLS have questions on the number of years of full-time teaching and the number of years of part-time teaching in an elementary or secondary school.

Elley (1992, p. 42) found that the variable *years of teacher experience* was associated with mean achievement score in reading. Countries in which mean achievement scores were in the top ten averaged 13.8 years of teacher experience, whereas the countries which were in the bottom ten averaged only 12.6 years. (The difference in years of teacher experience between the two groups of countries, however, was only 0.68 standard deviations.) A similar association between years of teacher education and student achievement remained after allowance was made for economic development.

Lundberg & Linnakyla (p. 89-90) found that teacher experience discriminated significantly between effective and less effective classes in 11 countries. In the United States, however, the statistical correlation between years of teacher experience and student achievement in reading was low (U.S. Department of Education, 1994, pp. 289-299).

Teacher Education

Lundberg and Linnakyla (1993, p. 27) note that the number of years teachers have spent acquiring their education varies considerably across countries. Because of the varying patterns and the varying interpretations of the concept of teacher education they found it difficult to compare the length of education across countries. They conclude (p. 50) that "... the variation between countries, in terms of how many years of experience the average teacher has, does not seem to be related to variation in national achievement level." There is a positive association, however, within many countries.

In the United States, however, the statistical correlation between years of teacher education and student achievement was low (U.S. Department of Education, 1994, pp. 288-290). In the model of the effects of teacher attributes on average reading achievement levels mentioned above, the author, Trevor Williams, notes (p. 393) that if one takes a fairly relaxed stance with

regard to statistical significance, then perhaps teacher education could be considered as an influence on classroom achievement.

A Final Comment

From the above discussion on international analyses using the RLS items recommended for inclusion in SASS combined with the items common to SASS and RLS, it is clear that implementing the recommendations would provide SASS data with the potential for a wide variety of analyses. Many of these analyses would be relevant to policy issues about IPD that have been raised in the current reform movement in education.

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PART III

COMPUTERS IN EDUCATION STUDY

The IEA Computers in Education study (CompEd) was conducted in two stages. The first stage of the study, which collected data in 1989, focused on "...the extent and availability of computers in schools; how computers were being used; the nature of instruction about computers; and estimates of the effects that computers are having on students, the curriculum, and the school as an institution". The purpose of stage one was to provide data for use in planning, implementation, and evaluation in the field of computers in education and to provide baseline information for measuring change in stage 2, which collected data in 1992. In addition to obtaining data to measure change between 1989 and 1992, stage 2 included a set of tests and questionnaires for students, and was designed to assess "...effects of school variables, and teacher and teaching variables on student outcomes in the domain of computer usage in schools (functional computer knowledge and skills)" (Pelgrum et al., 1993). The survey included questionnaires for principals, school computer coordinators, and teachers of mathematics, science, mother tongue, and computer education in grades 5, 8, and 11 (i.e. the penultimate grade of secondary education). This report considers only items from the stage 2 questionnaires. Appendix A lists the 12 countries that participated in stage 2.

The IEA is planning a Second Information Technology in Education Study (SITES). A planning project for the development of case studies and the required "core" of a survey has been approved. No date for data collection has been announced, but it is possible that the survey questions will be available in time for use in SASS 1999-2000.

IPD Items Recommended for SASS

The IEA Computers in Education Study is of particular interest in this report because it contains extensive information on the professional development of teachers, much more than is found in the other two IEA studies considered. The items address teachers' professional development related to the implementation of computers in educational practice. Table IV lists the subjects of the IPD-related items that are recommended for inclusion in the 1999-2000 SASS along with the questionnaire and item number where each question can be found. In the table the questionnaires are designated as CETQ for Computer Education Teacher Questionnaire, PQ for Principal (School) Questionnaire, and CCQ for Computer Coordinator Questionnaire. It is important to note that the CETQ was sent only to secondary schools since it is unusual for elementary schools to have a computer education teacher. Instead, fifth grade teachers who used a computer for

TABLE IV
RECOMMENDED ITEMS RELATED TO INSERVICE PROFESSIONAL DEVELOPMENT

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS
ATTRIBUTES	
Computer Education Teacher--Need for Training	
Knowledge and Skill Level	**11[6]CETQ: Int'n. A[7]**
Instructional Problems Experienced	**11CETQ: Int'n. B (part)**
Perceived Need for Training	**11CETQ: 20 (part)**
Topics Taught in Teacher Training	**11CETQ: Int'n. C**
Topics Taught in Computer Education Lessons	**11CETQ: Int'n. C**
Computer Coordinator Time on IPD Activities	**11CCQ: 37 c, g, h**
ENVIRONMENT	
School	
Computer Coordinator **Availability and Type**	**11CCQ: 35**
Availability of Training at School	**11CCQ: 34**
Support for Training	**11PQ: 11**
Coordination among Teachers	**11PQ: 5**
Teacher's Control of Resources	**11CCQ: 25**

[6] The number "11" is used to designate the penultimate grade of secondary education. These items are also found in the questionnaires for grades 5 and 8.

[7] The items listed are from the U.S. questionnaires except for items A, B, and C, which are from the international Computer Education Teacher Questionnaire. These items can be found in an international report (Pelgrum et al., 1993). The United States did not survey computer education teachers.

instructional purposes were asked to respond to the CETQ questions.

It is also relevant to note that the United States did not use the CETQ questionnaire in 1992 because few schools had such teachers. That is no longer the case, although there still are schools that do not have a full-time computer education teacher. In such schools it would be important to address the CETQ questions to individuals who teach one or more computer education classes, since many teachers in other disciplines, e.g., mathematics also teach computer education courses.

Appendix B contains a copy of the items. They are also discussed in a later section on *Potential Analyses Using the Recommended Items*, along with findings about the items and illustrations of analyses using the items.

Recommended Items that are Not IPD-Related

Table V displays three CompEd items that are not IPD-Related, *Certification Requirements Include Computer Education, Percentage of Students Receiving Instruction about Computers* and *Computer Coordinators' Activities not Related to IPD*. The first is recommended because it is related to the recommended questions on training needs. The second is recommended as a possible classification variable for schools for use in analyses. The third is recommended since the computer coordinator is a type of staff that was found in approximately ninety percent of U.S. schools that used computers in 1992, and it is important to understand their role in the implementation and use of computers in education. A copy of these items is included in Appendix B.

TABLE V

RECOMMENDED ITEMS THAT ARE NOT IPD-RELATED

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS
Attributes	
Teachers	
Certification Requirements Include Computer Education	**11P: 6 g**
Students	
Percentage Receiving Instruction about Computers	**CCQ: 28**
School Organization	
Computer Coordinators' Activities not Related to IPD	**CCQ: 37 a, b, d, e, f, and i**

The following section describes the items in Tables IV and V and discusses potential analyses using these items.

Potential Analyses Using the Recommended Items

This section draws heavily on a major international report that analyses data from most of the recommended IPD-related items. The report--*Schools, Teachers, Students and Computers: A Cross-National Perspective* (Pelgrum et al., 1993)--is the first report of the second stage of the CompEd study. The analyses and findings described here, unless otherwise noted, come from the chapter entitled *Educating the Educators; Training for Teaching about Computers (pp. 71-89)*. The policy relevance of the findings indicates the potential benefits of including these data items in SASS.

Need for Training

To determine whether there is need for more training for computer education teachers in secondary school and for teachers in elementary school, the CompEd study used questions about teachers knowledge and skill level, problems experienced, and their opinion concerning need for more training. To determine what type of future training would be most useful, teachers were asked what types of training they have already received.

Knowledge and Skill Level To measure teachers' knowledge about and skills on how to use computers, Item A in the international teacher questionnaire includes three self-rating scales:

> knowledge scale: 9 questions about knowledge of hardware and software, e.g, What "file extensions" are. The teacher was required to answer "yes" or "no" to the statement "I know..." for each question.
>
> programming scale: 5 questions about programming skills, e.g. Storing data on a disk drive. The teacher was required to answer "yes" or "no" to the statement "I can write a program for..." each question.
>
> capability scale: 8 questions about the ability of using the computer as a tool, e.g., word processing and computer assisted instruction. The teacher was required to answer "yes" or "no" the statement "I am capable of..."

The results on the three self-rating scales for the computer education teachers in lower and upper secondary education and for all computer-using teachers in elementary schools are shown in a bar chart (p. 75) for each of the three rating scales. The

statistic plotted is the median of scores on the three knowledge and skills self-rating scales (percentage marked items) for (computer education) teachers using computers. In a number of countries lower and upper secondary teachers rate themselves very high on the knowledge scale and the programming scale.

Problems Experienced in Using Computers The long list of problems used in the CompEd study includes two that are related to professional development: (1) *teachers lack knowledge/skills about using computers for instructional purposes*, and (2) *insufficient training opportunities for teachers*. Teachers were asked to indicate whether each of these problems was a minor problem, a major problem, or not a problem. The data from these two items are displayed in bar charts comparing countries in terms of the percentage of (computer education) teachers who had experienced each of the two training-related problems (either minor or major). The data, which are for 1992, show that Japan is the country in which teachers consider that training problems are the most serious. (The data were collected just before Japan introduced computer education in its national curriculum, so many teachers still needed training.) Across countries a considerable proportion of the (computer education) teachers indicate a lack of knowledge about using computers for instructional purposes and also insufficient training opportunities, which indicates that it would be useful to organize inservice courses for these teachers.

Teacher's Opinion of Training Needs Teachers were asked for their opinion related to computers. One of the scales in this questionnaire dealt with training need. There were five items in this scale:

1. I try to keep myself informed about technological changes
2. I would like to take part in a computer course to learn more about computers
3. Inservice training courses about computers should be made compulsory
4. I would like to learn more about computers as teaching aids
5. I do not mind learning about computers.

This item asked teachers[8] to check one of the following

[8]The United States did not administer the teacher questionnaire, but did include this question on the principal questionnaire as a condition for participating in Stage 2 of the CompEd study.

statements for each of the five items: strongly disagree, slightly disagree, uncertain, slightly agree, strongly agree. Data from this question were displayed in a bar graph (p. 77) for each of the three levels of education for 1989 and 1992 in terms of the mean percentage of (computer education) teachers who (strongly) agree on the attitude scale "training need".

Topics Covered in Teacher Training This item (Intn'l. C in Appendix C) provides a list of 31 topics covered in computer education teacher training. They are listed in five groups of training topics: computers and society (4 items), applications (like word processing, 14 topics), problem analysis and programming (5 items), hard- and software principles (3 topics), and pedagogic/instructional aspects (5 topics). The mean number of topics included in teacher training in each category according to the (computer education) teachers is tabulated for each of the three levels of schools and for each country. The data for this item are analyzed in conjunction with the following item.

Topics Taught in Computer Education Lessons The list of topics covered in teacher training were also included in a question to teachers about what topics are covered in their daily teaching practice. For each level of schooling and each country the mean percent of topics covered in training of the (computer education) teachers, given the computer topics taught in the classroom was computed. The results show that a majority of the topics covered in the lessons on computers were also included in the training courses teachers received. Looking at the other ratio, mean percent of topics covered in (computer education) lessons, given the computer topics taught in teacher training, it was found that in a number of countries a majority of the topics included in the training courses that teachers receive are indeed part of actual teaching about computers in the classroom. The results seem to imply that careful consideration of topics included in future training for (computer education) teachers is important because teachers tend to teach the topics covered in their own training in the lessons for their students.

School Environment

Computer Coordinator: Availability and Type In addition to support from outside agencies, support inside the school is also important and it would be logical for such support to come from the computer coordinator. Item CCQ:35 asks whether there is someone on the school staff who coordinates teachers' instructional use of computers and/or helps other teachers use computers. Eight options are provided including a full-time school-level computer coordinator (who does not teach classes), a full-time regular teacher who also has the title of computer coordinator, a district-level computer coordinator, and NO ONE coordinates. Data for this item are reported in the U.S. national report for CompEd (Anderson, 1993). Data are reported

for the three levels of education for each of the countries and for four types of coordinators: full-time coordinator, teacher/coordinator, other, and no one. In 1992 only a small percentage of computer-using schools in the United States reported having no coordinator: 13 percent, 9 percent, and 12 percent, respectively for elementary, lower-secondary, and upper-secondary schools. The person most frequently coordinating tasks related to the use of the computer in all schools and for all three populations was a teacher/coordinator.

Computer Coordinator: Time on IPD Activities: Item CCQ37 asks the computer coordinator "Roughly how many hours per week, on the average, do you spend in the following ways?" Two of the ways listed relate to helping teachers: *c) Training or helping teachers learn to use computers*, and *g) Writing (or adapting) instructional software.* An additional way, *h) Developing your own computer-related skills*, is also a form of staff development. The mean percentage of coordinator time spent on primary coordinating tasks during 1992 by type of task, by country, by school level are tabulated in the U.S. national report (p. 52). Coordinators spend more time helping students than they do helping teachers (training teachers or providing computer-based instructional materials). In the United States at each of the three school levels, coordinators spend a smaller portion of their time helping teachers than do coordinators in the other countries in the study. U.S. coordinators spend even less time developing their own skills than in helping teachers and less time than coordinators in any of the other countries.

Availability of Training at School Item CCQ34 in Appendix C lists seven types of teacher training and asks the Computer Coordinator whether it is available for teachers either outside or inside the school. Bar charts for each of the three levels of schooling show the availability of training as indicated by the computer coordinator of computer-using schools (p. 83). Across countries the most available types of training are introductory courses and courses in the use of application programs, although some countries list other courses as equally or more important. Data for the USA are available only for upper secondary education, but at that level the availability of training is uniformly low for all types of training courses.

Agencies that Provide Training Support Item PQ11 asked Principals to indicate which of the following agencies provide training support: Ministry of Education, local educational authority, parents, universities/(teacher training) colleges, teachers of other schools, teacher associations/other associations, support institutions/resource centers. and business and industry. The percentage of principals of computer-using schools who checked each agency giving support in teacher training is tabulated by school level and by country (p. 85). Across countries the agencies most important in providing support

in teacher training are support institutions/resource centers and local educational authorities. In the more centralized countries, Ministries of Education are an important source of support for teacher training.

Coordination among Teachers and **Teachers Control of Resources** The reports used as sources in this section (Pelgrum, 1993; Anderson, Ed., 1993) do not contain data on these items. Two more recent publications (Pelgrum and Plomp, 1994; Plomp et al., 1996) may include data and analyses. The IEA headquarters office in the Netherlands would have information on whether the data have been published or could be obtained from IEA.

Teacher Certification Requirements Include Computer Education Data are not available for this item. Possible data sources are listed in the previous item

Percentage of Students Receiving Instruction about Computers: The U.S. national report (p. 77) provides data on the percentage of schools offering students an opportunity to learn in a computer course in 1992 by country within grade level. The percentages for the United States were 20 percent, 46 percent, and 48 percent for grades 5, 8, and 11 respectively. The percentages for the Netherlands for grades 5 and 8 were approximately double those for the United States. It should be noted that item CCQ:28 asks the question in a reversed format (Who did not have the opportunity to learn?). Percentages shown are 100 percent minus the "not" proportions.

School Organization

Computer Coordinators' Activities not Related to IPD The source of country data for this item is discussed above under Computer Coordinators' Time on IPD Activities.

What Impact Would the Recommended Items Have on SASS 1999-2000?

Including the CompEd items from Tables IV And V in SASS would require additional questions in the SASS Principal Questionnaire for schools with grades 5, 8, or 11; a new Computer Coordinator Questionnaire for use in schools with grades 5, 8 or 11; a new Computer Educator Questionnaire for schools with grades 8 or 11 and additional questions about computer education on the SASS Teacher Questionnaire for teachers of 5th grade students.

Because of the difficulty of adding new questionnaires to SASS, an alternative procedure is considered that would eliminate the need for questionnaires for computer coordinators and computer educators. The computer coordinator questionnaire could be replaced by changing the teacher questionnaire to a teacher

and computer coordinator questionnaire. An item near the beginning of the questionnaire should ask the question: *Do you serve as the computer coordinator?* with "no", or "yes" as possible responses. If "no", skip to the teacher questions. If "yes", respond to the computer coordinator questions plus one additional question: *Do you teach classes in addition to serving as computer coordinator?* If "yes", proceed to the teacher questions. If "no", the computer coordinator has completed the questionnaire.

The computer education teacher questionnaire for secondary schools could be eliminated by adopting and extending the procedure used by IEA for elementary schools, which was to have fifth grade teachers who used a computer for instructional purposes respond to the CETQ questions. This would mean that at some appropriate point in the teacher questionnaire there would be an instruction: *If you teach grades 5, 8, or 11 and use a computer for instructional purposes, continue to the next question*, which would be the first item in a block of the recommended CETQ questions. *If not, skip to item X.* (Item X would be the first item following the block of CETQ items.)

Addressing the CETQ questions to teachers would provide very useful information about teachers' knowledge about and skills on how to use a computer; their perceived need for training; whether they think they lack knowledge/skills about using computers for instructional purposes; and whether they consider the training opportunities for teachers to be insufficient. It would also provide information on the computer topics covered in their teacher training and the computer topics that they teach their students. The disadvantage of this procedure is that international data for all teachers in a grade would be available only for fifth grade teachers. If, however, the SASS sample captures a sufficiently large number of full-time computer education teachers among the teachers sampled in grades 8 and 11, there would be comparable international data available from the CompEd study.

Data Items in Both SASS and CompEd

There are several data items that are common to SASS and CompEd: age and sex of principal; number of teachers by subject; number of students enrolled in school and number enrolled in each of the grades 10, 11, and 12; race/ethnic classification of students; and highest degree obtained for computer education teachers surveyed in CompEd and for the computer education teachers among the sampled teachers in SASS. The last item might be useful as a classification variable in comparing the differences among computer education teachers for the variables in Table IV that relate to computer education teachers. It would be necessary to check with the IEA headquarters to determine

whether country data are available since neither the international report (Pelgrum, 1993) nor the U.S. national report (Anderson, 1993) contains data on highest degree attained by computer education teachers, or indeed, on any of the items common to SASS and CompEd.

Items Related to Telecommunications Equipment

Although the CompEd study did not address the IPD aspects of teachers' use of advanced telecommunications equipment, it would be useful to include questions in the SASS Teacher Questionnaire on how teachers use networking and other forms of advanced telecommunication, the training teachers receive to prepare them to use technologies as teaching tools and resources, and their awareness of the resources technology can offer them as professionals in carrying out many of the activities of their jobs (Fulton, 1996). Fulton develops this topic more extensively. A focus group to address ways to incorporate such questions in the survey without losing comparability with the data from the CompEd study could be useful. The focus group could also formulate questions about the use of the educational technology programs of the North Central Regional Educational Laboratory described in the next section.

The magnitude of the impact of adding these items to SASS is recognized. To justify this addition the following sections discuss the need for such data and the benefits of including the items in SASS.

Need for Data on IPD for Use of Computers and Advanced Telecommunications Equipment[9]

This section first describes the rapid growth in use of computers in the schools and the support for introduction of advanced telecommunications equipment in the schools, both politically and by the Department of Education. It concludes with a discussion of the importance of IPD in the use of computers and advanced telecommunications equipment.

The Use of Computers in Education

As we move into the age of cyberspace, there are many unanswered questions about the role that computers and other

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[9]Parts of this section and the following section on benefits of including CompEd items in SASS summarize material from an earlier paper (Gilford, 1996). One of several recommendations in that paper is a broad recommendation that SASS include CompEd items, however, it did not provide detail specifying the items.

forms of technology can play in education. The percentage of elementary and secondary school students who use a computer at school is increasing rapidly: in the nine years from 1984 to 1993 the percentage doubled, increasing from 28.5 percent to 59.0 percent (NCES, 1996). Fulton (1996) estimates that there were almost 5 million computers for instructional use in K-12 schools in 1995 and that the expenditures on technology reached $2.4 billion a year. Policy makers are justly concerned about the effectiveness of an investment of this size; they need additional data about computers, how they are used in the schools, and how they improve teaching and learning.

Support for Introduction of Advanced Telecommunications Equipment in the Schools

Political support for the use of computers and technology in education is strong. The *National Information Infrastructure* proposed by President Clinton includes a goal to connect all the nation's school classrooms (and also various other institutions and organizations) to the "Information Superhighway." In March 1996 most of California's 13,000 public and private schools were wired for the Internet. Television on that day showed both the President and the Vice-President participating in the wiring!

Recognizing the importance of education technology, the Office of Educational Research and Improvement of the U.S. Department of Education has designated education technology as the specialty area of its North Central Regional Educational Laboratory (NCREL). The laboratory was a pioneer with the Public Broadcasting System in using satellites to deliver video-based professional development programs. In the past five years, NCREL produced 22 programs, which were delivered free via PBS satellite to the more than 23,000 public and private schools in NCREL's region (U.S. Department of Education, 1996).

More recently the NCREL has established two new technology-based resources: an Internet site called *Pathways to School Improvement* and a national *Forum on Educational Technology*. The Internet site for the NCREL Pathways project is a "navigating" tool designed to help educators access information tailored to their school improvement needs. For example, it would take a mathematics teacher only an hour to find the latest research on proven practices, download lesson plans and hands-on learning activities, and share them with colleagues (Kober, 1996). In 1996, Pathways was being accessed about 3,000 times per month.

The Forum on Educational Technology is designed to serve as a "think tank" to create an extensive knowledge base about educational technology and as an "interface' for users of this knowledge base. Among other information, the knowledge base will include information derived from the experiences of state and

local entities as they implement technology programs and formulate technology policies. Initially it will focus on five policy domains (U.S. Department of Education, 1996):

- providing universal access to technology systems;
- integrating technologies into curricula;
- monitoring and stimulating the development of new technology innovations;
- establishing communities of practice and partnerships; and
- examining regulatory and management issues.

Adding questions to SASS on the use of NCREL video-based professional development programs, Pathways, and the Forum would provide OERI with an impartial assessment of program use as well as information about equity in access to or use of these programs geographically and by socioeconomic characteristics of teachers and their students.

The United States is not alone in recognizing the importance of education technology. Representatives of several countries (Australia, Canada, Mexico, Federated States of Micronesia, Taiwan, and the United States) who attended a recent meeting on this subject agreed that "Adequate training in technology is needed to prepare students for the world of work" (Anderson, 1996).

Importance of IPD in the Use of Computers and Advanced Telecommunications Equipment

Although IPD in the use of computers and other technologies is an important aspect of the successful introduction of the equipment in the schools, little is known about it. There are large gaps in the U.S. system of teacher training: teachers need more time to become conversant with computer technology, to plan lessons that integrate the computer in classroom activities, and to learn about computers. (Anderson, 1993). The CompEd study is of special interest because it looked carefully at IPD for use of computers and because it found that U.S. teachers had less opportunity for such IPD than teachers in countries whose students were more proficient than U.S. students in the use of computers.

Pelgrum and Plomp (1993) stress that "...teachers are ultimately the ones charged with the implementation of computers in educational practice and therefore 'education of the educators' or teacher training is an important aspect of the

introduction of computers in schools." In fact, most of the benefits students will derive from using computers depend on the extent to which teachers integrate computers in their daily classroom activities.

Inservice professional development is an important aspect of the introduction of computers in schools because most of today's teachers did not use computers when they were in elementary and secondary school and many of them did not receive computer education as part of their pre-service training. In 1992, however, less than half the schools in the United States reported having an introductory computer course available for teachers (Anderson, 1993, p.52). American teachers have less opportunity to take inservice computer courses than do teachers in Austria, Germany, and the Netherlands and, as might be expected, students in these countries are more computer-knowledgeable than American students (Anderson, 1993).

More recently, in a survey to obtain baseline data on the status of advanced telecommunications in public elementary and secondary schools, nearly two-thirds of the surveyed schools cited *lack of or inadequately trained staff* and *lack of teacher awareness regarding ways to integrate telecommunications equipment into curricula* as moderate or major barriers to the school's acquisition of advanced telecommunication capabilities (NCES, 1995).

Benefits of Including IPD Items from CompEd in the 1999-2000 SASS

There are several reasons why it would be useful for the 1999-2000 SASS to include some of the CompEd stage 2 questions about inservice development of teachers. First, because many types of experts were involved in developing the IEA survey (this is true for all IEA surveys), it has led not only to interesting findings about the status of professional development for computer education and identification of large differences between countries in IPD, but has also provided data useful to policy makers. For example, data from the CompEd study (a) provided the basis for recommendations concerning the training needs of teachers, (b) made it possible to identify the relative position of a country with respect to the availability of training and support for teachers, (c) provided a measure of the extent to which the computer was integrated in classroom teaching, and (d) made it possible to determine the relationship of teacher training to actual classroom use of computers. Second, including CompEd IPD questions in SASS 1999-2000 would make it possible to measure change for some of the items related to the amount and character of computer IPD in the United States from 1992 to 1999. Third, it would permit States to compare their IPD in 1999-2000 with that of other states and the nation. And fourth, although there would be seven years difference in the

data, States could compare IPD for their teachers with that of teachers in other nations at an earlier time.

In summary, the importance of including items on IPD for use of computers and advanced telecommunications equipment is supported by the combination of rapid growth in the use of computers and advanced telecommunications technology in the schools, the essential role that teachers play in their effective use, the inadequate training in their use that is available to teachers, and the national will for U.S. students to match the achievement of students in other countries in the use of these technologies.

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PART IV

THIRD INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

The Third International Mathematics and Science Study (TIMSS), conducted in 1994-1995 under the auspices of the International Association for the Evaluation of Educational Achievement (IEA), is a study designed to evaluate school achievement in mathematics and science by drawing comparisons of student achievement in over 40 countries. (Appendix A lists the countries.) The TIMSS study also explores students' attitudes and opinions. The study focuses on teaching and learning of mathematics and science by students at three levels of education: nine-year-olds, thirteen-year-olds, and students in their last year of secondary school regardless of their program of study, and a special sample of calculus and physics students (twelfth grade in the United States). For the nine-year-olds and the thirteen-year-olds, testing within each country involved the two adjacent grades containing the majority of the students. In most countries, including the United States, analyses focus on the upper grade, which is grade 4 for the nine-year-olds and grade 8 for the thirteen-year-olds.

The study has special strengths when compared with traditional surveys of achievement. According to the IEA TIMSS U.S. National Research Center (1995) these strengths "...come from integrating a survey of achievement with comprehensive analysis of curricula and a focus on instructional practices, to examine their influences on student learning. TIMSS seeks to identify variables associated with high levels of achievement in mathematics and science and will endeavor to explain systemic characteristics that influence educational performance." Like other IEA surveys, the TIMSS design will permit analysis of the intended curriculum, the curriculum as actually delivered by the teacher in the classroom, and as it is learned by students (the achieved curriculum).

In addition to the student assessments and questionnaires about background factors related to achievement, TIMSS included four other components: performance assessments, curriculum analysis, videotape observations of teachers from grade 8 mathematics classes, and case studies of education policy issues in Germany, Japan, and the United States. One of the four topics investigated in the case studies is teacher working conditions. Appendix D provides more detail about the components of TIMSS. A related activity consisted of assessments for three states (Colorado, Illinois, and Minnesota) that assessed a state-representative sample of their students--a strong indication of states' interest in being able to make comparisons with other countries.

Figure 1 displays the complex model of educational opportunity that was used to guide the development of TIMSS. In the design phase, each of the blocks in the conceptual framework was considered in detail (including development of submodels for some of the blocks in the conceptual framework) to guide data collection, prospective analyses, and indicators development (IEA TIMSS U.S. National Research Center, 1993). Schmidt and McKnight (1995) provide further discussion of the conceptual framework.

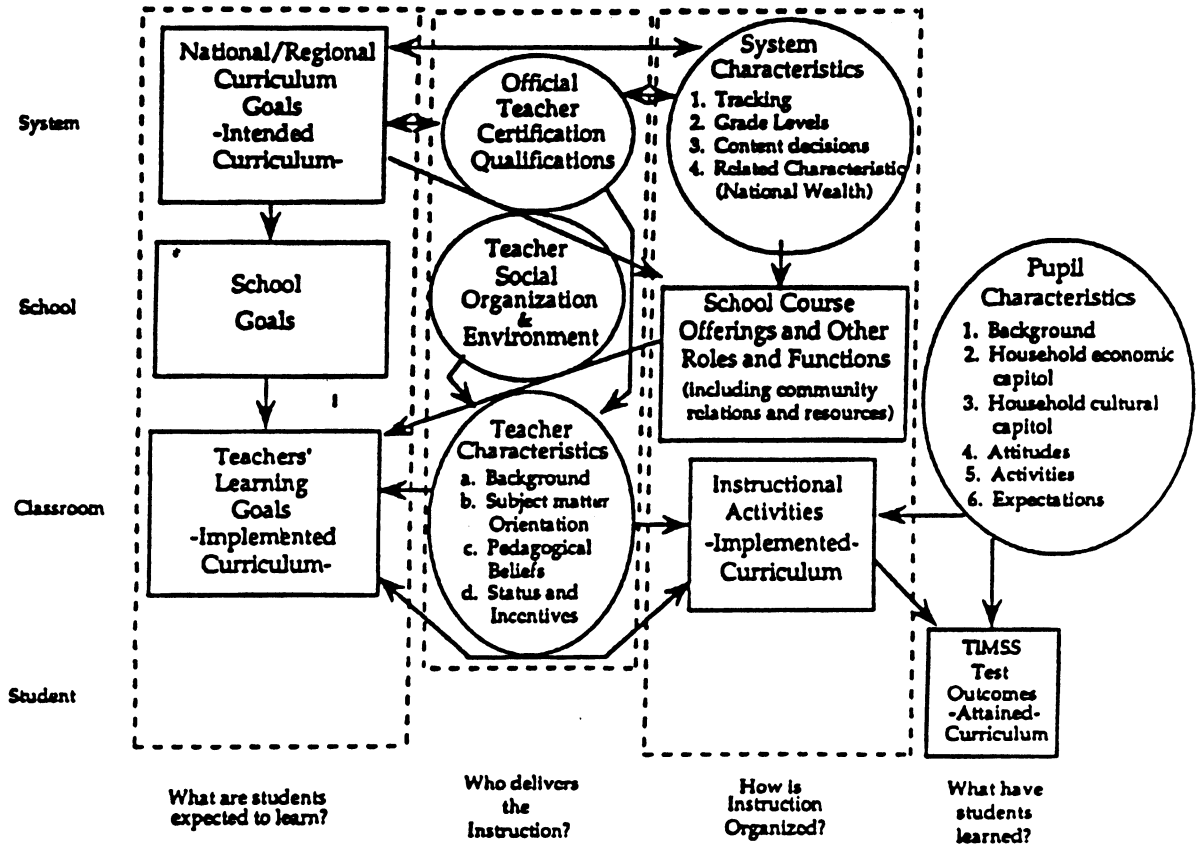

Figure 1. Conceptual Framework: Educational Opportunity

Source: IEA TIMSS U.S. National Research Center (1993)

Explanatory Variables in TIMSS

TIMSS collected a wealth of diagnostic and contextual information that can be used in studying variables that are associated with the achievement results, in investigating policy issues, and in identifying improvements or changes that might be made. Three types of questionnaires were used to collect

information on approximately 1,500 contextual variables: questionnaires for students, teachers, and school principals. For our purpose, identifying characteristics of IPD that are associated with student achievement internationally, the teacher and the school questionnaires are both of interest.

The teacher questionnaire included questions about teachers' preparation, instructional practices, textbook usage, lesson structure and context, and their views on current issues in mathematics and science education, as well as beliefs about teaching mathematics and science. The school questionnaire asked school administrators about school characteristics, resources, administrative policies, implemented curriculum, principal's activities, inservice education, and retention rates.

Selection of Items for SASS From the U.S. Version of the TIMSS Questionnaires

All of the items from the U.S. version of the TIMSS questionnaires that are recommended in this section will provide country data since they are international items. Based on the analyses conducted by the TIMSS International Study Center in preparing the first publications of TIMSS achievement data, none of these items were rejected as problem items.

Recommended Items That Are IPD-Related

Six TIMSS items, or parts of items, related to IPD are recommended for inclusion in SASS. To facilitate comparison of recommended items across the three studies considered in this report, the items are organized by the categories in the framework for the Reading Literacy Study, rather than introducing the different set of categories from the TIMSS conceptual framework. Table VI lists the subjects of the items and the questionnaire and item number where each can be found, organized by category. Appendix E contains a copy of the items as they appear in the questionnaires. The items are also discussed in the following section on *Rationale for Recommending TIMSS Items for SASS*, along with comments about each item. For SASS, the items from the teacher questionnaire should be addressed to science and mathematics teachers of students in grades 3 & 4 (Population 1), and 7 & 8 (Population 2). There was no teacher questionnaire for the 12th grade (Population 3). Items from the school questionnaire should be addressed to school administrators of schools that include any of the grades for the three populations.

The items in Table VI are the same for science as those for mathematics for the teacher questionnaire and they are the same for populations 1 and 2. The items in the school questionnaires are the same for populations 1 and 2. Population 3 includes the

item on *principal's activities* (numbered differently), but not the two on *cooperation and collaboration* and *joint curriculum planning*. Other than several IPD-related items that are also in SASS and will be discussed later, the school and teacher questionnaires contain no additional IPD-related items that were used internationally.

TABLE VI

TIMSS ITEMS RELATED TO IPD

Framework Categories	Questionnaire and Items
Attributes	
Teacher Qualifications	
Inservice Professional Development	**TQM2[10]: 12f**
Environment	
School	
Principal's Activities	**SCQ2[11]: 11 f, g, l**
School Organization	
Teachers	
Cooperation and Collaboration	**SCQ2: 10**
Joint Curriculum Planning	**TQM2: 13** **SCQ2: 13 f, g, h**
Meeting with Parents	**TQM2: 12e**

The United States TIMSS questionnaires include three additional questions related to school environment, but they are not recommended for inclusion in SASS since international data are not available for them. These questions were SCQ2 item 30 on *parent cooperation* and TQM2 items 18 and 19 on *observing other teachers* and *observation by other teachers*.

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[10] TQM2 stands for Teacher Questionnaire, Mathematics, Population 2 (eighth grade)

[11] SCQ2 stands for School Questionnaire, Population 2 (eighth grade)

Recommended Items That are NOT IPD-Related

Three TIMSS items that are not IPD-related are recommended for inclusion in SASS. Table VII displays the items: *Computer Availability*, *Total Instructional Time*, and *Teachers Time Spent on School Related Activities Outside the Formal School Day*. A copy of the items can be found in Appendix E. The first item is recommended for use with items from the Computers in Education study. The second item, *Total Instructional Time*, has already been recommended for inclusion in SASS in the section on the Reading Literacy Study. The discussion of the significant association between total instructional time and reading achievement (U.S. Department of Education, 1994) also includes documentation that instructional time is a significant factor in promoting academic achievement generally. The item is included here because it would also be of interest in connection with a profile of IPD-related indicators derived from SASS and TIMSS data for state and nation comparisons.

The third item, *teacher's time spent on school-related activities outside the formal school day*, is recommended to give a full picture of the teacher's activities, and to provide a better understanding of how much variability exists in time spent on such activities. This variability could be studied by comparing different groups of teachers (e.g. grouped by subject matter, age, or years of experience) or teachers from different types of schools (e.g. those with a high percentage of minority students or students from low income families, or those located in communities with differing degrees of urbanicity).

TABLE VII

RECOMMENDED ITEMS THAT ARE NOT IPD-RELATED.

FRAMEWORK CATEGORIES	QUESTIONNAIRE AND ITEMS	
ENVIRONMENT		
School Resources		
Computer Availability	**SCQ2:**	**15 a, c, d**
School Organization		
Total Instructional Time	**SCQ2:**	**19**
Teachers		
Time Spent on School-Related Activities Outside the Formal School Day	**TQM2:**	**12 a-h, except e & f**

The questionnaires for Populations 1 and 2 include the items on *computer availability* and *time spent on school-related*

activities but the population 3 questionnaire does not. The *total instructional time* item is in the questionnaires for all three populations.

Potential Analyses Using the Recommended Items

Unlike the Reading Literacy Study and the Computers in Education Study, TIMSS is a very recent study--the first publications of international data were issued late in 1996. To make the TIMSS data on school achievement available to policy makers and the public quickly, these publications are limited in large part to providing cross country comparisons of the data for many of the TIMSS items. Analyses to show the relationship among the various factors that support high student achievement have been left for later publications.

Availability of TIMSS Data for Use in IPD-Related Analyses

Five major publications that release international data from TIMSS are now available. The first two focus on international comparisons of student achievement in mathematics and in science for students in the middle school years (Beaton et. al. 1996a and 1996b). There is also a U.S. national report, *Pursuing Excellence: A Study of U.S. Eighth-Grade Mathematics and Science Teaching, Learning, Curriculum, and Achievement in International Context* that reports data from the TIMSS questionnaires (U.S. Department of Education, 1997). This report also uses data from the TIMSS case studies in Germany, Japan, and the United States and from the TIMSS Curriculum Analysis, which analyzed more than 1,000 curriculum documents for mathematics and science.

Three publications based on the Curriculum Analysis Study have been issued: a cross-national report for mathematics and one for science (Schmidt, et. al, 1997a and 1997b) and a U.S. national report (Schmidt, et. al., 1997c). The three curriculum reports provide extensive information on the intended curriculum--what is in the curriculum, what students are expected to do, and how decisions about curriculum are made. They integrate data from the curriculum analysis and data from teacher questionnaires on topic coverage and instructional practices.

There is also a publication from the Survey of Mathematics and Science Opportunities (SMSO). In the SMSO, information was collected about the curriculum used and observations were made of instructional practices in science and mathematics classrooms of nine-year old and thirteen-year old students in six countries: France, Japan, Norway, Spain, Switzerland, and the United States. The report (Schmidt et. al., 1997d) provides information on international differences in curriculum and on observations of instructional practices.

Although the Curriculum Analysis Study and the SMSO provide extremely valuable information in explaining the differences in student achievement across countries, the major sources of data related to IPD are the teacher and school questionnaires administered in connection with the achievement tests for students.

By the time data from SASS 1999-2000 are available for analysis there will be many more reports from TIMSS. Several reports are scheduled for publication in 1997, including international reports and U.S. national reports on the TIMSS performance assessment and on mathematics and science achievement for the two additional student populations: 9-year-olds and students enrolled in the final year of secondary school. Reporting plans for TIMSS also include detailed reports on findings and methodology used in the videotape study of mathematics instruction, and three reports from the case studies. One of the case study reports will be on the working lives of teachers in the three countries studied, including information on certification and training requirements.

There will also be a report that will link NAEP and TIMSS data. This report will link the achievement of U.S. eighth grade mathematics students in the states with eighth grade students from 41 countries who took the TIMSS mathematics assessment. The performance of fourth grade students in both mathematics and science will also be linked. These linkages will make it possible to order the states and TIMSS nations by student achievement in science or mathematics and to make comparisons of the characteristics of IPD in states and/or nations whose students demonstrate high achievement and those whose students show low achievement.

Although IEA (1996) has indicated that further in-depth analyses will be conducted that will show the complex interplay among the cultural, social, attitudinal, and instructional factors that support high student achievement, no detailed plans have been announced. Consequently, information on the analyses and the items for which international data will be available in the future is not available. Information is available, however, on the analyses that were planned for the items that were considered for inclusion in the early design of TIMSS (IEA TIMSS U.S. National Research Center, 1993).

Access to TIMSS data will not be limited to data in published reports since arrangements are being made to give researchers access to the TIMSS data base. The National Science Foundation and NCES plan to stimulate research using the TIMSS data bases, so numerous additional reports, papers, and analyses can be expected.

This discussion of available and planned reports based on

TIMSS data has been included to highlight the wealth of data and analyses that can be expected to be forthcoming before SASS 1999-2000 data are available for analysis. If the recommended TIMSS items are included in SASS, there will be many opportunities for comparisons with the TIMSS findings for 45 countries. The balance of this section lists each of the recommended questions, provides the reason for selecting it, and indicates currently available sources of international data for the item.

IPD-Related Items Recommended for SASS

Teacher Inservice Professional Development This question, one of nine parts of item 12 in the Teacher Questionnaire, asks the teacher APPROXIMATELY how many hours per week he/she spends on each of the activities outside the formal school day, with five options: none, less than 1 hour, 1-2 hours, 3-4 hours, or more than 4 hours. Item 12f pertains to IPD:

> 12f. professional reading and development activity (e.g., seminars, conferences, etc.)

This item is disappointing as an IPD question because it does not separate reading from other professional development activities and gives no information on the prevalence of individual types of IPD. It is however, the only TIMSS question that addresses IPD directly. Although the 1993-1994 SASS contains several items related to IPD (Public School Teacher Questionnaire items 30, 31, 32, and 35), the information in TIMSS item 12f cannot be derived from the SASS items. Country comparisons are of sufficient interest to warrant adding item 12f to SASS.

Beaton and his colleagues (1996a, p148 and 1996b p141) report country data for item 12f. The average number of hours per week that students' mathematics teachers spend on professional reading and development ranges from 0.5 for Iran and Ireland to 2.8 for Israel, while the corresponding U.S. figure is 0.9. The range for students' science teachers is from 0.5 for Canada to 3.3 for Israel, and the corresponding U.S. figure is 1.0[12].

Principal's Activities This question asks the principal about how many hours per month he/she usually spends on each of 14 activities. Only four of the activities are proposed for SASS:

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[12]It is important to note that all teacher data for TIMSS are reported for the teachers of the representative samples of students assessed. The responses to the mathematics teacher questionnaire do not necessarily represent all of the eighth-grade mathematics teachers in each of the countries. See Beaton (1996b, p.131-2) for a more detailed discussion of this approach.

f. Giving a demonstration lesson
g. Discussing educational objectives with teachers
h. Initiating curriculum revision and/or planning
l. Training teachers

Item g, *discussing educational objectives with teachers* is one method of providing clear purposes and outcomes, one of the characteristics that Loucks-Horsley et al.(1989) list as related to an environment that is supportive of professionalism. The other three activities are modes of demonstrating leadership and support of inservice professional development, another characteristic that Loucks-Horsley and her colleagues found typical of a school environment that is supportive of IPD. The published reports do not include country data for this item. (Another activity in this question--m. *Professional development activities*--appears to be related to IPD, but it is not clear whether it refers to the principal's personal professional development activities or whether it pertains to those of the teachers. Because of this ambiguity, the item is not recommended for SASS.)

Teachers' Cooperation and Collaboration This question asks the principal to respond to three questions by checking one box (Yes or No) for each question.

a. Does your school have an official policy related to promoting cooperation and collaboration among teachers?

b. Are teachers in your school encouraged to share and discuss instructional ideas and materials?

c. Do teachers in your school meet regularly to discuss instructional goals and issues?

This item and the two following items are aspects of school organization that are supportive of teachers' learning and professional development (Gilford, 1996, p.115). Data have not been published for this item.

Teachers' Joint Curriculum Planning Teachers are asked how often they have meetings with other teachers in their subject area to discuss and plan curriculum or teaching approaches. There are seven response options: never, once or twice a year, every other month, once a month, once a week, two or three times a week, or almost every day.

Beaton and his colleagues (1996a, p.145) note that "Opportunities to meet with colleagues to plan curriculum or teaching approaches enable teachers to expand their view of mathematics, their resources for teaching, and their repertoire of teaching and learning skills." They report country data for this item (p. 149 and 1996b p. 142), but collapse the seven

options to four categories. For example, in the United States the percentage of students taught by mathematics teachers who never meet or meet once/twice a year is 29 percent; 37 percent meet monthly or every other month; 26 percent meet once, twice, or three times a week; and 8 percent meet almost every day. The range of countries for the last category is from 1 percent for Hong Kong to 46 percent for Hungary and Slovenia.

Teachers Meeting With Parents Teachers are asked APPROXIMATELY how many hours per week they normally spend on each of the following activities outside the formal school day. Five options are provided: none, less than 1 hour, 1 - 2 hours, 3 - 4 hours, or more than 4 hours. One of the activities is of interest here:

e. meeting with parents.

Beaton and his colleagues (1996a, p148 and 1996b p.141) report country data for this item, but convert the responses to scores: no time=0,less than 1 hour = 0.5, 1-2 hours = 1.5, 3-4 hours = 3.5, and more than 4 hours = 5. In the United States the average number of hours students' mathematics teachers spend on meeting with parents outside the formal school day during the school week is 0.7 hours. The range for this variable is from 0.3 for Ireland to 1.2 for the Russian Federation and Slovenia.

Parents meeting with teachers is one form of parental involvement in schools. In designing the 1993-1994 SASS the educational problems posed by the lack of such involvement was recognized and *lack of parental involvement* was included in a list of problems in the Principal Questionnaire. In the earlier discussion of the Reading Literacy Study a related question on *parent cooperation with the school in terms of support for the school's educational principles or goals* was recommended for SASS. That discussion includes two research findings: parental cooperation is important in discriminating between more effective and less effective schools in reading, and there is a positive relationship between parental support for the school and mean level of reading comprehension for fourth grade classes in the school. Results of a similar analysis of TIMSS data on the relationship between the amount of time teachers spend meeting with parents and student achievement in mathematics and science have not yet been published.

Recommended Items that Are not IPD-Related

The rationale for including the items on *computer availability* and *total instructional time* in SASS has already been discussed. TIMSS data on computer availability and total instructional time have not yet been released. Some TIMSS information is available, however, about instructional time for mathematics and science classes (eighth-grade U.S. students spend more hours of mathematics and science instructional time per year

than do students in Germany and Japan). The findings for mathematics and science are of sufficient interest to warrant a closer look at total instructional time.

Data Items in Both SASS and TIMSS

A number of items in TIMSS can be used to provide international comparisons with SASS data, and some of them can be used in analysis of the IPD-related data. Data for some of these items (teacher certification requirements; age and gender of mathematics and science teachers; and years of experience of mathematics and science teachers) have been published (Beaton et al., 1996a and 1996b). The TIMSS school questionnaire and SASS questionnaires include questions on geographic location of the school, grade levels in the school, number of FTE staff by type, and number of full- and part-time classroom teachers. Items more directly related to IPD or school environment include a TIMSS item on who has primary responsibility for each of a list of activities (some are in item 45 of the SASS teacher questionnaire) and an item on shortages or inadequacies that affect school's capacity to provide instruction (some are in item 47 of the SASS teachers questionnaire).

An item of particular relevance to IPD is *teacher's control of classroom*. The four parts of TIMSS item 14 in the TIMSS Teacher Questionnaire for Population 2 (eighth grade) pertains to teacher's control of classroom. The 1993-1994 SASS included three of the four parts, as shown in parentheses following the TIMSS question below. In this question teachers are asked how much influence (none, little, some, or a lot) they have on each of the following:

a. subject matter to be taught (SASS item 45b)

b. specific textbooks to be used (SASS item 45a)

c. the amount of money to be spent on supplies (SASS item 44d)

d. what supplies are purchased (not in SASS)

A recent study of the effects of professionalization of teachers on their commitment to their teaching careers found that schools with a higher level of teacher classroom autonomy had higher levels of teacher commitment (U.S. Department of Education, 1997). It is important to understand the variability in the extent of teachers's control, e.g., by type of school, teacher's subject matter, and teacher's years of experience. The TIMSS data for this item have not yet been published.

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PART V

RECOMMENDED ITEMS: SUMMARY AND PRIORITIES

The report recommends 33 items that might be included in SASS 1999-2000. They include a number of IPD-related items and a few general items from three IEA surveys: the Reading Literacy Study, the Computers in Education Study, and the Third International Mathematics and Science Study. In addition, types of analyses that could be made with the recommended items are described for most of the items. As noted in Part III, the Computers in Education Study is the richest study of the three with respect to items directly related to IPD. On the other hand it provides international data for relatively few countries and the data, which were collected in 1992, are rather old. TIMSS has the largest number of countries (50 participating and valid data for over 40) and is the most recent study, with data collection in 1994 and 1995. Unfortunately it contains only one question directly related to IPD. The Reading Literacy Study is midway between the CompEd study and TIMSS with respect to number of IPD items (two items directly related to IPD), and 32 participating countries. The RLS has the oldest data, however, with data collection in 1991. By the time reports with state and nation comparisons could be prepared from the 1999-2000 SASS, data from the RLS and the CompEd study will probably be ten or eleven years old and TIMSS data will be seven years old.

Table VIII shows the number of recommended items in each survey for each type of questionnaire and for three types of items:

direct measures of IPD,

items related to IPD because they describe a school environment that is supportive of IPD (and also associated with effective school reform), and

general items that would be useful in a profile of IPD in states and nations either as classification variables or because they are strongly associated with student achievement.

Each table cell contains three numbers: the first is the number of items directly related to IPD, the second is the number of school environment items, and the third is the number of general items. For the CompEd study the questionnaires and items in the table correspond to the alternative procedure suggested in Part III that modifies the SASS Teacher Questionnaire to be a Teacher and Computer Coordinator Questionnaire and also embeds the Computer Education Teacher items in the questionnaire. The SASS 1993-1994 subject matter list for teachers includes the subject "computer science", for SASS 1999-2000 it would be desirable to

modify this to "computer science (computer education)" even if none of the recommendations for CompEd items are adopted.

TABLE VIII

RECOMMENDED ITEMS FOR EACH SURVEY BY RESPONDENT TYPE

QUESTIONNAIRE	SURVEY		
	CompEd Schools with grades 5, 8, or 11	RLS Schools with grades 4 or 9	TIMSS Schools with grades 3, 4, 7, 8, 12
Principal (School)	0, 2, 1[13]	0, 4, 1	0, 3, 2
Teachers (in Grades 5, 8, & 11 who use computers in instruction)	5, 0, 0		
and computer coordinators	1, 3, 2		
Reading Teachers (in grades 4 & 9)		3, 1, 1	
Science and Mathematics Teachers (in Grades 3, 4, 7, & 8)			1, 2, 1
TOTAL ITEMS	6, 5, 3	3, 5, 2	1, 5, 3

Response Burden for the Recommended Items

The total response burden for different types of respondents depends on the difficulty of the items and the number of respondents. The total burden for the 13 items for principals is not large since there is only one respondent per school. The burden for teachers is considerably larger since many more

[13] The three numbers in each table cell represent, in order, the number of IPD items, the number of school environment items related to IPD, and the number of items not related to IPD.

teachers would be involved: five CompEd items for all teachers in grades 5, 8, and 11 who use the computer in their classes for instructional purposes; six RLS items for grade 4 and 9 reading teachers; and four TIMSS items for science and mathematics teachers in grades 3, 4, 7, and 8. Teachers in grades 3, 5, 7, and 9 would respond to items from only one of the three IEA studies, while teachers in grades 4 and 8 would respond to two sets of questions. The burden for computer coordinators is also small: six CompEd items in the questionnaire for Teachers and Computer Coordinators.

As can be seen from Appendices B, C, and D, most of the questions are relatively easy to answer--less than half the items have more than five parts. For these items, with two exceptions, the parts of the items require only "yes" or "no" answers or checking one of three or four alternatives. The exceptions are CompEd item 37 and RLS item 26. The *Computer Coordinators' CompEd item, Activities not Related to IPD,* requires an estimate of hours per week spent on each of six activities. The RLS item request principals to rank eight activities in order of importance in work as a school principal.

The total burden of including all 33 recommended items would not be great. Should that not be feasible, the next section provides a rationale for prioritizing the items.

Priority Items for Inclusion in SASS 1999-2000

To facilitate consideration of the relative priority of the items they have been listed in Table IX. Top priority obviously should be given to the 10 items directly related to IPD: six items from CompEd, three from RLS, and one from TIMSS. The next priority would go to the other eight items from TIMSS because they provide recent data for a large number of countries. A possible exception is the item *Time Spent on School-Related Activities Other than IPD Outside the Formal School Day.* Although this information would be useful to teachers and might be useful in clarifying variation in equality of teacher commitment for different groups of teachers, it has little to do with professional development.

To assign priorities to the remaining school environment items, three criteria are used:

Is the item strongly associated with professional development?

Does the item provide information that complements one of the top priority items?

Is the item associated with high student achievement?

TABLE IX
Priorities for Items Recommended for SASS 1999-2000
Classified by Questionnaire

ITEMS RELATED TO IPD:		
Teacher (and Computer Coordinator) Questionnaire		
Teacher		
1[14]	RLS	Further Education in Reading
1	RLS	Inservice Reading Education
1	RLS	General Reading Interests
1	CompEd	Knowledge and Skill Level
1	CompEd	Instructional Problems Experienced
1	CompEd	Perceived Need for Training
1	CompEd	Topics Taught in Teacher Training
1	CompEd	Topics Taught in Computer Education Lessons
1	TIMSS	Inservice Professional Development
Computer Coordinator		
1	CompED	Time on IPD Activities
ITEMS RELATED TO SCHOOL ENVIRONMENT THAT IS SUPPORTIVE OF IPD		
School or Principal Questionnaire		
3	RLS	School Resources
3	RLS	Community Resources
2	RLS	Parent Cooperation
2	RLS	Principal's Activities
3	CompEd	Support for Training
3	CompEd	Coordination among Teachers
1	TIMSS	Principal's Activities
1	TIMSS	Teachers' Cooperation and Collaboration
1	TIMSS	Teachers' Joint Curriculum Planning
Teacher (and Computer Coordinator) Questionnaire		
Teacher		
2	RLS	Principal Discusses with Teacher
1	TIMSS	Joint Curriculum Planning
1	TIMSS	Meeting with Parents

[14]The numbers at the left of the table signify the priority assigned to the item: "1" for top priority, "2" for moderate priority, and "3" for low priority.

Computer Coordinator

2	**CompEd**	**Availability and Type**
1	**CompEd**	**Availability of Computer Training for Teachers at School**
3	**CompEd**	**Teacher's Control of Resources**

ITEMS THAT ARE NOT IPD-RELATED

School or Principal Questionnaire

1	**RLS**	**Books in Library**
	RLS	**Total Instructional Time**
1	**CompEd**	**Teacher Certification Requirements Include Computer Education**
1	**TIMSS**	**Computer Availability**
1	**TIMSS**	**Total Instructional Time**

Teacher (and Computer Coordinator) Questionnaire

Teacher

3	**TIMSS**	**Time Spent on School-Related Activities Other than IPD Outside the Formal School Day**

Computer Coordinator

2	**CompEd**	**Percentage of Students Receiving Instruction about Computers**
3	**CompEd**	**Computer Coordinators' Activities not Related to IPD**

Using these criteria, an additional CompEd item, *Availability of Computer Training for Teachers at School*, was assigned top priority because it is closely related to professional development. Four items were assigned priority 2: the RLS item on *Parent Cooperation* because it complements the TIMSS item on this topic; the RLS item on *Principal's Activities* because it will measure the relative importance principals assign to professional development; the RLS item *Principal Discusses with Teacher* because one of the five items is directly related to professional development and a second pertains to a supportive environment for professional development; and the CompEd item: *Availability and Type of Computer Coordinator* because the computer coordinator assists teachers in professional development. The CompEd item on *Coordination among Teachers* is assigned a low priority because it is focused solely on computer-related coordination, whereas the TIMSS question applies to all coordination among teachers. The remaining items are also assigned low priority. Although some of the IPD-related school environment items have been assigned middle and low priority, it should be remembered that all of them are also associated with effective school reform and therefore can also be useful in that regard.

Among the items that are not IPD-related, there are two TIMSS items that have already been given top priority. The first, *Computer Availability*, would be useful as a classification variable in conjunction with the CompEd items. The second item, *Total Instructional Time*, which occurs in both RLS and TIMSS questionnaires, is useful because it is associated with student achievement. Since the TIMSS item has already been assigned top priority, no priority is assigned to the RLS item. Two other items in this group are assigned a top priority: the CompEd item, *Teacher Certification Requirements Include Computer Education* and the RLS item, *Books in Library*. The CompEd item because it will help understand the future need for inservice professional development in this field, and the RLS item because it is highly correlated with reading achievement and could be used as a classification variable in analyzing the RLS items related to IPD.

The item, *Percentage of Students Receiving Instruction in Computer Education*, is assigned a moderate priority as a useful classification variable, especially for the IPD items related to computer education. The remaining items from CompEd and TIMSS that are not IPD-related are assigned a low priority, but they could be useful in identifying ways to increase the time computer teachers and coordinators can spend on IPD.

A Final Comment on the Recommended Items

A great deal of useful information could be obtained by incorporating the recommended items in the 1999-2000 SASS. As indicated throughout the paper the data would lend themselves to many analyses relevant to important policies in current U.S. education. As one last warning to the reader and to the analyst who might use the potential data from the recommended items: it is important to place international data in context. The following section discusses why it is important and provides information on a number of sources of such information. The range of information covered in these sources and their obvious relevance to country differences provide an effective argument for placing cross-country comparisons in context.

PART VI

PROVIDING CONTEXT FOR COMPARISONS OF STATE AND NATION IPD DATA

In analyzing the IPD-related data recommended for inclusion in SASS, particularly the interactions among the variables, it is clear that it will be important to recognize the significance of educational influences and cultural context of the various nations and the states (or regions, or other groups of U.S. schools) that are compared. These context variables, which are not measured in SASS or the IEA studies, include historical traditions that account for particular structures of schooling and achievement levels, cultural values, laws, systems of reward, expectations, motivation, and many socioeconomic characteristics. In considering the importance of attention to educational influences, Bradburn and Gilford (1990) note that the interpretation of an international study "...should be considered in the light of participating nations' resources,curricula, graduation requirements, and school-going populations." The importance of contextual information needed to make informed judgments about the successes and failures of the U.S. education system is stressed in the recent NCES publication on *Education Indicators: An International Perspective* (U.S.Department of Education, 1996a). Background information is interspersed with the indicators throughout this publication.

Today's analyst of international education data is fortunate, indeed, because of the numerous international comparative studies in the past decade that have provided information never before available. As more and more international comparisons became possible, concern about misinterpretation of country differences grew. Education researchers responded to this concern with publications describing education systems and providing information on cultural context for multiple countries. In the past two years nine publications providing such information have become available. To help guide the analysts to the publications that would be most useful in their analyses, the following section includes brief descriptions of these publications and one earlier report.

Information on Teacher Preparation and Professional Development

Two reports provide context for IPD data: a report on teacher preparation and professional development in APEC (Asia-Pacific Economic Cooperation) countries (Darling-Hammond and Cobb, 1995), and a report on inservice training of teachers in the countries in the European Union (EURYDICE, 1995).

The APEC Report

The organization for Asia-Pacific Economic Cooperation (APEC) is an organization of 18 economies that border the Pacific Ocean. Twelve members (Australia, Brunei Darussalam, Canada, the People's Republic of China, Hong Kong, Japan, Malaysia, New Zealand, the Republic of Korea, Singapore, Chinese Taipei, and the United States) recently completed a comparative study of teacher training practices by its members. The study report (Darling-Hammond and Cobb, 1995) includes information on induction; ongoing professional development; and participation and incentives to participate in professional development programs for each of the participating members. The countries show a wide variety of approaches to professional development, e.g. in Japan, teachers have 20 or more hours each week for collegial work and planning; visitations to other classrooms and schools; and demonstrations of teaching strategies. In the United States schools provide teachers almost no in-school time for professional development.

The report also provides information for each country on a number of topics other than IPD that are relevant to SASS and could provide interesting and useful comparisons in SASS reports:

the context of schooling

a description of the teaching force: characteristics of teachers and of teaching employment; and supply and demand

characteristics and governance of teacher education programs: characteristics of institutions, policy guidance, and accreditation or approval of teacher preparation programs

nature and content of teacher preparation: goals of teacher education, academic preparation prior to teacher education, preservice teacher preparation curriculum, differences in teacher preparation programs, and links between teacher education curricula and student standards

licensing requirements: initial licensing, continuing requirements for licensure, conditions under which requirements for licensure are waived or altered

policy issues and trends: current policy issues and problems; and policy initiatives

The EURYDICE Report

The Education Information Network in the European Union and the EFTA/EEA Countries (EURYDICE) recently published a report on inservice training of teachers in the 15 European Union countries

that participate in the network and two EFTA/EEA countries (Iceland and Norway) (EURYDICE, 1995). The Executive Summary of the report provides useful cross-national summary tables comparing characteristics of the organization of inservice teacher training:

> the official implementation date of inservice training for pre-primary, primary, lower secondary, and upper secondary teachers.
>
> main features of "inservice training" structures and responsible bodies, type of organization, main training establishments, status (university or non-university), training compulsory or training voluntary
>
> approximate share of budgets allocated to inservice training: education budget as percent of GDP, and percent of the education budget spent on inservice training (ranging from about 0.12 percent in Belgium and Finland to 2 percent in Norway)
>
> teachers requesting participation in inservice training courses in 1991/92 or 1992/93 for each of four levels of schooling (pre-primary, primary lower secondary, upper secondary: teachers requesting participation as a percentage of the total number of teachers concerned, actual participation in inservice training courses

In addition, the Executive Summary lists a variety of measures used to replace teachers attending training courses. It also includes a table presenting the main types of qualifying training offered by governing bodies or Ministries. Statutory leave is granted for such training, during which teachers receive all or a large part of their normal salary. For each country the table shows the availability of qualifying training, the qualification awarded; whether it is awarded for change of position, promotion, or enhanced status; and whether it is accompanied by a salary increase.

The summary concludes with a section on content and practice of inservice training covering several topics: content, trainers, assessment procedures and the European dimension, mobility, and conclusions. It is interesting to note that the aspects of inservice training given the highest priority in the majority of countries are mastery of the **mother tongue**, learning and mastery of **foreign languages** and early learning of them, **multiculturalism** and management of diversity in school populations, and knowledge of and respect for the **environment**. The 14 remaining chapters of the EURYDICE report are country reports with detailed information on teacher training.

Other Contextual Information for Interpreting Country Differences in IPD

Six reports provide information on many aspects of country differences, however, they have less information related to IPD than the two reports in the prior section. The first two discuss both educational and cultural context for countries, while the remaining four provide in-depth information on international education indicators.

The TIMSS Encyclopedia of Education Systems

Staff of the Third International Mathematics and Science Study (TIMSS) recognized the importance of context in interpreting international studies and have compiled information for 38 countries that participated in TIMSS (Robitaille, 1997). According to the *IEA Bulletin* (December 1996), the first two chapters discuss the importance of context in international comparisons, and provide broad patterns of similarities and differences in structure, curriculum, and assessment among countries. The balance of the encyclopedia consists of 38 national chapters, each of which provides information concerning the country's geographic location, economy, political system and other factors that may have a bearing on education. Each chapter contains a description of the nation's education system (governance, decision making, teacher education, and grade structure); details on streaming and tracking; and extensive information on the organization and teaching of mathematics and science. The chapters are supplemented with statistical data from UNESCO, OECD, World Bank, and other sources.

The IAEP Report

The International Assessment of Educational Progress (IAEP) in mathematics and science, conducted by the Educational Testing Service in 1990 and 1991, included a country questionnaire designed to obtain information on some of the unique characteristics and current challenges in each country. It provides information for a few countries that did not participate in TIMSS. In conjunction with the IAEP a series of ethnographic studies of countries participating in IAEP were conducted to describe the qualities of these societies that motivate parents and students to value learning (Lapointe et. al, 1992).

OECD Publications on International Indicators

The Centre for Educational Research and Innovation of the Organisation for Economic Cooperation and Development recently released two publications on education indicators: *Education at a Glance: OECD Indicators* and *Education at a Glance: Analysis* (OECD, 1996a and 1996b). This indicators volume, which provides

data for the OECD countries and three non-OECD countries (Korea, Poland, and the Russian Federation), is the fourth in a series that started in 1992. The publication includes 43 indicators that were selected to measure the current state of education internationally, and that "... can assist policy makers in evaluating student and school performance, monitoring the functioning of education systems, and planning and managing resources and educational services" (OECD, 1996a p. 9).

The indicators are grouped in four chapters: demographic, social and economic context of education; costs of education and human and financial resources; access to education, participation and progression; and school environment and school/classroom processes. The second and fourth chapters contain indicators relevant to IPD: teaching staff as a percentage of the total labor force; number of teaching hours per year in public institutions by level of education; non-teaching activities of headteachers (includes professional development), frequency of informal meetings between headteacher and teachers, frequency of entire teaching staff meetings; and indicators of parental involvement in the schools. The last group of indicators includes percentage of students in schools with structures or procedures for parental involvement in various aspects of the school's decision making process, percentage of students in primary schools where parents are informed on various educational matters by the school, and estimated percentage of parents actually involved in various types of school activities at some time during the year .

The analysis volume (OECD, 1996b) includes four chapters, each of which brings together data on a topic related to current issues in education: An Overview of Enrolment and Expenditure Trends; Educational Outcomes: Measuring Student Achievement and Adult Competence; Transition from School to Work; and Teachers' Pay and Conditions. Each of the chapters draws conclusions based on interpretation of the data, identifies relevant policies, or discusses the implications of alternative policies. The last chapter on Teachers' Pay and Conditions provides some context information for considering IPD across nations. The chapter explores projections of the size of the school-age population and the age distribution of current teachers, noting that it will be essential to make teaching attractive to new entrants. The authors then explore the variability across countries in teacher salary and teaching conditions such as teaching hours and class size. Trade-offs among these variables in several countries are described. The report documents the rapid growth in teacher pay in the past decade and declines in pupil-teacher ratios in some countries that have contributed to rising costs per student in most OECD countries. The chapter concludes by considering the implications of teacher pay policies for spending on education.

NCES Publications on International Indicators

Two recent NCES publications, *Education Indicators: An International Perspective* and *International Education Indicators: A Time Series Perspective* (U.S. Department of Education, National Center for Education Statistics, 1996 and 1997) have compiled a comprehensive set of education indicators from a variety of sources. These reports differ from the OECD reports because they are geared to a U.S. audience. They focus on the United States and present indicators that are important to the policy interests in the United States.

The first report includes sections on indicators of participation and student flows; achievement and attainment; education and labor market destinations; education institutions (including indicators on teachers and teaching); contextual factors; and societal support for education. It also provides matrices of comparative information on countries' education systems. The second report, which provides a time series perspective, includes twelve indicators presented in five sections: the social and economic context of education; participation in education; human and financial resources (which includes aa useful discussion of trends in student-teacher ratios in the public sector); system outcomes; and labor market outcomes.

Other Reports that Provide Country Context for Education

Two additional publications that provide information about national systems of education are the *International Encyclopedia of National Systems of Education*, Second Edition (Postlethwaite, Ed., 1995) and the TIMSS report on mathematics achievement (Beaton et al., 1996a). The former contains 152 articles on national systems of education covering a number of topics including general background information, e.g., geographical, social structure, and economic factors; polices and goals of the educational system; and personnel for the education system. The TIMSS report includes five tables of information for TIMSS countries: selected demographic characteristics, public expenditure on education at primary and secondary levels ,and tables showing the TIMSS countries in which decision-making regarding curriculum syllabi, textbooks, and examinations is nationally centralized, regionally centralized or not centralized.

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APPENDIX A

COUNTRIES PARTICIPATING IN IEA STUDIES[15] [16]

Country	Computers in Education	Reading Literacy	Science and Math.
Total Number	12	32	45
Argentina			(X)
Australia			X*
Austria	X		X*
Belgium (Flemish)			X
Belgium (French)		X	X*
Botswana		X	
Bulgaria	X		X*
Canada			X
Canada/BC		X	
Columbia			X*
Cyprus		X	X
Czech Republic			X
Denmark		X	X*
England			X

[15] The TIMSS reports available at this time (Beaton et al., 1996a and 1996b) do not include data for the countries whose participation in indicated in parentheses, i.e. as "(X)". Argentina, Italy, and Indonesia were unable to complete the steps necessary for their data to appear in the reports. Because the characteristics of its school sample are not completely known, achievement results for the Philippines are not included in these reports in the tables comparing countries. Mexico participated in the testing portion of TIMSS, but chose not to release its results at grades 7 and 8 in the international reports.

[16]TIMSS countries that did not meet the standards established for coverage of the target population, participation rates, and the age of students are tabulated separately from the 25 countries that met the standards. Countries failing to meet the guidelines for sample participation rates are Australia, Austria, Bulgaria, and the Netherlands. Countries not meeting age/grade specifications (high percentage of older students) are Columbia, Germany, Romania, and Slovenia. Countries with unapproved sampling procedures at classroom level are Denmark, Greece, South Africa, and Thailand. Countries with unapproved sampling procedures at classroom level and not meeting other guidelines are Israel and Kuwait. All of these countries are shown with an asterisk i.e. "X*".

COUNTRIES PARTICIPATING IN IEA STUDIES (continued)

Country	Computers in Education	Reading Literacy	Science and Math.
Finland		X	
France		X	X
Germany	X		X*
Germany (GDR) (East)		X	
Germany (FRG) (West)		X	
Greece	X	X	X*
Hong Kong		X	X
Hungary		X	X
Iceland		X	X
India	X		
Indonesia		X	(X)
Iran, Islam Republic			X
Ireland		X	X
Israel	X		X*
Italy		X	(X)
Japan	X		X
Korea, Republic of			X
Kuwait			X*
Latvia	X		X
Lithuania			X
Mexico			(X)
Netherlands	X	X	X*
New Zealand		X	X
Nigeria		X	
Norway		X	X
Philippines		X	(X)
Portugal		X	X
Romania			X*
Russia			X
Scotland			X*
Singapore		X	X
Slovak Republic			X
Slovenia	X	X	X*
South Africa			X*
Spain		X	X

COUNTRIES PARTICIPATING IN IEA STUDIES (continued)

Country	Computers in Education	Reading Literacy	Science and Math.
Sweden		X	X
Switzerland		X	X
Thailand	X	X	X*
Trinidad & Tobago		X	
United States	X	X	X
Venezuela		X	
Zimbabwe		X	

APPENDIX B

Reading Literacy Study
Table I items from the Teacher Questionnaire

11. **Approximately how many courses have you completed related to the teaching of reading since your initial teacher certification?** *(Circle only one.)*

None	1
One	2
Two	3
Three	4
Four or more	5

12. **How many times have you been to in-service teacher training courses in reading in the last three years?** *(Circle one number only.)*

None	1	(Go to Q.15)
Once	2	
Twice	3	
Three times	4	
Four or more times	5	

17. **About how often do you read each of the following?** *(Circle one number per line only.)*

		Never or almost never	About once a year	About once a term	About once a month	About once a week or more
a.	Articles on teaching	1	2	3	4	5
b.	Articles on reading	1	2	3	4	5
c.	Books on history or politics	1	2	3	4	5
d.	Books on the arts	1	2	3	4	5
e.	Books on science	1	2	3	4	5
f.	Novels or short stories	1	2	3	4	5
g.	Poems	1	2	3	4	5
h.	Plays	1	2	3	4	5
i.	Books for children	1	2	3	4	5

64. **Does the school principal (or deputy principal) ...** *(Circle one number per line only.)*

		No	Yes
a.	discuss explicit achievement standards for the subject that you teach?	1	2
b.	ask for evaluation results or progress of your students in reading?	1	2
c.	make suggestions about the choice of instructional methods in reading?	1	2
d.	encourage contacts among teachers?	1	2
e.	initiate activities directed at the professional development of teachers?	1	2
f.	make suggestions about the content that must be covered in reading?	1	2

Reading Literacy Study
Table I items from the Principal Questionnaire

6. **Please indicate the availability of the following resources in relation to your school?** *(Circle one number on each line.)*

	Not readily available	Available in neighboring town or city (less than 2 hours of normal one way travel time)	Available locally (within 30 minutes of normal one way travel time)
Public library	1	2	3
Bookstore/book department in a store	1	2	3
Secondary level school	1	2	3
A higher education institution	1	2	3
Museum	1	2	3

8. **Which of the following resources and activities are there in your school?** *(Circle one number on each line.)*

	No	Yes
School library	1	2
Reading room for students	1	2
Student/school newspaper or magazine	1	2
Teacher (Professional) library	1	2

7. **What is the degree of parent cooperation with the school in terms of support for the school's educational principles or goals (compared with other schools you know)?** *(Circle one only.)*

Much below average	1
Below average	2
Average	3
Above average	4
Much above average	5

26. **Please rank the following activities in order of importance in your work as a school principal.** *("1" is the most important activity, "8" is the least important activity, "NA" = not applicable. Do not assign equal rankings.)*

		Rank of Importance
a.	Representing the school at official meetings	_____
b.	Evaluation of staff	_____
c.	Contacts with local community (e.g., parents, community organizations, local industry)	_____
d.	Discussing educational objectives with the teaching staff	_____
e.	Administrative tasks concerning the functioning of the school (e.g., regulations, disciplinary duties, school budget, timetable)	_____
f.	Using records of students' progress	_____
g.	Taking care of issues of student welfare and guidance	_____
h.	Activities aimed at the professional development of teachers	_____

Reading Literacy Study
Table III items from the Principal Questionnaire

9. **Approximately how many books with <u>different titles</u> does your school library contain?** *(Exclude magazines and periodicals.)*

_____ Books with different titles

Teacher Questionnaire - 4th Grade

14. **What is the <u>total instructional time</u> (in hours and minutes), excluding breaks, for this class in a typical week?** *(For all subject areas.)*

_____ Hours and _____ Minutes per week

APPENDIX C

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire

(These items are for the SASS Teacher and Computer Coordinator Questionnaire for all teachers in grades 5, 8, and 11 who use the computer for instructional purposes.)

A. Self-Rating Items

Please indicate below what you have learned so far about computers.
For each particular statement, please circle "yes" or "no".

I know . . .

Several advantages of computer use for instruction	yes	no
The difference between a word processor and a desktop publishing program	yes	no
Criteria to judge the quality of a printer	yes	no
The trends in hardware development in the past 20 years	yes	no
What 'file extensions' are	yes	no
What a 'loop' means in programming	yes	no
What a 'relational database' is like	yes	no
What a 'bit' is defined as	yes	no
The difference between 'RAM' and 'ROM'	yes	no

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

I can write a program for . . .

Adding up numbers	yes	no
Using arrays	yes	no
Storing data on a disk drive	yes	no
Sorting data into a certain sequence	yes	no
Printing the complete ASCII character set	yes	no

I am capable of . . .

Exchanging data between different types of computers	yes	no
Copying files from one disk to another	yes	no
Editing documents with a word processor	yes	no
Loading a data set from a disk drive	yes	no
Creating a database-file	yes	no
Evaluating the usefulness of software for my lessons	yes	no
Adapting instructional software to my needs	yes	no
Writing courseware for my own lessons	yes	no

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

B. Problem List

For each of the following problems, please indicate the seriousness of the problem that you experience in using computers for computer education in the target class. *Please read and respond to each alternative.*

Problem	*Seriousness of problem*		
Instruction			
Not enough help for supervising computer using students	not at all	minor	major
Difficult to integrate computers in my classroom instruction practices	not at all	minor	major
Integration of computer use in the existing prescribed class curriculum is difficult	not at all	minor	major
I lack knowledge / skills about using computers for instructional purposes	not at all	minor	major
Insufficient expertise / guidelines for helping me to use computers instructionally	not at all	minor	major
Organization / administration			
Insufficient training opportunities for me	not at all	minor	major
Lack of support or initiatives from the school administration	not at all	minor	major

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

20. Below are statements about the use of computers and their impact on society.
Please indicate for each of the following statements your personal opinion.
Try to give a spontaneous reaction by circling one opinion for each statement.

Statement	Opinion				
	Strongly disagree	Slightly disagree	Uncertain	Slightly agree	Strongly agree
I try to keep myself informed about technological changes	☐¹	☐²	☐³	☐⁴	☐⁵
I would like to take part in a computer course to learn more about computers .	☐¹	☐²	☐³	☐⁴	☐⁵
In-service training courses about computers should be made compulsory .	☐¹	☐²	☐³	☐⁴	☐⁵
I would like to learn more about computers as teaching aids	☐¹	☐²	☐³	☐⁴	☐⁵
I don't mind learning about computers .	☐¹	☐²	☐³	☐⁴	☐⁵

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

C. Training Topics

For each of the following computer-related topics, indicate whether you learned about it during teacher and/or in-service training?
Please, circle one answer for each topic.

Topic		
Computers and society		
History / evolution	yes	no
Relevance (e.g. for citizen, industry, education)	yes	no
Impact of computer applications (e.g. social, economical)	yes	no
Ethical issues (e.g. copyright, privacy)	yes	no
Applications		
Editing / word processing / desktop publishing	yes	no
Drawing / painting / illustrating	yes	no
Spreadsheets	yes	no
Database management	yes	no
Statistical application programs	yes	no

Note that this item is also to be repeated with the lead question changed to: For each of the following computer-related topics, indicate whether you taught them in your classes.

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

Topic

Artificial intelligence / expert systems	yes	no
Authoring languages	yes	no
Models and simulations	yes	no
Laboratory instrumentation	yes	no
Scanning / image processing	yes	no
CAD / CAM / process control / robotics	yes	no
Telecommunications (e.g. electronic mail) / networks	yes	no
Educational games / recreational games	yes	no
Music generation	yes	no

Problem analysis and programming

General concepts (e.g. file, variable, array, loop, etc.)	yes	no
General procedures (e.g. debugging)	yes	no
Structure of programs (e.g. input, output, storage of data flow control)	yes	no
Programming languages (e.g. Basic, Assembler, Pascal, Fortran)	yes	no
Problem analysis (e.g. flowchart, story board, algorithms)	yes	no

Computer Education Study
Table IV items from the Computer Education Teacher Questionnaire (continued)

Training Topics

Topic

Principles of hard-and software structure

Basic concepts about computers and computer systems	yes	no
Hardware (e.g. computer architecture, CPU, data flow control)	yes	no
Software (e.g. software architecture, system software)	yes	no

Pedagogical / instructional aspects

Application of drill / practice / tutorial programs	yes	no
Locate overviews of existing software	yes	no
Evaluation of software	yes	no

Pedagogical / instructional aspects

Integration of software in existing lessons	yes	no
Organization of computer use during lessons	yes	no

Other *(please specify)* _____

Computer Education Study
Table IV items from the Computer Coordinator Questionnaire
(These items are for the SASS Teacher and Computer Coordinator Questionnaire for all teachers in grades 5, 8, and 11 who use the computer for instructional purposes.)

37. **Roughly how many hours per week, on the average, do you spend in the following ways?** (*If you also work at other schools, count only the hours spent for THIS school.*)

	Hours per week (estimate)
a) Teaching students about computers and how to use them (including programming, word processing, etc.)	_____
b) Supervising students' computer use for other school subjects	_____
c) Training or helping teachers learn to use computers	_____
d) Selecting and providing computer-based instructional materials	_____
e) Keeping equipment and programs in working order	_____
f) Writing (or adapting) instructional software	_____
g) Writing lesson plans integrating computer activities into curricular objectives	_____
h) Developing your own computer-related skills	_____
i) Other computer-related activities (please specify): _____	_____

35. **Do you or someone else at your school function as a "computer coordinator" (informally or formally) — that is, someone on the school staff who coordinates teachers' instructional use of computers and/or helps other teachers use computers?** (*Check the ONE BEST description for that person. If there is more than one person, describe the one person who spends the most time at this task.*)

- A full-time school-level computer coordinator (who does not teach classes) ☐1
- A full-time regular teacher who also has the title of computer coordinator ☐2
- One teacher INFORMALLY provides leadership to other teachers who use computers ☐3
- A district-level computer coordinator serves this function at our school ☐4
- The principal or another school administrator provides this function ☐5
- A part-time teacher serves as a computer coordinator ☐6
- Another person (please describe):_____ ☐7
- NO ONE coordinates — teachers who use computers work out their own arrangements — if so, check this box and skip to Q.41 ☐8

Computer Education Study
Table IV items from the Computer Coordinator Questionnaire (continued)

34. **Which of these formal staff development activities are readily available for teachers at your school- and through what agencies?** *(For each, check one or more choices, as appropriate. If the activity is available through some other source than those listed, please specify the source under "Other.")*

	Not available	School	District	College	Other
a) Introductory courses in using computers	☐1	☐2	☐3	☐4	____5
b) How to use application programs (e.g., word processors, spreadsheets)	☐1	☐2	☐3	☐4	____5
c) How to use computers in specific subjects ..	☐1	☐2	☐3	☐4	____5
d) Computer programming instruction	☐1	☐2	☐3	☐4	____5
e) Computer electronics instruction	☐1	☐2	☐3	☐4	____5
f) Computer science courses for technical subjects	☐1	☐2	☐3	☐4	____5
g) Educational software development	☐1	☐2	☐3	☐4	____5
h) Evaluation of software using teaching	☐1	☐2	☐3	☐4	____5
i) Other (specify):_____	☐1	☐2	☐3	☐4	____5

25. **Schools make decisions about computers in different ways — decisions such as what additional hardware and software should be acquired and which uses of computers should get priority. At your school, who mainly makes each of the following kinds of decisions?** *(Check the one or two MAJOR deciders for each type of decision below.)*

(Note: Include a district computer coordinator under "district." Check "Comp. coord." for school-level coordinators only. If none of the choices are appropriate, write in your own explanation.)

	District	School admin.	Comp. coord.	Group of teachers	Each teacher	Other (write title below)
a) Computer acquisition decisions	☐1	☐2	☐3	☐4	☐5	_____6
b) Software acquisition decisions	☐1	☐2	☐3	☐4	☐5	_____6
c) Where computers should be located in the school	☐1	☐2	☐3	☐4	☐5	_____6
d) Allocating computer time among classes, subjects, and uses	☐1	☐2	☐3	☐4	☐5	_____6
e) The content of computer literacy classes or units	☐1	☐2	☐3	☐4	☐5	_____6
f) The software to be used in a particular class	☐1	☐2	☐3	☐4	☐5	_____6

Computer Education Study
Table IV items for Principals

11. **To implement computer use effectively, some schools find outside assistance valuable. Others have trouble getting that help. In your case, please indicate how outside groups and agencies have provided help and support for school computer activities in these four areas:**

TEACHER TRAINING	⇔ Training in the operation and use of computer hardware and software
INSTRUCTIONAL SUPPORT	⇔ So that teachers improve their use of computers, including integrating their use with the curriculum and organizing their use in the classroom

Consider each column ("area of support"), and check the boxes for ALL groups that have given important support to your school in that area in the last several years. "Important support" means that your school's use of computers would have clearly been different without their support. If no group has given important support in one of these areas, check the box for "None" for that area of support.

Group or Agency	Area of Support	
	Teacher training	Instructional support
U.S. government	☐[3]	☐[4]
State government	☐[3]	☐[4]
School district and its personnel (including district computer coordinator)	☐[3]	☐[4]
Other education agencies including regional resource centers	☐[3]	☐[4]
Teachers at other schools	☐[3]	☐[4]
Computer manufacturers	☐[3]	☐[4]
Software producers	☐[3]	☐[4]
Local computer retailer	☐[3]	☐[4]
Local businesses (other than computer stores)	☐[3]	☐[4]
Colleges or universities	☐[3]	☐[4]
Parents	☐[3]	☐[4]
Computer clubs and hobbyists	☐[3]	☐[4]
Teacher associations	☐[3]	☐[4]
Other associations	☐[3]	☐[4]
Other (please specify)_____	☐[3]	☐[4]
None (no group has given that type of support)	☐[3]	☐[4]

Computer Education Study
Table IV items for Principals (continued)

5. **Since last September how often have each of these activities taken place at your school?** *(Check one choice for each type of activity.)*

	How often since September?			
	Not at all	Some weeks	Most weeks	Every week
Teachers met to exchange information about the use of computers	☐¹	☐²	☐³	☐⁴
A teacher exchanged information about computers with teachers at other schools	☐¹	☐²	☐³	☐⁴
We assessed how the computers were being used and made organizational adjustments accordingly	☐¹	☐²	☐³	☐⁴

Table V Items from the Computer Coordinator Questionnaire
(These items are for the SASS Teacher and Computer Coordinator Questionnaire for all teachers in grades 5, 8, and 11 who use the computer for instructional purposes.)

28. **Roughly, what percentage of students in each of the following grades receive instruction about computers as part of the school curriculum, and how many hours of instruction during the school year do students at those grades typically receive?** ***Estimates are sufficient; ignore grade levels not present at your school and those omitted from the list below.***

Instruction ABOUT computers	**Percent of students**	**Hours per year**
a) Grade 10	_____	_____
b) Grade 11	_____	_____
c) Grade 12	_____	_____

Item 37. a, b, d, e, f, and i: Activities not Related to IPD. Computer Coordinator's See Item 37 in Table IV

Computer Education Study
Table V items for Principals

6. **Some schools, districts, and states establish specific policies about computer use. For each policy area described below, indicate whether your school, school district, or state has established any policies in that area for schools like yours.**

(If no policies in an area affect your school, check "No Policy" on that line. If policies exist at more than one level, check ALL levels that apply. Treat an "intermediate administrative unit" as a "state" agency.)

Policy area	Policy maker			
	No policy	School policy	District policy	State policy
A policy requiring a minimum amount of computer training for certification of teachers of other subjects	☐[1]	☐[2]	☐[3]	☐[4]

APPENDIX D

Components of TIMSS[17]

Achievement tests and performance assessments

Different topics were covered in the tests for students in each of the three grades, The eighth grade test (at this time assessment data have been released only for grade eight) covered the following topics:

Mathematics

- Fractions and number sense
- Geometry
- Algebra
- Proportionality
- Data representation. analysis and probability
- Measurement

Science

- Earth science
- Life science
- Physics
- Chemistry
- Science and the environment

Questionnaires

Student Survey

- Attitudes toward mathematics and science
- Personal/academic backgrounds and education
- School experiences
- Career/educational goals

Teacher Surveys

- Teacher background
- Instructional practices
- Pedagogical beliefs
- Views about mathematics and science as disciplines

School Administrator Surveys

- Curricula
- School climate organization
- Staffing levels
- Availability of services

Country-Level Surveys

- Information on each educational system's structure

[17]Source: (Owen, 1996)

Components of TIMSS (continued)

Curriculum analyses

The curriculum content of more than 1,600 mathematics and science textbooks and curriculum guides was analyzed to obtain the following information:

- **When** topics are introduced
- **How long** they remain in the curriculum
- When (if ever) they **receive special attention**
- The emphasis **a particular topic** is given in mathematics or science textbooks
- **How many other topics** are competing for students' attention
- What students are **expected to be able to do** with the mathematics and science they learn

Videotapes

Videotapes of a nationally representative sample of eighth grade mathematics classrooms provide information on five topics:

- Lesson organization
- Mathematics content
- Instructional methods
- The nature of mathematics discourse
- Teachers' understanding and implementation of reform initiatives

Case Studies

Ethnographic case studies in the U.S., Japan, and Germany addressed four topics:

- Implementation of national standards
- Working environment and training of teachers
- Role of secondary schools in adolescents' lives
- Ability differences and tracking

APPENDIX E

Third International Mathematics and Science Study
Table VI items from the Teacher Questionnaire

12. APPROXIMATELY how many hours per week do you normally spend on each of the following activities outside the formal school day?

Check one box in each row.

	none	*less than 1 hour*	*1 - 2 hours*	*3 - 4 hours*	*more than 4 hours*
e) meeting with parents	☐	☐	☐	☐	☐
f) professional reading and development activity (e.g., seminars, conferences, etc.)	☐	☐	☐	☐	☐

13. About how often do you have meetings with other teachers in your subject area to discuss and plan curriculum or teaching approaches?

Check one box only.

- never ☐
- once or twice a year ☐
- every other month ☐
- once a month ☐
- once a week ☐
- two or three times a week ☐
- almost every day ☐

Third International Mathematics and Science Study
Table VI items from the Principal Questionnaire

11. As principal of this school, about how many hours per month do you usually spend on each of the following activities?

Please indicate the approximate number of hours for each item. Please write 0 (zero) if no time is spent on an activity.

	hours per month
f) Giving a demonstration lesson	_____
g) Discussing educational objectives with teachers	_____
l) Training teachers	_____

10. Cooperation and Collaboration:

	Check one box for each line. *Yes*	*No*
a) Does your school have an official policy related to promoting cooperation and collaboration among teachers?	☐	☐
b) Are teachers in your school encouraged to share and discuss instructional ideas and materials?	☐	☐
c) Do teachers in your school meet regularly to discuss instructional goals and issues?	☐	☐

13. How much influence does each of the following have in determining the curriculum that is taught in your school?

Check one box in each line.

	none	*a little*	*some*	*a lot*
f) Teachers (collectively for the school)	☐	☐	☐	☐
g) Teachers (of same subject) as a group	☐	☐	☐	☐
h) Each teacher individually	☐	☐	☐	☐

Listing of NCES Working Papers to Date

Please contact Ruth R. Harris at (202) 219-1831
if you are interested in any of the following papers

Number	Title	Contact
94-01 (July)	Schools and Staffing Survey (SASS) Papers Presented at Meetings of the American Statistical Association	Dan Kasprzyk
94-02 (July)	Generalized Variance Estimate for Schools and Staffing Survey (SASS)	Dan Kasprzyk
94-03 (July)	1991 Schools and Staffing Survey (SASS) Reinterview Response Variance Report	Dan Kasprzyk
94-04 (July)	The Accuracy of Teachers' Self-reports on their Postsecondary Education: Teacher Transcript Study, Schools and Staffing Survey	Dan Kasprzyk
94-05 (July)	Cost-of-Education Differentials Across the States	William Fowler
94-06 (July)	Six Papers on Teachers from the 1990-91 Schools and Staffing Survey and Other Related Surveys	Dan Kasprzyk
94-07 (Nov.)	Data Comparability and Public Policy: New Interest in Public Library Data Papers Presented at Meetings of the American Statistical Association	Carrol Kindel
95-01 (Jan.)	Schools and Staffing Survey: 1994 Papers Presented at the 1994 Meeting of the American Statistical Association	Dan Kasprzyk
95-02 (Jan.)	QED Estimates of the 1990-91 Schools and Staffing Survey: Deriving and Comparing QED School Estimates with CCD Estimates	Dan Kasprzyk
95-03 (Jan.)	Schools and Staffing Survey: 1990-91 SASS Cross-Questionnaire Analysis	Dan Kasprzyk
95-04 (Jan.)	National Education Longitudinal Study of 1988: Second Follow-up Questionnaire Content Areas and Research Issues	Jeffrey Owings
95-05 (Jan.)	National Education Longitudinal Study of 1988: Conducting Trend Analyses of NLS-72, HS&B, and NELS:88 Seniors	Jeffrey Owings

Listing of NCES Working Papers to Date--Continued

Number	Title	Contact
95-06 (Jan.)	National Education Longitudinal Study of 1988: Conducting Cross-Cohort Comparisons Using HS&B, NAEP, and NELS:88 Academic Transcript Data	Jeffrey Owings
95-07 (Jan.)	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
95-08 (Feb.)	CCD Adjustment to the 1990-91 SASS: A Comparison of Estimates	Dan Kasprzyk
95-09 (Feb.)	The Results of the 1993 Teacher List Validation Study (TLVS)	Dan Kasprzyk
95-10 (Feb.)	The Results of the 1991-92 Teacher Follow-up Survey (TFS) Reinterview and Extensive Reconciliation	Dan Kasprzyk
95-11 (Mar.)	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
95-12 (Mar.)	Rural Education Data User's Guide	Samuel Peng
95-13 (Mar.)	Assessing Students with Disabilities and Limited English Proficiency	James Houser
95-14 (Mar.)	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
95-15 (Apr.)	Classroom Instructional Processes: A Review of Existing Measurement Approaches and Their Applicability for the Teacher Follow-up Survey	Sharon Bobbitt
95-16 (Apr.)	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
95-17 (May)	Estimates of Expenditures for Private K-12 Schools	Stephen Broughman
95-18 (Nov.)	An Agenda for Research on Teachers and Schools: Revisiting NCES' Schools and Staffing Survey	Dan Kasprzyk
96-01 (Jan.)	Methodological Issues in the Study of Teachers' Careers: Critical Features of a Truly Longitudinal Study	Dan Kasprzyk

Listing of NCES Working Papers to Date--Continued

Number	Title	Contact
96-02 (Feb.)	Schools and Staffing Survey (SASS): 1995 Selected papers presented at the 1995 Meeting of the American Statistical Association	Dan Kasprzyk
96-03 (Feb.)	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
96-04 (Feb.)	Census Mapping Project/School District Data Book	Tai Phan
96-05 (Feb.)	Cognitive Research on the Teacher Listing Form for the Schools and Staffing Survey	Dan Kasprzyk
96-06 (Mar.)	The Schools and Staffing Survey (SASS) for 1998-99: Design Recommendations to Inform Broad Education Policy	Dan Kasprzyk
96-07 (Mar.)	Should SASS Measure Instructional Processes and Teacher Effectiveness?	Dan Kasprzyk
96-08 (Apr.)	How Accurate are Teacher Judgments of Students' Academic Performance?	Jerry West
96-09 (Apr.)	Making Data Relevant for Policy Discussions: Redesigning the School Administrator Questionnaire for the 1998-99 SASS	Dan Kasprzyk
96-10 (Apr.)	1998-99 Schools and Staffing Survey: Issues Related to Survey Depth	Dan Kasprzyk
96-11 (June)	Towards an Organizational Database on America's Schools: A Proposal for the Future of SASS, with comments on School Reform, Governance, and Finance	Dan Kasprzyk
96-12 (June)	Predictors of Retention, Transfer, and Attrition of Special and General Education Teachers: Data from the 1989 Teacher Followup Survey	Dan Kasprzyk
96-13 (June)	Estimation of Response Bias in the NHES:95 Adult Education Survey	Steven Kaufman
96-14 (June)	The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component	Steven Kaufman

Listing of NCES Working Papers to Date--Continued

Number	Title	Contact
96-15 (June)	Nested Structures: District-Level Data in the Schools and Staffing Survey	Dan Kasprzyk
96-16 (June)	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
96-17 (July)	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
96-18 (Aug.)	Assessment of Social Competence, Adaptive Behaviors, and Approaches to Learning with Young Children	Jerry West
96-19 (Oct.)	Assessment and Analysis of School-Level Expenditures	William Fowler
96-20 (Oct.)	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96-21 (Oct.)	1993 National Household Education Survey (NHES:93) Questionnaires: Screener, School Readiness, and School Safety and Discipline	Kathryn Chandler
96-22 (Oct.)	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
96-23 (Oct.)	Linking Student Data to SASS: Why, When, How	Dan Kasprzyk
96-24 (Oct.)	National Assessments of Teacher Quality	Dan Kasprzyk
96-25 (Oct.)	Measures of Inservice Professional Development: Suggested Items for the 1998-1999 Schools and Staffing Survey	Dan Kasprzyk
96-26 (Nov.)	Improving the Coverage of Private Elementary-Secondary Schools	Steven Kaufman
96-27 (Nov.)	Intersurvey Consistency in NCES Private School Surveys for 1993-94	Steven Kaufman

Listing of NCES Working Papers to Date--Continued

Number	Title	Contact
96-28 (Nov.)	Student Learning, Teaching Quality, and Professional Development: Theoretical Linkages, Current Measurement, and Recommendations for Future Data Collection	Mary Rollefson
96-29 (Nov.)	Undercoverage Bias in Estimates of Characteristics of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
96-30 (Dec.)	Comparison of Estimates from the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97-01 (Feb.)	Selected Papers on Education Surveys: Papers Presented at the 1996 Meeting of the American Statistical Association	Dan Kasprzyk
97-02 (Feb.)	Telephone Coverage Bias and Recorded Interviews in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-03 (Feb.)	1991 and 1995 National Household Education Survey Questionnaires: NHES:91 Screener, NHES:91 Adult Education, NHES:95 Basic Screener, and NHES:95 Adult Education	Kathryn Chandler
97-04 (Feb.)	Design, Data Collection, Monitoring, Interview Administration Time, and Data Editing in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-05 (Feb.)	Unit and Item Response, Weighting, and Imputation Procedures in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-06 (Feb.)	Unit and Item Response, Weighting, and Imputation Procedures in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97-07 (Mar.)	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97-08 (Mar.)	Design, Data Collection, Interview Timing, and Data Editing in the 1995 National Household Education Survey	Kathryn Chandler

Listing of NCES Working Papers to Date--Continued

Number	Title	Contact
97-09 (Apr.)	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
97-10 (Apr.)	Report of Cognitive Research on the Public and Private School Teacher Questionnaires for the Schools and Staffing Survey 1993-94 School Year	Dan Kasprzyk
97-11 (Apr.)	International Comparisons of Inservice Professional Development	Mary Rollefson