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### **3. MONITORING THE TIMSS DATA COLLECTION.....3-1** *Michael O. Martin, Craig D. Hoyle, and Kelvin D. Gregory*

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## **3. MONITORING THE TIMSS DATA COLLECTION**

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### **3.1 THE TIMSS QUALITY CONTROL MONITORS**

Since all data collection activities took place within participating countries and were the responsibility of NRCs, it was considered essential to have a representative of the International Study Center visit each country to interview the NRC about data collection plans and procedures and to select and visit a sample of schools while the TIMSS testing was taking place.

In December 1994, the International Study Center contracted Goodison Associates (United States) to help with the hiring and training of a team of quality control monitors to carry out the required visits. Goodison Associates also helped to develop a procedural manual and data collection instruments for the quality control monitors, and were responsible for paying them and ensuring that they met their contractual obligations.

In January 1995, NRCs were asked to nominate a person, such as a retired school teacher, to serve as quality control monitor for their country. The International Study Center reviewed the nominations and in almost all cases adopted the NRC's first suggestion. The

monitors were trained centrally before returning to their countries to interview the NRC and to observe classroom testing sessions.

### **3.2 TRAINING OF QUALITY CONTROL MONITORS**

The TIMSS quality control monitors were trained in a two-day session during which they were briefed on the design and purpose of TIMSS, the responsibilities of the NRC in conducting the study in each country, and their own roles and responsibilities. In total, five such training sessions were held. Most quality control monitors were trained in one of three scheduled sessions: February 1995, London, England; March 1995, Enschede, The Netherlands; April 1995, Paris, France. Two additional sessions were held to train the remaining quality control monitors, from Argentina (August 1995, Philadelphia, United States) and Australia and New Zealand (July 1995, Wellington, New Zealand). The quality control monitors are listed in Appendix D. Also provided in Appendix D is information about the training sessions.

The *Manual for the TIMSS Quality Control Monitors* (TIMSS, 1995d) was developed by the TIMSS International Study Center with the assistance of Goodison Associates and was used as the basis for the training sessions. The manual included:

- An introduction to TIMSS, outlining the purpose of the study, study schedule, management arrangements, the major components of TIMSS (populations, sampling design, test and questionnaire design), and the purpose of the quality assurance program
- An overview of the roles and responsibilities of the TIMSS quality control monitor
- An overview of the major tasks of the NRC
- Instructions for visiting the national center, interviewing the NRC, collecting the required materials from the NRC, and using the translation verification report to check the implementation of the suggestions made in the international review of the translations
- A questionnaire to be completed during the interview with the NRC
- Step-by-step procedures for selecting the schools for classroom observation
- Instructions for visiting these schools: arranging the visit, observing the testing sessions, completing the Classroom Observation Record, and interviewing the School Coordinator
- A copy of the Classroom Observation Record
- Instructions for returning materials to the International Study Center.

In addition to the *Manual for TIMSS Quality Control Monitors* (TIMSS, 1995d), each quality control monitor received copies of the *Survey Operations Manuals* (TIMSS, 1994d, 1994e), the *Test Administrator Manual* (TIMSS, 1994f), the *School Coordinator Manuals* (TIMSS, 1994b, 1994c), and the *Guide to Checking, Coding, and Entering the TIMSS Data* (TIMSS, 1995c), which describe the procedures required for the implementation of TIMSS in

each country. Although quality control monitors did not need to know every TIMSS policy and procedure in detail, they were encouraged to read through all the manuals in order to become familiar with the work of NRCs and the procedures to be followed in each country participating in TIMSS.

During each training session, a TIMSS International Study Center staff member explained the structure and major components of the study, emphasizing the NRC's tasks, especially as they related to the quality control monitor's duties. Goodison Associates staff members reviewed the quality control monitors' roles and responsibilities and led them through the schedule for the Interview with the National Research Coordinator and the Classroom Observation Record. Quality control monitors also took part in an exercise to help them select the schools for classroom observation.

### **3.3 THE QUALITY CONTROL MONITOR'S VISIT TO THE NATIONAL CENTER**

The quality control monitor in each country was required to visit the TIMSS national center to (1) interview the National Research Coordinator about aspects of the data collection activities, (2) work with the NRC to select a sample of schools to visit, and (3) collect copies of the national versions of the TIMSS data collection instruments.

The quality control monitor's interview with the National Research Coordinator addressed the NRC's ten major responsibilities:

- Selecting the sample of students to be tested
- Working with the School Coordinators
- Translating the test instruments
- Assembling and printing the test booklets
- Packing and shipping the necessary materials to the designated School Coordinators
- Arranging for the return of materials from the school sites
- Arranging for coding the free-response and performance assessment questions
- Entering the testing results and information from students, teachers, and principals
- Conducting on-site quality assurance observations for a 10% sample of schools
- Preparing a report on survey activities.

The quality control monitor recorded the NRC's responses to questions regarding the implementation of these responsibilities, and any additional comments made regarding the TIMSS procedures. The interview questions were designed to ascertain the degree to which the procedures and policies described in the *Survey Operations Manuals* (TIMSS, 1994d, 1994e) the *Sampling Manual* (TIMSS, 1994a), the *Guide to Coding, Checking, and Entering the TIMSS Data* (TIMSS, 1995c), and other documents were followed.

### **3.4 SUMMARY OF RESULTS OF INTERVIEWS WITH NRCS**

This section summarizes the main issues arising from the interviews. The data are presented in summary form in Appendix E. As shown in Table 3.1, interviews were conducted in all but four countries.

#### **3.4.1 SAMPLING PROCEDURES**

Most NRCs reported that they were able to select a sample of schools and students using the *Survey Operations Manuals* (TIMSS, 1994d, 1994e) and *Sampling Manual* (TIMSS, 1994a) provided by the International Study Center. Only 7 of the 43 NRCs interviewed reported selecting a sample for any of the populations being tested without reference to the *Survey Operations Manuals* and the *Sampling Manual*. Explanations for deviations from the standard procedure tended to be practical in nature: for example, all schools were included in the population for that sample; national circumstances necessitated a change in sampling procedure; or someone other than the NRC was responsible for sampling.

About a third of the NRCs interviewed indicated that they had used the sampling and operations software provided by the International Study Center in order to facilitate the selection of classes and students. In some of these cases, NRCs found it convenient to use the software for one population but not another. Most of the NRCs (25 out of 43) reported using either their own software or other software such as Microsoft Excel or SAS programs that had been developed during the field trial. One NRC reported following the steps as outlined in the software but doing the actual sampling on paper instead.

In terms of the complexity of the procedures and number of personnel needed, most of the NRCs found the process of sample selection to be “somewhat difficult” or “not difficult at all.” In the few cases where NRCs indicated the process was “very difficult” it was mainly because of a lack of resources, i.e. materials, staff, and funding.

**Table 3.1**  
**Interviews with National Research Coordinators**

Country	Interview with NRC	Country	Interview with NRC
Argentina	X	Japan	X
Australia	X	Korea <sup>2</sup>	-
Austria	X	Kuwait <sup>2</sup>	-
Belgium (Fl)	X	Latvia	X
Belgium (Fr)	X	Lithuania	X
Bulgaria	X	Mexico	X
Canada (Alberta)	X	The Netherlands	X
Canada (Ontario)	X	New Zealand	X
Columbia	X	Norway	X
Cyprus	X	Philippines	X
Czech Republic	X	Portugal	X
Denmark	X	Romania	X
England	X	Russian Federation	X
France	X	Scotland	X
Germany <sup>1</sup>	-	Singapore <sup>2</sup>	-
Greece	X	Slovakia	X
Hong Kong	X	Slovenia	X
Hungary	X	South Africa	X
Iceland	X	Spain	X
Indonesia	X	Sweden	X
Iran	X	Switzerland	X
Ireland	X	Thailand	X
Israel	X	United States	X
Italy	X		
X = Interview Conducted			
Total = 43			

<sup>1</sup>Germany was unable to nominate a quality control monitor.

<sup>2</sup>Because of the timing of the funding of the quality assurance program, interviews with NRCs were not conducted in Korea, Kuwait, and Singapore.

### 3.4.2 WORKING WITH SCHOOL COORDINATORS

As the role of School Coordinator was vital to the successful implementation of the study, one function of the interview with the NRC was to assess the “readiness” of the School Coordinators in these countries.

At the time the interviews with NRCs were conducted, the majority of NRCs (38 out of 43) indicated that all the School Coordinators for their samples had been contacted, and

that most NRCs (31) had already sent materials about the testing procedures to them. About half of the NRCs interviewed further indicated that they had already had formal training sessions for the School Coordinators.

### **3.4.3 TRANSLATING THE DOCUMENTS**

The translation process and its verification was a major task for most participants. The interviews with NRCs attempted to assess whether any major problems were encountered that had not been previously exposed or dealt with.

Slightly over half of the NRCs found the process of translating and/or adapting the test booklets to be “somewhat difficult,” compared with a third of the NRCs (14) reporting that the process was “not difficult at all.” Of these 14 NRCs, 8 did not need to translate the documents since the international versions were prepared in English. When asked whether they used their own staff or outside experts to translate the booklets, most (24) reported that they used a combination of the two.

Thirty-three NRCs went through the recommended procedure of submitting their test booklets and receiving a Translation Verification Report from the International Study Center. Eight NRCs reported that they had not gone through this process, mainly because of time constraints. At the time of the interviews, one NRC had yet to receive the Translation Verification Report from the internationally commissioned reviewer.

NRCs generally found the process of adapting the questionnaires to be “somewhat difficult.” Nine of the 10 NRCs that described this process as “very difficult” commented that many of the questions on the questionnaires were inappropriate for their country’s educational system.

Adapting the *Test Administrator Manual* (TIMSS, 1994f), on the other hand, appears to have been a much easier process. Twenty-six of the NRCs indicated that the process was “not difficult at all.” Eleven found the process “somewhat difficult”, and only three considered the process to be “very difficult.” Results were similar for adapting the *School Coordinator Manuals* (TIMSS, 1994b, 1994c). Most (24) had no trouble. Some (8) found the process to be a little difficult, and only a few (4) found it to be particularly difficult. Less than half of the NRCs interviewed (19) by quality control monitors either had translated or planned to translate the *Coding Guides for Free Response Items* (TIMSS, 1995a, 1995b) at the time of the interview.

### **3.4.4 ASSEMBLING AND PRINTING THE TEST MATERIALS**

The procedure for the assembly of the test books was specified in detail in the *Survey Operations Manuals* (TIMSS, 1994d, 1994e) and in *Instructions for Preparation of the Instruments at the National Center*.

The assembly of the test booklets appears to have gone well throughout the study. Only two NRCs reported not being able to assemble the booklets according to the instructions provided by the International Study Center. One of these preferred to divide the test items into two books, and the other changed the number system for Population 1 in order to avoid potential confusion. Most of the 43 NRCs interviewed (30) experienced no difficulties actually assembling the test booklets. Only two NRCs indicated that the process was very difficult. Comments revealed that much of the difficulty was due to shortages of personnel and time.

Thirty-three of the NRCs interviewed reported conducting quality assurance procedures for checking the test booklets during the printing process. Three commented that this would be done by the printers; one pointed out that the process was not yet complete in that country; one indicated that the check would be performed before packing the materials; and two alluded to problems of staff shortage and lack of time. Several of the NRCs that did in fact conduct quality checks during printing discovered errors. The most frequently reported concern was “printing quality” followed by “pages missing” and “page ordering.”

Most of the printing of test booklets and questionnaires was done by outside printers as opposed to in-house staff. Even so, only four of the NRCs interviewed reported not having followed specific procedures to protect the security of the tests during the assembly and printing process. Generally, the reasons given indicate that these NRCs considered such measures either unnecessary or not practical given their situation. Only one NRC found that the potential for a breach of security existed, but no details were provided.

#### **3.4.5 PACKING, SHIPPING AND RETURNING THE TESTING MATERIALS**

The *Survey Operations Manuals* (TIMSS, 1994d, 1994e) provided detailed instructions to the NRC for distributing and collecting the testing materials. There were specific instructions about what should be in each school’s package and how the packages were to be assembled.

Very few errors were detected in packaging the materials for shipment to schools. Only 15 NRCs indicated that any errors were detected, and these tended to be minor and easily corrected. After distribution of materials, only 7 NRCs reported finding errors. At the time of the interviews, about half (21) of the NRCs indicated that they either planned to establish or already had established a procedure requiring schools to confirm receipt of the testing materials and verification of the contents. Concerns about confidentiality prevented about half of the NRCs from putting student names on the booklet covers.

#### **3.4.6 CODING FREE-RESPONSE QUESTIONS**

The selection and training of coders for the free-response questions was yet another vital component of the study and major task for the NRCs.

When asked who would primarily be coding the student responses to the free-response questions, most NRCs replied that this would be done by a combination of their own staff, teachers, and university students. The number of coders NRCs planned to use ranged between 4 and 65, with most NRCs using 20 or fewer. Three-quarters of the NRCs reported that at the time of the interview they had already selected the coders for the free-response items. Of these, many (19) had already trained the coders and scheduled the coding sessions for the free-response questions. Virtually all of the NRCs reported that they understood the procedure for coding the 10% reliability sample as explained in the *Guide to Checking, Coding, and Entering the TIMSS Data* (TIMSS, 1995c).

#### **3.4.7 DATA ENTRY AND TRANSMITTAL**

About half of the NRCs interviewed (21) indicated that they planned to use a combination of their own staff and outside experts to enter the data from the achievement test booklets and questionnaires into computer files. Most of those who had selected their data entry staff at the time of the interview (22) had already conducted training sessions. Twenty-eight of the 43 NRCs interviewed further planned to enter a percentage of test booklets twice as a verification procedure. That percentage ranged from 1% to 100%, with most of the NRCs reporting that they would double-enter between 6% and 10% of the data. Thirty-nine of the 43 reported that they had established a secure storage area to keep the tests following the coding of the responses.

#### **3.4.8 QUALITY ASSURANCE SAMPLE**

The NRCs were also responsible for conducting quality assurance observation visits in a tenth of the schools sampled. At the time of the interviews, approximately half of the NRCs had already selected their quality assurance sample for their on-site classroom observations. In most of the cases, the persons selected to do the observations were members of the NRC's staff. Several NRCs also relied, in whole or in part, on external agencies to complete this task.

### **3.5 SELECTION OF SCHOOLS FOR CLASSROOM OBSERVATION**

Following the interview with the NRC, the quality control monitor and the NRC worked together to select 10 schools for classroom observation, plus 3 extra schools as potential replacements. Using the School Tracking Form, the quality control monitor and NRC chose the schools by a random selection process (albeit one subject to a number of practical constraints). The schools selected for classroom observation had to be within easy traveling distance of the quality control monitor's home so that travel and observation could be done in one working day; the NRC or quality control monitor had to be able to contact the school to ascertain the date and time of testing and to arrange the visit; the school could not be taking part in the NRC's own national quality control observation program; and the testing could not yet have taken place in that school. After the schools, the classrooms for

observation were selected. Where possible, the class chosen was the upper-grade class. The school name and classroom to be observed were recorded on the Classroom Observation Tracking Form.

### **3.6 NATIONAL VERSIONS OF DATA COLLECTION INSTRUMENTS**

At the end of the visit to the national center, the quality control monitor collected the following materials from the NRC:

- Test Administrator Manual (TIMSS, 1994f)
- School Coordinator Manual (TIMSS, 1994b, 1994c)
- Test booklets (for each population assessed)
- Performance assessment tasks (for each population assessed, if participating)
- School questionnaires (for each population assessed)
- Student questionnaires (for each population assessed)
- Teacher questionnaires (for each population assessed)
- Translation Verification Report (if this was not given to the quality control monitor at the training session)
- Student Tracking Forms for each class selected for observation
- Class Tracking Forms for each school selected for observation.

Quality control monitors received the Translation Verification Report either from the International Study Center during training or from the NRC on their visit to the national center. The quality control monitor checked that any deviations in translation or booklet layout were corrected before test administration, recorded that information, and submitted it to the International Study Center together with the instruments and manuals collected from the NRC.

### **3.7 SURVEY ACTIVITIES REPORT**

NRCs were required to prepare a report on the survey activities and to submit the report to the IEA Data Processing Center together with their data files and documentation. The following indicates some important points this report was to cover.

- A description of the procedure used and any problems encountered in the translation, layout, and printing of the test instruments
- A description of any modifications in the international coding schemes
- An indication of which of the within-school sampling procedures applied to each population
- The national definition of mathematics classes, mathematics and science teachers, and streams (or tracks) that was used for the within-school sampling
- The criteria and definitions that were used for excluding students from testing within the selected schools

- If countries tested in languages other than English, the documentation of the coding schemes in the student data file
- A description of the problems encountered in the use of the survey tracking forms
- An indication of the procedures used for obtaining cooperation from schools and an indication of problems encountered
- Information on the organization of the testing sessions
- An indication of the position of school coordinators and test administrators in the schools
- A summary of the problems reported by the test administrators in the Test Administration Forms
- A description of any discrepancies in the timing of the testing sessions between the Test Administration Forms and the international instructions
- An indication of the procedures that were used for quality control and a summary of the findings from the national quality control monitors
- A description of the arrangements used for coding the student responses to the free-response questions, and problems encountered
- A description of data entry and data verification problems encountered, including an indication of error rate found during the verification of double-entered data
- Anything else that might help in interpreting the data or explaining possible anomalies.

NRCs were also required to submit a set of national survey instruments and a report on the appropriateness of the test items used in TIMSS. Forty-three reports were submitted. The information provided is summarized below.

Many of the NRCs reported following the TIMSS guidelines on translation, layout, and printing. Countries reported following TIMSS guidelines when translating from English to the country's local language. For English-speaking countries, only minor adaptations in the items were made. These changes generally reflected regional differences in spelling (e.g. colour for color), and regional name preference. Translation of the TIMSS documents was more problematic. Several NRCs commented upon the difficulty of making exact translations of single words or phrases from English into the country's language. In addition, NRCs reported attempts to ensure that items were presented in a manner that gave a "natural level for the grade in question." While a number of countries stated that they were able to have their translated instruments verified before printing the test booklets, some NRCs reported that due to a lack of time they could not have their translations verified prior to printing. Other NRCs did not mention the international verification process.

Frequent problems reported with respect to the test booklets were missing pages, blank pages, and duplicated pages, in addition to problems associated with item translation. Several NRCs commented that the timeline did not allow for a more thorough review of the test booklets before printing and dissemination. In general, where it was

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necessary to translate the questionnaires and manuals into another language, the NRCs felt that more time was needed. In a few cases, mention was made of the cost of printing and the need to obtain financial support and help in getting the booklets duplicated.

All NRCs reported making adaptations in the international test booklets. In some countries, items were adapted by a committee, while in others, the task was completed by one expert. Most countries reported making only minor, mainly name, changes in the test items. Only one country mentioned a severe mismatch between test booklet items and curriculum. Another country mentioned that several items referred to human reproduction and noted that its request to TIMSS that these items be removed had not been heeded.

With few exceptions, NRCs reported using within-school sampling Procedure A, based on selecting intact classes. In some cases, a random sample of students was selected from all the students in a particular year level and intact classes were not used. Many NRCs reported that no streams or tracks were used in their selected classes. In some cases, students were tracked by the school system within which they were placed. Few countries reported that streams or tracks were important to their school system.

Excluded students either had some disability or parental permission had not been given for their participation in the study. For example, several countries reported excluding functionally disabled students, educable mentally retarded students, students not speaking the native language, and students having subject- or reading-specific difficulties. One country reported that some students were excluded from the study because parental permission for their participation in the study had not been given.

The time allocated to the achievement tests was found to be too generous by many NRCs (64 minutes for Population 1, 90 minutes for Populations 2 and 3). Many students had completed their test in 30 minutes. In contrast, students needed 10 to 20 minutes more than expected for filling out the entire questionnaire, and many students were “very tired at the end of the session and were not able to concentrate fully on their work.”

Some NRCs mentioned that the study was affected by events outside their control. For example, in a few cases strikes affected communication between NRCs and schools. In some cases schools were reluctant to participate in the study since they were trying to meet local demands or were already participating in other studies. Comment was also made on the heavy demands made by the TIMSS study. For example, the teacher questionnaire was criticized as being “too elaborate, overloaded, too long, too detailed, and consuming too much time.”

The procedures for obtaining cooperation from schools, and the problems encountered, fall into two main categories. In some countries, participation was under the control of a central authority, such as a ministry of education, and participation levels and cooperation levels were very high. In other school systems, participation in the study was voluntary, with the schools themselves deciding whether or not to participate. One NRC

reported that, despite letters from the director of education, the help of the education department, and the staff of the faculty of education of a university, the biggest problem of the study was getting schools to participate. One NRC obtained a very high participation rate by asking ministerial inspectors of mathematics to function as quality control managers. Several NRCs commented favorably upon the support they received from their school systems. For example, one NRC commented that “we would like to express our appreciation for the good cooperation between selected schools, County Inspectorates, and the National Center.”

### **3.8 SUMMARY**

In order to carry out the International Study Center’s quality assurance program, quality control monitors were hired and trained for each participating country. Each quality control monitor was provided with a procedural manual and data-collection instruments, and was required to visit the TIMSS national center to (1) interview the NRC about aspects of their data collection activities, (2) work with the NRC to select a sample of schools to visit, and (3) collect copies of national versions of the TIMSS data collection instruments.

The results of the interviews indicate that NRCs had generally prepared well for the data collection, and, despite the heavy demands of the schedule and shortages of resources in some centers, were in a position to conduct the data collection in an efficient and professional manner. Quality control monitors succeeded in selecting schools for their visit to observe a test administration session, and collected copies of the TIMSS instruments as requested.

Following the completion of their data collection, NRCs were asked to submit a report describing their experiences and documenting any unusual occurrences or deviations from prescribed procedures. Most NRCs complied with this request, and while many minor mishaps and delays were recorded, in general most NRCs managed to follow the TIMSS procedures and collect their data in a satisfactory manner.

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