Methodology

2.1 Introduction

In chapter 1, the background and significance of National Assessments with particular relevance to Sri Lanka were discussed. This chapter elaborates the methodology used to conduct the present study in 2016.

2.2 Objectives of the study

In accordance with the Education Sector Development Framework Programme (ESDFP 2012-2016) and the education sector development plan through sector-wide approach, the main objective of the study was to determine the achievement of the learning outcomes of students completing grade 08 in 2016.

2.2.1 Specific objectives of the study

I.   Assess the extent to which the expected learning outcomes have been achieved by students
II. Identify the areas of strengths and weaknesses of student achievement in relation to subject content and related skills
III. Examine whether there are disparities in achievement in relation to school type, medium of instruction, school location, and gender
IV. Compare the achievement level of students in 2016 with that of 2014.

2.3 Sampling methodology

The sampling methodology used for this study was the same as the one used in national assessments of 2012 and 2014. It was based on an instructional manual designed by the Statistical Consultation Group, Statistics Canada in Ottawa. This has been recommended by the World Bank in its series, Assessment of Educational Achievement in Developing Countries and has been used for evaluation purposes since 2007 in international studies

such as the IEA Study of Reading Literacy, the IEA Progress in International Reading Study (PIRLS), and Trends in International Mathematics and Science Study (TIMSS).

Selection of the sample of schools and the sample of students are given below.

2.3.1 Target population

The target population of the study has grade-based definition. Therefore, students who have completed eighth grade in the year 2016 in the education system of Sri Lanka were considered as the desired target population for this study.

2.3.2 Sampling frame and elements of the sampling frame

Sampling frame is the list of ultimate sampling entities. Latest updated school database available at the Ministry of Education, Sri Lanka (the school database for the year 2015 June) was the sampling frame used for the study.

Private schools also provide primary and secondary education. However, they are not regulated by the Ministry of Education in Sri Lanka. Some private schools follow the local curriculum while some of them teach both local and international curricular. International schools, another variety of private schools in Sri Lanka, follow only international curricular. The medium of instruction of these private schools is either Sinhala or Tamil or English. These private schools were not included in the sampling frame. Accordingly, as Table 2.1 indicates the desired target population of the study was 336,593 pupils who completed grade eight in 2016 from 6,176 government schools.

Table 2.1: Target population

Province	Number of Schools	Number of classes	Number of Students
1. Western	896	2,229	78,861
2. Central	913	1,580	45,400
3. Southern	688	1,359	41,566
4. Northern	525	842	19,288
5. Eastern	643	1,159	32,259
6. North Western	781	1,380	40,696
7. North Central	423	765	22,752
8. Uva	564	899	23,794
9. Sabaragamuwa	743	1,176	31,977
Total	6,176	11,389	336,593

2.3.3 Sample design – Procedure

The sample procedure of this study has a multi-stage approach, a strategy used to select the final sample through a series of stages.

In the first stage, schools were selected for the sample. Schools were selected within strata with Probability Proportional to Size, without replacements. *Probability Proportional to Size Sampling* (PPS) is a sampling technique, commonly used in multistage cluster sampling, in which the probability that a particular sampling unit is selected in the sample is proportional to some known variable (Ross, K., 2005). In the second stage, a group of students was selected from the sampled schools using cluster sampling approach thereby an entire grade 08 class from each sampled school was selected.

In selection of the sample, in the present study, as in the two previous studies, 'province' was taken as the main stratum (explicit stratum) because in the Sri Lankan context, education being a devolved subject, Provincial Ministries of Education have a key role in planning, implementing and monitoring educational plans. Medium of instruction (Sinhala and Tamil) and type of school have been considered as implicit strata, because

in Sri Lanka it is used to report students' achievement by medium of instruction and type of school. Accordingly results will be reported for provinces.

Table 2.2 illustrates student sample and school sample per province with other important values which decide the size of sampling error, such as roh, ESS and design effect. Design Effect is the ratio of the variance of the sample mean for a complex sample design to the variance of a simple random sample.

Table 2.2: Calculated student sample and school sample per province

Province	Data	Total	MOE (average class size)	roh	Design effect	ESS=178 Student sample calculated	School sample
Western	students	78,861	35	0.25	9.594885599	1,708	48
	classes	2,229					
Central	students	45,400	29	0.25	7.933544304	1,412	49
	classes	1,580					
Southern	students	41,566	31	0.25	8.396431199	1,495	49
	classes	1,359					
Northern	students	19,288	23	0.25	6.476840855	1,153	50
	classes	842					
Eastern	students	32,259	28	0.25	7.708369284	1,372	49
	classes	1,159					
North Western	students	40,696	29	0.25	8.122463768	1,446	49
	classes	1,380					
North Central	students	22,752	30	0.25	8.185294118	1,457	49
	classes	765					
Uva	students	23,794	26	0.25	7.36679644	1,311	50
	classes	899					
Sabaragamuwa	students	31,977	27	0.25	7.547831633	1,343	49
	classes	1,176					
Total					**8.138554746**	12,697	442

Table 2.3 illustrates calculated student sample, allocated student sample and achieved student sample by provinces.

Table 2.3: Calculated, allocated and achieved student sample per each province

Province	Calculated Student Sample	Allocated Student Sample as MOE School Census Database	Achieved Student Sample		
			Science	Mathematics	English
Western	1,708	1,885	1,415	1,465	1,466
Central	1,412	1,718	1,460	1,472	1,473
Southern	1,495	1,753	1,435	1,499	1,503
Northern	1,153	1,363	1,287	1,302	1,301
Eastern	1,372	1,494	1,329	1,339	1,345
North Western	1,446	1,690	1,489	1,497	1,496
North Central	1,453	1,588	1,376	1,384	1,379
Uva	1,311	1,655	1,478	1,500	1,499
Sabaragamuwa	1,344	1,707	1,454	1,512	1,509
Total	**12,694**	**14,853**	**12,723**	**12,970**	**12,971**

The sampling frame was explicitly stratified by province. With stratification, sample student size can be calculated in advance of sampling procedure so that it will meet the desired level of precision, by each stratum. This ensures that the target population is represented adequately in the sample. Study team was satisfied with 178 as Effective Sample Size (ESS). This would be an accuracy of plus or minus 7.5% at the error limit at the province level. Rate of homogeneity, (roh) 0.25 was calculated from the previous grade 8 assessment study data. Maximum value of roh at the province level was taken for the calculation of the student sample for each province. Assigning a weight to each sampled unit was calculated within the explicit strata.

2.4   Framework for the National Assessment

In assessing the achievement of students, three achievement tests which, were constructed and validated for the previous grade 8 study in 2012, were used in this study as well. These achievement tests were developed to determine the achievement level of learning outcomes of grade 8 students in 2012. The learning outcomes were the competency levels of each subject expected to be achieved by the students. Therefore, to assure the content validity of test papers, a table of specifications similar to the one given below was used.

Example of a skeleton table of specification:

Competency	Competency Level	Content domain	Cognitive domain	Question numbers

2.5   Achievement tests

The tests in mathematics, science and English Language were designed based on the above framework for each subject. Mathematics paper consisted only selective type questions, while the English Language and science papers consisted of both selective and supply type items.

Mathematics test consisted of 40 multiple choice questions with four options. Science paper consisted of 20 multiple choice questions carrying 40 marks and questions requiring short answers carrying 60 marks. The English Language paper consisted of 37 items of different types such as multiple choice, matching activities, completion of sentences and writing simple sentences.

2.6   Procedures in administration of the National Assessment 2016

National Assessment of Grade 08 students were conducted island-wide on the 29th and 30th of November, 2016. It was possible to conduct the test in all 442 schools on the same stipulated dates.

2.6.1   Test coordinators

Coordinators to administer the test from the sample schools were appointed from among Lecturers of the Faculty of Education, University of Colombo and students who follow Master of Philosophy, Master of Education and Post Graduate Diploma in Education courses. Furthermore, lecturers from National Colleges of Education and teachers were also selected for this task. Senior teachers from the schools, where the tests were administered, were appointed to assist the coordinators with the consent of principals.

2.6.2 Training workshop for coordinators

Training workshops for coordinators were organized in two phases. During the first phase, a team representing NEREC visited North Central, Northern, Eastern, Southern and Uva Provinces and conducted workshops at Anuradhapura, Polonnaruwa, Vavuniya, Killinochchi, Jaffna, Trincomalee, Batticaloa, Ampara, Monaragala, Bandarawela, Galle and Hambathota from 21st to 25th of November 2016. Test papers and other relevant documents were handed over to all coordinators with necessary instructions in the above centers during the workshops.

The second phase of the training workshops was organized at the NEREC on the 24th and 25th of November, 2016.

Coordinators from Central, Western, North Western, and Subragamuwa Provinces participated in these sessions. Test papers and other relevant documents with necessary instructions were handed over to them during these workshops. All coordinators were advised to meet the principals and the school coordinators of sample schools on 28th of November 2016 to make prior arrangements concerning the test.

Given below are some of the measures that were adopted in the 2016 study which were expected to increase the reliability of the assessment.

- The tests were administered on weekdays (29th and 30th of November 2016)
- In order to better monitor the administering of the tests, in the 2016 study 442 independent coordinators were appointed to the 442 examination centers.
- The coordinators were expected to complete a journal in which they had to provide information regarding the conduct of the examination.

2.6.3 Return of answer scripts and other documents

Coordinators from Central, Western, North Western, and Sabragamuwa Provinces handed over the answer scripts and other documents to the NEREC office from 3rd to 6th December 2016. A team from NEREC visited the North Central, Northern, Eastern, Southern and Uva Provinces to collect answer scripts and other documents from 8th to 17th December 2016.

2.7   Analysis of data

Data gathered through the achievement tests were analyzed on a national and provincial basis. Since samples were selected on provincial basis, data were weighted.

Patterns in learning achievement were presented using mean, standard deviation, standard error of mean, skewness, cumulative percentages and percentile ranks. In addition to these, graphs such as frequency polygons, box plots, whisker plots and bar graphs were also used to present the data visually.

2.8   Summary

This chapter presented the specific objectives of the study, sampling procedures and the framework of the national assessment of achievement of Grade 8 students in 2016. As mentioned earlier, the National Assessment of Achievement of Grade 8 Students of Sri Lanka in the year 2016 was conducted with the main objective of examining how far the expected learning outcomes have been achieved by such students. The findings are expected to provide important insights into areas that contribute to the achievement of learning outcomes. The next three chapters will present the data pertaining to student achievement in relation to the three subjects, mathematics, science and English language.