

Chapter Two

Methodology

2.1 Introduction

As mentioned in chapter 1, the National Assessment of Achievement of Grade 04 Pupils in Sri Lanka was conducted in 2015.

This chapter elaborates the methodology adopted in the 2015 study which was based on the instruments constructed for this purpose in 2013.

2.2 Objectives of the study

In accordance with the Education Sector Development Framework Programme (ESDFP 2012-2017) and the Development of Education plan through sector-wide approach, the main objective of the study was to:

determine the achievement of learning outcomes of students completing grade 04 in the year 2015 and to compare such achievement with that of 2013.

2.2.1 Specific objectives of the study

2.2.1.1 Assess the extent to which the expected learning outcomes have been achieved by grade 4 students in 2015

2.2.1.2 Identify the areas of strengths and weaknesses of student achievement in relation to subject content and related skills

2.2.1.3 Examine whether there are disparities in achievement in relation to school type, medium of instruction, school location, and gender.

2.2.1.4 Compare the achievement level of students in 2013 with that of 2015.

In section 2.3, the sampling methodology will be discussed.

2.3 Sampling methodology

The sampling methodology used for this study, was based on an instructional manual designed by the Statistical Consultation Group, Statistics Canada in Ottawa. It 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). The same methodology had been used in NEREC assessments since 2009.

Selection of the sample of schools and the sample of students will be discussed next.

2.3.1 Desired target population

The target population of the study has grade-based definition. Therefore, students who have completed fourth grade in the education system of Sri Lanka in the year 2015 were considered as the desired target population of 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 2014 June) was the sampling frame used for the study.

Although private schools also provide primary and secondary education they are not controlled by the government, yet follow the local curriculum set up by the Ministry of Education in the local language mediums of Sinhala or Tamil or English. In addition there are a few international schools which also provide primary and secondary education. These schools are also not included in the sampling frame. Accordingly, as Table 2.1 indicates the desired target population of the study was predicted by calculating the number of students who studied in Grade 3 in 2014. Therefore, the desired target population is approximately **337828** students who will complete Grade 4 in 2015 in state schools.

However, in selecting the final sample certain schools and consequently number of students had to be excluded from the population.

2.3.3 School level exclusions

Extremely small size :

The schools that consist of less than 10 students in grade 04 of the available MOE database was considered as extremely small size schools. Such schools had been excluded from the sample in the previous study as well. Table 2.1 illustrates school level exclusions by provinces.

Table 2.1: School level exclusions by provinces

Province	Number of schools				Number of Students			
	Desired target population	Defined target population	Excluded population	Exclusion %	Desired target population	Defined target population	Excluded population	Exclusion %
Western	1214	1100	114	9%	79587	78938	649	1%
Central	1340	1026	314	23%	45254	43513	1741	4%
Southern	965	760	205	21%	44804	43652	1152	3%
Northern	885	591	294	33%	19812	18349	1463	7%
Eastern	977	820	157	16%	35533	34636	897	3%
North Western	1120	876	244	22%	42097	40680	1417	3%
North Central	716	564	152	21%	24032	23115	917	4%
Uva	788	593	195	25%	24197	23159	1038	4%
Sabaragamuwa	986	697	289	29%	33307	31786	1521	5%
Total	8991	7027	1964	22%	348623	337828	10795	3%

2.3.4 Defined target population

After excluding schools from the desired target population, remaining schools can be defined as the "Defined Target Population".

Table 2.2: Defined target population by provinces

Province	Defined Target School Population	Defined Target Student Population
1. Western	1100	78938
2. Central	1026	43513
3. Southern	760	43652
4. Northern	591	18349
5. Eastern	820	34636
6. North Western	876	40680
7. North Central	564	23115
8. Uva	593	23159
9. Sabaragamuwa	697	31786
	7027	337828

2.3.5 Sample design – procedure

The sample procedure has a multi stage approach. Multi stage sampling is a strategy whereby the final sample is derived 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 will be selected in the sample is proportional to some known variable (Ross, K., 2005). Then in the second stage a group of students was selected from the sampled schools. Cluster sampling approach was the strategy used for selection of students from the grade 04 classes. This means that an entire grade 04 class from each sampled school was selected.

In selection of the sample, the present study as in the previous study, the province was taken as the main stratum (explicit stratum). The rationale for selecting the province as the explicit stratum is that in the Sri Lankan context education being a devolved subject the 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 instructions and type of school. Accordingly results will be reported for provinces.

Table 2.3 illustrates student sample and school sample per province with other important values which decide the size of sampling error, such as roh and 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 2.3: Calculated student sample and school sample per province

Province	Number of schools	Number of classes	Number of student	Average	ROH Value	Design Effect	Student Sample (ESS=178)	Final school sample
1. Western	1214	2343	79587	33.96	0.25	9.241997	1645	48
2. Central	1340	1791	45254	25.26	0.25	7.066862	1258	50
3. Southern	965	1483	44804	30.21	0.25	8.302933	1478	49
4. Northern	885	1069	19812	18.53	0.25	5.383302	958	52
5. Eastern	977	1402	35533	25.34	0.25	7.086127	1261	50
6. North Western	1120	1543	42097	27.28	0.25	7.570642	1348	49
7. North Central	716	955	24032	25.16	0.25	7.041099	1253	50
8. Uva	788	1011	24197	23.93	0.25	6.733432	1199	50
9. Sabaragamuwa	986	1307	33307	25.48	0.25	7.120888	1268	50
Grand Total	8991	12904	348623				11667	448

Table 2.4 illustrates calculated student sample, allocated student sample and achieved student sample by provinces.

Table 2.4: Calculated, allocated and achieved student sample per each province

Province	Calculated Student Sample	Allocated Student Sample as MOE Student Database	Achieved Student Sample			
			Tamil	Sinhala	Mathematics	English
Western	1645	1860	242	1496	1691	1694
Central	1258	1721	592	1025	1591	1593
Southern	1478	1891	104	1684	1773	1772
Northern	958	1434	1283	109	1381	1388
Eastern	1261	1640	1174	351	1524	1523
North Western	1348	1786	242	1411	1622	1622
North Central	1253	1614	216	1340	1519	1523
Uva	1199	1620	455	1069	1509	1510
Sabaragamuwa	1268	1896	211	1607	1828	1828
	11667	15462	4519	10092	14149	14453

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 4 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 Achievement tests

The tests in First Languages- Sinhala and Tamil, the Second language - English and mathematics, were designed in 2013 based on the framework for each subject.

The same test papers were used in the 2015 in order to compare the achievement of students in 2013 with that of the achievement in 2015.

2.5 Framework for the National Assessment

Content of the achievement tests and their distribution in the papers is given in Table 2.5.

Table 2.5: Content of the achievement tests and their distribution in the papers

Subject	Sub skill	No. of Questions	Question nos.	Duration
Sinhala Language	Vocabulary	11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	One Hour
	Comprehension	10	12, 13, 14, 25, 26, 27, 28, 29, 30, 31	
	Syntax	10	15, 16, 17, 18, 19, 20, 21, 22, 23, 24	
	Writing	9	32, 33, 34, 35, 36, 37, 38, 39, 40	
Tamil Language	Vocabulary	11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	One Hour
	Comprehension	10	12, 13, 14, 25, 26, 27, 28, 29, 30, 31	
	Syntax	10	15, 16, 17, 18, 19, 20, 21, 22, 23, 24	
	Writing	9	32, 33, 34, 35, 36, 37, 38, 39, 40	
English Language	Vocabulary	10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	One Hour
	Comprehension	10	11, 12, 13, 14, 15, 16, 17, 18, 19, 20	
	Syntax	10	21, 22, 23, 24, 25, 26, 27, 28, 29, 30	
	Writing	05	31, 32, 3, 34, 35	
Mathematics	Concepts	12	2, 3, 4, 16, 23, 27, 29, 31, 35, 37, 38, 39	One Hour
	Procedures	11	1, 6, 7, 8, 9, 14, 18, 20, 24, 25, 33	
	Problem Solving	17	5, 10, 11, 12, 13, 15, 17, 19, 21, 22, 26, 28, 30, 32, 34, 36, 40	

2.6 Procedures in administration of the National Assessment 2015

National Assessment of Grade 04 students were administered island wide on 1st and 2nd of December, 2015.

Test coordinators

Coordinators to administer the test and collect background information from 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, lecturers from Colleges of Education. To assist them, experienced teachers from the same schools were appointed with the consent of principals. Coordinators' contribution in the process of test administration and other activities involved were very much appreciated.

Training workshop for coordinators

Training workshops for coordinators were organized in three phases. A team representing NEREC visited the North, North Central and Eastern provinces from 23rd – 27th November 2015 and conducted the training programme in Anuradhapura, Vavuniya, Kilinochchi, Jaffna, Trincomalee, Batticaloa and Polonnaruwa. Test papers and other relevant documents were handed over to all coordinators with necessary instructions.

The team who visited the Phase II covered the Uva, Southern and part of Eastern Provinces from 23rd – 26th November 2015. Team members conducted the training programme at Bandarawela, Monaragala, Hambantota, Galle and Ampara.

In Phase III, the training workshops were held at the NEREC for four provinces Western, Central, North Western and Sabaragamuwa on 26th and 27th November 2015.

The following measures were adopted in this study as well, which were expected to increase the reliability of the assessment.

- In order to assess the achievement of grade 4 pupils who completed grade 4 in 2015, tests were held at the end of the academic year 2015.
- The tests were administered on two week days.
- In order to better monitor the administering of the tests, in the 2015 study 448 independent coordinators were appointed to the 448 examination centers.
- The coordinators had to complete a journal in which they had to provide information regarding the conduct of the examination and the collection of other relevant background information.

Test administration

All necessary instructions were sent in advance to all Provincial Directors, Zonal Directors and relevant school principals regarding the test administration.

The test was administered on 1st and 2nd of December 2015, as per the time table prepared by NEREC.

Return of answer scripts and other documents

Coordinators from Central, Western, North Western and Sabaragamuwa Provinces handed over the answer scripts and other documents at the NEREC from 05th to 8th December 2015. 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 2015.

2.7 Analysis of data

Data gathered through the achievement tests were analyzed on a national and provincial basis. In order to minimize the effect of the discrepancy between the expected and the achieved sample, data was weighted.

Patterns in learning achievement was discussed using Measures of central tendency (Mean, Standard Deviation and median) error of mean, Skewness, cumulative

percentages and percentile ranks. In addition, graphs – frequency polygon and box plots were also used.

2.8 Summary

The National Assessment of Achievement of grade 04 pupils of Sri Lanka in the year 2015 was conducted with the main objective of examining how far equity is promoted in the country by enabling all children to access and complete basic education.

This chapter elaborated the specific objectives of the study, sampling procedures and the frame work of the assessment.

The next four chapters will present the data pertaining to student achievement in relation to the four subjects – Sinhala language, Tamil language, English language and mathematics.