National Report

National Assessment of Achievement of Students Completing Grade 8 in Year 2014 in Sri Lanka

Ministry of Education
National Education Research and Evaluation Centre (NEREC)

Financed by:
World Bank-funded Transforming the School Education System as the Foundation of a Knowledge Hub Project (TSEP)

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Writers: W. Chandradasa
Lakshman Wedikkarage

Sample Selection: Jude Nonis

Data Analysis: W. Chandradasa
Nishara Fernanado

Proof Reading: Jeevani Herath

Data Processing: Nayanie Gamaethige
M.H.S.F. Mahsanie
Nadee Gamaethige
Anuradha S. Seneviratne
Varuni Gurugamage
K.P. Ganga Udeshika
K.M. Kanishka Karunanayake
Devinda Wijethunga
Jayathu Amarasinghe

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Dr. Lakshman Wedikkarage
Acting Director
National Education Research and Evaluation Centre (NEREC)

Message from the Secretary, Ministry of Education

It is my pleasure and privilege to write this message as the Secretary of Ministry of Education on the 'National Assessment of Achievement of Students Completing Grade 8 in Year 2014 in Sri Lanka'. Conducting periodical national assessments is one of the major activities of the Education Sector Development Framework and Programme (ESDFP) (2012-2016). This is an important practice which is exercised to reveal the achievement levels of students in various grades. While it enables teachers to understand the levels of achievement of students, it also provides an opportunity to policy-makers to determine the performance of the education system through learning outcomes, to what extent the educational development programmes and investments have been successful and what steps should be taken further to upgrade the performance. In Sri Lanka, recommendations and suggestions of the national assessments are predominantly used for policy-making purposes and also designing quality development programmes. Considering the importance of this exercise, the Ministry of Education (MoE) has planned to continue these assessments periodically and effectively.

The Ministry of Education, with the financial assistance of the World Bank, has commissioned the National Education Research and Evaluation Center (NEREC) of the Faculty of Education, University of Colombo to conduct a series of national assessments to determine the levels of achievement of students in grades 4 and 8, during the past several years. Its latest national assessment reveals factors that are particularly significant in order to enhance teaching and learning, analysed by various aspects such as types of schools, gender, and medium of instruction, location and competency levels of students who completed grade 8 in the year 2014.

I wish to extend my sincere gratitude to Hon. Akila Viraj Kariyawasam, Minister of Education for providing guidance to implement this type of activities which have a national importance. Further, I also wish to thank Dr. Harsha Aturupane, Lead Education Specialist, Education Global Practice of the World Bank for providing technical guidance to carry out this assessment and appreciate the financial assistance extended by the World Bank though the 'Transforming School Education Project (TSEP)' for this purpose. I also appreciate the NEREC research team for their academic

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Upali Marasinghe
Secretary
Ministry of Education

Research Team

W. Chandradasa

Marie Perera

M. Karunanithy

Jeevani Herath

Jude Nonis

R.D.C. Niroshini

Kumudu Seneviratne

Lakshman Wedikkarage - Coordinator

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Abbreviations

EFA	Education for All
ESDFP	Education Sector Development Framework and Programme
ESS	Effective Sample Size
IEA	International Association for the Evaluation of Educational Achievement
NEREC	National Education Research and Evaluation Centre
PPS	Probability Proportional to Size
roh	Rate of homogeneity
SD	Standard deviation
TIMSS	Trends in International Mathematics and Science Study

Executive Summary

National Assessment of Achievement is generally considered as an important investigation of schools and students (and sometimes teachers) that is designed to provide evidence about students' achievements at a particular stage of education, in identified curriculum areas such as, reading or writing, English language, mathematics or science. National assessments can play a critical role in demonstrating the efficiency or otherwise of all other investments in education.

NEREC has conducted National Assessments of Learning Outcomes both at primary and secondary levels. At secondary level, National Assessments of Learning Outcomes were conducted for Grade 8 in 2005, 2008 and 2012. This report presents the findings of the National Assessment conducted in grade 8 for English, mathematics and science in the year 2014.

The National Assessment conducted in 2012 used new instruments and as such a comparison of achievement levels with previous years was not possible. It served as a starting point for monitoring the level and distribution of learning outcomes overtime. The National Assessment of Achievement of 2014 used the same instruments that were used in 2012 to test cognitive skills in English, mathematics and science in keeping with the new competency based curriculum which was introduced to grade 8 in 2009.

The present National Assessments covered the entire country and the sample was drawn to enable analysis by type of school, gender, medium of instruction and location of schools. Patterns in learning achievement were discussed using mean, median, skewness of the distribution, cumulative percentages and percentile ranks. Furthermore, graphs including frequency polygons and box plots were also used. Data gathered through the achievement tests were analyzed on national and provincial bases in relation to school type, gender, medium of instruction and school location.

Moreover, to test the generalizability of results, statistical tests such as t-tests and F-tests were conducted. Findings of the National Assessment in 2014 revealed that

the achievement level of students completing grade 8 in 2014 is above 35 marks in all three subjects.

Further to the above, the findings revealed that there is disparity in achievement in all the three subjects in relation to school location, gender, medium of instruction and school type.

Differences in achievement of competencies related to the three subjects tested can also be seen in varying degrees.

Chapter One

Introduction to the Study

1.1 Background

The World Conference on Education for All (EFA) held in Jomtien in 1990, an extended vision for meeting learning needs was outlined. This included the requirement to improve and assess learning achievement (UNESCO, 1990). Hence, a worldwide emphasis on the need for timely and credible data on student learning, that may inform the design of effective mechanisms to improve educational outcomes, rather than only on education inputs has become a primary concern among educationists.

In the year 2000, The World Education Forum held in Dakar placed special emphasis on the quality of Education. This is mentioned in goal no. 6 which states "improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills" (UNESCO 2000: iv, 7). As observed by economists, education systems can provide pathways to economic advancement (Ross, Paviat & Gnevois, 2006). It is often argued that good quality education in terms of increased learning outcomes 'in literacy, numeracy and life skills can contribute to increased work productivity, higher individual income levels, economic and social growth, improvement in health, and the generation of innovative ideas' (Saito & Cappelle, 2010: p5). As a result, there has been an increased global growth in the use of learning assessments (Kamens & McNeely, 2010).

This is evident in Sri Lanka as well. Being a member country agreed on the World Declaration on Education for All, it strives to enhance the quality of education by implementing procedures that will provide information on students' learning. One such measure adopted was monitoring student achievement through national assessments at different Grade levels conducted by the National Education Research and Evaluation Centre (NEREC).

1.2 What is a National Assessment of Education?

A national assessment "is designed to describe the achievement of students in a curriculum area aggregated to provide an estimate of the achievement level in the education system as a whole at a particular age or grade level" (Kellaghan, Greaney and Murray. 2009, p.xi). It is an investigation of schools and students (and sometimes teachers) that is designed to provide evidence about students' achievements at a particular stage of education, in identified curriculum areas such as, reading or writing, English language, mathematics or science. The resolve of a national assessment, in addition to determining the realization of objectives of learning and how far learning outcomes have been achieved, is to convey such information to relevant authorities so that it could lead to improvement in future student achievement thereby contributing to the decision making process. In other words, the ultimate objective of a national assessment while determining the achievement levels is to contribute to the expansion of the quality of students' learning. According to Kellaghan, Greaney and Murray (2009), national assessment can throw light on the following issues in education.

Access Obstacles to attending school, such as limited availability of places or distance of students' homes from school (or the type of school).

Quality The quality of inputs to and outputs of schooling, such as the resources and facilities available to support learning (responsive curricula, teacher competence, textbooks); instructional practices; learner-teacher interactions; and student learning.

Efficiency Optimal use of human and financial resources, reflected in pupil-teacher ratio, and grade repetition rates.

Equity Provision of educational opportunities to students and attainment of parity of achievement for students, irrespective of their characteristics, such as gender, language or ethnic group membership, and geographic location

Furthermore, according to Kellaghan, Greaney and Murray (2009), all national assessments seek answers to one or more of the following questions:

- How well are students learning in the education system (with reference to general expectations, aims of the curriculum, preparation for further learning, or preparation for life)?
- Does evidence indicate particular strengths and weaknesses in students' knowledge and skills?
- Do particular subgroups in the population perform poorly? Do disparities exist, for example, between the achievements of (a) boys and girls, (b) students in urban and rural locations, (c) students from different language or ethnic groups, or (d) students in different regions of the country?
- What factors are associated with student achievement? To what extent does achievement vary with characteristics of the learning environment (for example, school resources, teacher preparation and competence, and type of school) or with students' home and community circumstances?
- Are government standards being met in the provision of resources (for example, textbooks, teacher qualifications, and other quality inputs)?
- Do the achievements of students change over time? This question may be of particular interest if reforms of the education system are being undertaken. Answering the question requires carrying out assessments that yield comparable data at different points in time?

  (Kellaghan and Greaney, 2008, p.9).

1.3 Equity and Excellence

It is generally argued that minimizing inequalities among individuals could be achieved through general acquisition of education. This will, in turn, lead to reduce inequalities within and among nations (Farrel, 2002). Theories such as 'Human capital Theory' and different interpretations of them became the bases of increased expenditures on education around the world in relation to access and equality. Findings of national assessments in this regard play an important role in informing policy planners of the quality of education received by students at a given time so that necessary changes to certain educational practices could be adjusted (World Bank, 2007).

Over the years, various steps have been taken to enhance the provision of equity in order to achieve excellence in Sri Lanka. One example is the widening of access to education through Kannangara reforms which were introduced as far back as 1944 with a view to providing equity in education irrespective of race, caste or ethnicity (Sumathipala, 1968). Therefore, one can see that promoting "equity" and "excellence" and reducing disparities in the education system has been a primary concern of the Governments of Sri Lanka. In this regard, a comprehensive medium term Education Sector Development Framework and Programme (ESDFP) from 2006–2010 was developed (Ministry of Education, 2011). One of the Major areas identified in this framework is "improving the quality of basic and secondary education" and "increasing equitable access to basic and secondary education" (p.2) This Framework further emphasizes, the meaning of equitable access as "each child can access an education appropriate to his /her individual learning potential and needs" (Pg.4). The plan for the second stage of the ESDFP for the period 2012 -2017 is an extension of the policy framework which comprises three policy themes as follows (Ministry of Education, 2013).

Theme 1: Increase equitable access to primary and secondary education

Theme 2: Improve the quality of primary and secondary education

Theme 3: Strengthen governance and service delivery of education

In addition, it provides a foundation theme and a crosscutting activity to ensure the achievement of policy themes related results and outcomes.

The foundation: Overarching education sector development rolling plan : and
Crosscutting activity: Results – based monitoring and evaluation. (p.1)

Under theme 2 – Improving Quality of primary and secondary education, National Assessment of Learning Outcomes are expected to be utilized for program development.

1.4 National Assessment Studies Conducted in Sri Lanka

National Assessment of Learning Outcomes has become an important component of education policy analysis and program monitoring in Sri Lanka. The Ministry of Education in Sri Lanka has commissioned such studies to The National Education Research and Evaluation Centre (NEREC) of the Faculty of Education, University of Colombo with the kind patronage of the World Bank.

NEREC has conducted National Assessments of Learning Outcomes both at primary and secondary levels. At primary level, assessments were conducted for Grade 4 in 2003, 2007, 2009 and 2013 respectively. At secondary level, National Assessment of Learning Outcomes were conducted for Grade 8 in 2005, 2008 and 2012. The results from these studies, it is claimed provide "useful information for analysis of policy and the monitoring of the progress of the education system" (Aturupana, 2009, p.31).

1.5 Rationale for the Present Study

The national assessments conducted in grade 8 in 2005, 2008 and 2012 reveal that on average there is an improvement in achievement levels of Grade 8 students in Science and Mathematics. The achievement of the English language, which is the second language of the students was not assessed in 2008. While there was an improvement in the achievement of learning outcomes, it was also revealed that there are inequalities in provision of education in relation to provinces, gender, medium of instruction and locality (NEREC, 2008). Although, there is a substantial increase in achievement over the period, the need "for these findings to be supported by further national assessments in the future, in order to reach a reliable and robust conclusion about the magnitude of improvement" (Aturupane, 2009, p.33) has been stressed.

Besides, a new competency based curriculum was introduced to grade 8 in 2009. Therefore, the need to find out in what way the introduction of the new curriculum had an impact on the learning outcomes was evident. Hence, the national assessment conducted in 2012 used various competency levels as indicators of achievement in English, Mathematics and Science. The analysis was done based on percentages of students who had achieved such competencies in varying degrees. The national

assessment results in 2012 indicated that 'there were inter and intra disparities among provinces, school types, ethnic groups and to a certain extent between genders' (NEREC, 2013). This report presents the findings of the national assessment of achievement of students completing grade 8 in year 2014 for English, Mathematics and Science.

1.6 National Assessment of Learning Outcomes- 2014

As mentioned elsewhere, the National Assessment of Learning Outcomes of 2012 used new instruments to test cognitive skills in English, Mathematics and Science in keeping with the new curriculum. In 2012, it served as a starting point for monitoring the level and distribution of learning outcomes overtime. Thus, a comparison of learning outcomes was not possible. However, a comparison would have been possible if there had been a repetition of the same test. Therefore, the National Assessment of 2014 used the same instruments used in 2012 to determine the achievement levels of the students in English, Mathematics and Science.

The national assessment in 2014 covered the entire country and the sample was drawn to enable analysis by province, type of school, gender and medium of instruction. This report presents the analysis of the achievement of learning outcomes related to cognitive skills. Chapter 2 of this report will discuss the methodology of the study. Chapters 3-5 will focus on the findings pertaining to the achievement of cognitive skills in Mathematics, Science and English respectively. The final chapter will emphasize on the areas that require attention by the educational planners based on the findings of this study.

1.7 Summary

This chapter discussed the nature of national assessments with particular references to their aims and objectives in improving the quality of education. Having introduced the rationale for the present study, it also presented why national assessments are important in the Sri Lankan context and how useful they are in determining the achievement levels of students in various subjects in relation to various aspects such as school type, gender, medium of instruction and school location among many other determinants.

Chapter Two

Methodology

2.1 Introduction

In chapter 1, background to the National Assessment of Grade 8 students of 2014 and the aims and objectives of a national assessment with particular relevance to Sri Lanka were discussed. This chapter elaborates the methodology used to conduct the present study in 2014.

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 2014.

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, gender, medium of instruction, and school location.

2.3 Sampling Methodology

The sampling methodology used for this study was the same as the one used in national assessment of 2012. 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 2014 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 2013 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 315,547 pupils who completed grade eight in 2014 from 6,574 government schools.

Table 2.1: Target population

Province	Number of Schools	Number of classes	Number of Students
1. Western	976	2,188	74,039
2. Central	937	1,557	41,896
3. Southern	788	1,357	38,496
4. Northern	520	837	20,085
5. Eastern	645	1,130	31,418
6. North Western	915	1,435	38,471
7. North Central	454	738	21,659
8. Uva	597	889	21,262
9. Sabaragamuwa	742	1,097	28,221
Total	6,574	11,228	315,547

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 three 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	74,039	34	0.25	9	1,639	48
	classes	2,188					
Central	students	41,896	27	0.25	7	1,331	49
	classes	1,557					
Southern	students	38,496	28	0.25	8	1,396	49
	classes	1,357					
Northern	students	20,085	24	0.25	7	1,201	50
	classes	837					
Eastern	students	31,418	28	0.25	8	1,371	49
	classes	1,130					
North Western	students	38,471	27	0.25	7	1,327	49
	classes	1,435					
North Central	students	21,659	29	0.25	8	1,439	49
	classes	738					
Uva	students	21,262	24	0.25	7	1,198	50
	classes	889					
Sabaragamuwa	students	28,221	26	0.25	7	1,278	50
	classes	1,097					
Total						12,180	443

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	1,639	1,806	1,352	1,273	1,279
Central	1,331	1,719	1,443	1,477	1,482
Southern	1,396	1,829	1,562	1,556	1,557
Northern	1,201	1,391	1,238	1,245	1,245
Eastern	1,371	1,530	1,385	1,386	1,386
North Western	1,327	1,652	1,467	1,465	1,463
North Central	1,439	1,678	1,562	1,562	1,551
Uva	1,198	1,637	1,422	1,417	1,417
Sabaragamuwa	1,278	1,871	1,559	1,550	1,553
Total	**12,180**	**15,113**	**12,990**	**12,931**	**12,933**

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 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. 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 2014

National Assessment of Grade 08 students were conducted island-wide on the 2nd and 3rd of December, 2014. It was possible to conduct the test in all 443 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 and trainee teachers from National Colleges of Education and Project officers from National Institute of Education 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 24th to 28th of November 2014. 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 27th and 28th of November, 2014.

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 01st of December 2014 to make prior arrangements concerning the test.

Given below are some of the measures that were adopted in the 2014 study which were expected to increase the reliability of the assessment.

- The tests were administered on weekdays (2nd and 3rd of December 2014)
- In order to better monitor the administering of the tests, in the 2014 study 443 independent coordinators were appointed to the 443 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 06th to 10th December 2014. A team from NEREC visited the North Central, Northern, Eastern, Southern and Uva provinces to collect answer scripts and other documents from 9th to 16th December 2014.

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 in 2014. As mentioned earlier, the National Assessment of Achievement of Grade 08 Students of Sri Lanka in the year 2014 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 play a central role in providing equality to students receiving compulsory education. The next three chapters will present the data pertaining to student achievement in relation to the three subjects, mathematics, science and English language.

Chapter Three

Patterns in Achievement – Mathematics 2014

3.1 Introduction

In this chapter, achievement levels as well as disparities in achievement of students in mathematics are discussed. Students' achievement levels concerning mathematics are presented in relation to such factors as school type, gender, medium of instruction and location of school. Furthermore, strengths and weaknesses of students' achievement are analyzed against various skills and subject contents of mathematics. The present National Assessment is the second study conducted on Grade 8 mathematics syllabus since the new competency based curriculum was introduced in Sri Lanka in 2007. The first study on the same was conducted by NEREC in 2012.

3.2 Achievement Levels in Mathematics at All Island and Provincial Levels

The mean value of the achievement level of students stands as 50.87 at all island level. However, the median value is 47.51 indicating that half of the student population has scored below 47.51. Furthermore, 25 percent of students have scored below 35.02 marks while 75 percent of them have scored below 67.51 marks. Table 3.1 below further illustrates the achievement levels at provincial as well as all island levels.

Table 3.1: All island and provincial achievement in mathematics 2014 –Summary statistics

Province	Mean	Rank	Standard Deviation	Standard Error of Mean	Percentile (p25)=Q1	Median (p50)=Q2	Percentile (p75)=Q3	Skewness
Western	55.49	1	20.73	0.08	37.61	55.00	72.52	0.00
Southern	53.66	2	21.44	0.11	35.02	52.51	72.62	0.21
Sabaragamuwa	52.35	3	19.46	0.11	37.42	50.02	67.51	0.18
North Western	50.99	4	19.58	0.10	35.02	47.53	65.21	0.31
Eastern	49.28	5	20.28	0.11	32.41	45.21	65.35	0.29
North Central	48.98	6	19.17	0.13	35.05	45.31	62.21	0.42
Uva	47.95	7	18.80	0.13	32.51	45.05	60.42	0.43
Northern	46.05	8	19.55	0.14	30.12	42.52	60.14	0.57
Central	44.96	9	18.77	0.09	30.02	40.01	57.51	0.68
All Island	50.87		20.29	0.04	35.02	47.51	67.51	0.29

When considering the provincial level achievement, mean values of Western, Southern, Sabaragamuwa and North Western Provinces are 55.49, 53.66, 52.35 and 50.99 respectively. While these values are above fifty, Western Province, according to this study, ranks number one in terms of achievement levels of mathematics. Yet, when one looks at the median of the same provinces, one can see that only Western, Southern and Sabaragamuwa show values that are above 50. Although the mean values of the other provinces show levels that are below 50, the lowest is 44.96. Achievement levels in mathematics are further illustrated by the Figure 3.1 below.

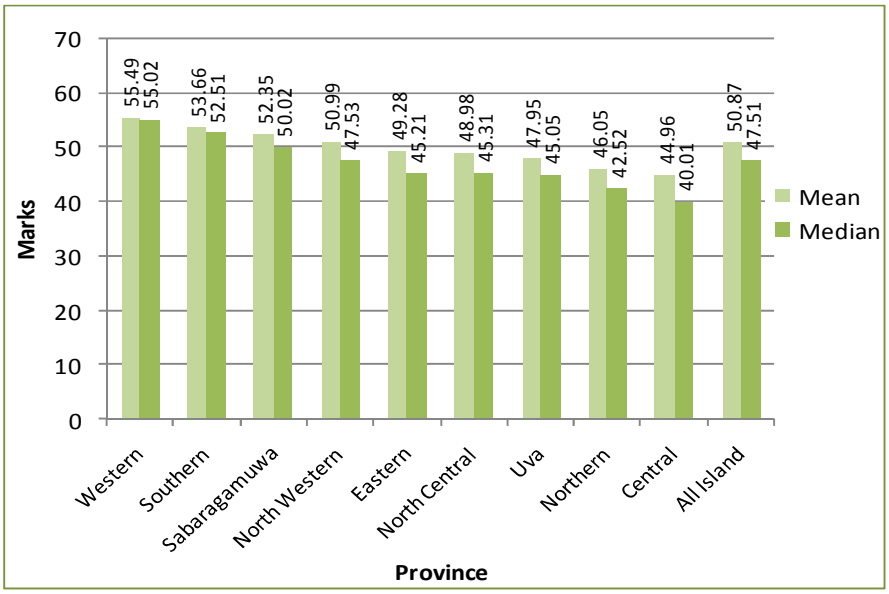

Figure 3.1: Mean values and median values of mathematics marks

3.3 Distribution of Test Scores of Mathematics

Standard deviation of marks (SD) which describes how scores are scattered around the mean value is 20.3 at all island level. If the marks are normally distributed nearly 68 percent of students fall between 71.16 (50.87+20.29) and 30.58 (50.87-20.29). However, mathematics scores have a positively skewed distribution (skewness = 0.29), which indicates that the majority of students are low achievers in mathematics. This can be further observed in the Figure 3.2 and Table 3.2 given below.

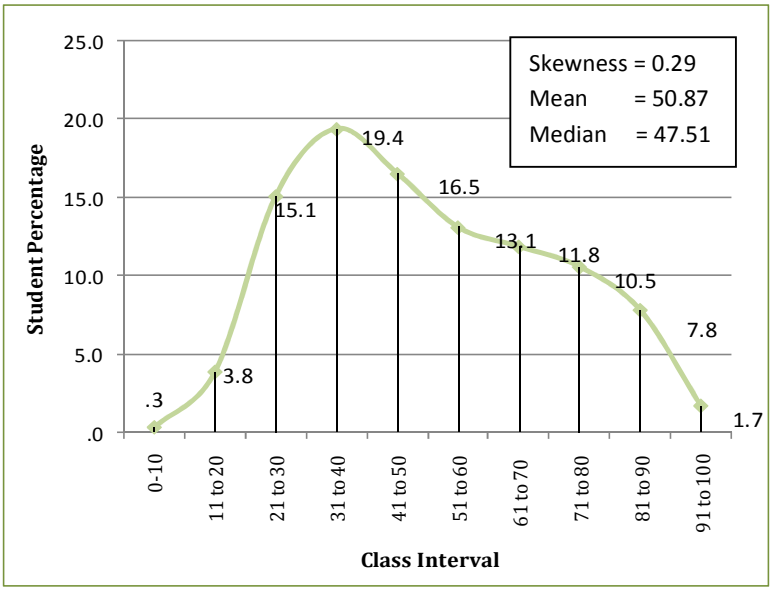

Figure 3.2: All island achievement in mathematics –distribution of marks

Table 3.2 : Distribution of all island achievement marks of mathematics

Class Interval	Student %	Cumulative %
00 to 10	.3	.3
11 to 20	3.8	4.1
21 to 30	15.1	19.2
31 to 40	19.4	38.6
41 to 50	16.5	55.1
51 to 60	13.1	68.2
61 to 70	11.8	80.0
71 to 80	10.5	90.6
81 to 90	7.8	98.3
91 to 100	1.7	100.0
Total	100.0	

One important phenomenon is that the percentage of highest frequency of students, which is 19.4, belongs to the marks category of 31-40. If conventionally viewed, this development may be seen as undesirable as the highest percentage of students have scored less than 40 marks for mathematics. Moreover, there is a clear indication that the percentages of students belonging to higher marks intervals are very low.

Positive skewness found in the distribution of mathematics marks can be seen in almost all the provinces. It is shown by Figure 3.3. According to the figure, only in Western, Sabaragamuwa and Southern Provinces positive skewness of the distribution of score is somewhat low. Furthermore, these distributions are bimodal distributions. It can be clearly seen in Western, Southern, Eastern and North Western Provinces.

Figure 3.3: Provincial-wise distribution of marks – Mathematics

According to Table 3.1 the differences of SD value of marks among different provinces are minimal. The highest value, which is 21.44, is in the Southern Province while the lowest value, which is 18.80, is seen in both Central and Uva Provinces. However, the skewness of the distribution of scores of various provinces show noticeable variations. While Western province has a negligible skewness (.00), Central Province has a very high skewness (.68). Central, Northern, Uva and North Central Provinces have a very high positive skewness indicating the fact that low achievers are very high. While Southern, Sabaragamuwa, and Eastern Provinces have a comparably low skewness indicating that low achievers are not many in these provinces when compared with other provinces. This skewness is indicated by the box-plot chart in Figure 3.4 given below.

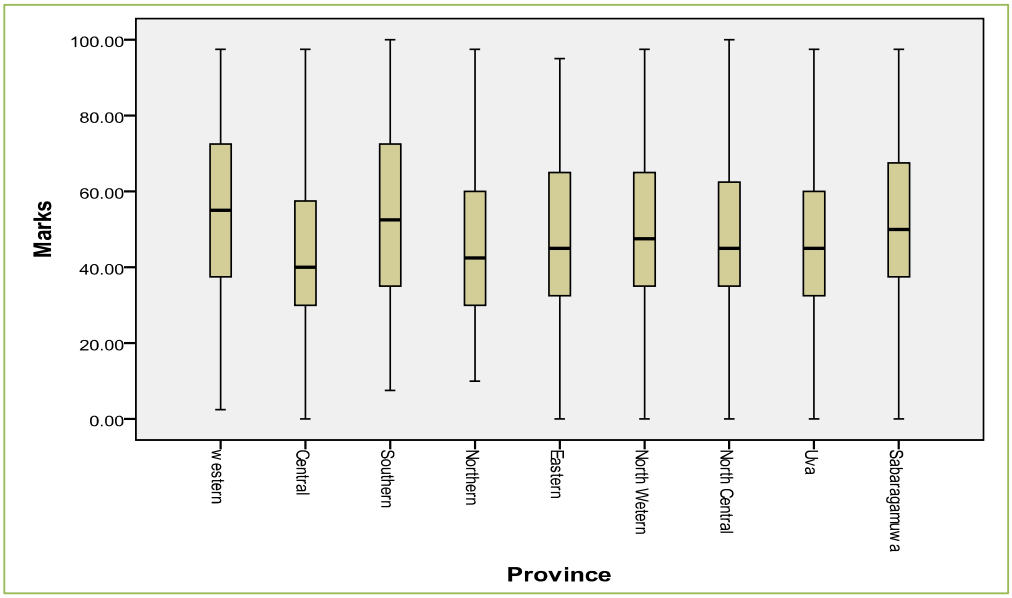

Figure 3.4 : Mathematics marks representation using boxplot and whisker plot

3.4 Disparities in Achievement in Mathematics

Over the years various efforts have been made to provide equal opportunities for school education in Sri Lanka. Yet, disparities in achievement in mathematics in different groups can still be seen owing to different factors. In this section, in what way the school type, gender, medium of instruction and school location have an influence on these disparities are discussed.

3.4.1 Disparities in Achievement in Mathematics in Relation to School Type

Indicators of achievement levels of mathematics according to school type are given in Table 3.3 below.

Table 3.3: Mathematics achievement marks according to school type

School Type	Mean	Standard Deviation	Median	Skewness	F	P
1AB	58.70	20.01	60.21	-0.11	31,747.29	.000
1C	42.37	16.42	40.01	0.63		
Type 2	41.54	17.08	37.54	0.76		
All Island	50.87	20.29	47.51	0.29		

According to Table 3.3, students in 1AB schools have shown the highest performance. The mean is 58.70 and median is 60.21, which can be considered as a satisfactory level. Another positive feature is that the distribution of marks of 1AB schools is negatively skewed, with a skewness value of -0.11. This indicates that the majority of students have shown a considerable high performance in mathematics in these schools. When 1C schools are considered, performance levels are lower than 1AB schools. Their mean is 42.37 and their median is 40.01. Their marks distribution is positively skewed, with a skewness value of 0.63 in 1C schools.

Type 2 schools show the lowest performance in mathematics. Their mean is 41.54 while the median is 37.54. This cannot be considered as a satisfactory level. It is a level which is below 50 marks. Another unsatisfactory feature is that the marks distribution in these schools is positively skewed which is 0.76. However, there is no conspicuous difference between the achievement levels of 1C and Type 2 schools. In both 1C and Type 2 schools, the skewness is positive while the skewness of 1AB schools is negative. This is further illustrated by Figure 3.5 below.

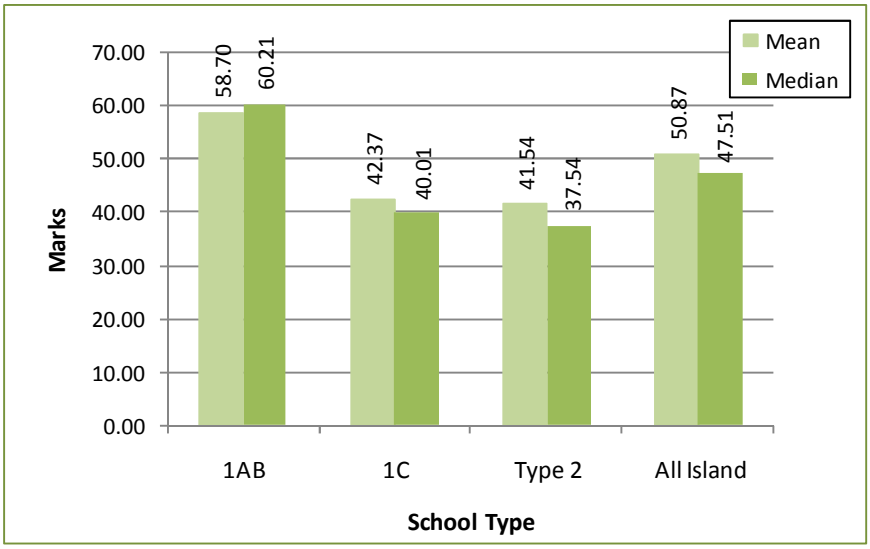

Figure 3.5: Mean values of mathematics marks according to school types

In addition to Table 3.3 above, Table 3.4 and Figure 3.6 also show the nature of the distribution of mathematics marks of students according to school type. This too shows that mathematics marks of 1C and Type 2 schools are positively distributed. Meanwhile, mathematics marks of 1AB schools are distributed with a negative skewness showing a satisfactory situation.

Table 3.4: Distribution of mathematics achievement marks according to school type

Class Interval	1AB Student %	Cumulative %	1C Student %	Cumulative %	Type 2 Student %	Cumulative %
00-10	0.13	0.13	0.43	0.43	0.46	0.46
11-20	1.57	1.70	5.73	6.16	7.42	7.88
21-30	8.24	9.94	22.34	28.50	23.49	31.37
31-40	13.40	23.34	25.86	54.36	26.48	57.85
41-50	14.99	38.33	18.98	73.34	17.04	74.89
51-60	14.36	52.69	12.19	85.53	10.72	85.62
61-70	15.34	68.03	8.32	93.85	7.25	92.86
71-80	16.29	84.32	4.04	97.89	4.18	97.04
81-90	12.76	97.08	1.96	99.85	2.58	99.62
91-100	2.92	100.00	0.15	100.00	0.38	100.00
Total	100.00		100.00		100.00	

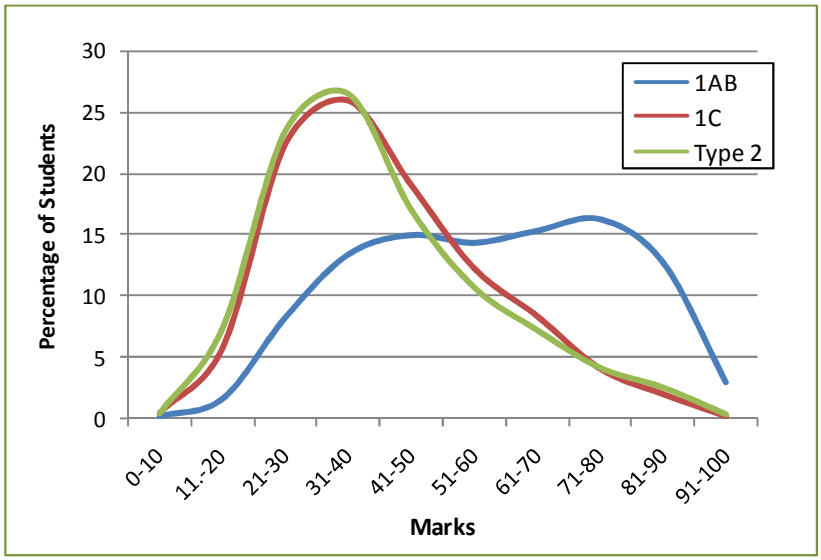

Figure 3.6: Distribution of mathematics achievement marks according to school type

3.4.2 Disparities in Achievement in Mathematics in Relation to Gender

Disparities in achievement of students were observed in relation to gender in previous grade 4 and 8 studies conducted by the NEREC. In the present study too, disparities of achievement related to gender were seen. According to Table 3.5 given below, there is a difference between the achievement levels of girls and boys. The mean value of the test scores of boys is 49.31 while the mean value of the test score of girls is 52.33.

Table 3.5: Mathematics achievement marks according to gender

Gender	Mean	Standard Deviation	Median	Skewness	F	P
Male	49.31	20.30	45.21	0.36	1,753.05	.000
Female	52.33	20.17	50.05	0.23		
All Island	50.87	20.29	47.51	0.29		

With regard to median also this difference can be seen. As such, it is evident in mathematics, performance of girls is better than that of boys. However, the standard deviation which indicates dispersion of marks is almost the same for two groups. This disparity in the achievement level in mathematics is further illustrated by Figure 3.7.

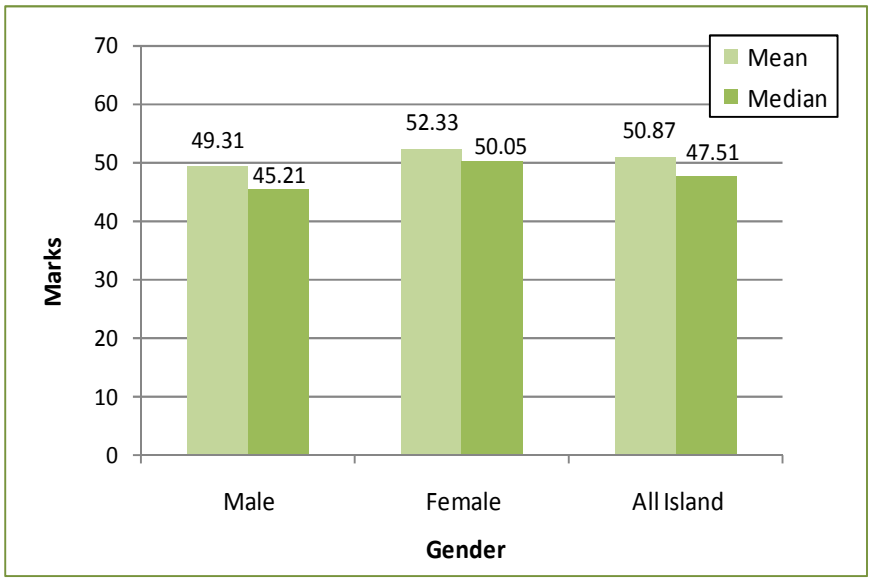

Figure 3.7: Mean values of mathematics marks according to gender

Distribution of mathematics marks was analyzed according to gender as well. These results are shown in Table 3.6 and Figure 3.8. According the Table 3.6 and Figure 3.8, it becomes evident that there is no considerable difference between the two groups with regard to the distribution of marks. This shows that there is no notable difference in distribution of marks in terms of gender.

Table 3.6: Distribution of mathematics achievement marks according to gender

Class Interval	Male %	Cumulative %	Female %	Cumulative %
00-10	0.37	0.37	0.19	0.19
11-20	4.42	4.79	3.26	3.45
21-30	17.05	21.84	13.23	16.68
31-40	20.35	42.19	18.47	35.14
41-50	16.09	58.28	16.93	52.07
51-60	12.37	70.66	13.74	65.81
61-70	11.00	81.66	12.64	78.45
71-80	9.67	91.33	11.37	89.82
81-90	7.11	98.44	8.43	98.25
91-100	1.56	100.00	1.75	100.00
Total	100.00		100.00	

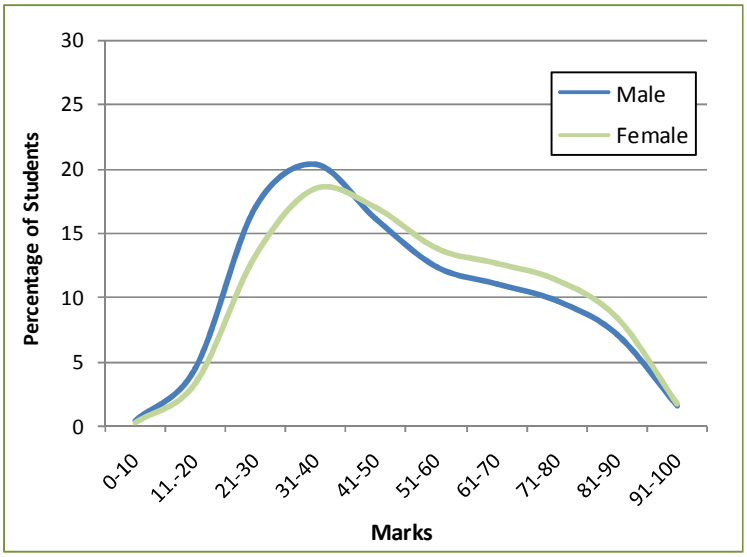

Figure 3.8: Distribution of mathematics achievement marks according to gender

3.4.3 Disparities in Achievement in Mathematics in Relation to Medium of Instruction

Either Sinhala or Tamil is the medium of instruction in almost all the schools in Sri Lanka. Those whose native language is Tamil normally study in Tamil medium while those whose native language is Sinhala generally study in Sinhala. Though both groups do their studies in their mother tongue, a difference can be observed in the achievement level in mathematics. The mean value of marks in the achievement of Sinhala medium students is 53.13 while it is 44.37 for the Tamil medium students. It is a noticeable difference. The median values also show the same. The median value of Sinhala medium students is 50.05 while the median value of the Tamil medium students is 40.21. This difference in achievement is further illustrated by Figure 3.9.

Table 3.7: Mathematics achievement marks according to medium of instruction

Medium of Instruction	Mean	Standard Deviation	Median	Skewness	F	P
Sinhala	53.13	20.34	50.05	0.18	23,597.05	.000
Tamil	44.37	18.69	40.21	0.64		
All Island	50.87	20.29	47.51	0.29		

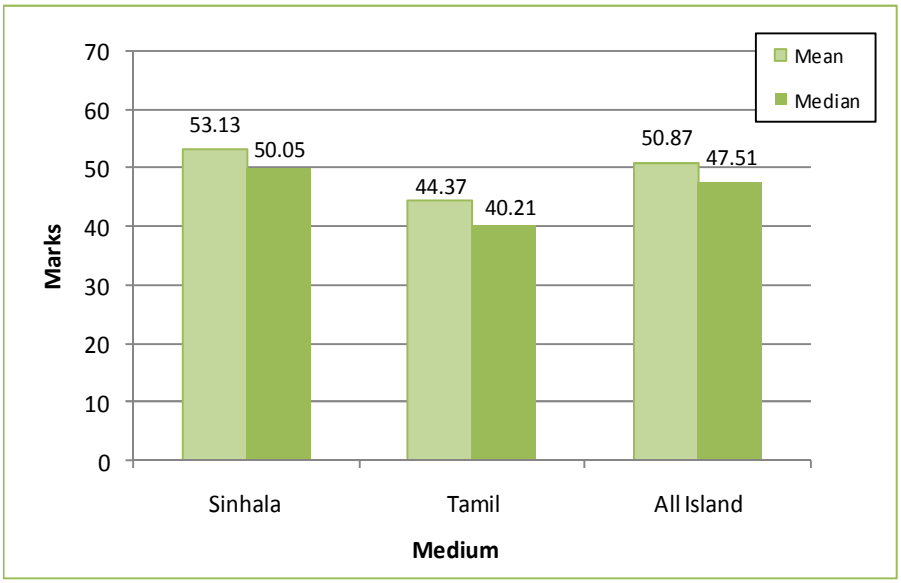

Figure 3.9: Mean values of mathematics marks according to medium of instruction

The analysis of the distribution of marks according to medium of instruction is given below in Table 3.8 and further illustrated by Figure 3.10. According to the results shown in Table 3.8 and Figure 3.10, it is apparent that the achievement of Sinhala medium students is more satisfactory than that of Tamil medium students. Although the skewness of distribution of marks is positive for Sinhala and Tamil medium groups, for Tamil medium students, it is considerably higher.

Table 3.8: Distribution of mathematics achievement marks according to medium of instruction

Class Interval	Sinhala %	Cumulative %	Tamil %	Cumulative %
00-10	0.21	0.21	0.45	0.45
11-20	3.20	3.42	5.62	6.06
21-30	12.40	15.81	22.77	28.83
31-40	18.07	33.88	23.13	51.96
41-50	16.50	50.38	16.57	68.53
51-60	13.69	64.07	11.34	79.87
61-70	12.87	76.95	8.91	88.78
71-80	11.99	88.94	6.41	95.18
81-90	9.07	98.01	4.09	99.27
91-100	1.99	100.00	0.73	100.00
Total	100.00		100.00	

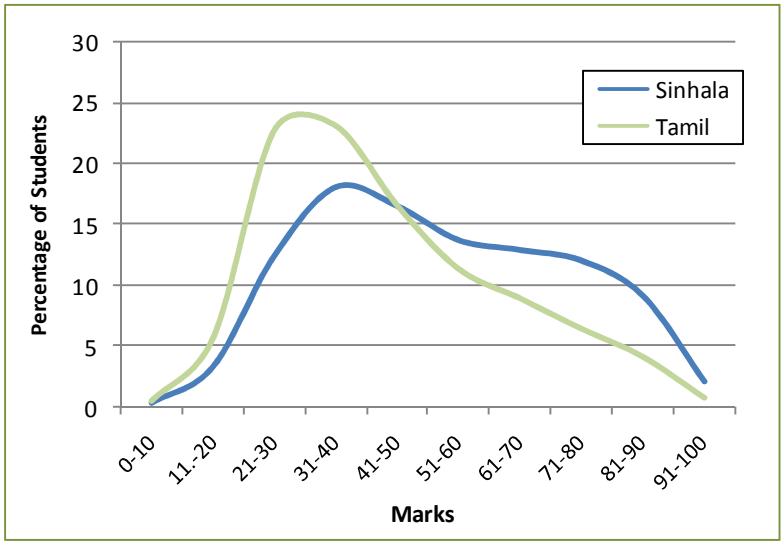

Figure 3.10: Distribution of mathematics achievement marks according to medium of instruction

3.4.4 Disparities in Achievement of Mathematics in Relation to Location of School

Different governments that came into power have taken numerous efforts to provide equal opportunities to every student studying in public schools irrespective of the location. However, the location of the school has been a leading factor affecting achievement. In this study the achievement level in mathematics of students attending schools located in Municipal Council areas, Urban Council areas and Pradeshiya Sabha areas were analyzed. Such analyzed data are given in Table 3.9 below.

Table 3.9: Mathematics achievement marks according to location

Location	Mean	Standard Deviation	Median	Skewness	F	P
Municipal Council	59.86	21.89	62.53	-0.18	13,649.47	.000
Urban Council	57.10	19.50	57.34	-0.15		
Pradeshiya Saba	46.79	18.65	42.52	0.48		
All Island	50.87	20.29	47.51	0.29		

The above table clearly shows that the performance level of students attending schools located in Municipal Council areas is the highest (Mean=59.86) while performance level of students attending schools located in Predeshiya Sabha areas is the lowest (Mean=46.79).

Though the achievement level of students in Urban Council areas is lower than that of Municipal Council areas, the difference is not relatively high when compared with the difference between Municipal Councils and Pradeshiya Sabhas. This is further illustrated by Figure 3.11.

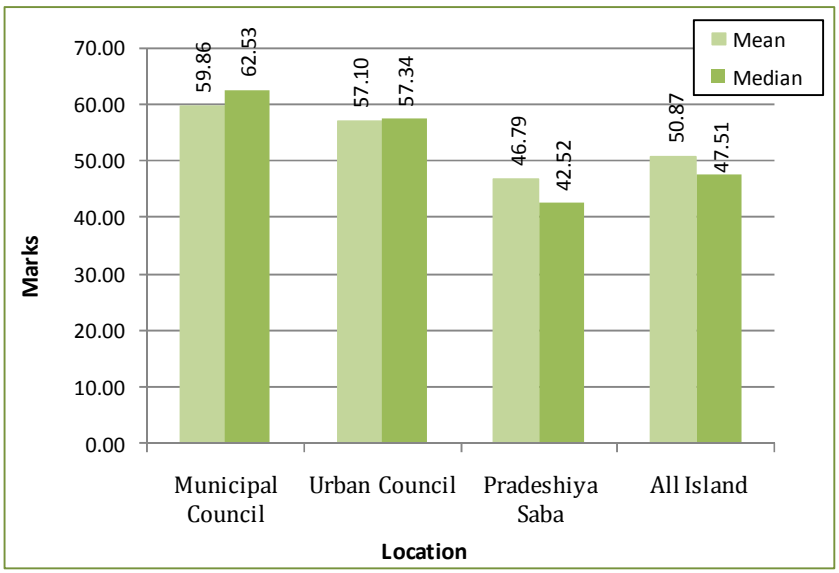

Figure 3.11: Mean values of mathematics marks according to location

This pattern of difference is further confirmed when the values of median are compared. It is an important finding to be considered when providing learning opportunities to students studying in schools located in different areas.

Distribution of marks in mathematics was analyzed according to the location of school. Data are presented in Table 3.10. Further it is illustrated in Figure 3.12. Analysis shows that the distribution of marks belonging to Municipal and Urban council areas is negatively skewed indicating a positive sign with regard to the achievement of students. However, in Pradeshiya Saba areas, score distribution is positively skewed which shows that the majority of students are in lower marks categories.

Table 3.10: Distribution of mathematics achievement marks according to location

Class Interval	Municipal Council %	Cumulative %	Urban Council %	Cumulative %	Pradshiya Saba %	Cumulative %
00-10	0.22	0.22	0.08	0.08	0.33	0.33
11-20	2.48	2.70	2.32	2.40	4.56	4.89
21-30	9.56	12.26	8.57	10.97	18.14	23.02
31-40	12.58	24.84	14.76	25.73	22.44	45.46
41-50	13.64	38.48	14.04	39.77	17.93	63.39
51-60	11.32	49.80	14.42	54.19	13.35	76.74
61-70	12.63	62.43	17.41	71.60	10.45	87.20
71-80	15.82	78.25	16.74	88.34	7.63	94.83
81-90	17.26	95.51	9.91	98.26	4.41	99.23
91-100	4.49	100.00	1.74	100.00	0.77	100.00
Total	100.00		100.00		100.00	

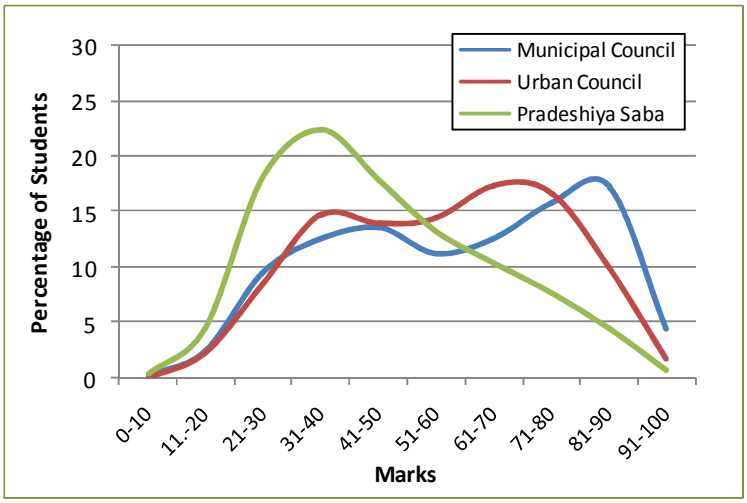

Figure 3.12: Distribution of mathematics achievement marks according to location

Further to the above analysis, Table 3.11 indicates the summary statistics considering the locality as urban and rural. In this analysis both urban council and municipal council schools have been considered as urban while Pradeshiya Saba schools as rural. Data given in the Table 3.11 indicates clearly that the performance of mathematics of students attending the schools situated in urban areas is very high when compared with the performance of students attending schools in rural areas. This is further illustrated by Figure 3.13.

Table 3.11: Mathematics achievement mark according to location- Urban /Rural

Location	Mean	Standard Deviation	Median	Skewness	F	P
Urban	58.75	21.01	60.51	-0.15	26,735.6	.000
Rural	46.79	18.65	42.55	0.48		
All Island	50.87	20.29	47.51	0.29		

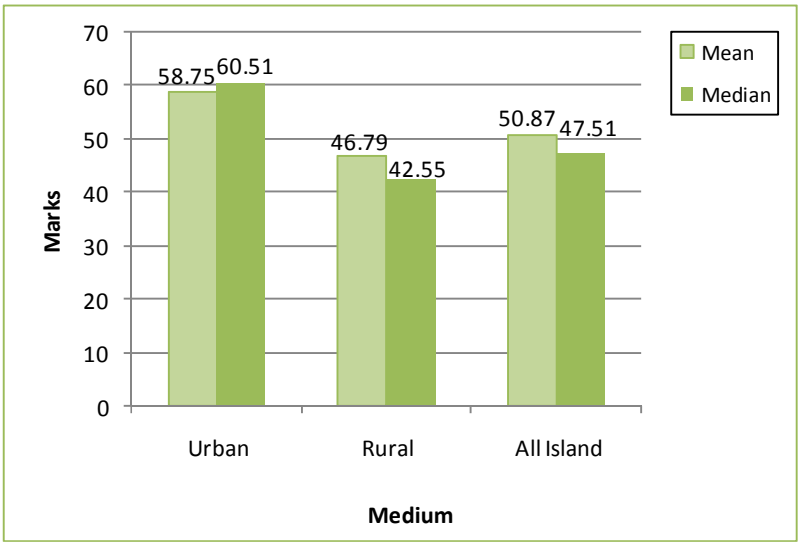

Figure 3.13: Mean values of mathematics marks according to location – Urban/Rural

Distribution of marks was analyzed according to the above categorization of schools and is given in Table 3.12 and Figure 3.14 below. This analysis shows that the marks of students in urban areas are negatively distributed while the distribution of marks in rural areas is seen with a positive skewness. As generally seen in educational studies, here too the achievement of students studying in urban schools is higher than that of those studying in rural schools.

Table 3.12: Distribution of mathematics achievement marks according to location – Urban/Rural

Class Interval	Urban %	Cumulative %	Rural %	Cumulative %
00-10	0.16	0.16	0.33	0.33
11-20	2.41	2.58	4.56	4.89
21-30	9.17	11.75	18.14	23.02
31-40	13.45	25.20	22.44	45.46
41-50	13.80	39.00	17.93	63.39
51-60	12.56	51.56	13.35	76.74
61-70	14.54	66.10	10.45	87.20
71-80	16.19	82.29	7.63	94.83
81-90	14.32	96.61	4.41	99.23
91-100	3.39	100.00	0.77	100.00
Total	100.00		100.00	

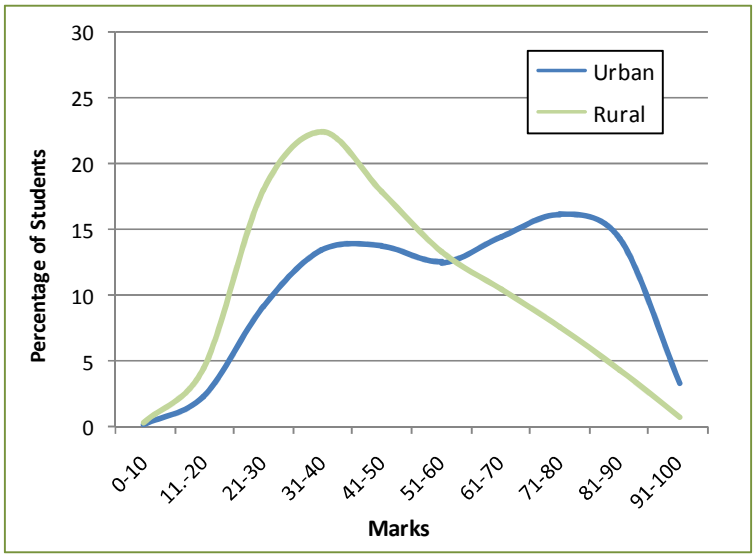

Figure 3.14: Distribution of mathematics achievement marks according to location – Urban/Rural

3.5 Achievement of Mathematics by Competency Levels

As mentioned in the second chapter, tests used to assess the achievement level of students in the present study were based on the competencies and competency levels expected to be achieved in each subject. In mathematics, 40 competency levels related to four areas of cognitive abilities, namely, knowledge and skills, communication, relationship, problem solving and reasoning were tested. Results are discussed below.

3.5.1 Achievement of Competency Levels Related to Knowledge and Skills

Percentages of students who have achieved expected competency levels related to knowledge and skills are given in Table 3.13.

Table 3.13: Achievement of competency levels related to knowledge and skills

Competency Level	Question numbers	Percentage
1.1 Inquires into the relationships between the whole numbers.	2	56.5
1.2 Manipulates directed numbers under the basic mathematical operations	1	38.8
2.1 Builds relationships between the terms of number patterns by investigating various properties	7	44.3
3.1 Manipulates units and parts under multiplication	3	66.7
5.1 Develops the relationship between fractions, ratios and percentages	8	34.9
7.1 Satisfies various requirements by investigating the perimeter of rectilinear plane figures	20	38.8
9.1 Facilitates daily work by investigating large masses	18	51.3
10.1 Determines for daily needs, the space that is taken up by various solids	15	59.6
11.1 Facilitates daily work by investigating the capacity of liquid containers	21	25.4
12.1 Investigates the rotation of earth and inquires into its results	19	58.3
12.2 Investigates the difference in time between countries and finds their relative positions	23	39.0
13.1 Indicates the direction of a location using angles	24	34.1
15.1 Factorizes algebraic expressions	26	38.0
20.2 Illustrates the behavior of a variable pictorially	31	35.1
20.3 Represents location on a Cartesian Plane	30	46.5
21.1 Examines the angles made by various straight lines	35	45.1
21.2 Performs calculations using the relationships between various angles	36	40.0
22.1 Created solids and confirms the relationships between properties related circles	34	63.7
23.1 Inquires into the relationships between the various angles of rectilinear plane figure	33	35.5
24.1 Inquiries into the special properties related to circles	32	72.0
25.1 Inquires into the results of a rotation that are based on symmetry	37	52.9

Competency Level	Question numbers	Percentage
27.1 Compares varies movements with the basic foci	11	69.0
29.1 Inquires into numerical representative values of a group of data	12	72.3
31.1 Determines the likelihood of an event occurring by investigating the various methods of finding a suitable value	13	67.6
Average		49.4

According to Table 3.13, the competency level 29.1 ('Inquires into numerical representative values of a group of data') was achieved by the highest percentage of students which is 72.3 percent. The competency level 11.1 ('Facilitates daily work by investigating the capacity of liquid containers') was achieved by the lowest percentage of students which is 25.4 percent. According to the data in Table 3.13, 11 competency levels out of 24 (nearly half of the tested competency levels) have been achieved by more than 50 percent of students. However, average percentage of students who achieved the competencies related to knowledge and skills areas is 49.4. Percentage of students achieved the competency levels related to knowledge and skills are further illustrated in Figure 3.15 below.

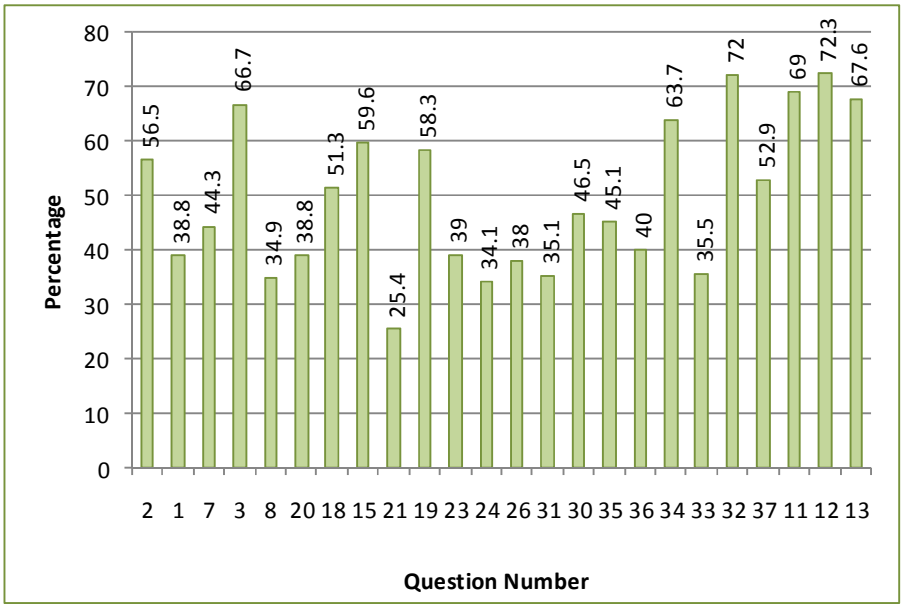

Figure 3.15: Achievement of competency levels related to knowledge and skills

3.5.2 Achievement of Competency Levels Related to Communication

Another important area with regard to cognitive abilities in mathematics is communication. Ten competency levels were tested related to this area. The percentage of students who achieved these competencies are given in Table 3.14.

Table 3.14: Achievement of competency levels related to communication

Competency level	Question No.	Percentage
3.2 Manipulates units and parts of units under division	9	27.9
3.3 Manipulates decimal numbers under the mathematical operations of multiplication and division.	4	72.5
6.2 Expands a power of a negative integer and finds the value	5	65.6
8.2 Fulfils daily needs by investigating the surface area of various solids	16	18.5
13.2 Describes various locations in the environment using scale drawings	22	65.6
14.1 Simplifies algebraic expressions by removing brackets and finds the value by substitution.	25	48.3
18.1 Uses the relationships between two quantities that can be used to enhance beauty.	28	52.5
20.1 Uses a number line to represent fractions and decimal numbers	29	36.8
26.1 Studies shapes by creating various patterns that can be used to enhance beauty.	39	59.4
30.1 Analyze the various relationships related to sets.	40	64.6
Average		51.2

The competency level related to communication achieved by the highest percentage (72.5) of students is 'Manipulates decimal numbers under the mathematical operations of multiplication and division' while the competency level achieved by the lowest percentage (18.5) of students is 'Fulfils daily needs by investigating the surface area of various solids'. As a whole, average percentage of students who achieved the competency levels related to communication is 51.2. Percentage of students who have achieved the above mentioned competency levels are given in Figure 3.16

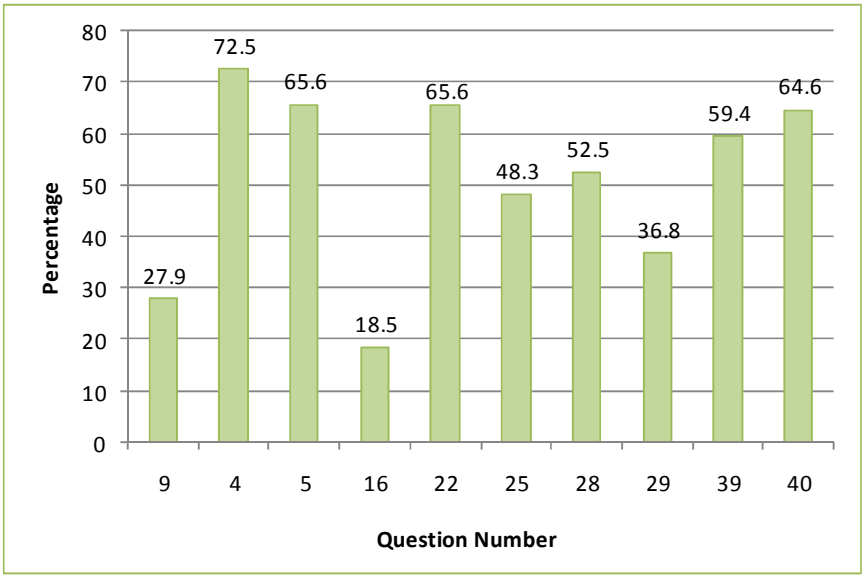

Figure 3.16: Achievement of competency levels related to communication

3.5.3 Achievement of Competency Levels Related to Relationship, Reasoning and Problem-Solving

Competency levels achieved by the students related to relationship, reasoning and problem-solving are given in Table 3.15

Table 3.15: Achievement of competency levels related to relationships, reasoning and problem solving

Standard	Competency Level	Question No.	Percentage
Relationships	4.1 Uses ratios in day to day activities	6	59.2
	4.2 Solves problems constructing relationships between two ratios	10	50.0
Problem solving	8.1 Finds the area of a compound plane figure in the environment and has an awareness of the space allocated for them.	17	57.3
	17.1 Uses linear equations to solve problems	27	39.6
Reasoning	27.2 Constructs triangles	38	63.2
	28.1 Represents data such that comparison is facilitated	14	68.3

It is clear that the percentage of students who achieved competency level related to reasoning is significantly high. It is 65.7 percent. Competency level related to relationship has also been achieved by the majority of students (54.6%). However, competency levels related to problem solving have been achieved by the lowest percentage of students. Average percentage is 48.45. This is not particularly encouraging because problem solving is a very important ability students should have developed, especially in mathematics. These results of competency level achievement are further illustrated in Figure 3.17.

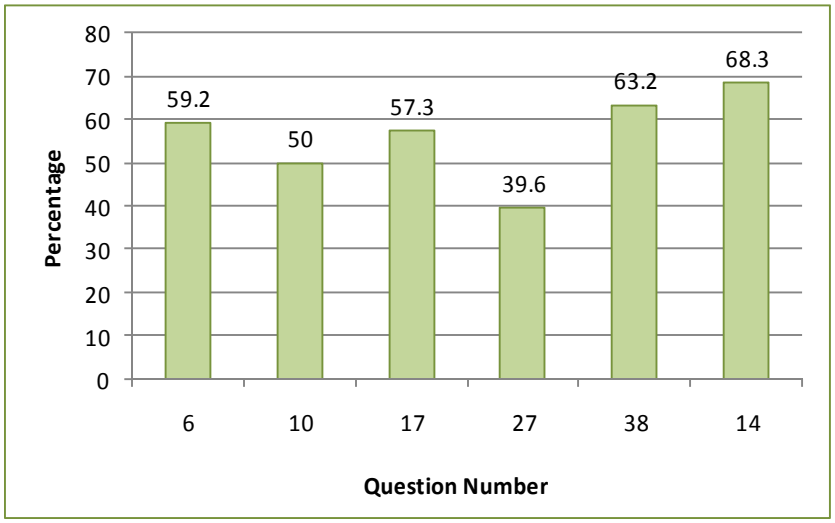

Figure 3.17: Achievement of competency levels related to relationships, reasoning and problem solving

3.6 Summary

In this chapter, achievement levels as well as disparities in achievement of students in mathematics were discussed. Average achievement of mathematics is above 50. The majority of the students belong to low marks categories. Disparities in achievement levels can be seen in terms of type of school, gender, medium of instruction and location of school.

Chapter Four

Patterns in Achievement – Science 2014

4.1 Introduction

This chapter presents the achievement levels of science which is one of the core subjects in grade 8 curriculum and tested in national assessment of achievement of grade completing grade 8 in year 2014. In 2007, a competency based curriculum was introduced for science as well. The present National Assessment is the second study conducted on the Grade 8 science curriculum since the new curriculum was introduced. The first one was conducted in 2012. In this chapter, firstly achievement levels in science at national and provincial levels are addressed followed by a discussion of distribution of marks in science. Afterwards, disparities in achievement levels with regard to the type of the school, gender, location of the school and the medium of instruction have been analyzed. Achievement levels of different competencies and competency levels in this subject are also examined.

4.2 Achievement Levels in Science at All Island and Provincial Levels

Mean value of science marks at all island level is 41.16. Although 41.16 is not a high mark, it may be desirable. Yet, it is below 50 marks. Even when the median is concerned it is nearly 40.

These values at all island level as well as provincial levels are given in Table 4.1 below.

Table 4.1: All island and provincial achievement in science 2014 – Summary statistics

Province	Mean	Rank	Standard Deviation	Standard Error of Mean	Percentile (p25)=Q1	Median (p50)=Q2	Percentile (p75)=Q3	Skewness
Southern	46.95	1	22.58	0.12	28.21	44.21	65.10	0.29
Sabaragamuwa	44.02	2	19.97	0.12	29.34	43.42	59.22	0.17
Western	43.76	3	22.08	0.08	25.25	41.51	62.32	0.25
North Western	42.78	4	20.09	0.10	27.41	40.70	57.41	0.37
North Central	41.15	5	19.44	0.13	26.61	38.51	55.61	0.45
Uva	39.41	6	19.31	0.13	24.21	37.42	52.71	0.52
Eastern	37.44	7	19.64	0.11	22.70	33.35	50.82	0.60
Central	34.91	8	18.96	0.09	20.61	30.81	47.51	0.76
Northern	34.15	9	18.78	0.13	20.50	29.27	46.31	0.73
All Island	41.16		20.92	0.04	25.21	40.05	58.21	0.44

Achievement level of students is indicated by both mean and median values. In a situation where scores are distributed with a high skewness, like in the present study, median value gives a better picture about the achievement level of students. In the present study, mean value of science marks at all island level is 41.16. It is not a high mark. Yet, it may be as satisfactory. The median value of the same subject is 40.05. This too is a low mark. It means that half of the students have scored below 40.05. The value of Q1 is 25.21. It indicates that 25 percent of students in grade has scored below 25.21. Meanwhile, according to the above table 75 percent of students are below 58.21. When standard deviation is concerned (SD=20.92), a considerably high dispersion of marks can be seen at all island level.

This is further illustrated by Figure 4.1

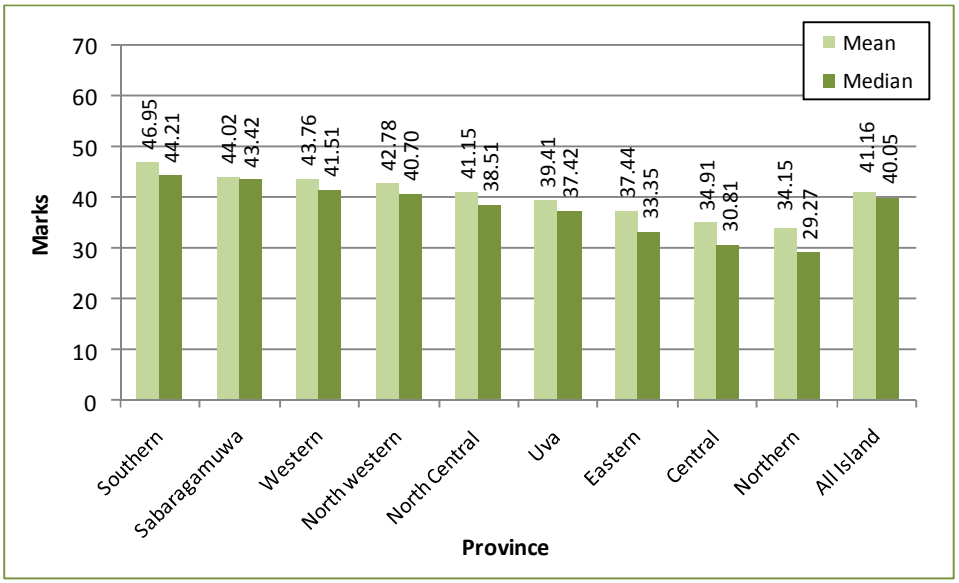

Figure 4.1: Mean values and median values of science marks

4.3 Distribution of Test Scores of Science

The manner in which science test scores are distributed is shown by Figure 4.2.

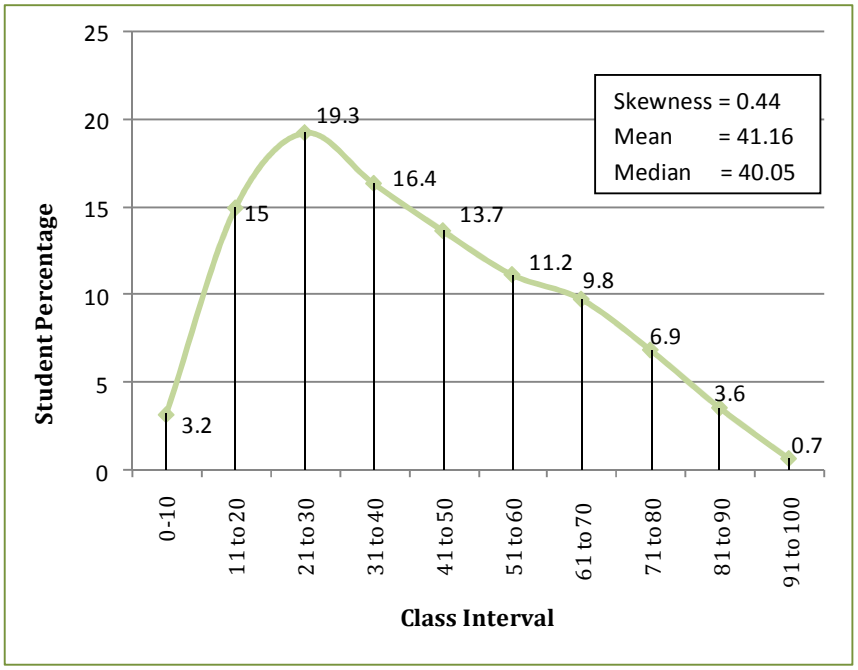

Figure 4.2: All island achievement in science –distribution of marks

According to the graph, the distribution of marks is positively skewed. The value of the skewness is 0.44. This skewness is further illustrated by Table 4.2.

Table 4.2: Distribution of all island achievement marks of Science

Class Interval	Student %	Cumulative %
00 to10	3.2	3.2
11 to 20	15.0	18.3
21 to 30	19.3	37.6
31 to 40	16.4	54.0
41 to 50	13.7	67.8
51 to 60	11.2	79.0
61 to 70	9.8	88.8
71 to 80	6.9	95.7
81 to 90	3.6	99.3
91 to 100	0.7	100
Total	100.0	

According to Table 4.2, most of the students belong to low level mark categories. Nearly 38 percent of students have scored 30 or less than 30 marks and nearly 68 percent of the students have scored 50 or less than 50 marks. If the students have been able to display predicted learning outcomes, distribution of marks must be negatively skewed. However, that doesn't appear in the said distribution of marks of science. This negatively skewed distribution of marks can be seen in almost all the provinces. This is shown in Figure 4.3. According to this figure, Western and Sabaragamuwa Provinces do not seem to have a highly positively skewed mark distribution. Meanwhile, Northern and Central Provinces have a very high positively skewed distribution of marks.

Another important feature that can be seen in Figure 4.3 is that in most of the provinces distributions of science marks are bimodal. This indicates that there are two main groups of student in the population.

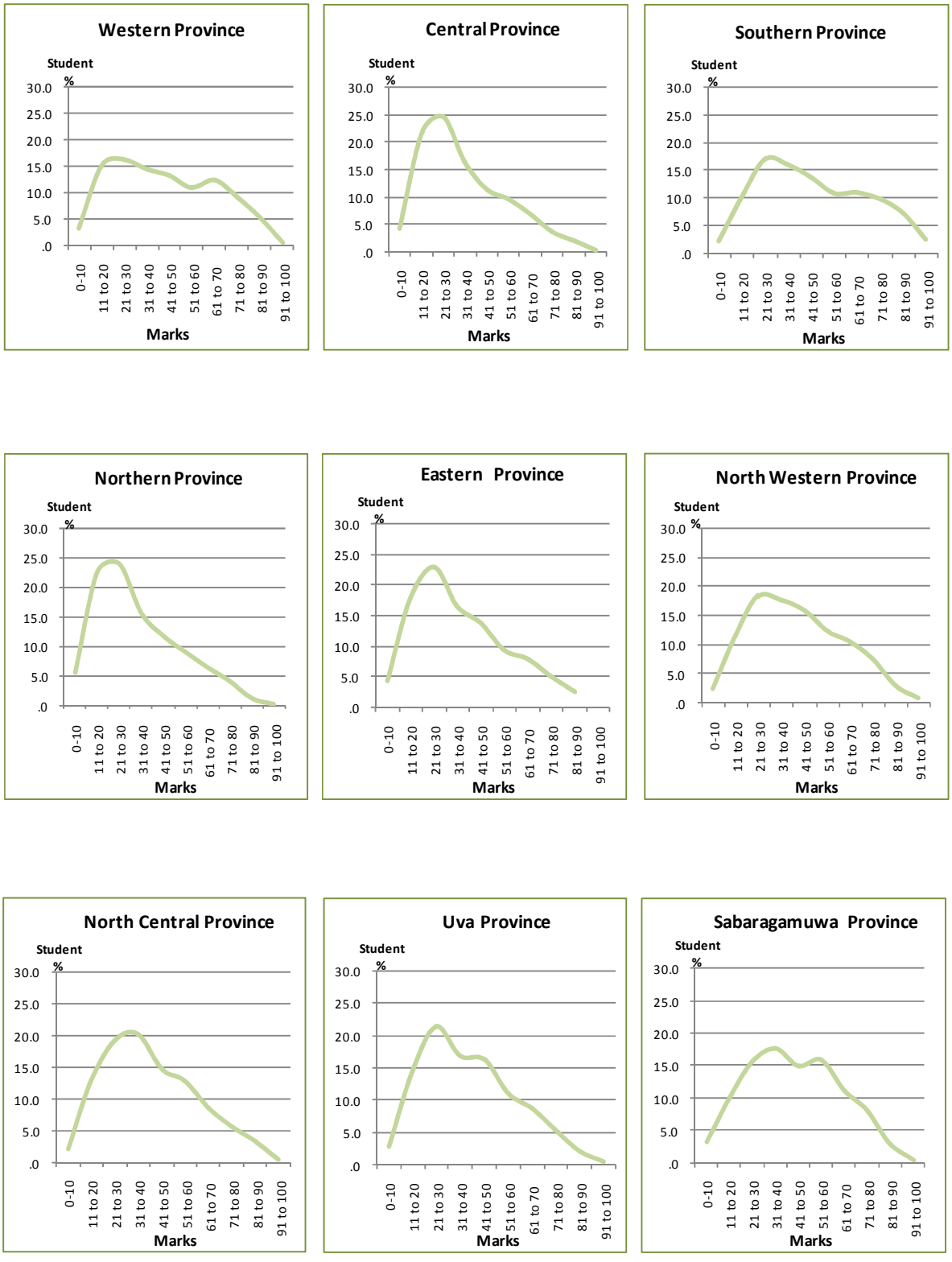

Figure 4.3: Provincial-wise distribution of marks – Science

Nature of the distribution of science marks is further elaborated by the box and whisker plots in Figure 4.4. One important thing is that a group of student who scored very high marks can be seen in Central and Northern provinces. These are the lowest performing provinces. This is a situation to be studied further.

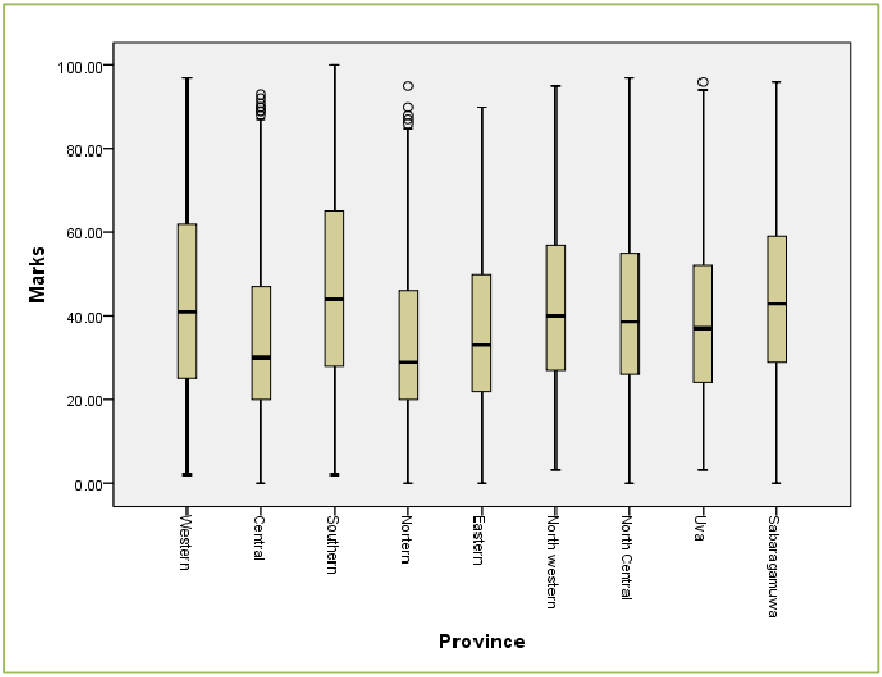

Figure 4.4: Science marks representation using boxplot and whisker plot

4.4 Disparities in Achievement in Science

Over the years various efforts have been made to provide equal opportunities for school education in Sri Lanka. Yet, disparities in achievement of students in science in different groups can still be seen owing to different factors. In this section, in what way the school type, gender, medium of instruction and school location have an influence on these disparities are discussed.

4.4.1 Disparities in Achievement in Science in Relation to School Type

Indicators of achievement levels of science according to the school type are given in Table 4.3 which is given below.

Table 4.3: Science achievement marks according to school type

School Type	Mean	Standard Deviation	Median	Skewness	F	P
1AB	49.18	20.99	49.01	0.07	30,719	.000
1C	32.95	16.74	30.22	0.74		
Type 2	31.24	17.05	28.53	0.86		
All Island	41.16	20.92	40.05	0.44		

According to this table, lowest performance can be seen in Type 2 schools. Mean and median values of these schools are 31.24 and 28.53 respectively. Meanwhile 1AB schools show the highest performance levels. According to the F test, differences in performance levels in three types of schools are statistically significant (p=0.00). However, the difference between the achievement levels of students in Type 2 schools and those of 1C schools is not so high. This is an indication of the commonality of factors affecting achievement of students attending these two types of schools. This is illustrated by both mean and median values. Mean values for 1C and Type 2 schools are 32.95 and 31.24 while median values are 30.22 and 28.53 for the same two types of schools. Nevertheless, mean and median values of 1AB schools are respectively 49.18 and 49.01. These differences are further illustrated by Figure 4.5 below.

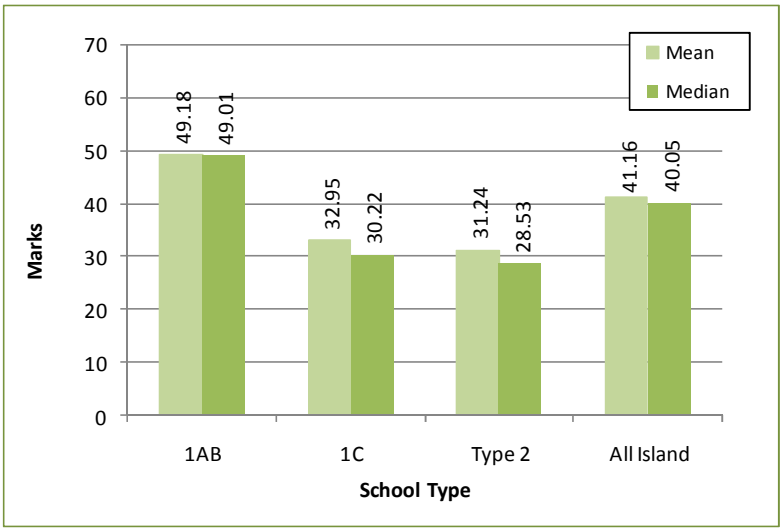

Figure 4.5: Mean values of science marks according to school type

Distribution of marks in achievement in science was analyzed in relation to school type. This is given in Table 4.4 below and further illustrated by Figure 4.6. Both the table and the figure show a highly positively skewed distribution of scores in 1C and Type 2 schools. Concerning 1AB schools scores are distributed with a positive skewness.

However this skewness is very low when compared with 1C and Type 2 schools. This indicates that the majority of students belonging to 1C and Type 2 schools have shown a poor performance.

Table 4.4: Distribution of science achievement marks according to school type

Class Interval	1AB Student %	Cumulative %	1C Student %	Cumulative %	Type 2 Student %	Cumulative %
00-10	1.29	1.29	4.78	4.78	6.43	6.43
11-20	8.04	9.33	21.06	25.84	25.61	32.03
21-30	13.75	23.08	26.01	51.85	24.71	56.74
31-40	14.63	37.71	19.48	71.33	16.64	73.38
41-50	14.84	52.55	12.82	84.15	12.06	85.44
51-60	14.32	66.87	7.91	92.06	7.37	92.81
61-70	14.59	81.46	4.90	96.96	3.86	96.67
71-80	11.02	92.48	2.34	99.30	2.60	99.27
81-90	6.29	98.77	0.70	100.00	0.62	99.89
91-100	1.23	100.00	0.00	100.00	0.11	100.00
Total	100.00		100.00		100.00	

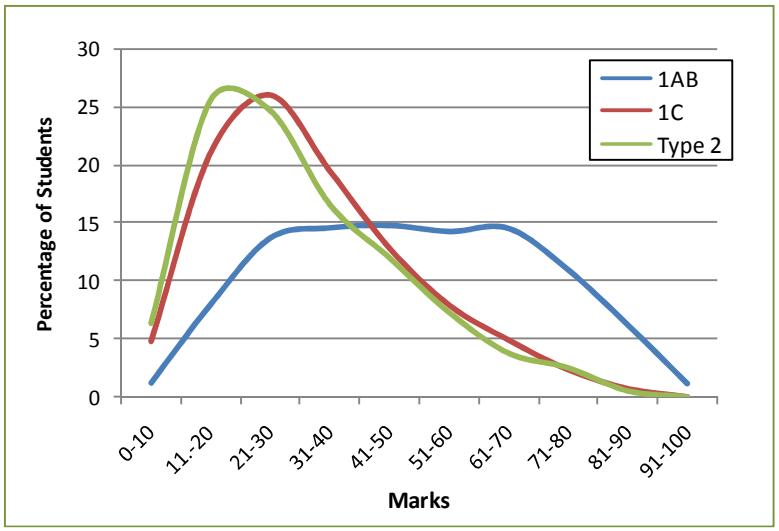

Figure 4.6: Distribution of science achievement marks according to school type

4.4.2 Disparities in Achievement in Science in Relation to Gender

Gender has been an important area of disparities in the achievement levels of students according to previous national assessment studies (Grade 4 and Grade 8) conducted by NEREC. Table 4.5 shows indicators of achievement levels of boys and girls separately.

Table 4.5: Science achievement marks according to gender

Gender	Mean	Standard Deviation	Median	Skewness	F	P
Male	39.41	21.14	36.61	0.49	2,087	.000
Female	42.80	20.58	40.52	0.41		
All Island	41.16	20.92	40.05	0.44		

It is clear that achievement levels of girls is slightly higher than that of boys. The mean value is 42.80 while the mean value of boys 39.41. This difference is further illustrated by Figure 4.7.

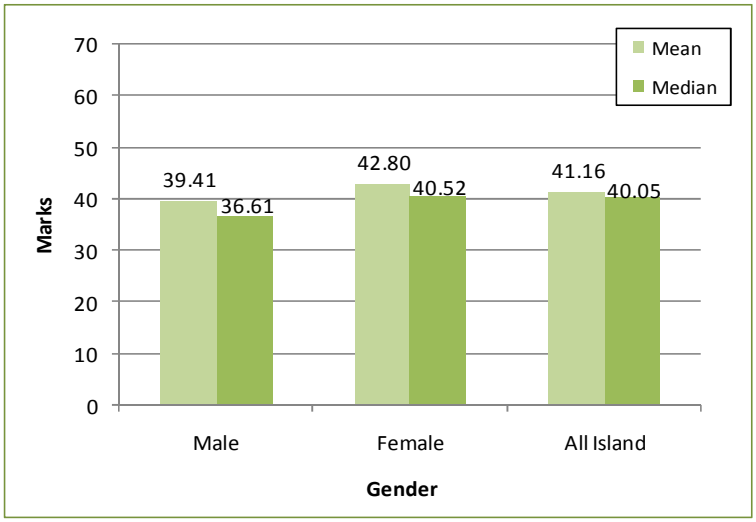

Figure 4.7: Mean values of science marks according to gender

Further to the mean value, values of the median show this. The value of the median for girls is 40.52 while the median value for boys is 36.61. However, this difference is not very high compared with the differences related to school type, location of school and medium of instruction.

The analysis of distribution of marks in science in relation to gender is given in Table 4.6 and further more it is shown in Figure 4.8. This analysis does not show a considerable difference with regard to the distribution of marks in relation to male and female. Both distributions are positively skewed. This indicates that the majority of students in both groups belongs to lower level mark categories.

Table 4.6: Distribution of science achievement marks according to gender

Class Interval	Male %	Cumulative %	Female %	Cumulative %
00-10	4.59	4.59	1.99	1.99
11-20	17.71	22.30	12.55	14.54
21-30	19.44	41.73	19.25	33.79
31-40	15.34	57.08	17.43	51.22
41-50	13.15	70.23	14.30	65.52
51-60	10.31	80.54	11.99	77.51
61-70	9.28	89.83	10.28	87.79
71-80	6.21	96.03	7.63	95.42
81-90	3.42	99.45	3.81	99.22
91-100	0.55	100.00	0.78	100.00
Total	100.00		100.00	

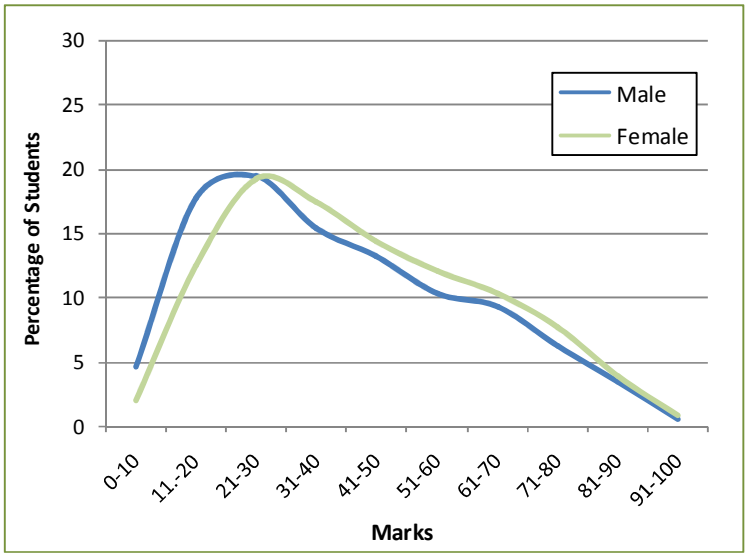

Figure 4.8: Distribution of science achievement marks according to gender

4.4.3 Disparities in Achievement in Science in Relation to Medium of Instruction

In the present study, medium of instruction was taken into consideration as a factor that apparently affect the achievement levels of students in science. Relevant statistics are displayed in Table 4.7.

Table 4.7: Science achievement marks according to medium of instruction

Medium	Mean	Standard Deviation	Median	Skewness	F	P
Sinhala	44.30	20.98	42.73	0.30	21,188	.000
Tamil	32.38	10.09	28.11	0.87		
All Island	41.16	20.92	40.05	0.44		

According to the above table the performance level of students who study in Sinhala is considerably higher than that of the students whose medium of instruction is Tamil. While the mean value of Sinhala medium students is 44.30, the mean value of Tamil medium students is 32.38. Furthermore, the median value of the Sinhala medium students is 42.73 and the median value of the Tamil medium students is 28.11. This difference is further shown by Figure 4.9 given below.

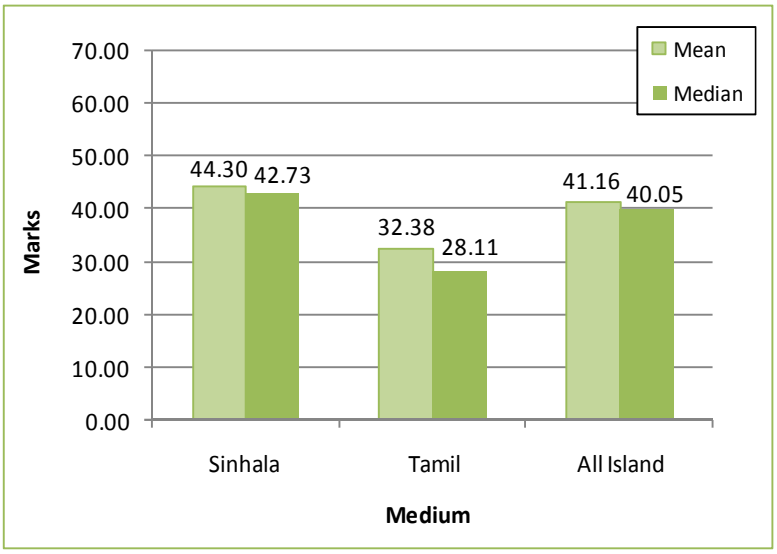

Figure 4.9: Mean values of science marks according to medium of instruction

One important thing is that though the medium of instruction for the two groups is different, more often the two languages in which they study are their mother tongues. When compared with the differences of achievement levels related to school type, gender and the location of school, the difference concerning the medium of instruction seems to be the highest. However, this can be due to some other factors associated with these two different kinds of schools where the medium of instruction is different.

Distribution of marks of student achievement was analyzed for both Sinhala and Tamil medium students. Such data are given in Table 4.8 below. For both groups, the distributions of marks show a positive skewness. This skewness is very high for Tamil medium students when compared with that of Sinhala medium students. This difference in skewness in marks is once again illustrated in Figure 4.10. This indicates that the majority of Tamil medium students who are in lower mark categories are higher than those of Sinhala medium.

Table 4.8: Distribution of science achievement marks according to medium of instruction

Class Interval	Sinhala %	Cumulative %	Tamil %	Cumulative %
00-10	2.25	2.25	6.00	6.00
11-20	11.58	13.83	24.74	30.74
21-30	17.42	31.25	24.73	55.46
31-40	16.43	47.68	16.42	71.89
41-50	14.62	62.30	11.29	83.18
51-60	12.62	74.92	7.14	90.32
61-70	11.42	86.34	5.26	95.58
71-80	8.31	94.65	3.11	98.69
81-90	4.45	99.10	1.29	99.98
91-100	0.90	100.00	0.02	100.00
Total	100.00		100.00	

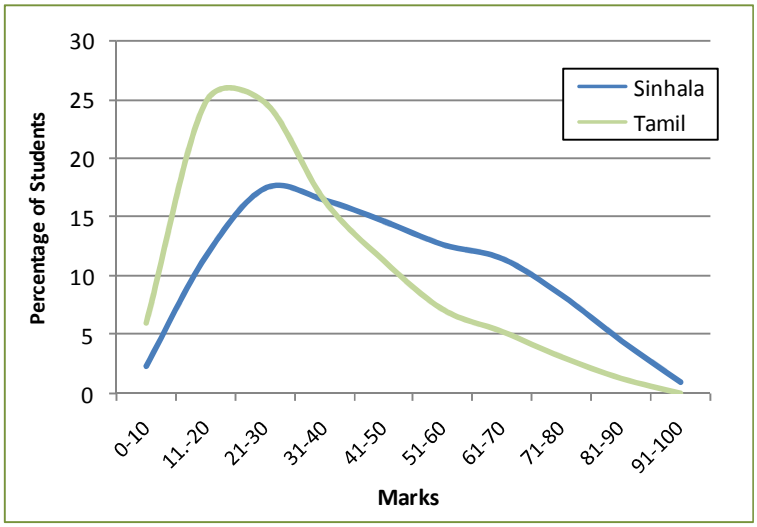

Figure 4.10: Distribution of science achievement marks according to medium of instruction

4.4.4 Disparities in Achievement in Science in Relation to Location of School

Location of the school is considered as one significant factor that could be influential for the achievement levels of students in science. Table 4.9 show the differences in such achievement levels of students in schools located in Municipal Council area, Urban Council areas and Pradeshiya Saba areas.

Table 4.9: Science achievement marks according to location

Location	Mean	Standard Deviation	Median	Skewness	F	P
Municipal Council	49.19	23.24	48.71	0.09	9,486	.000
Urban Council	46.50	21.34	46.14	0.07		
Pradeshiya Saba	37.67	19.13	34.38	0.55		
All Island	41.16	20.92	40.05	0.44		

According to the indicators of achievement level given in Table 4.9, the highest achievement level can be seen in schools located in Municipal Council areas. The mean value of the achievement marks of students in schools that come under Municipal council areas is 49.19. Meanwhile, the lowest achievement level recorded by schools that come under Pradesiya Sabas shows a mean value of 37.67. The gap between these mean values is noticeably high. Nonetheless, the difference between the achievement levels of schools located in Municipal and Urban Council areas is not so high. The mean value of achievement of students in science in schools located in Municipal Council areas is 49.19 while the mean value of achievement in science in schools located in Urban Council areas is 46.50. This is further shown by Figure 4.11.

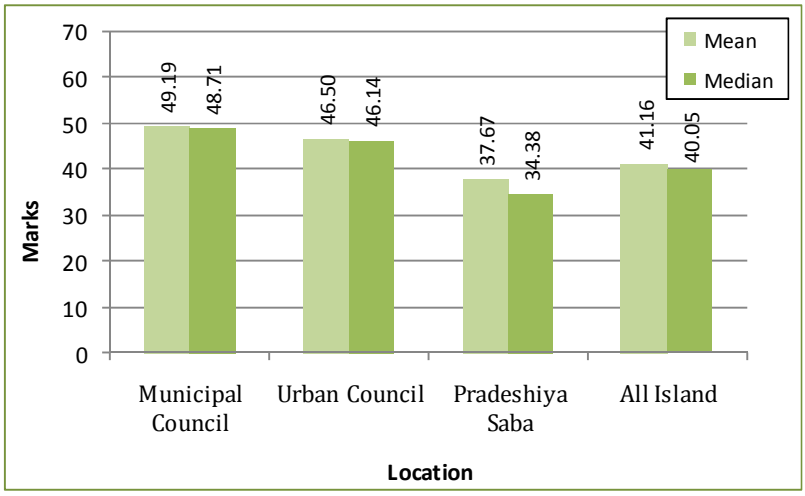

Figure 4.11: Mean values of science marks according to location

An analysis of the distribution of marks based on the location of school relating to Municipal, Urban and Pradeshiya Saba areas were conducted. Data are presented in Table 4.10 and further illustrated by Figure 4.12. It shows that there is no significant difference between the distributions of marks in schools belonging to Municipal and Urban Council areas. Concerning the Paradeshiya Saba schools distribution of marks is highly positively skewed. One important finding according to this analysis is that that the skewness of the distribution of marks in Municipal and Urban Council areas is significantly lower than that of Pradeshiya Saba areas. This shows that the performance of students in schools located in Municipal and Urban Council areas is more satisfactory than that of Pardeshiya Saba areas.

Table 4.10: Distribution of science achievement marks according to location

Class Interval	Municipal Council %	Cumulative %	Urban Council %	Cumulative %	Pradeshiya Saba %	Cumulative %
00-10	2.20	2.20	2.39	2.39	3.73	3.73
11-20	10.24	12.44	11.76	14.15	17.14	20.87
21-30	14.88	27.32	14.05	28.20	21.76	42.63
31-40	12.90	40.22	14.78	42.98	17.82	60.45
41-50	12.41	52.63	13.94	56.91	14.11	74.56
51-60	11.85	64.48	12.15	69.06	10.78	85.34
61-70	12.59	77.07	15.47	84.54	7.81	93.14
71-80	11.95	89.02	9.65	94.19	4.89	98.03
81-90	8.75	97.76	5.45	99.64	1.71	99.74
91-100	2.24	100.00	0.36	100.00	0.26	100.00
Total	100		100		100	

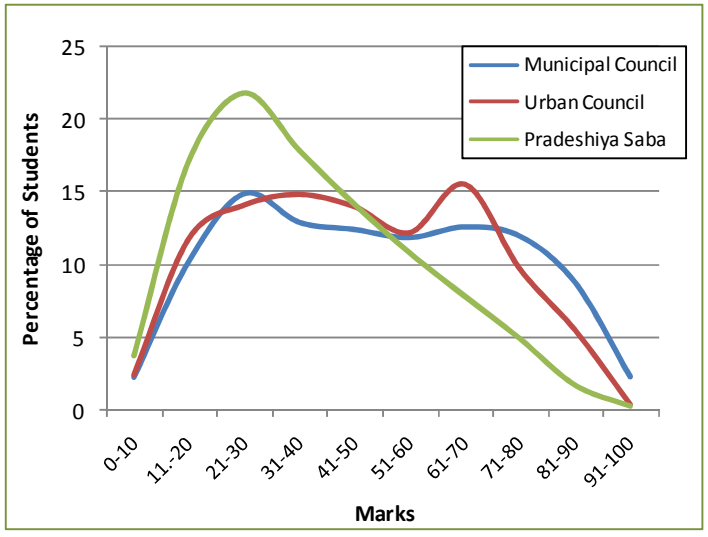

Figure 4.12: Distribution of science achievement marks according to location

Table 4.11 shows science performance of students who attends to schools located in urban areas and rural areas separately. It clearly shows that the performance level of the students in urban areas (Mean = 48.10) considerably higher than that of the students in rural areas (Mean = 37.67). This is further illustrated by Figure 4.13.

Table 4.11: Science achievement marks according to location - Urban/Rural

Location	Mean	Standard Deviation	Median	Skewness	F	P
Urban	48.10	22.54	47.41	0.10	18,500.96	.000
Rural	37.67	19.13	34.31	0.55		
All Island	41.16	20.92	40.05	0.44		

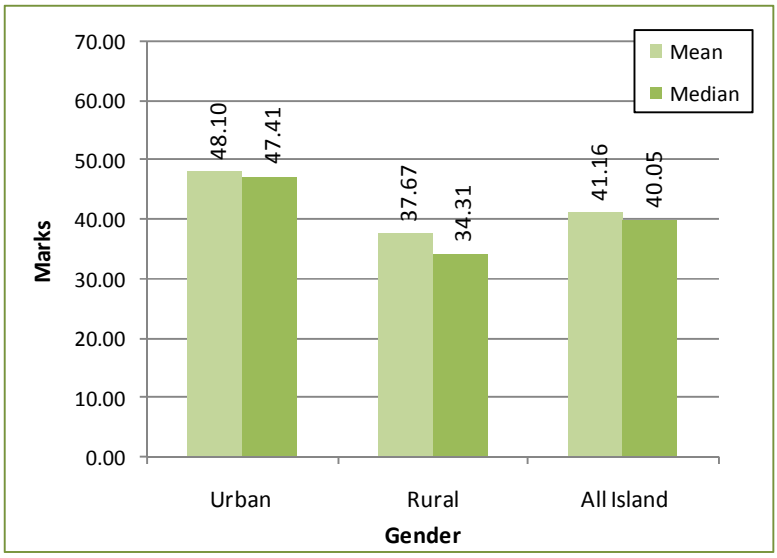

Figure 4.13: Mean values of science marks according to location – Urban/Rural

Further to the above analysis, distribution of scores was analyzed based on urban and rural categorizations. Analyzed data are given in Table 4.12 Findings show that the distribution of marks of students belonging to rural areas is highly positively skewed while the distribution marks of students in urban areas are slightly positively skewed. This again confirms the unsatisfactory achievement in rural areas.

Table 4.12: Distribution of science achievement marks according to location – Urban/Rural

Class Interval	Urban %	Cumulative %	Rural %	Cumulative %
00-10	2.28	2.28	3.73	3.73
11-20	10.86	13.13	17.14	20.87
21-30	14.54	27.67	21.76	42.63
31-40	13.66	41.33	17.82	60.45
41-50	13.03	54.36	14.11	74.56
51-60	11.97	66.33	10.78	85.34
61-70	13.76	80.09	7.81	93.14
71-80	11.02	91.11	4.89	98.03
81-90	7.41	98.52	1.71	99.74
91-100	1.48	100.00	0.26	100.00
Total	100.00		100.00	

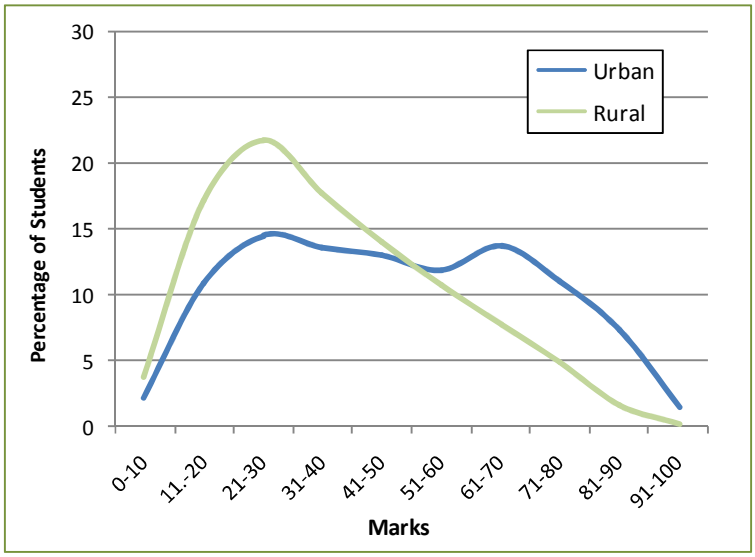

Figure 4.14: Distribution of science achievement marks according to location – Urban/Rural

4.5 Achievement of Science by Competency Levels

It is important to see to what extent, students have been able to achieve the expected competencies related to science in Grade 8. The test which was administered to assess the achievement level of science was principally based on competencies and competency levels in science. The percentage of students who achieved the expected competency levels according to the results of the test was analyzed. This was done for four areas in science separately. They are biology, chemestry, earth science and physics.

4.5.1 Achievement of Competency Levels Related to Biology

Percentages of students who achieved different competency levels related to biology ware analyzed and are given in Table 4.13 below.

Table 4.13: Achievement of competency levels related to biology

Content	Competency Level	Percentage
Biology	1.1 Discovers the diversity of the natural environments	42
	1.2 Investigates the advantages/disadvantages of the built environments	40
	1.3 Focuses attention on the venomous animals that are harmful to man	**68**
	1.4 Acquires the ability to use international scientific symbols	59
	3.1 Observes the interactions based on life cycles	36
	3.3 Explains the importance of use of cultivations under specific conditions	62
	3.4 Investigates the biotic factors affecting the perpetuation of the environment.	45
	6.1 Conducts explorations to identify the morphological diversity of leaves	**8**
	6.3 Investigates the functions related to the diversity of roots.	33
	6.4 Uses plant related products with a scientific attitude	40
	Average	43

According to the above Table, the competency level 1.3, ('focuses attention on the venomous animals that are harmful to the man') has been achieved by the highest percentage of students which is 68. On the other hand, competency level 6.1, ('Conducts explorations to identify the morphological diversity of leaves') has been achieved by eight percent of the students and it is the lowest percentage according to the Table. Another significant finding is that more than 50 percent of students have been able to achieve only 3 competency levels out of the 10 competency levels which were tested. As a whole, only 43 percent of students have been able to achieve expected competency levels. This is further illustrated by Figure 4.15.

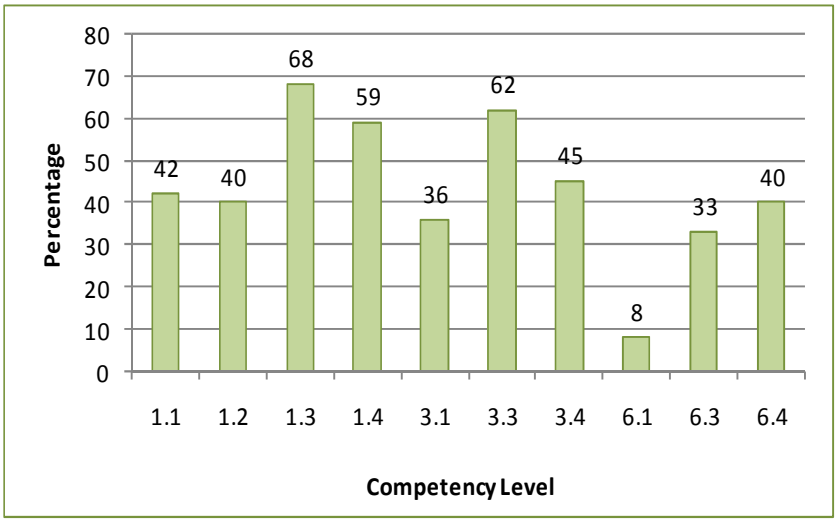

Figure 4.15: Achievement of competency levels related to biology

4.5.2 Achievement of Competency Levels Related to Chemistry

Table 4.14: Achievement of competency levels related to chemistry

Content	Competency Level	Percentage
Chemistry	2.1 Inquires into the properties of matter	50
	2.2 Inquires into the standard symbols used for elements	47
	2.3 Display the ability to use the differences in density of substances in day today life.	41
	2.4 Uses the expansion of solids, liquids and gases in day today life effectively.	8
	2.5 Inquires into the usages of compounds according to their properties.	25
	2.6 Inquires into the domestic uses of chemicals	21
	2.7 Uses parallel and serial connections of electrical appliances in human needs.	44
	2.8 Uses magnets in day today life	53
	Average	36

Analysis related to chemistry shows that highest percentage of students (53) have been able to achieve the competency level 2.8, (Uses magnets in day today life). On the other hand, the lowest percentage of students (8) has achieved the competency level 2.4 (Uses the expansion of solids, liquids and gases in day today life effectively).

According to the above analysis, only 2 competency levels out of the tested 10 have been achieved by majority of students. These two, however, are related to knowledge. They are, 'inquiries into the properties of matter' and 'uses magnets in day today life'. In general, 36 percent of the students have been able to achieve the expected competencies which were tested in the study.

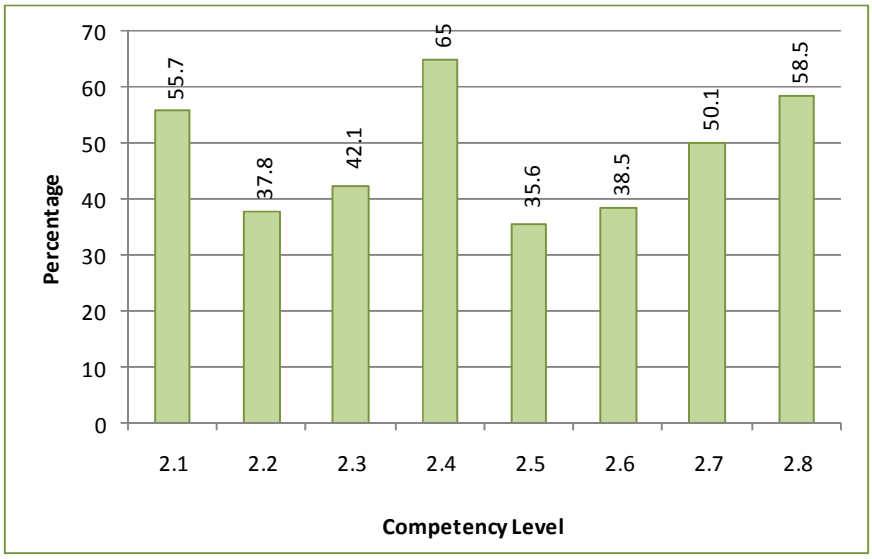

Figure 4.16: Achievement of competency levels related to chemistry

4.5.3 Achievement of Competency Levels Related to Earth Science

Table 4.15: Achievement of competency levels related to earth science

Content	Competency Level	Percentage
Earth science	4.1 Investigates the constituents of the atmosphere	32
	4.2 Acts to maintain optimum composition of the atmosphere	38
	4.3 Uses natural resources obtained from the earth effectively	47
	Average	39

The highest percentage of students has achieved the competency 4.3 (uses of natural resources obtained from the earth effectively) while the least percentage (32%) has been able to achieve the competency level 4.1 (investigates the constituents of the atmosphere). Thus according to the above table, the majority of the students have not been successful in achieving any one of the competencies. The overall percentage of the students who achieved the expected competency levels is 39. This is also less than 50 and may be viewed as an undesirable situation.

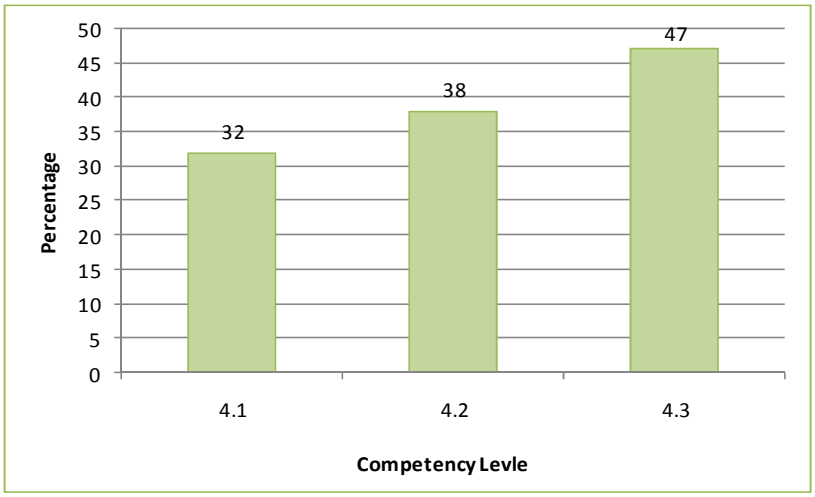

Figure 4.17: Achievement of competency levels related to earth science

4.5.4 Achievement of Competency Levels Related to Physics

Table 4.16: Achievement of competency levels related to physics

Content	Competency Level	Percentage
Physics	5.1 Inquires into the application of the concept "pressure" in day today needs	22
	5.2 Inquires into the effect of Center of Gravity on the equilibrium of an object in relation to life experiences	58
	5.3 Uses work, energy and power in human concerns/needs	31
	7.1 Uses properties of light in human needs	21
	7.2 Uses generation and propagation of sound in musical instruments	17
	7.3 Explores the scientific basis of modern communication equipment	31
	8.1 Contribute to minimize the risks associated with cyclones	44
	8.2 Contribute to minimize the risks associated with lightning and thunder	59
	Average	35

Compared to the overall percentages of each branch in Science, students have achieved the lowest for Physics (35%). Analysis by competency level shows that highest percentage of the students possesses the required knowledge in minimizing the risks associated with lightning and thunder (59%) and effect of Center of Gravity on the equilibrium of an object in relation to life experiences (58%). Thirty percent of students have achieved the competency in applying scientific concepts of work; energy and power in human concerns/needs, while a similar percentage has the knowledge in relation to the scientific basis of modern communication equipment. However, the

above table indicates that the lowest percentage (17%) of students has achieved the competency in applying skill in relation to 'uses generation and propagation of sound in musical instruments'. It also reveals that applying scientific knowledge in real world situations in relation to pressure as well as properties of light is not satisfactory.

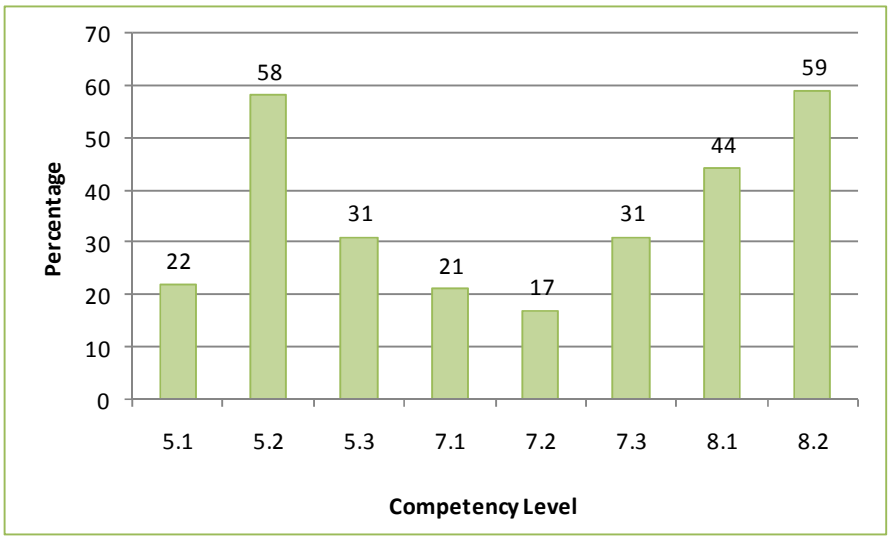

Figure 4.18: Achievement of competency levels related to physics

4.6 Summary

This chapter presented the achievement levels of science. The average achievement of science is 41.16. The majority of students belong to low marks category. There are disparities in achievement in science with regard to school type, gender, medium of instruction and location of school. Achievement level of the students of 1AB schools is higher than that of 1C and Type 2 schools. Girls' performance is higher than that of boys. Achievement level of Sinhala medium students is also higher than that of Tamil medium students. A significant disparity in the achievement level of competencies related to biology, chemistry, physics and earth sciences tested under the general term 'science' is not noticed.

Chapter Five

Patterns in Achievement – English Language 2014

5.1 Introduction

The achievement of English language based on the marks of the English language test which was administered to students completing grade 8 in year 2014 will be discussed in this chapter. First the achievement levels of students and the nature of the distribution of marks are analyzed. Next, disparities in achievement levels in relation to school type, gender, medium of instruction and location of school are presented. Differences in achievement pertaining to various provinces are also analyzed. English language achievement too is assessed by various competencies and competency levels.

5.2 Achievement Levels in English Language at All Island and Provincial Levels

Based on the mean and the median values of the test marks, the achievement levels are discussed. These are the indicators normally used to assess the level of performance especially, median can be used as a representative value of a set of data when the distribution of values is considerably skewed. Those values related to English language results are given in Table 5.1 below.

Table 5.1: All island and provincial achievement in English language 2014 – Summary statistics

Province	Mean	Rank	Standard Deviation	Standard Error of Mean	Percentile (p25)=Q1	Median (p50)=Q2	Percentile (p75)=Q3	Skewness
Western	41.04	1	20.86	0.08	26.41	34.51	56.71	0.73
Southern	37.27	2	19.75	0.10	24.21	30.71	46.61	1.11
North Western	35.11	3	17.76	0.09	22.11	30.05	44.41	1.12
Sabaragamuwa	34.87	4	16.60	0.10	22.61	30.21	44.71	1.03
Central	33.82	5	17.82	0.09	22.21	30.41	42.31	1.23
Uva	31.86	6	15.79	0.11	22.35	28.61	75.21	1.29
Eastern	31.28	7	14.27	0.08	22.50	28.21	38.01	1.01
North Central	29.81	8	13.32	0.09	20.87	28.35	34.51	1.29
Northern	29.24	9	15.87	0.11	18.21	24.41	34.41	1.65
All Island	35.23		18.32	0.03	22.31	30.05	44.31	1.13

According to Table 5.1, all island mean value of achievement test marks is 35.23. This cannot be taken as a satisfactory level. On the other hand, the median value is 30.05 which can be considered as another representative value of achievement level. This value further confirms the unsatisfactory level of the achievement of English language. Dispersion of marks also seems to be considerably high. Standard deviation is 18.32. This is indicative of the fact that disparities in student achievement are very high.

All island and provincial level achievement further presented by Figure 5.1 below.

The mean values of marks related to achievement in English language of Central Province, Northern Province, Eastern Province, North Central Province, Uva Province and Sabaragamuwa Province are below 35. The median values of these provinces are also below 35. The mean values of the other provinces are above 35. However, the median values of these provinces also are below 35. On the other hand, in all the provinces mean values and median values are below 40 except Western Province where the mean value is 41.04. This indicates that achievement levels of students in English language are not satisfactory.

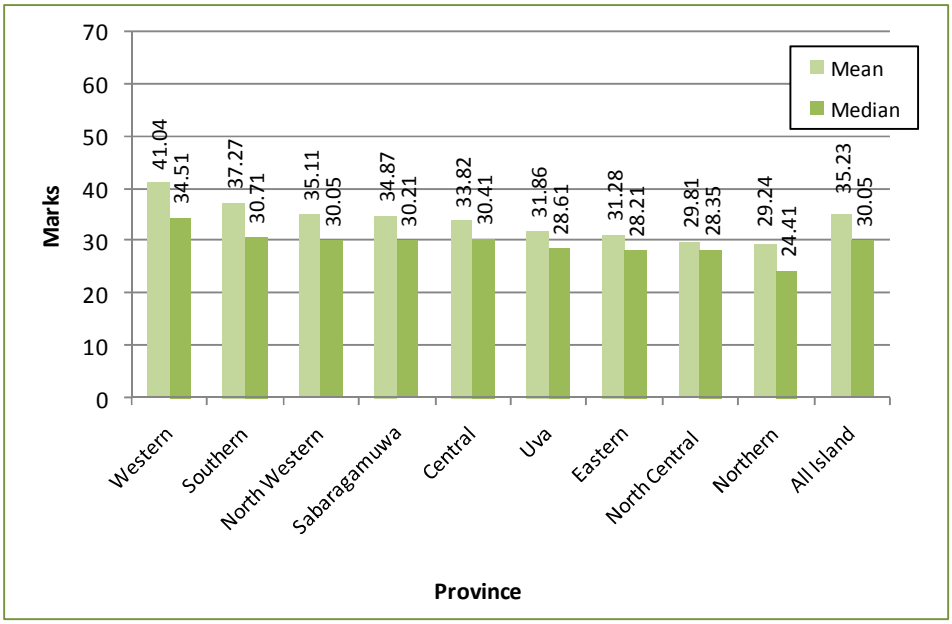

Figure 5.1: Mean values and median values of English language marks

5.3 Distribution of Test Scores of English Language

The nature of the distribution of test scores of the English language is presented by Figure 5.2 and Table 5.2.

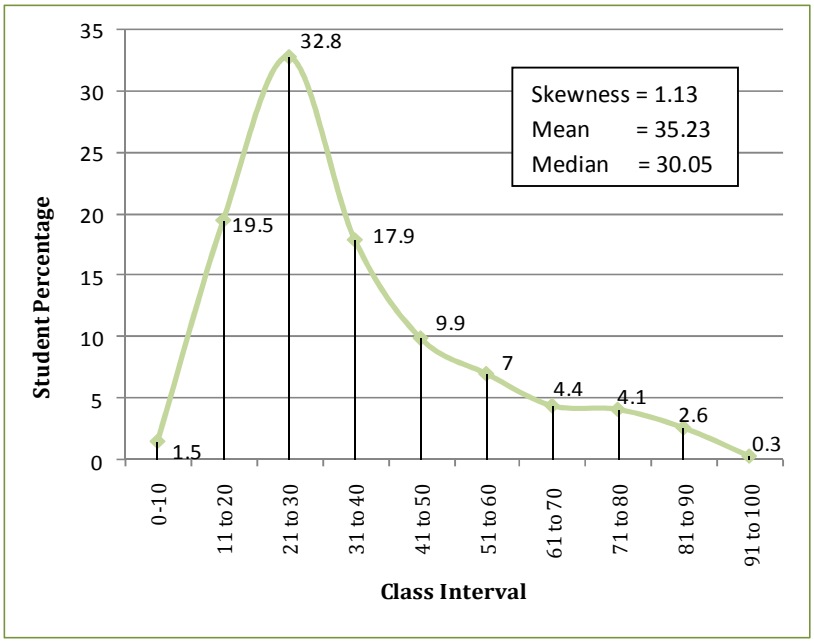

Figure 5.2: All island achievement in English language –distribution of marks

Table 5.2: Distribution of all island achievement marks of English language

Class Interval	Student %	Cumulative %
00 to 10	1.5	1.5
11 to 20	19.5	21.0
21 to 30	32.8	53.9
31 to 40	17.9	71.8
41 to 50	9.9	81.7
51 to 60	7.0	88.7
61 to 70	4.4	93.1
71 to 80	4.1	97.1
81 to 90	2.6	99.7
91 to 100	0.3	100.0
Total	100.0	

According to Figure 5.2, it can clearly be seen that the marks are positively skewed (SK=1.13). This indicates that majority of students tends to be lower achievers in English language. In addition, Table 5.2 shows that most of the students belong to score categories of lower levels. Nearly 82 percent of the total number of students belongs 50 or less than 50 marks categories. Almost 70 percent of students belong to 11-40 mark category.

Positively skewed marks distribution, can be seen in all the provinces with a slight variations in the skewness. This is shown by Figure 5.3

This highly positive distribution of marks is not a satisfactory situation regarding achievement levels. It carries the need to rethink the effort made to enhance the achievement level of English language of students in this grade.

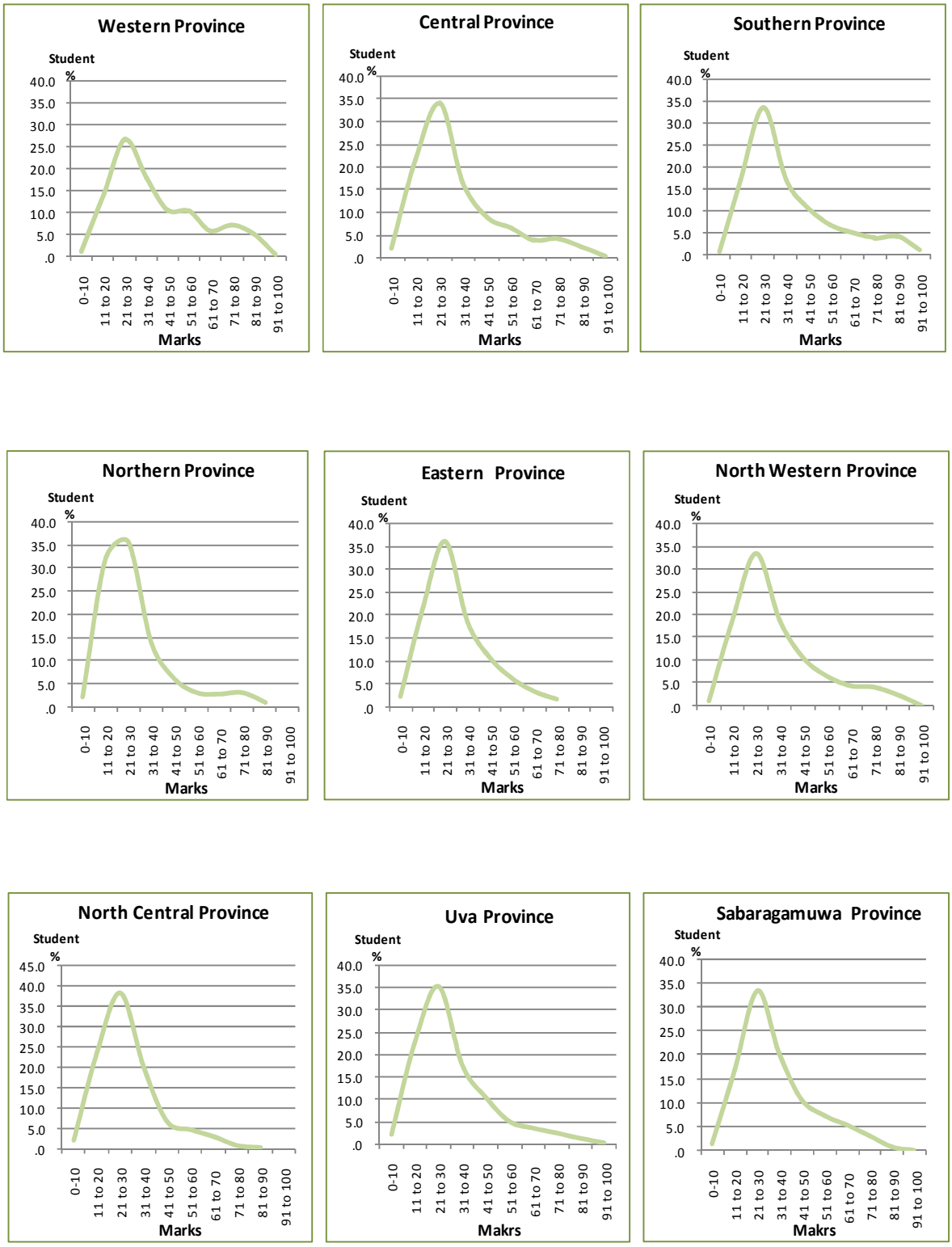

Figure 5.3: Provincial-wise distribution of marks – English language

Patterns of achievement of English language are further elaborated by the box and whisker plots in Figure 5.4 below. Small circles in the figure represent the students who have taken extremely high marks (outliers). The figure clearly shows that in almost all the provinces, there is a small group of students who shows extremely high achievement levels although the achievement in general is low in all these provinces except in Western Province. This is an important phenomenon to be investigated further.

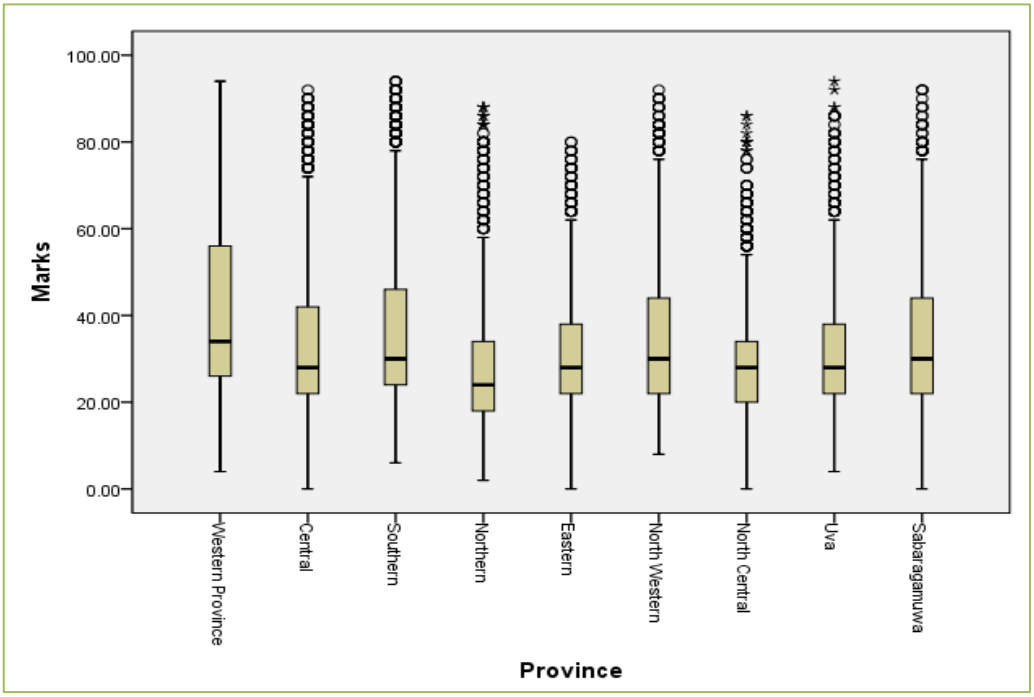

Figure 5.4: English language marks representation using boxplot and whisker plot

5.4 Disparities in Achievement in English Language

Under the disparities in achievement four particular aspects of disparities are discussed. Disparities in relation to school type, gender, medium of instruction and school location are analyzed in this way.

5.4.1 Disparities in Achievement in English Language in Relation to School Type

It is well known that various efforts and strategies have been taken to provide equal opportunities for students irrespective of the type of school which they attend. However, according to the Table 5.3, and Figure 5.5, there are noticeable discrepancies in levels of achievement of students attending different types of schools.

Table 5.3: English language achievement marks according to school type

School Type	Mean	Standard Deviation	Median	Skewness	F	P
1AB	41.64	20.28	36.27	0.71	25,252	.000
1C	28.28	11.90	26.51	1.27		
Type 2	27.58	12.94	24.64	1.45		
All Island	35.23	18.32	30.05	1.13		

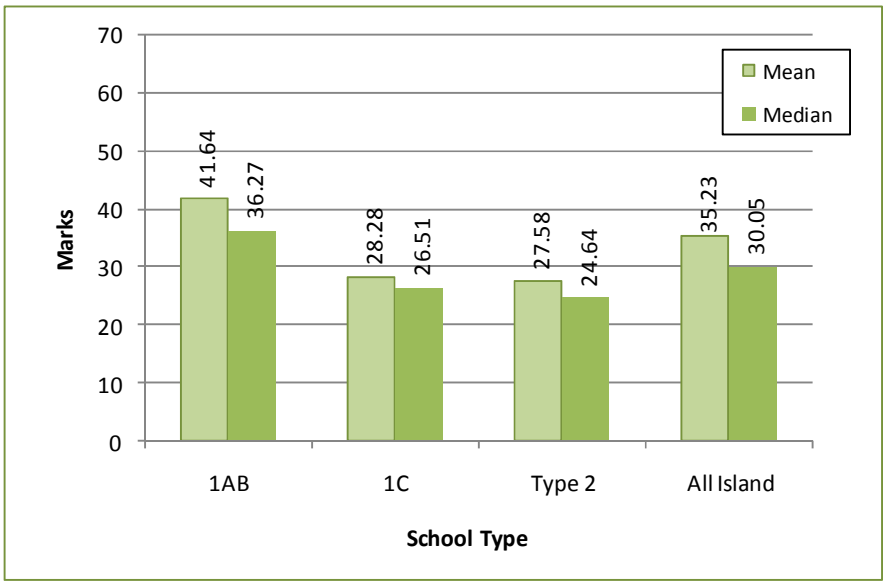

Figure 5.5: Mean values of English language marks according to school type

The achievement levels of students attending 1AB schools seem to be higher (mean-41.64) than that of those who are attending 1C schools (mean=28.28) and Type 2 schools (mean=27.58). However, there is no considerable disparity in achievement levels of students attending 1C and Type 2 schools. Meanwhile it clearly shows that the dispersion of marks of the students attending 1AB schools is very high when compared with other schools.

In addition to the analysis conducted to see the disparities in English language achievement pertaining to school type, the distribution of marks of the same is given below in Table 5.4. It shows that the same pattern of distribution can be seen with regard to 1C and Type 2 schools. In other words, distribution of marks is highly positively skewed. This distribution shows low achievement of students in these schools. However, distribution of marks related to 1AB schools shows somewhat satisfactory level of achievement when compared with those of the other two types of schools. These patterns can be observed in Figure 5.6.

Table 5.4: Distribution of English language achievement marks according to school type

Class Interval	1AB Student %	Cumulative %	1C Student %	Cumulative %	Type 2 Student %	Cumulative %
00-10	0.65	0.65	1.88	1.88	3.49	3.49
11-20	12.33	12.98	26.00	27.88	30.34	33.83
21-30	26.15	39.13	41.73	69.61	38.15	71.97
31-40	19.13	58.26	17.33	86.95	15.20	87.17
41-50	12.73	70.99	6.98	93.93	6.06	93.23
51-60	9.92	80.91	3.81	97.74	3.55	96.78
61-70	6.67	87.58	1.61	99.35	2.32	99.10
71-80	7.06	94.64	0.62	99.97	0.75	99.85
81-90	4.76	99.40	0.03	100.00	0.15	100.00
91-100	0.60	100.00	0.00	100.00	0.00	100.00
Total	100.00		100.00		100.00	

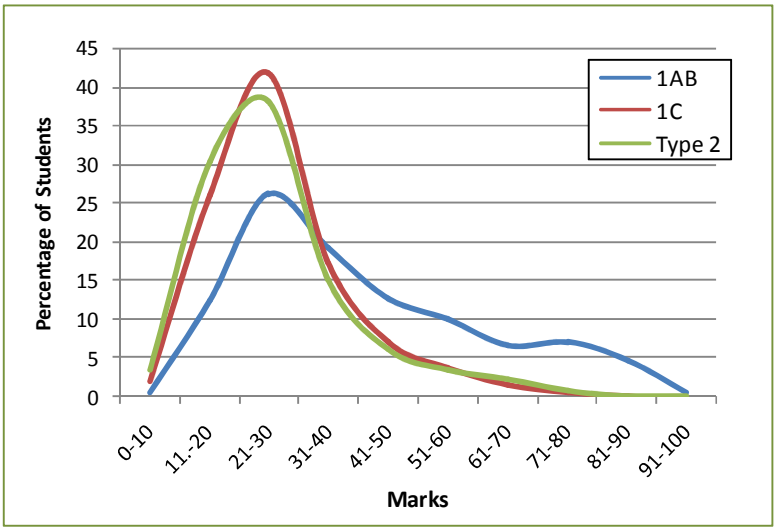

Figure 5.6: Distribution of English language achievement marks according to school type

5.4.2 Disparities in Achievement in English Language in Relation to Gender

Confirming the general trend in other research findings conducted by NEREC, this study too shows that the achievement levels in English of girls are higher than that of boys. The mean value of test marks of girls is 37.87 and for boys it is 32.40. This tendency can be seen even by comparing the median values. The median value related achievement of girls is 32.15. And for the boys it is 28.31. Table 5.5 and Figure 5.7 show this.

Table 5.5: English language achievement marks according to gender

Gender	Mean	Standard Deviation	Median	Skewness	F	P
Male	32.40	16.89	28.31	1.34	7,168.95	.000
Female	37.87	19.18	32.15	0.95		
All Island	35.23	18.32	30.05	1.13		

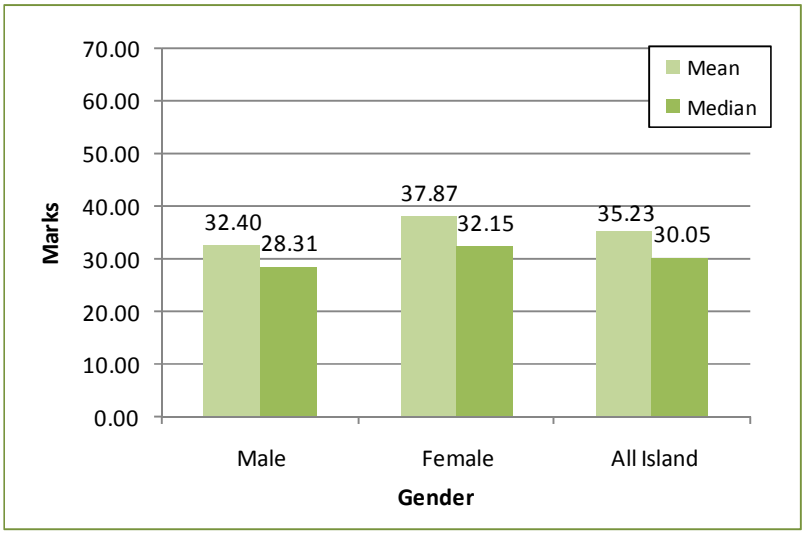

Figure 5.7: Mean values of English language marks according to gender

Distribution of marks in English language was analyzed according to gender as well. Such data are given in Table 5.6 and further highlighted in Figure 5.8. According to both the table and the figure, distribution of marks of both male and female students is positively skewed. It further shows that girls' performance is better than that of boys. Similar observations were made in distribution of marks concerning science and mathematics as well.

Table 5.6: Distribution of English language achievement marks according to gender

Class Interval	Male %	Cumulative %	Female %	Cumulative %
00-10	2.08	2.08	0.98	0.98
11-20	23.21	25.29	16.09	17.08
21-30	35.56	60.85	30.31	47.39
31-40	17.12	77.97	18.64	66.03
41-50	8.12	86.09	11.49	77.51
51-60	5.64	91.74	8.27	85.79
61-70	3.47	95.21	5.30	91.09
71-80	3.07	98.28	4.96	96.05
81-90	1.46	99.74	3.58	99.63
91-100	0.26	100.00	0.37	100.00
Total	100.00		100.00	

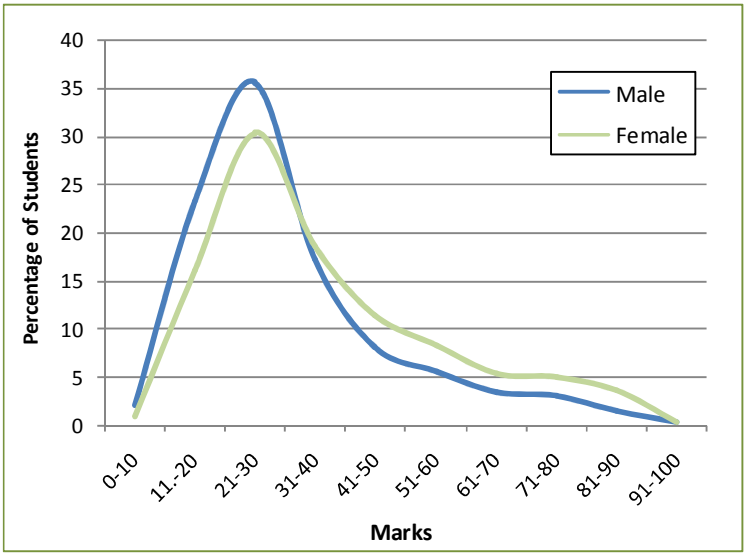

Table 5.8: Distribution of English language achievement marks according to gender

5.4.3 Disparities in Achievement in English Language in Relation to Medium of Instruction

According to the Table 5.7 which is given below, considerable difference of achievement can be seen in relation to medium of instruction. The mean value of achievement of English language in students studying in Tamil medium is lower (28.58) than that of Sinhala medium students (37.49). This difference can be observed even when the values of median of both groups are compared as well.

Table 5.7: English language achievement marks according to medium of instruction

Medium of Instruction	Mean	Standard Deviation	Median	Skewness	F	P
Sinhala	37.49	19.26	32.71	0.98	14,772	.000
Tamil	28.58	13.08	26.15	1.36		
All Island	35.23	18.32	30.05	1.13		

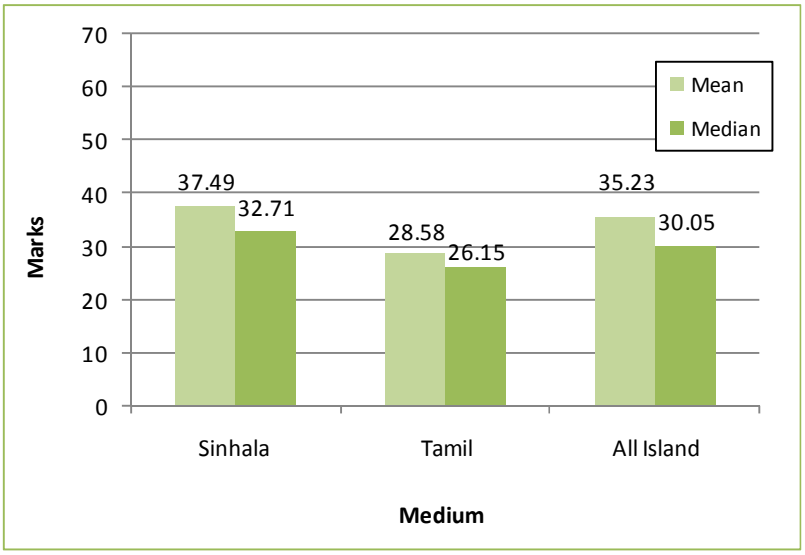

Figure 5.9: Mean values of English language marks according to medium of instruction

Disparities in achievement of students in both Sinhala and Tamil media were studied by analyzing the nature of the distribution of marks in English language. Both distributions are positively skewed. However, skewness of the distribution of marks of Tamil medium students is somewhat higher than that of the Sinhala medium students. This shows that the achievement in English of Tamil medium students is not so satisfactory when compared with Sinhala medium students. Data are given in Table 5.8 and in Figure 5.10.

Table 5.8: Distribution of English language achievement marks according to medium of instruction

Class Interval	Sinhala %	Cumulative %	Tamil %	Cumulative %
00-10	1.21	1.21	2.37	2.37
11-20	16.99	18.20	26.75	29.12
21-30	31.13	49.33	37.79	66.91
31-40	18.56	67.90	16.12	83.03
41-50	10.61	78.51	7.77	90.80
51-60	8.03	86.54	4.06	94.86
61-70	5.07	91.61	2.59	97.45
71-80	4.73	96.33	2.09	99.54
81-90	3.24	99.57	0.46	100.00
91-100	0.43	100.00	0.00	100.00
Total	100.00		100.00	

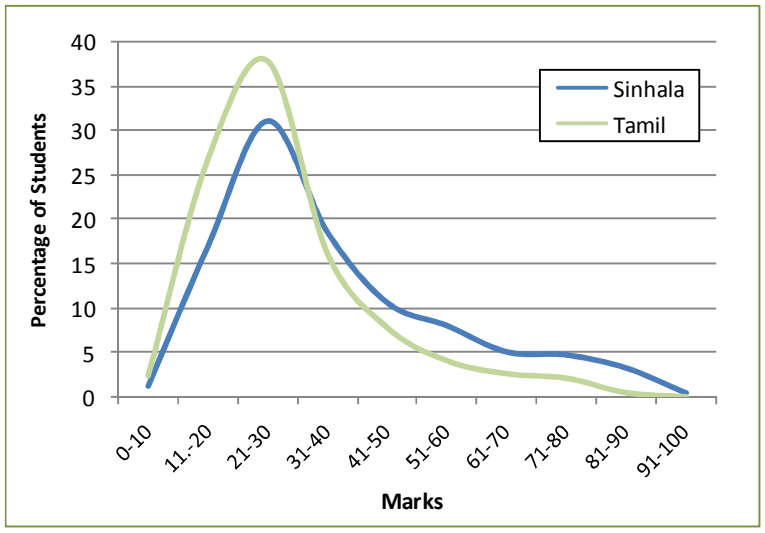

Figure 5.10: Distribution of English language achievement marks according to medium of instruction

5.4.4 Disparities in Achievement in English Language in Relation to Location of School

Achievement disparities can be observed in relation to the locations of schools as well. Schools belonging to areas that come under Municipal Councils show higher achievement levels (mean=47.17) than those belonging to Urban Council areas (mean=40.01) and Pradeshiya Sabas (mean=30.52). Schools belonging to Pradeshiya

sabas show lower achievement than those belonging to Urban Councils. This can be seen in Table 5.9.

Table 5.9: English language achievement marks according to location

Location	Mean	Standard Deviation	Median	Skewness	F	P
Municipal Council	47.17	23.17	42.22	0.36	25,691	.000
Urban Council	40.01	18.07	36.71	0.65		
Pradeshiya Saba	30.52	14.25	28.15	1.32		
All Island	35.23	18.32	30.05	1.13		

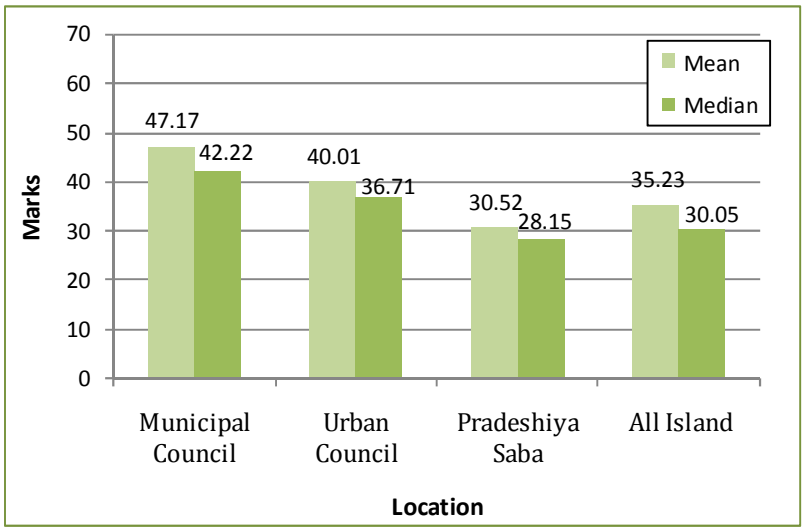

Figure 5.11: Mean values of English language marks according to location

Considering location of Sri Lankan schools belonging to every province, these disparities are universal.

Disparities in achievement of students in English language with regard to the location of school can be seen when the distribution of marks is analyzed. The highest positive skewness in the distribution of marks can be seen in students in Pradeshiya saba areas while the lowest is seen in Municipal council areas. This is shown in Table 5.10 and in Figure 5.12. This shows that the achievement of students in Municipal Council areas is better than those of the other two areas and the achievement of students in Urban Council areas is better than that of the Pradeshiya Saba areas.

Table 5.10: Distribution of English language achievement marks according to location

Class Interval	Municipal Council %	Cumulative %	Urban Council %	Cumulative %	Pradeshiya Saba %	Cumulative %
00-10	0.91	0.91	0.77	0.77	1.85	1.85
11-20	11.09	12.00	11.83	12.60	23.75	25.60
21-30	21.45	33.45	26.39	38.99	37.73	63.33
31-40	15.67	49.12	20.27	59.26	18.12	81.45
41-50	10.81	59.93	13.69	72.94	8.78	90.22
51-60	9.54	69.47	12.56	85.51	5.06	95.29
61-70	8.35	77.83	7.10	92.61	2.64	97.92
71-80	11.26	89.09	5.24	97.85	1.56	99.48
81-90	9.60	98.69	2.11	99.96	0.45	99.94
91-100	1.31	100.00	0.04	100.00	0.06	100.00
Total	100		100		100	

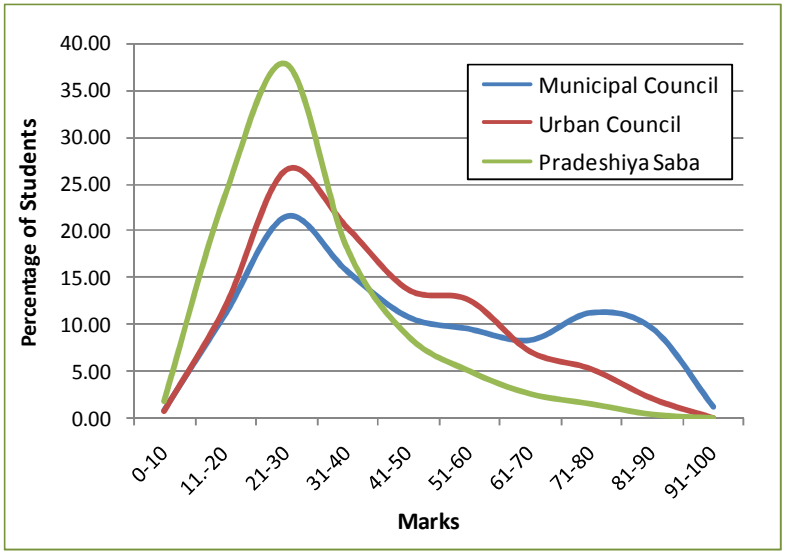

Figure 5.12: Distribution of English language achievement marks according to location

English language performance level of students who attends to schools in urban areas is considerably high (Mean =44.32) compared with the achievement level of students attending to schools located in rural areas (Mean =30.53). Figure 5.13 shows this clearly.

Table 5.11: English language achievement marks according to location - Urban /Rural

Location	Mean	Standard Deviation	Median	Skewness	F	P
Urban	44.32	21.57	38.41	0.52	46,122.52	.000
Rural	30.53	14.26	28.32	1.32		
All Island	35.23	18.32	30.05	1.13		

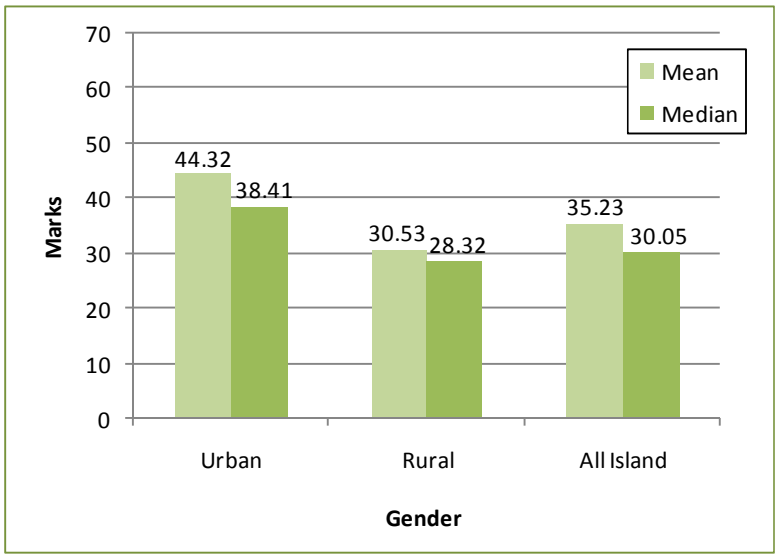

Figure 5.13: Mean values of English language marks according to location- Urban/Rural

When schools are classified according to urban and rural categories, a difference between the distribution of marks of schools belonging to urban and rural areas can be seen. With regard to the nature of the distribution of marks of students in both urban and rural areas, a positive skewness is seen. However, the skewness is higher concerning rural areas. This further highlights low achievement of students in English language in rural areas. These are shown in Table 5.12 and in Figure 5.14.

Table 5.12: Distribution of English language achievement marks according to location – Urban/Rural

Class Interval	Urban %	Cumulative %	Rural %	Cumulative %
00-10	0.85	0.85	1.85	1.85
11-20	11.39	12.24	23.75	25.60
21-30	23.42	35.66	37.73	63.33
31-40	17.50	53.16	18.12	81.45
41-50	11.96	65.12	8.78	90.22
51-60	10.75	75.87	5.06	95.29
61-70	7.85	83.72	2.64	97.92
71-80	8.86	92.58	1.56	99.48
81-90	6.61	99.20	0.45	99.94
91-100	0.80	100.00	0.06	100.00
Total	100.00		100.00	

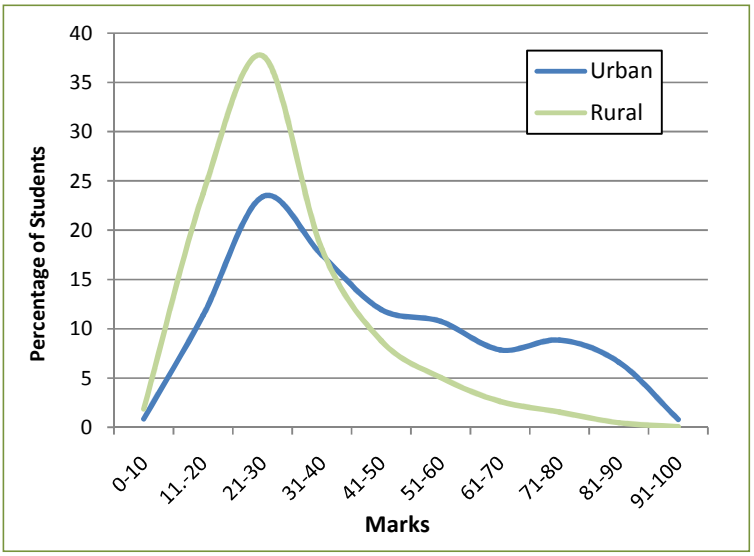

Figure 5.14: Distribution of English language achievement marks according to location – Urban/Rural

5.5 Achievement of English Language by Competency Levels

Learning outcomes of English language were assessed based on different competencies and competency levels. Competencies related to four areas were especially tested. They are writing, grammar, reading and vocabulary. The percentages of students who achieved different competency levels are given in Table 5.13 and they are further illustrated by Figure 5.15

Table 5.13: Achievement of competency levels – English language

Competency	Competency Level	Percentage	Average Percentage
Vocabulary	4.4 Uses English words in the proper contexts	49.6	48.1
	4.5 uses the dictionary effectively	40.4	
	4.6 uses visual clues and contextual clues to derive the meaning of words	54.3	
Reading	5.4. Transfers information into other forms	35.7	41.1
	5.5. Extracts the general idea of a text	46.5	
Grammar	6.2. Analyze the grammatical relations within a sentence	45.4	44.9
	6.6.Construct complex sentences through the process of subordination	44.4	
Writing	2.4 Uses commas with understanding	47.3	
	7.5. Writes short stories	10.5	
	7.6. writes brief notes	0.7	

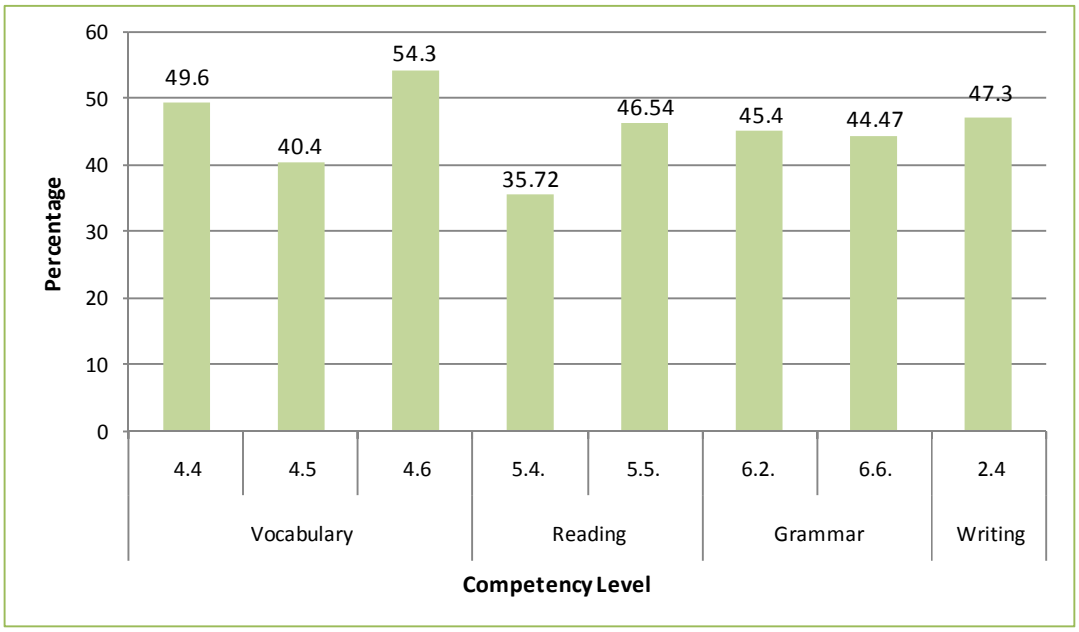

Figure 5.15: Achievement of competency levels – English language

In relation to vocabulary, out of the three competency levels that were tested, only one has been achieved by the majority of students. That is the ability to 'use visual clues and contextual clues to derive the meaning of words'. This has been achieved by 54.3 percent of the students. The average percentage of students who achieved the expected competency levels in vocabulary is 48.1 percent.

With regard to competencies in reading, 41.1 percent of students have achieved the expected competency levels. In this regard, the students are able to 'transfers information into other forms and extract the general idea of a text'. Concerning grammar, the percentage of students who have been able to achieve expected competency levels is 44.9. Two competency levels assessed in this area were to 'analyze the grammatical relations within a sentence' and 'construct complex sentences through the process of subordination'. These have been achieved by 45.4 and 44.4 percentage of students respectively.

The poorest achievement is shown in the skill 'writing'. Most of the students have not attempted to answer the given questions related to writing task. Table 5.14 shows the performance indicated by the marks obtained for writing a brief note.

Table 5.14: Performance in writing a brief note

	Not Attempted	**Attempted**						
Marks		**0**	**1**	**2**	**3**	**4**	**5**	**Total**
%	60	7.7	3.9	5.3	6.9	6.4	10.5	100

According to Table 5.14, only a very small percentage of students have been able to achieve the expected level in writing a brief note. Only 10.5 % of the students have been able to score the highest mark for this writing task. Writing a guided short story was another question to assess the competencies that relate to the skill, writing. Performance achieved in this regard denoted by the marks obtained is given in Table 5.15.

Table 5.15: Performance in writing a guided short story

	Not Attempted	**Attempted**											
Marks		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
%	75	10	2.2	2.5	1.7	2.1	2.6	2	1.8	1.8	1.4	0.7	100

In this task too, majority of the students has not attempted to answer the question. According to Table 5.15 achievement level in this task is not satisfactory. Only 0.7 percent of the students have been able to score the total marks for this question. In general, achievement of competency levels with regard to writing is not satisfactory.

5.6 Summary

The achievement of English language test which was administered to students completing grade 8 in year 2014 was discussed in this chapter. The average achievement of English language is 35.23. The distribution of marks of English Language is highly positively skewed indicating that the majority of students belong to low marks category. There are disparities in achievement pertaining to school type, gender, medium of instruction and location. Competency levels related to writing show less achievement.

Chapter Six

Conclusion

6.1 Introduction

This concluding chapter will focus on key patterns in achievement unearthed through the National Assessment of Achievement of Students Completing Grade 8 in Year 2014. It presents an overall evaluation of findings in relation to various patterns identified through the study. It analyzes the key patterns recognized against the objectives of the national study. The chapter ends with a discussion on additional action to be taken at all island level to maximize more equitable provision of education.

6.2 Conclusions Based on the Findings on the National Assessment 2014

6.2.1 Achievement Level of Students

The achievement of mathematics (mean=50.87 and median=47.51) is relatively more satisfactory when compared with those of science and English language. The achievement of science (mean=41.16 and median=40.05) is lower than that of mathematics. Achievement of English language is the lowest of all three subjects with a mean of 35.23 and median of 30.05 respectively. For all three subjects, the achievement level is above 35 while the mean value for overall achievement in mathematics is above 50. This shows that at this national assessment, mathematics, despite being a difficult subject for students, has recorded the highest performance against the other two subjects.

6.2.2 Distribution of Marks in Achievement

The nature of the distribution of marks can be considered as an indicator of the performance levels of students. The overall distribution of marks of mathematics is positively skewed. Yet, this skewness is quite marginal. On the other hand, the skewness of the distribution of marks of English as well as science, which is positive, is conspicuously higher than those of the other two subjects. Nevertheless, one noticeable finding is that 1AB schools belonging to Municipal and Urban Council areas show either negatively or very low positively skewed distribution indicating somewhat satisfactory performance in all three subjects while 1C and Type 2 schools and schools belonging to Pradeshiya Sabha areas show a highly positively skewed score distribution which indicate an unsatisfactory achievement pattern. When examining the provincial marks, the same trend can be seen. Yet, in some provinces such as Western and Southern, this skewness is negligibly low showing a satisfactory pattern of achievement.

6.2.3 Disparities in Achievement

Disparities in achievement are visible among students belonging to different groups. Achievement of students who study in 1AB schools is higher in all three subjects tested than that of 1C and Type 2 schools. The lowest performance is seen in students attending Type 2 schools. However, the difference between the performance level of students attending 1C and Type2 schools is not significantly high. Performance of students studying in 1AB schools is substantially high when compared with the other two types of schools. This trend can be seen in all the provinces. This is an indication that there can be distinct factors common to both 1C and Type 2 schools affecting their overall performance.

Gender has also played a notable role in terms of performance in all three subjects in the national assessment. The performance of girls is higher than that of boys. This phenomenon was found in previous studies conducted by the NEREC as well.

Medium of instruction is yet another factor that has affected the achievement of students. Students studying in Sinhala medium show higher achievement levels than

those who study in Tamil medium. Once again this can be observed in the achievement of all three subjects tested in the current study.

However, one noticeable phenomenon is that though these two groups use different languages of instruction, these languages are primarily their mother tongues. Therefore, one may argue that the discrepancies of achievement may not have been caused by the medium of instruction alone. There can be different factors that play an influential role on achievement concerning this phenomenon. Further investigations to uncover why this phenomenon recurs in every national assessment should follow.

The location of the school where one learns, according to this study (and in previous studies undertaken by the NEREC too), has also acted as a key factor on the achievement of students. The study reveals that students attending schools in Municipal Council areas show the highest achievement while those who study in schools located in Pradeshiya Sabha areas display the lowest. Again this propensity is seen in all three subjects which were tested. As mentioned previously, same disparities were identified in previous NEREC studies conducted for Grade 4 and 8. When the data were analyzed according to rural urban categorization, performance of students belonging to urban areas is higher than that of rural areas.

6.2.4 Achievement of Competencies

In the present national assessment, in determining the achievement, competencies and competency levels were assessed using only questions that require written answers. Consequently, it was not possible to test some competencies. For example, certain competencies related to 'speaking skill' in English language were not possible to be assessed. Therefore, based on the written responses to the questions in the test papers in all three papers, the achievement of the students was measured. The study revealed that the majority of students have not been able to display satisfactory achievement of the competency levels expected to be achieved by them in the said subjects. This development is seen in all three subjects but it is particularly poignant in English language where the achievement of competency levels associated with questions concerning writing tasks is not desirable. Yet, in mathematics nearly half of the

competency levels assessed through the test have been achieved by the majority of the students.

6.2.5 Achievement at Provincial Level

Analysis of performance at provincial level shows that Western, Southern and Sabaragamuwa Provinces have taken the 1st, 2nd and 3rd places in the achievement of mathematics respectively, while the central province has achieved the lowest according to the mean value. However, mean value of the achievement of students in mathematics in all provinces is above 44.96 and below 55.49. This suggests that the achievement level of students in mathematics somewhat satisfactory.

With regard to science, Southern, Sabaragamuwa and Western Provinces have taken the 1st, 2nd and 3rd places in terms of achievement while the Northern Province has got the last in terms of rankings. However, the 1st, 2nd and 3rd places have once again been obtained by Western, Southern and Sabaragamuwa Provinces despite different orders of ranking for science and mathematics. Achievement of science at provincial level is somewhat lower than that of mathematics. Central and Northern provinces have not been able to reach even 35 in science.

In terms of achievement of English language, the 1st, 2nd and 3rd places have gone to Western, Southern and North-Western Provinces thereby depriving Sabaragamuwa of its stay among the first three places as shown in achievement of mathematics and science mentioned above. As in mathematics, Northern Province has become the last in terms of rankings of the achievement of the English language. Another significant finding is that except Western, all the other provinces have achieved the level of 40. If we consider the mean value, all the provinces are below 35.

6.3 Suggestions for Future Action

In chapter one it was noted that the resolve of a national assessment, in addition to determining the realization of objectives of learning and how far learning outcomes have been achieved, is to convey such information to relevant authorities so that it

could lead to improvement in future student achievement thereby contributing to the decision making process. Therefore, a national assessment is undertaken with a determination to allocate resources and reform education in the light of its findings (Kellaghan, Bethell & Ross, 2012). World Bank (2011) too highlights that the findings of national assessments of learning outcomes should be better utilized for policy purposes (World Bank, 2011).

6.3.1 National Level Solutions

According to the analysis of the achievement of students in all 3 subjects, common pattern can be seen in all the provinces; low achievement level, positively skewed marks distribution, low performance of boys, low performance of Tamil medium students, low performance of students in rural areas, low performance of students belonging to 1C and Type 2 schools. Therefore, remedial measures should be taken at national level rather than at provincial level.

6.3.2 Provision of Equal Educational Opportunities

The study shows that the overall achievement in all subjects at all island level is not satisfactory. This proves that this low achievement is predominantly a national issue and not particularly a provincial one. It is, therefore, suggested that this phenomenon should be addressed at a national level rather than at provincial level. Hence, priority should be given to common factors associated with achievement of learning outcomes. In this regard, action pertaining to following areas is suggested.

6.3.3 Quality Development of Teachers

Increased achievement levels of students are the result of increased quality in teaching. In this respect, the role the teachers play in the teaching learning process is unmistakably important. Attention must be paid to various training requirements of teachers irrespective of the type of appointment they have. It is vital to observe whether the teachers are equipped with necessary skills to handle the competency-based curriculum in use.

6.3.4 Supervision and Monitoring

For smooth functioning of proper guidance to students, a continuous mechanism to monitor and supervise the teaching learning process at both national and provincial levels is required. This can ensure that what should be applied to maximize the teaching learning is actually taking place within the classroom and elsewhere as well.

6.3.5 Revisiting the Curriculum

It is well-known that the subject contents in the Sri Lankan secondary school curriculum are heavier than those in the curricular of some of well developed countries such as Finland and Denmark whose educational achievement tops the world rankings. It will be noteworthy to examine the suitability and thereby the mastery of the contents in given syllabi while identifying proper delivery methods of the same.

6.3.6 Incentive Program for Teachers

Incentive programs are good motivators to get the best performances of teachers. China in preparing her students for the 21st century rewards the teachers who produce outstanding performances of students (Asia Society, 2005). This may be difficult depending on the context due to various reasons. Yet, it will be important to explore some program to reward teachers who bring about excellent results which eventually contribute to achievement of students.

6.3.7 Low-Stakes Testing

Another possible reason for low achievement could be the particular grade (in this case Grade 8) at which the national assessment is conducted. Furthermore, the results are particularly used by policy makers and teachers. At this grade students are not preparing for a national or a competitive examination and as such they may not be using their maximum strength to sit for standardized tests. The assessment was conducted after the final day of the 3rd term test of the year 2014. Students are aware that this kind of testing does not provide them with either a certificate or a grade. Thus, this feeling of relaxation alone can act as a barrier for them to display their maximum performance.

6.3.8 Gender Disparity

As noticed in the previous chapters, the achievement of girls is higher than that of boys in all three subjects. This is a positive feature in terms of gender equity. Girls have surpassed boys in terms of achievement of learning outcomes. But, it is needed to find out why boys' performance is less than that of girls. The reason for low achievement by boys may be found in the teaching-learning process adopted by teachers. It is possible that this process may suit well for girls but boys. On the other hand, the assessment mechanisms could be more favorable for girls than boys. Furthermore, the attitude of boys towards education may have changed over the years and they may not be pleased with the curriculum, and the knowledge and skills promoted by it. Their thinking towards education may have taken a revolutionary turn where they question the relevance of cleverness expected to be achieved through school education to a competitive labor market. Whatever the case may be, further investigations in order to determine why boys' performance less must be conducted.

6.3.9 The Question of Medium

Performance of students in Tamil medium is lower in all three subjects. There can be a number of reasons related to this phenomenon. Years of disruption to continuous general education due to various reasons such as war and destruction particularly in the North and the East could hold back smooth functioning of learning. Thus one may say there can be social and cultural factors which can affect general achievement levels of such students. This needs further investigation.

6.3.10 Revisiting Competencies

The national assessment in 2014 shows that the percentages of achievement of all competencies in general are low. In English, achievement of competency levels is below basic level. A comprehensive study examining the competency levels and the tasks attached to each competency must be carried out. The achievement of higher order cognitive abilities cannot be viewed as satisfactory. The teachers should be made aware of the need to develop higher order cognitive skills in problem solving in mathematics

and application of proper use of grammar in the English language. In English language, competencies related to the skill 'writing' have been achieved by a very small percentage of students. As suggested elsewhere, programs to compensate the training requirements of teachers so that they will be better equipped with most effective methodologies to teach the specific competencies must be introduced.

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