

Sri Lankan Students' Readiness for International Assessments

**Assessment of Learning Outcomes of Grade 8 Students
in the Year 2019 at National Level in Sri Lanka**

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

*Financed by:
World Bank-funded General Education Modernization (GEM) Project*

July 2020

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The main purpose of the National Assessment of Learning Outcomes of grade 8 students in 2019 is to assess students’ readiness to participate in International Assessments. Therefore, findings of this study cannot be compared with previous National Assessment studies conducted by NEREC.

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National Education Research and Evaluation Centre (NEREC)**

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Senior Professor Marie Perera
Former Director
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Message from the Secretary, Ministry of Education

I consider it is a privilege for me to write this message to the report on 'Sri Lankan Students' Readiness for International Assessments'. Conducting periodical national assessments has been one of the major activities of the General Education Modernization Project (GEM) (2018-2024). This is an important national action which is exercised with a view to reveal in the achievement levels of students in various grades. Findings of these assessments help teachers to understand the levels of achievement of students and policy-makers and planners to determine the performance of the education system by means of learning outcomes, to what extent the educational development programmes and investments have been successful and what further steps should be taken in order further to upgrade the performance of the system considering the importance of this exercise, the Ministry of Education has planned to continue these assessments regularly and effectively. Moreover, this study is specially conducted to find out the readiness of Sri Lankan students for international assessment. Since it will help benchmark learning levels in Sri Lanka to international standards.

In this context 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 the task of conducting this study to determine the levels of achievements of students in grades 4 and 8, during last several years. Its latest national assessment report reveals factors that are particularly significant in order to enhance teaching and learning, analysed by various aspects such as types of schools, gender, medium of instruction, location, and competency levels of students who completed grade 8 in the year 2019.

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Contents

Acknowledgements	iii
Message from the Secretary, Ministry of Education	v
Research Team	vii
Test Construction Team	viii
Contents	xi
List of Tables	xiii
List of Figures	xv
Abbreviations	xvi
Executive Summary	xvii

Chapter 1 – Introduction to the Study

1.1	Background	1
1.2	National Assessment Studies conducted in Sri Lanka	4
1.3	National Assessment of Learning Outcomes - 2014 and 2016	4
1.4	Rationale for the present study	4
1.5	Summary	6

Chapter 2 – Methodology

2.1	Introduction	7
2.2	Objectives of the study	7
2.2.1	Specific objectives of the study	7
2.3	Sampling methodology	7
2.3.1	Target population	8
2.3.2	Sampling frame and elements of the sampling frame	8
2.3.3	Sample design – Procedure	9
2.4	Framework for the National Assessment	10
2.5	Item selection for the final test papers (English Language and Mathematics)	20
2.6	Procedures in administration of the National Assessment 2019	22
2.6.1	Test coordinators	22
2.6.2	Training workshop for coordinators	22
2.6.3	Return of answer scripts and other documents	23
2.7	Analysis of data	23
2.8	Summary	23

Chapter 3 - Patterns in Achievement: English Language 2019

3.1	Introduction	25
3.2	Patterns of achievement at national level	25
3.3	Provincial wise student achievement	27
3.4	Achievement levels by type of school	31
3.5	Achievement levels by gender	35
3.6	Achievement levels by medium of instruction	39
3.7	Achievement levels by location	43
3.8	Analysis of achievement by sub skills	47
3.9	Summary	53

Chapter 4 - Patterns in Achievement: Mathematics 2019

4.1	Introduction	55
4.2	Patterns of achievement at national level	55
4.3	Provincial wise student achievement	57
4.4	Achievement levels by type of school	61
4.5	Achievement levels by gender	65
4.6	Achievement levels by medium of instruction	69
4.7	Achievement levels by location	73
4.8	Analysis of achievement by sub skills	77
4.9	Summary	86

Chapter 5 - Conclusion and the Way Forward

5.1	Introduction	87
5.2	Achievement of learning outcomes – 2019	87
5.2.1	National level performance	87
5.3	Disparity in achievement among the sub groups	88
5.3.1	Provincial wise performance	88
5.3.2	Achievement according to school types	88
5.3.3	Achievement according to gender	89
5.3.4	Achievement according to medium of instruction	89
5.3.5	Achievement according to location	90
5.4	Strengths and weaknesses in students' knowledge and skills	90
5.5	Students' readiness for international assessments	91
5.6	What the findings reveal	92
5.7	The way forward	94
5.8	Conclusion	95

References	97
Annexure 1 - Matching Activities in Textbook with Competency Levels	99
Annexure 2 - Content domain, the respective competency level, learning outcome and the question numbers – Mathematics	105
Annexure 3 - Table of Specification – English Language	109
Annexure 4 – Ministry of Education Letter	111
Series of National Assessments	113

List of Tables

Chapter 2

Table 2.1:	Target population	8
Table 2.2:	School sample and calculated, allocated and achieved student sample per each province	10
Table 2.3	Overall structure of TOEFL Junior Standard	11
Table 2.4	Overall structure of TOEFL Junior Comprehensive	12
Table 2.5	Comprehension of language skills in TOEFL and local curriculum	15
Table 2.6	Table of specification	16
Table 2.7	PISA competency clusters	18
Table 2.8	Mathematics items by content areas, cognitive processes and item type	19

Chapter 3

Table 3.1:	All island achievement in English 2019 – cumulative percentages	26
Table 3.2:	Provincial achievement in English 2019 – Summary statistics	27
Table 3.3:	Percentage of students scoring 50 or above and below for the English language – 2019	31
Table 3.4:	English language achievement according to school type	31
Table 3.5:	Cumulative student percentages according to school type- English language	34
Table 3.6:	English language achievement according to gender	35
Table 3.7:	Cumulative student percentages according to gender – English language	38
Table 3.8:	English language achievement according to medium of instruction	40
Table 3.9:	Cumulative student percentages according to medium of instruction – English Language	41
Table 3.10:	English achievement according to location	43
Table 3.11:	Cumulative student percentages according to the location – English Language	45
Table 3.12 :	Achievement of competency levels – English language	48
Table 3.13 :	Achievement of competency level 7.1	50
Table 3.14:	Performance in the guided letter	51
Table 3.15:	Sender's address	52
Table 3.16:	Appropriate salutation	52
Table 3.17:	Ending	52
Table 3.18:	Closing line	53

Chapter 4

Table 4.1:	All island achievement in Mathematics 2019 – cumulative percentages	56
Table 4.2:	Provincial achievement in Mathematics 2019 – Summary statistics	57
Table 4.3:	Percentage of students scoring 50 or above and below for Mathematics – 2019	61
Table 4.4:	Mathematics achievement according to school type	61
Table 4.5:	Cumulative student percentages according to school type- Mathematics	64
Table 4.6:	Mathematics achievement according to gender	65
Table 4.7:	Cumulative student percentages according to gender – Mathematics	67
Table 4.8:	Mathematics achievement according to medium of instruction	69
Table 4.9:	Cumulative student percentages according to medium of instruction – Mathematics	71
Table 4.10:	Mathematics achievement according to location	73
Table 4.11:	Cumulative student percentages according to the location – Mathematics	75
Table 4.12:	Achievement of competency levels – Mathematics	80
Table 4.13:	Understanding the concepts and processes	84
Table 4.14:	Use of cognitive processes	85

List of Figures

Chapter 3

Fig. 3.1:	All island achievement in English 2016 – dispersion of marks	25
Fig. 3.2:	Box and whisker plot representing all island English achievement	26
Fig. 3.3:	Bar chart to represent mean and median values among the provinces – English Language	28
Fig. 3.4:	Provincial wise distribution of marks – English Language	29
Fig. 3.5:	Box and whisker plot representing provincial wise English achievement	30
Fig. 3.6:	Bar chart representing the mean and median among the school types- English Language	32
Fig. 3.7:	Dispersion of marks by school type – English Language	33
Fig. 3.8:	English marks according to school types using box and whisker plot	35
Fig. 3.9:	Bar chart representing mean and median values according to gender – English Language	36
Fig. 3.10:	Dispersion of marks by gender – English	37
Fig. 3.11:	Box and whisker plot representing gender wise English Language marks	39
Fig. 3.12:	Bar chart representing mean values according to medium of instruction – English language	40
Fig. 3.13:	Dispersion of marks by medium of instruction – English	41
Fig. 3.14:	English marks according to medium of instruction using box and whisker plot	42
Fig. 3.15:	Bar chart representing mean values according to location– English	44
Fig. 3.16:	Dispersion of marks by location – English	45
Fig. 3.17:	Box and whisker plot representing location wise English marks	46
Fig. 3.18:	Students performance in the subskills	47
Fig. 3.19:	Achievement of competency levels – English Language	49

Chapter 4

Fig. 4.1:	All island achievement in Mathematics 2019 – dispersion of marks	55
Fig. 4.2:	Box and whisker plot representing all island achievement in Mathematics	56

Fig. 4.3:	Bar chart to represent mean and median values among the provinces – Mathematics	58
Fig. 4.4:	Provincial wise distribution of marks - Mathematics	59
Fig. 4.5:	Box and whisker plot representing provincial wise Mathematics achievement	60
Fig. 4.6:	Bar chart representing the mean and median among the school types- Mathematics	62
Fig. 4.7:	Dispersion of marks by school type – Mathematics	63
Fig. 4.8:	Mathematics marks according to school types using box and whisker plot	65
Fig. 4.9:	Bar chart representing mean and median values according to gender –Mathematics	66
Fig. 4.10:	Dispersion of marks by gender – Mathematics	67
Fig. 4.11:	Box and whisker plot representing gender wise Mathematics marks	68
Fig. 4.12:	Bar chart representing mean values according to medium of instruction – Mathematics	69
Fig. 4.13:	Dispersion of marks by medium of instruction – Mathematics	70
Fig. 4.14:	Mathematics marks according to medium of instruction using box and whisker plot	72
Fig. 4.15:	Bar chart representing mean values according to location– Mathematics	74
Fig. 4.16:	Dispersion of marks by location – Mathematics	75
Fig. 4.17:	Box and whisker plot representing location wise Mathematics marks	76
Fig. 4.18:	Students performance in the subskills	78
Fig. 4.19:	Achievement of competency levels – Mathematics	79

Abbreviations

EFA	Education for All
GESDP	General Education Sector Development Programme
ESS	Effective Sample Size
GEMP	General Education Modernization Project
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
PISA	Programme for International Students Assessment
TOEFL	Test of English as a Foreign Language
TIMSS	Trends in International Mathematics and Science Study
HOTS	Higher Order Thinking Skills
LOTS	Lower Order Thinking Skills

Executive Summary

The General Education Modernization (GEM) Project (2018-2024) of the Ministry of Education funded by the World Bank is supporting the Government of Sri Lanka to modernize the primary and secondary education system. Some of the specific initiatives under this project are the improvement of English Language learning, Mathematics learning and the modernized assessment of learning outcomes by introducing “a regular system of international assessments of learning outcomes that extend the system of national assessments of learning outcomes” (2018,19)

Assessment of student learning has become a major tool of governments to collect high-quality data on education in order to inform effective policies and practices. In keeping with this trend, in Sri Lanka the Ministry of Education has entrusted the National Education Research and Evaluation Centre (NEREC) of the Faculty of Education, University of Colombo to conduct these assessments.

NEREC has conducted National Assessment of Learning Outcomes both at primary as well as at secondary level. At secondary level National Assessment of learning outcomes were conducted at Grade 8 in 2005, 2008, 2012, 2014 and 2016. This report presents the findings of a Sri Lankan Students’ Readiness for International Assessments conducted in grade 8 for English, and Mathematics in the year 2019. This assessment differed from previous assessments as new test papers were designed in line with test items similar to International assessments PISA (Programme for International Student Assessment) for Mathematics and TOEFL Junior for English Language.

This study had the following specific objectives.

- I. Explore students readiness for international testing
- II. Assess the extent to which the expected learning outcomes have been achieved by students.
- III. Examine whether there are disparities in achievement in relation to school type, school location, medium of instruction, and gender.
- IV. Identify the areas of strengths and weaknesses of student achievement in relation to subject content and related skills.

The study covered the entire country and the sample was drawn to enable analysis by province, type of schools, gender and medium of instruction. The sample consisted of 13,002 students drawn from 442 schools.

Patterns in learning achievement was discussed using measures of central tendency mean and median, Skewness values of the distribution, cumulative percentages and percentile ranks. In addition, graphs – frequency polygon and box plots were also used.

Data gathered through the achievement tests were analyzed on a national and provincial basis in relation to medium of instruction, school type, gender and location.

The findings revealed that national averages of achievement for the two subjects Mathematics, and English in 2019 were 24.18, and 34 respectively. Therefore, it could be concluded that majority of the students had not achieved the expected learning outcomes in the two subjects.

There is disparity in achievement in both subjects in relation to provincial performance, school type, gender, medium of instruction and locality in which the schools are situated. While the performance of Uva, Eastern and Northern Provinces is below the National achievement in both English and Mathematics, performance in Western, Southern and North Western is above the National mean. While 1AB schools' performance is better than the other two school types, girls' performance is better than the boys in both subjects. Sinhala medium students' performance is better than the Tamil medium students performance. Schools in convenient and very convenient localities' are performing better than difficult area schools.

In both subjects student's use of Higher Order Thinking skills are weaker than Lower Order Thinking skills. In Mathematics students' achievement is lowest in the content domains of measurement and numbers. On the other hand, performance is highest in statistics. Overall, the knowledge of content is better than process knowledge. In English reading and writing skills are the weakest. On the other hand, their content knowledge of vocabulary and grammar are better. Further, application of knowledge in authentic situations was weak in both subjects.

The analysis of results of the study, indicates that Sri Lanka is not yet ready to join in international assessments as students are not familiar with the type of test items included in such assessments. Therefore, there is a need for curriculum revision authentic assessment of learning outcomes at classroom level as well as at public examinations at national level.

Authentic assessment and authentic learning should be conducted in schools. The analysis of the assessment results should lead to remedial teaching. There should be constructive alignment between assessment, learning outcomes and the activities conducted in classrooms.

Policy decision should be taken regarding provision of facilities to difficult and very difficult location schools. Special projects should be conducted in these schools to upgrade them. More research regarding these schools is needed.

With proper curriculums revision, school tests and public examinations adapted to the international type of testing and with proper teacher development programmes International assessments may be possible in the future. Such changes will improve students' learning and Sri Lanka will move towards achieving Sustainable Development Goal 4- "No one leave behind".

CHAPTER ONE

Introduction to the Study

Background

Assessment of learning outcomes at national level or national assessment is a survey of schools and students (and sometimes teachers) that is designed to provide evidence, such as at the level of the education system, about students' achievements at a particular stage of education, and in identified curriculum areas (e.g., reading or literacy, mathematics or numeracy, science). On the other hand, an international assessment provides similar information for more than one education system but may not be sensitive to the characteristics of individual systems.

Evidence on how successful schools are in transforming resources into student learning is essential to guide policy and management decisions regarding educational provision. Assessment of learning, especially in the foundational areas of language and mathematics, is needed at varying points in the educational careers of students. Assessment entails measurement of learning, analysis to diagnose problems, and use of the findings to guide remedial action. An effective national assessment policy demands real political commitment to action based on the results, such as reallocation of resources, curriculum reform and/or re-orientation of teaching.

The purposes of national assessments are today many and varied, The principal, explicit and shared 'complex' purpose continues to be a) to establish an 'attainment baseline' in given knowledge-skill areas at particular stages in schooling, for the given student populations as a whole and usually also for subgroups within these (gender, deprivation, language of learning, for example,) and b) to monitor change in the initial attainment profiles over time. This multi-faceted purpose – 'system description' and 'system monitoring' – often co-exists with a range of complementary ambitions. These include the potentially invaluable aim, as far as the interpretation of attainment change is concerned, of establishing relevant learning environments within and outside the classroom, including resource availability, teachers' instructional styles, teachers' and students' subject attitudes, and school accountability. (Johnson, 2017)

The purpose of a national assessment is not only to provide information on the state of education, but also that information should lead to improvement in student achievement by systematically feeding into decision making. Sui-chu Ho, (2015) identifies three main

purposes of National Assessment. First, is to evaluate the overall learning achievement levels of students at certain grade levels and to monitor the overall quality of basic education. Secondly, to provide feedback to the curriculum and teaching and learning practices in order to achieve better outcomes for students. Thirdly, to inform policy.

There is a greater need today to uphold the fundamental principles of equality of educational opportunity and universal access to education. The World Declaration on Education for All, adopted in Jomtien, Thailand (1990) and the Dakar Framework for Action (2000) set out an overall vision: universalizing access to education for all children, youth and adults, and promoting equity. Evaluating the progress made towards the Education for All (EFA) goals since 2000 and the education related Millennium Development Goals (MDGs) as well as the lessons learned, a new education agenda and the Framework for Action, Incheon Declaration, 2030 has been proposed. This declaration having examined the remaining challenges has identified on future priorities and strategies for its achievement hoping to “leave no one behind”. This new vision is embodied in the proposed Sustainable Development Goal 4 (SDG 4) “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”.

The global norm for educational governance has been established by adopting evidence-based policymaking in education (Wiseman, 2010). 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 providing education inputs could be seen. Consequently there is a dramatic and global growth in the use of learning assessments (Kamens & McNeely, 2010). Assessment of student learning have become a major tool of governments to collect high-quality data on education in order to inform effective policies and practices (Masters, 2017).

This shift from an emphasis on education inputs to assessment of quality was influenced by the Jomtien Declaration (*World Declaration on Education for All* 1990). Article 4 of the Jomtien Declaration states that the focus of basic education should be “on actual learning acquisition and outcome, rather than exclusively upon enrolment, continued participation in organized programs and completion of certification requirements” (*World Declaration on Education for All* 1990, p.5). Another reason for this shift in focus was the Dakar Framework for Action (UNESCO 2000), which also highlighted the importance of learning outcomes. One of its goals was, by 2015, to improve “all aspects of the quality of education especially in literacy, numeracy, and essential life skills” (UNESCO 2000, iv, 7). Over 130 Education Ministers and more than 1500 participants have now adopted the Incheon Declaration "Education 2030: Towards inclusive and equitable quality education and

lifelong learning for all ". The Incheon Declaration was signed at the end of the World Education Forum (WEF) held in Incheon, Republic of Korea, during the third week of May 2015. As explained in the opening paragraphs of the document, the Declaration marks an important step in the development of international education policy, continuing the Education for All (EFA) movement, started in Jomtien Thailand in 1990 and formalized by the Dakar Framework for Action (2000).

As a member country agreed on the World Declaration on Education for All, Sri Lanka strived 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).

Promoting "Equity" and "Excellence" and reducing disparities in the education system is one of the main focuses of the Government of Sri Lanka. In this regard a comprehensive medium term General Education Sector Development Plan (GESDP) for Sri Lanka from 2018–2025 was developed. The purpose of this strategic plan" is to address prevailing issues relating to equity, equality, quality, efficiency, effectiveness and adequacy considering the general education in the country" (p,07). This Development Plan is organized under four thrust areas:

Thrust area 1: Strengthen equity in education: equitable learning opportunities for all children.

Thrust area 2: Improve quality of general education.

Thrust area 3: Strengthen stewardship and service delivery in general education.

Thrust area 4: Enhance evidence-based education policy-making and planning.
(p.15)

Under the four thrust areas several objectives, components, strategies as well as key performance indicators have been identified.

Component 2.7, under thrust area 2 is "improving learning outcomes of students". It is stated that National assessment of learning outcomes will be continued incorporating international modules from the international assessment in future. During the next five years' period Ministry of Education plans to move step by step to a modernized menu of assessment systems of learning outcomes in relation to international standards (2017,p.44)

It is expected that the implementation of this plan "will improve educational outcomes of the general education sector mainly in terms of learning outcomes of students in the country" (p.9)

1.2 National Assessment Studies conducted in Sri Lanka

National Assessment of Learning Outcomes has become an important component of education policy analysis and programme monitoring in Sri Lanka. The National Education Research and Evaluation Centre (NEREC) of the Faculty of Education, University of Colombo has been the forerunner in conducting these assessments.

NEREC has conducted National Assessment of Learning Outcomes both at primary as well as at secondary level. At primary level, assessments were conducted at Grade 4 in 2003, 2007, 2009, 2013 and 2015 respectively. At secondary level National Assessment of Learning Outcomes were conducted at Grade 8 in 2005, 2008, 2012, 2014 and 2016. 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).

1.3 National Assessment of Learning Outcomes - 2014 and 2016

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. Therefore, it was not possible to compare with the previous assessments. Instead, the 2012 National Assessment served as the baseline for monitoring the level and distribution of learning outcomes overtime. The same instruments were used in the National Assessment of learning outcomes in 2014 and 2016. Hence a comparison of achievement over time was possible.

The national assessments conducted in grade 8 in 2016 reveal that on average there is a very slow improvement in achievement levels of Grade 8 students in English and Mathematics. The achievement of the English language, which is the second language of the students, increased from 35.23 percent to 35.81 percent the achievement in Mathematics increased from 51.11 per cent to 51.87 per cent. 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, 2016).

1.4 Rationale for the present study

This report presents the findings of an Assessment of learning outcomes conducted in grade 8 in 2019 for English and Mathematics.

Sri Lanka has made impressive progress in expanding access to education. Universal access to primary education has been achieved and the net enrolment rate for the secondary education is higher than the average of lower –middle income countries and

upper middle income countries. Despite this significant progress according to MoE, (2018, p.1) “the Sri Lanka education system now faces a major set of challenges as the country seeks to reach Upper Middle Income Country (UMIC) status. The country lags in terms of learning Outcomes in key subjects which are critical for the high level industrial and service sector activities of UMIC. As a result, it is assumed that the General Education system needs to be better equipped to the production of socio emotional skills and to be developed to reflect modern international trends which seek to reflect both learning outcomes and the socio –emotional skills of students” (p2).

Therefore, the General Education Modernization (GEM) Project (2018-2024) of the Ministry of Education funded by the World Bank is expected to support the Government of Sri Lanka to modernize the primary and secondary education system. Two of the sub components relevant to National Assessments out of the six components of the project and the specific initiatives are:

1. Curriculum modernization and diversification

Specific initiatives – Improving English Language Learning
Improving mathematics learning

2. System level quality assessment

Specific initiatives – Modernized assessment of learning outcomes (National Assessments: grades 4 and 8)

As the General Education Modernization (GEM) Project Operational Manual states it was expected to “ introduce a regular system of international assessments of learning outcomes that extend the system of national assessments of learning outcomes” (2018.p.11).

In this regard the NEREC, University of Colombo has been selected for conducting assessment of learning outcomes of the subjects Mathematics and English Language in Grade 4 and 8. It was hoped that in the future the national assessments could lead to international assessments. However, in the 2019 study the assessment tools would be designed preparing test items similar to PISA (Programme for International Student Assessment) items for mathematics and for English similar to TOEFL Junior (Test of English as a Foreign Language). As explained before, this study in particular was not mainly focused on evaluating learning outcomes but to examine the Sri Lankan students’ readiness for international assessments. **Hence this study would be different to previous National Assessments conducted by NEREC.** The proposed study will be carried out by NEREC in 2019 in collaboration with the Ministry of Education and funded by the World Bank. The sample will be drawn from students completing grade 08 in 2019.

According to Kellaghan and Greaney (2009), all national assessments seek answers to six questions. The present Assessment seeks to find answers to three of them as follows:

- 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?

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

In addition to these questions the present assessment also seeks to find out the answer to an additional question.

- How ready are Sri Lankan students to face international assessments?

Chapter 2 of this report will discuss the methodology of the study. Chapters 3-4 will present the findings pertaining to the achievement of cognitive skills in Mathematics, and English respectively. The final chapter will discuss the lessons to be learnt and the way forward.

1.5 Summary

According to Sustainable Development Goal 4 (SDG 4) it is necessary to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". Therefore, a worldwide concern regarding the need to achieve "Education for All" is evident. The challenge before all nations is to ensure that increased access to education is delivered in association with improvements in the conditions of schooling and student achievement levels.

Sri Lanka being a member country that has agreed to the World Declaration on Education for All, has conducted national assessments of achievement of learning outcomes of students with the aim of monitoring and evaluating the quality of its education systems.

The General Education Modernization (GEM) Project (2018-2024) of the Ministry of Education funded by the World Bank is supporting the Government of Sri Lanka to modernize the primary and secondary education system. Some of the specific initiatives under this project are the improvement of English Language learning, Mathematics learning and the modernized assessment of learning outcomes.

CHAPTER TWO

Methodology

2.1 Introduction

In chapter 1, the background and significance of National Assessments with particular relevance to Sri Lanka were discussed. This chapter elaborates the methodology used to conduct the present study in 2019.

2.2 Objectives of the study

In accordance with the General Education Modernization (GEM) Project (2018-2024), the main objective of the study was to determine the achievement of the learning outcomes of students completing grade 08 in 2019 and to explore the readiness of students to face international assessments.

2.2.1 Specific objectives of the study

- I. Explore the readiness of students to face international assessments.
- II. Assess the extent to which the expected learning outcomes have been achieved by students
- III. Examine whether there are disparities in achievement in relation to school type, school location, medium of instruction, and gender
- IV. Identify the areas of strengths and weaknesses of student achievement in relation to subject content and related skills.

2.3 Sampling methodology

The sampling methodology used for this study was the same as the one used in national assessments of 2012, 2014 and 2016. 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 2019 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 2017 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 follow 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 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 345093 pupils who completed grade eight in 2019 from 6313 government schools.

Table 2.1: Target population

Province	Number of Schools	Number of classes	Number of Students
1. Western	925	2264	79611
2. Central	919	1588	45046
3. Southern	703	1395	44076
4. Northern	529	861	19249
5. Eastern	655	1211	34783
6. North Western	827	1419	42025
7. North Central	427	804	23935
8. Uva	584	918	23956
9. Sabaragamuwa	744	1197	32411
Total	6313	11657	345093

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, 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. Results will be reported for provinces accordingly.

Table 2.2 illustrates school sample and calculated student sample, allocated student sample and achieved student sample by provinces.

Table 2.2: School sample and calculated, allocated and achieved student sample per each province

Province	School Sample	Calculated Student Sample	Allocated Student Sample as MOE School Census Database	Achieved Student Sample	
				English	Mathematics
Western	48	1698	1844	1638	1618
Central	49	1396	1691	1506	1508
Southern	49	1539	1870	1564	1567
Northern	50	1128	1301	1175	1181
Eastern	49	1412	1513	1344	1353
North Western	49	1451	1637	1444	1445
North Central	49	1458	1679	1543	1553
Uva	50	1295	1504	1347	1346
Sabaragamuwa	49	1338	1708	1429	1431
Total	442	12715	14747	12990	13002

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

2.4 Framework for the Study

In assessing the achievement of students, two new achievement tests were constructed and validated. These achievement tests were developed to determine the achievement level of learning outcomes of grade 8 students in 2019. Since there had been a curriculum revision the previous test items could not be used. The learning outcomes were the competency levels of each subject expected to be achieved by the students.

As discussed in chapter 1, General Education Modernization (GEM) Project (2018-2024) of the Ministry of Education is expected to support the Government of Sri Lanka to modernize

the primary and secondary education system. Under this project one of the sub components is system level quality assessment and a specific initiative is the modernized assessment of learning outcomes. In keeping with this objective it was decided that the assessment tools would be designed preparing test items similar to PISA items for mathematics and for English language items similar to that of TOEFL Junior. Unlike in the Mathematics paper English paper was not similar to PISA English language paper. The reasons are, PISA English language paper is given to 15 year olds who had completed school education and tests only reading literacy. On the other hand, TOEFL junior tests English language skills similar to local curriculum and is meant for 14 year old second/foreign language learners. Therefore, TOEFL Junior is more suitable for Sri Lankan grade 8 students.

In order to prepare the test items two teams were appointed. Each team consisted of two University academics, an ISA (In service Advisor) and a school teacher.

Construction of the English Language Paper

Stage 1

The team studied the format of the TOEFL Junior. It was found that it has the following format.

Organization of the Test into Sections

It was found that TOEFL Junior has two types of tests. TOEFL Junior Standard and TOEFL Junior comprehensive.

As summarized in Tables 2.3 and 2.4 two sections, listening and reading, appear in both tests, whereas other sections appear in only one of the tests. The language form and meaning section is only present in TOEFL Junior Standard, whereas the speaking and writing sections are included only in TOEFL Junior Comprehensive.

Table 2.3: Overall structure of TOEFL Junior Standard

Section	No of items	Testing time
Listening	42	40
Language form and meaning	42	25
Reading comprehension	42	50
Total	126	115 mins

Table 2.4: Overall structure of TOEFL Junior Comprehensive

Section	No of items	Testing time
Listening	36	35
Reading	36	40
Speaking	04	25
Writing	04	40
Total	80	140 mins

After studying the organization of the two test types the team decided to limit the English language paper for the present paper to,

- Language form and meaning
- Reading Comprehension
- Writing

The reason for not including Listening and speaking components are:

- It is difficult to test listening and speaking in a pencil and paper test
- These skills are not tested at public exams as well in Sri Lanka due to the practical constraints.

Stage 2

The test construction team studied the above constructs in the TOEFL Junior in order to match these constructs with the competencies identified in the local grade 8 curriculum.

Construct Definition by Section

Language Form and Meaning

The test items in this section aim to measure enabling skills required for communication, whereas items and tasks in the other sections measure the ability to apply such enabling skills in actual communicative tasks. Specifically, the items in this section assess the degree to which students can identify the structure of English and choose appropriate lexical units. The items are presented as gap-filling questions within the context of a cohesive paragraph. Therefore, students are required to take into account the context of an entire passage to answer the questions appropriately in the sections.

The items are divided into two categories: items targeting language meaning and items targeting language form. As explained in the following, vocabulary and grammar knowledge was measured in the context of a single paragraph, with the justification that

they can be better operationalized in a rich context than through decontextualized, individual sentences:

1. *The ability to identify an appropriate lexical item within context.* Students must be able to identify a word that semantically completes a sentence within the context of a paragraph.
2. *The ability to recognize a proper grammatical structure within context.* Students must be able to identify a proper structure needed to complete a grammatically accurate sentence in English.

Reading

TOEFL Junior assesses the degree to which students have mastered the reading subskills such as understanding main ideas, identifying important details, and making inferences. In addition, the curricula and standards specify different types of text. A relationship was observed between text types and the three subskills. Therefore, the three reading abilities to be measured in TOEFL Junior are defined as follows, according to text type:

1. *The ability to read and comprehend texts for social and interpersonal purposes.* Students should be able to read and comprehend written texts on familiar topics in order to establish or maintain social relationships. Text types for this purpose may include correspondence (e.g., e-mail, letters) and student writing. In addition, reading for personal pleasure (e.g., novels, periodicals) is included in this category.
2. *The ability to read and comprehend texts for navigational purposes.* Students need to be able to read and comprehend texts in order to identify key information from informational texts for future reference. Such texts include those containing school-related information, usually in less linear formats (e.g., directions, schedules, written announcements, brochures, and advertisements). Reading subskills that are particularly relevant to this type of reading include comprehending explicit meaning, identifying key information, and understanding steps and procedures.
3. *The ability to read and comprehend academic texts.* Students need to be able to read and comprehend academic texts in a range of genres (e.g., expository, biographical, persuasive, literary) across a range of subject areas (e.g., arts/humanities, science, social studies). They need to be able to read such texts at difficulty levels up to and including those typical of what is used in English-medium classrooms.

Writing

TOEFL Junior Comprehensive assesses the degree to which test takers have the writing abilities required by English-medium instructional environments at the middle school level. This includes three types of ability:

1. *The ability to write in English for social and interpersonal purposes.* In English-medium instructional environments, students must be able to engage in written communication for the purposes of establishing and maintaining social and interpersonal relationships. This includes the ability to write effective informal correspondence to peers or teachers and the ability to recount events based on personal experience and observation.
2. *The ability to write in English for navigational purposes.* In school settings, students must be able to extract key school-related information from a variety of spoken or written stimuli and keep written records for future reference. For instance, students may need to take notes while listening to their teacher explain a class assignment or the steps of a science experiment. Students may also need to write simple, short summaries of school-related information (e.g., a field trip, announcements, directions, or procedures).
3. *The ability to write in English for academic purposes.* In English-medium instructional environments, students must be able to communicate in writing using appropriate written language on subject matters representing a range of content areas and genres. This includes the ability to produce connected text; to describe a process in an academic context; to understand and be able to summarize, synthesize, and paraphrase important and relevant information from spoken and written stimuli; and to integrate information from multiple academic spoken and/or written stimuli.

The test construction team after studying the above constructs in the TOEFL Junior decided only to measure the first reading and writing ability in the local paper as the other abilities correspond to English medium learning contexts.

Stage 3

The test construction team matched the competencies of the local curriculum with the identified abilities in the TOEFL Junior test.

Table 2.5: Comparison of language skills in TOEFL and Local curriculum

Language skill	TOEFL Junior Abilities	Local grade 8 competencies
Vocabulary	<i>The ability to identify an appropriate lexical item within context. (Knowledge Level in Bloom’s Taxonomy)</i>	<i>Builds up vocabulary to use words appropriately and accurately to convey precise meaning Comprehension and application.</i>
Grammar	<i>The ability to recognize a proper grammatical structure within context. (Comprehension and application Levels in Bloom’s Taxonomy)</i>	<i>Uses English grammar for the purpose of accurate and effective communication (Comprehension and application)</i>
Reading	<i>The ability to read and comprehend texts for social and interpersonal purposes. (More challenging- Application level)</i>	<i>Extracts necessary information from various types of texts. (More challenging- Application)</i>
Writing	<i>The ability to write in English for social and interpersonal purposes.(Higher Order Thinking skills)</i>	<i>Uses English creatively and innovatively in written communication.(Higher Order Thinking skills)</i>

Stage 4

The test team matched the items in the Pupils book and the workbook with the identified competency levels for the four selected language skills (refer annexure 1). Next, test items to measure the achievement of competency levels were decided considering the weightage given in the textbook and workbook for each competency level and the cognitive level measured that is whether it measures a Lower Order Thinking skill (LOTs) or a Higher Order Thinking skill (HOTs).

In order to assure the content validity of test papers, a table of specifications similar to the one given below was used. Three parallel test papers were prepared based on this Table.

Table 2.6: Table of specification

Competency	Competency Level	No. of questions
Vocabulary	4.3 Finds synonyms and antonyms for given words	3
	4.4 Uses affixes to change the word class and the meaning of words	2
	4.7 Uses collective nouns and compound nouns	1
Reading	5.5 Reads and responds to simple folk stories /stories	10
	5.6 Extracts the general idea of a text	5
Grammar	6.1 Construct simple sentences using present perfect and passive voice	5
	6.2 Uses pronouns appropriately	2
	6.3 Uses modals	1
	6.5 Uses contracted forms	1
	6.6 Uses adjectives appropriately	1
	6.7 Uses prepositions appropriately	1
	6.8 Uses conjunctions appropriately	1
	6.9 uses adverbs appropriately	1
Mechanics of Writing	2.5 Uses inverted commas appropriately	1
Writing	7.1 Writes descriptions of things, persons and places	1 (5 marks)
	7.3 Writes for personal purposes	1 (10 marks)

Construction of the question paper for Mathematics

Similar to the English language test development team, the Mathematics test construction team also comprised of two university academics, an ISA and a teacher. In the initial discussions the Ministry of Education Mathematics Branch officials as well as National Institute of Education officers from the Mathematics Department also participated.

Stage 1

The team members studied the constructs of the PISA mathematics paper framework. It was found that in addition to assessing facts and knowledge, PISA assesses students' ability to use mathematical knowledge to solve real-world problems. Therefore, the term 'literacy' is used, since it implies not only knowledge of a domain, but also the ability to

apply that knowledge. The main purpose of PISA is to assess real-world knowledge and skills and preparedness of students for life-long learning and adult participation in society. The PISA mathematics framework has three dimensions: (i) situations and contexts; (ii) content; (iii) and competencies.

Mathematics Situations and Contexts

The ability to use and do mathematics in a variety of situations is considered an important part of mathematics education and the type of mathematics employed often depends on the situation in which the problem is presented. Four categories of mathematical problem situations and contexts are used: personal, educational/occupational, public, and scientific. The situation is the part of the student's world in which the problem arises (e.g., a scientific context). Context reflects the specific setting within that situation (e.g., variation in growth rates).

Mathematics Content Areas

PISA 2012 measured student performance in four areas of mathematics (also called 'overarching ideas'):

- Space & Shape – recognizing and understanding geometric patterns and identifying such patterns in abstract and real-world representations;
- Change & Relationships – recognizing relationships between variables and thinking in terms of and about relationships in a variety of forms including symbolic, algebraic, graphical, tabular, and geometric;
- Quantity – understanding relative size, recognizing numerical patterns and using numbers to represent quantities and quantifiable attributes of real-world objects;
- Uncertainty – solving problems relating to data and chance, which correspond to statistics and probability in school mathematics curricula, respectively.

Mathematics Competencies/Processes

PISA identifies eight types of cognitive processes involved in mathematisation – reasoning; argumentation; communication; modelling; problem-posing and -solving; representation; using symbolic, formal and technical language and operations; and use of aids and tools. A mathematical task may involve one or more of these processes at various levels of complexity. In PISA, these processes are represented at different levels of complexity in three broad competency clusters: Reproduction, Connections, and Reflection. Key features of each competency cluster are described in Table 2.7.

Table 2.7: PISA Competency Clusters

Reproduction Cluster	Connections Cluster	Reflection Cluster
Reproducing representations, definitions and facts	Integrating and connecting across content, situations and representations	Complex problem solving and posing
Interpreting simple, familiar representations	Non-routine problem solving	Reflecting on, and gaining insight into, mathematics
Performing routine computations and procedures	translation Interpretation of problem situations and mathematical statements	Constructing original mathematical approaches
Solving routine problems	Using multiple well-defined methods	Communicating complex arguments and complex reasoning
	Engaging in simple mathematical reasoning	Using multiple complex methods
		Making generalizations

Source: Adapted from OECD (2012)

Stage 2

Test construction team adapted the PISA mathematics framework to suit the local curriculum framework. It was decided to consider the six content areas to assess the students' performance in Mathematics in accordance with the Curriculum in Sri Lanka. It further concluded to consider two broader cognitive processes as (1) Lower Order Thinking skills (LOTs) and (2) Higher Order Thinking skills (HOTs). The cognitive processes included under LOTs are knowledge and skills, and comprehension (communication and relationships), while reasoning and problem solving are considered as Higher Order Thinking skills (HOT). Next the item type was decided. Accordingly, it was decided to include MCQs, both traditional MCQs and Complex MCQs along with short response type and structure type (similar to open-constructed item in PISA). The Table 2.8 provides a breakdown of mathematics items by content areas, cognitive processes and item type for the National Assessment of performance of Mathematics of students completing grade 8 in Sri Lankan state schools in year 2019.

Table 2.8: Mathematics items by content areas, cognitive processes and item type

Content Areas		Cognitive Processes	Item type
MCQ type questions		Lower Order Thinking Knowledge and Skills Comprehension (Communication & relationships)	Traditional MCQ 16=16 marks (one each) Complex MCQ 02= 4 marks (two each)
Themes	Number of questions		
Numbers	5		
Measurements	2		
Algebra	4		
Geometry	3		
Statistics	2		
Sets and Probability	2		
Total	18		
Short Response type questions (4)		Higher Order Thinking Reasoning Problem Solving	5 marks each $\times 4 = 20$ marks
Themes	Number of questions		
Numbers	1		
Measurements	1		
Algebra	1		
Geometry	1		
Total	4		
Structure type questions (6)		Each consists of three parts Part I- Lower Order Thinking Part II- Higher order thinking Part III- Higher order thinking	Each part in Part I - 2 marks Each part in Part II - 3 marks Each part in Part III- 5 marks Total marks = $10 \times 6 = 60$ marks
Themes	Number of questions		
Numbers	2		
Measurements	2		
Algebra	1		
Geometry	1		
Total	6		

After considering the content area, cognitive processes items were selected according to competency levels and learning outcomes expected to achieved by grade 8 students.

Final Papers

The three parallel papers for both subjects were then pilot tested in July 2019. The items for the final paper were selected from each pilot tested paper as per the results of the

Conquest analysis. The content and face validity of the items were tested and the final paper was constructed to be administered in November 2019.

The Table of Specification for the final papers (English Language and Mathematics) are given in annexures 2 and 3.

2.5 Item selection for the final test papers (English Language and Mathematics)

The item analysis was carried out using conquest software which is based on item response theory to select valid items for the final test papers.

IRT models are often referred to as latent trait models. The term latent is used to emphasize that discrete item responses are taken to be observable manifestations of hypothesized trait, construct, or attribute, not directly observed, but which must be inferred from manifest responses. The performance of an item in a test is described by the item characteristic curve (ICC). The curve gives the probability that a person with a given ability level will answer the item correctly. Persons with lower ability have less of a chance, while persons with high ability are very likely to answer correctly.

The analysis of items using IRT helps test developers to understand whether the items are successful in measuring the latent variable defined by the test and also to understand whether items tap into the same construct. Thus the Conquest, a software based on IRT provides facilities to estimate the fit statistics, item discrimination, item difficulty, point biserial correlation, item characteristic curves, item category curves, item expected curves, item information curves etc.

In the present study, three parallel test papers were administered for Mathematics and English language to select valid test items. Firstly, data files were created using Excel software and cleaned. Then they were imported to SPSS. Next, the conquest command files were created for item analysis. Based on general item analysis item characteristics curves, item category curves, table of response model parameter estimates, map of estimates and response model parameter estimates were created.

Item fit statistics

In evaluating quality of items whether the item is misfit or good fit to the model is based on the criterion used by the test developers. The item fit indices provide the weighted and un-weighted Mean Square values (MNSQ) of each item which can be used to detect the misfit or in fit items. The fit statistics indicate the extent to which the item fits to the IRT

model to measure the relevant trait. According to the Rasch model MNSQ value is close to 1 indicates that the item fits to the model very well. The deviation of MNSQ value from 1 indicates poor fit to the model. In terms of ConQuest, for good fit, un-weighted MNSQ should be close to 1 (CI 0.88-1.12). The ICC helps to understand the degree of the misfit of an item and to take measures to rectify any problems of the test items.

Difficulty Index & Item Difficulty Map

The Rasch models provide facilities to estimate item difficulty indices. The item difficulty for an item can be defined as the level of ability at which the probability of success on the item is 0.5. The ConQuest defines the item difficulty (average person δ) in relation to the ability level of a person who has a 50-50 percent chance of being successful on the item. If we know a person's ability, the likelihood of that person's performance can be predicted without administering the item to the person. This is possible by defining the item difficulty and person ability on the same scale on the item person map.

Point Biserial Correlation

The point biserial measures the relationship between the item score and the total raw score of each respondent. In a good item point biserial increases with increasing scores and for the highest score category point biserial correlation should be positive. Point biserial can be used to check whether there is a category disordering in the item. When category disordering occurs, the point biserial correlation value may not be in increasing order with increasing category scores. Point biserial correlation of a good item should be between .2 and .8. According to IRT, for the multiple choice items point biserial correlation of the correct category should be positive value while other categories or the distractors should have negative values in order to be a good item.

Average Ability Measure

In a good multiple choice item the average ability measure of the correct option should have higher value among all response categories of the item.

In terms of IRT, a good item should possess following characteristics.

- The fit mean square index is close to 1. (between .90 -1.1 can be accepted)
- The discrimination index is higher than .4.
- The point biserial correlation increases with increasing score and the point biserial correlation should be positive for the higher score category.
- The average ability measure increases with increasing score.
- The observed item characteristics curve is close to the theoretical curve (ICC).

- Behaviour patterns of the Distractor curves

To select valid items for the final test papers (Mathematics & English) all the above criteria and the competency level of the items were considered.

2.6 Procedures in administration of the Study

The study was conducted island-wide on the 27th of November, 2019. It was possible to conduct the test in all 442 schools on the stipulated dates.

2.6.1 Test coordinators

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

2.6.2 Training workshop for coordinators

Training workshops for coordinators were organized in two phases. During the first phase, a team representing NEREC visited North Central, Northern, Eastern, Southern and Uva Provinces and conducted workshops at Anuradhapura, Polonnaruwa, Vavuniya, Killinochchi, Jaffna, Trincomalee, Batticaloa, Ampara, Monaragala, Bandarawela, Nuwara Eliya, Galle and Hambantota from 18th to 22nd of November 2019. 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 21st and 22nd of November, 2019.

Coordinators from Central, Western, North Western, and Sabragamuwa 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 26th of November 2019 to make prior arrangements concerning the test.

Given below are some of the measures that were adopted in the 2019 study which were expected to increase the reliability of the assessment.

- The tests were administered on a weekday (27th of November 2019)

- In order to better monitor the administering of the tests, 442 independent coordinators were appointed to the 442 examination centers.
- The coordinators were expected to complete a journal in which they had to provide information regarding the conduct of the examination.

2.6.3 Return of answer scripts and other documents

Coordinators from Central, Western, North Western, and Sabragamuwa Provinces handed over the answer scripts and other documents to the NEREC office from 30th November to 2nd December 2019. A team from NEREC visited the North Central, Northern, Eastern, Southern and Uva Provinces to collect answer scripts and other documents from 2nd to 18th December 2019.

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 and 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 same. As mentioned earlier, the study was conducted with the main objective of examining how far the expected learning outcomes have been achieved by the students. Further, this study differed from earlier National Assessments, though the test items selected were in line with the competencies students were expected to be achieved through the national curriculum, the question types as far as possible were similar to International test items. The findings are expected to provide important insights into areas that contribute to the achievement of learning outcomes. Further, the findings would also indicate how far the Sri Lankan students are ready for International assessments. The next two chapters will present the data pertaining to student achievement in relation to the subjects, English language and Mathematics.

CHAPTER THREE

Patterns in Achievement: English Language 2019

3.1 Introduction

This chapter presents the patterns in achievement of the students in the English language in relation to the readiness of students for international assessments.

Part I

Patterns in achievement in the English language

First, national level student achievement would be discussed in relation to student performance pertaining to English Language.

3.2 Patterns of achievement at national level

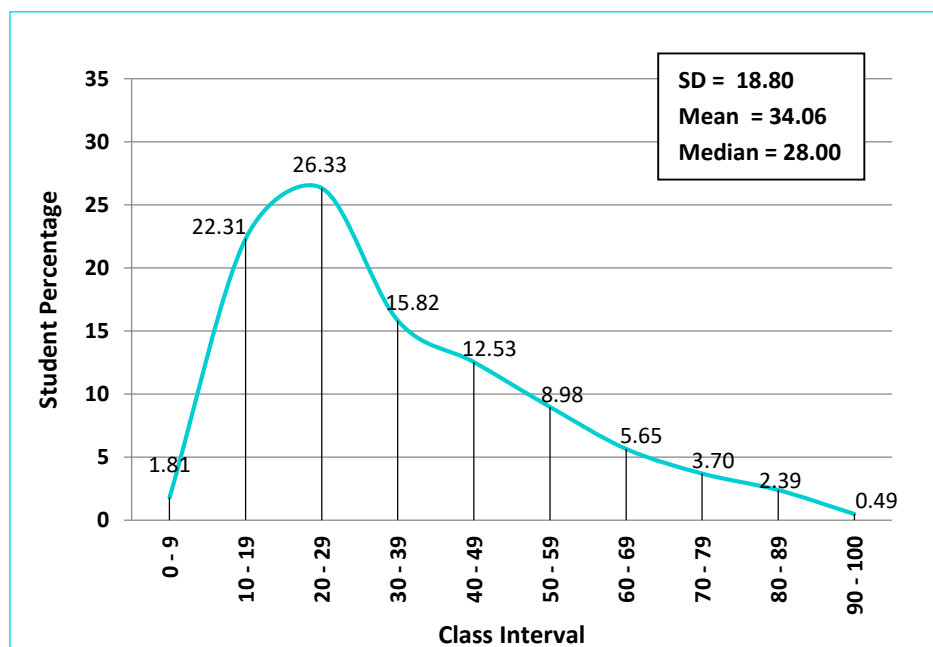


Fig. 3.1: All island achievement in English 2019 – dispersion of marks

The frequency polygon shown in Fig. 3.1 outlines the total picture of the distribution of marks of grade 8 students in English. According to this curve the average marks obtained

by the students (Mean) is 34 and the median is 28. Therefore, the achievement in the English language cannot be considered as satisfactory.

Fig. 3.1 depicts a positively skewed distribution of marks displaying that majority of the students has scored low marks in English. The distribution of marks is further clarified in Table 3.1.

Table 3.1: All island achievement in English 2019– cumulative percentages

Class Interval	Students number	Student Percentage	Cumulative Percentage
90 - 100	64	0.49	100.00
80 - 89	310	2.39	99.51
70 - 79	480	3.70	97.12
60 - 69	734	5.65	93.43
50 - 59	1166	8.98	87.78
40 - 49	1628	12.53	78.80
30 - 39	2055	15.82	66.27
20 - 29	3420	26.33	50.45
10 - 19	2898	22.31	24.12
0 - 9	235	1.81	1.81

According to this table the highest percent of students (26%) has scored between 20-29 marks. Further, 66% of students has scored below 40 marks.

Fig. 3.2 illustrates student achievement patterns further.

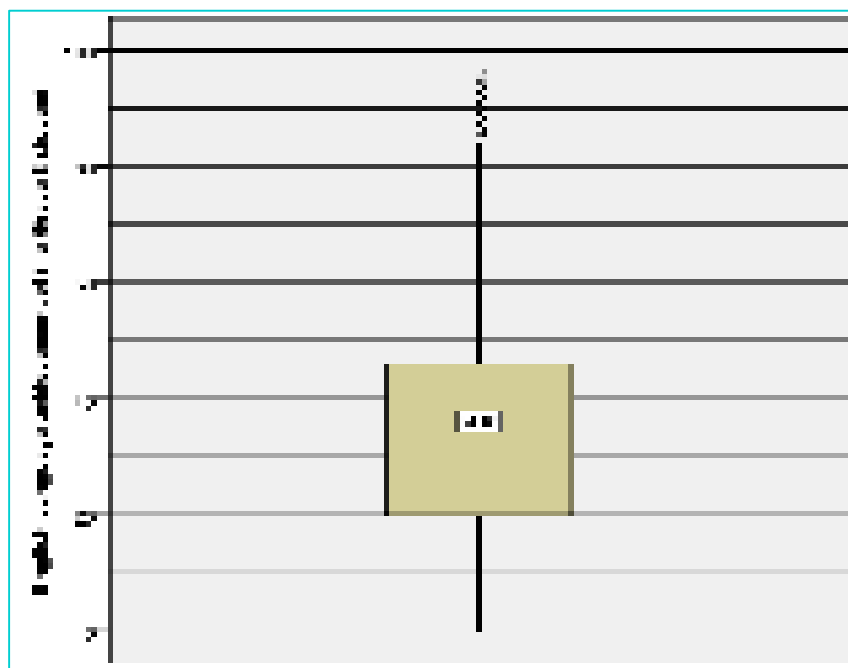


Fig. 3.2: Box and whisker plot representing all island English achievement

As Fig. 3.2, the box plot displays average marks (mean) is 34. On the other hand the median of the achievement is 28. Therefore, more than 50% of the students has achieved values above the average marks.

While 25% of the students (25th percentile) has scored below 20 marks, another 25% of the students has scored above the 46 marks. However, there are also some outliers.

Summary of national level achievement

- National level mean is 34, while the median is 28.
- The highest number of students falls within the marks range of 20-29.
- 66% of students has scored below 40 marks.

Provincial wise student achievement will be discussed next.

3.3 Provincial wise student achievement

The nature of the distribution of scores provincial wise reveals certain patterns. These patterns are discussed based on Table 3.2.

Table 3.2: Provincial achievement in English 2019 – Summary statistics

Province	Mean	Rank	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Western	38.46	1	19.95	0.07	0.62	22.00	34.00	52.00
North Western	36.94	2	20.11	0.10	0.69	20.00	32.00	50.00
Southern	36.42	3	17.75	0.08	0.62	22.00	34.00	48.00
Sabaragamuwa	32.20	4	17.16	0.10	1.04	20.00	28.00	42.00
North Central	32.06	5	18.18	0.12	1.03	18.00	26.00	42.00
Central	31.93	6	18.13	0.09	1.23	18.00	26.00	42.00
Uva	30.89	7	17.04	0.12	1.04	18.00	26.00	40.00
Eastern	27.81	8	16.05	0.09	1.46	18.00	22.00	34.00
Northern	27.71	9	17.37	0.13	1.43	16.00	22.00	34.00
All Island	34.06		18.80	0.03	0.90	20.00	28.00	46.00

As Table 3.2 indicates based on provincial wise mean achievements Western Province ranks first. The North Western Province is ranked second with the Southern Province being third.

Achievement wise the provinces fall into three categories. Western, North Western and Southern Provinces with mean scores above the national mean, fall into the higher category. All the other provinces are below the national mean. However, Sabaragamuwa

North Central and Central Provinces mean values are closer to the National mean. Between the Western and Northern Provinces there is a ten point difference in mean values indicating the disparity in achievement among the Provinces.

The mean and median values for the different provinces are depicted in Fig. 3.3

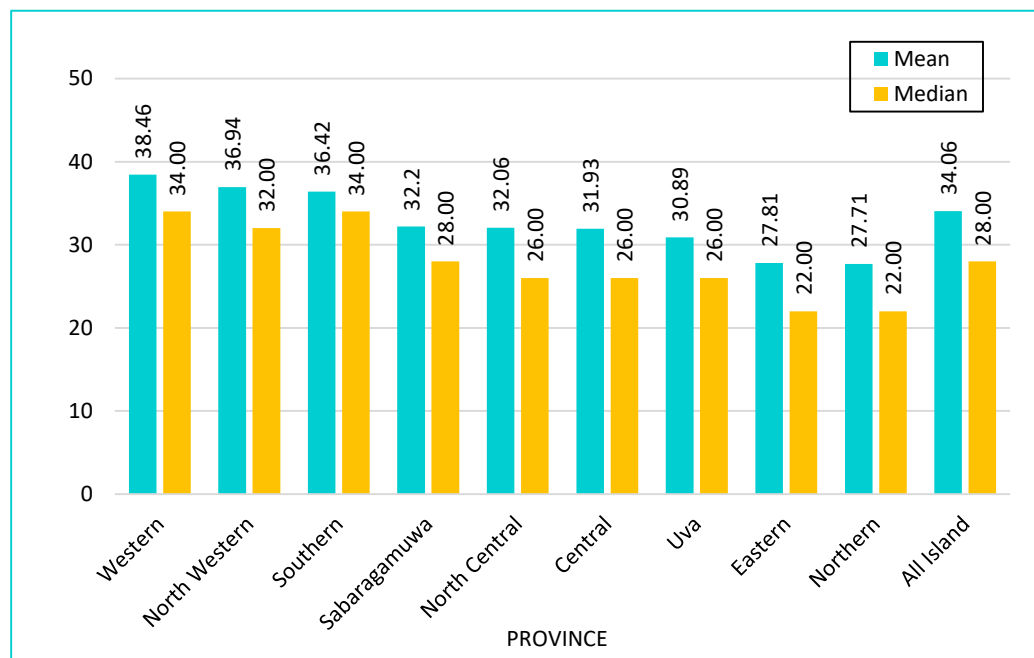


Fig. 3.3: Bar chart to represent mean and median values among the provinces – English Language

As Fig. 3.3 displays the median values of all the provinces are below the mean value. Therefore, 50% of the students has scored above the average marks.

Disparity in achievement among provinces

According to Table 3.2 and Fig. 3.3, Western Province has the highest mean value but its SD is also high. Similarly, North Western Province which is ranked second also has a similar SD score. Thus the variation of students' marks is the highest in these two provinces. The SDs of these two provinces are also higher than the all island SD. The SD value is lowest in the Eastern Province indicating that there is less student variation in achievement. However, its mean value is also very low suggesting that all students' performance is weak in this study.

As the Figures on pg. 29 indicate all the provinces have obtained positive skewed values. This indicates that student performance is low. Only Southern Province depicts a slightly different curve which is slightly like a normal curve. According to this curve the highest percent of students has scored (22.06) between 30-39 marks. On the other hand, in both Western and North Western Provinces which are ranked first and second, the highest

percent of students has scored between 20-29. In the Southern Province the disparity in achievement is less than in the Western and North Western provinces as its SD is lower than the all island SD.

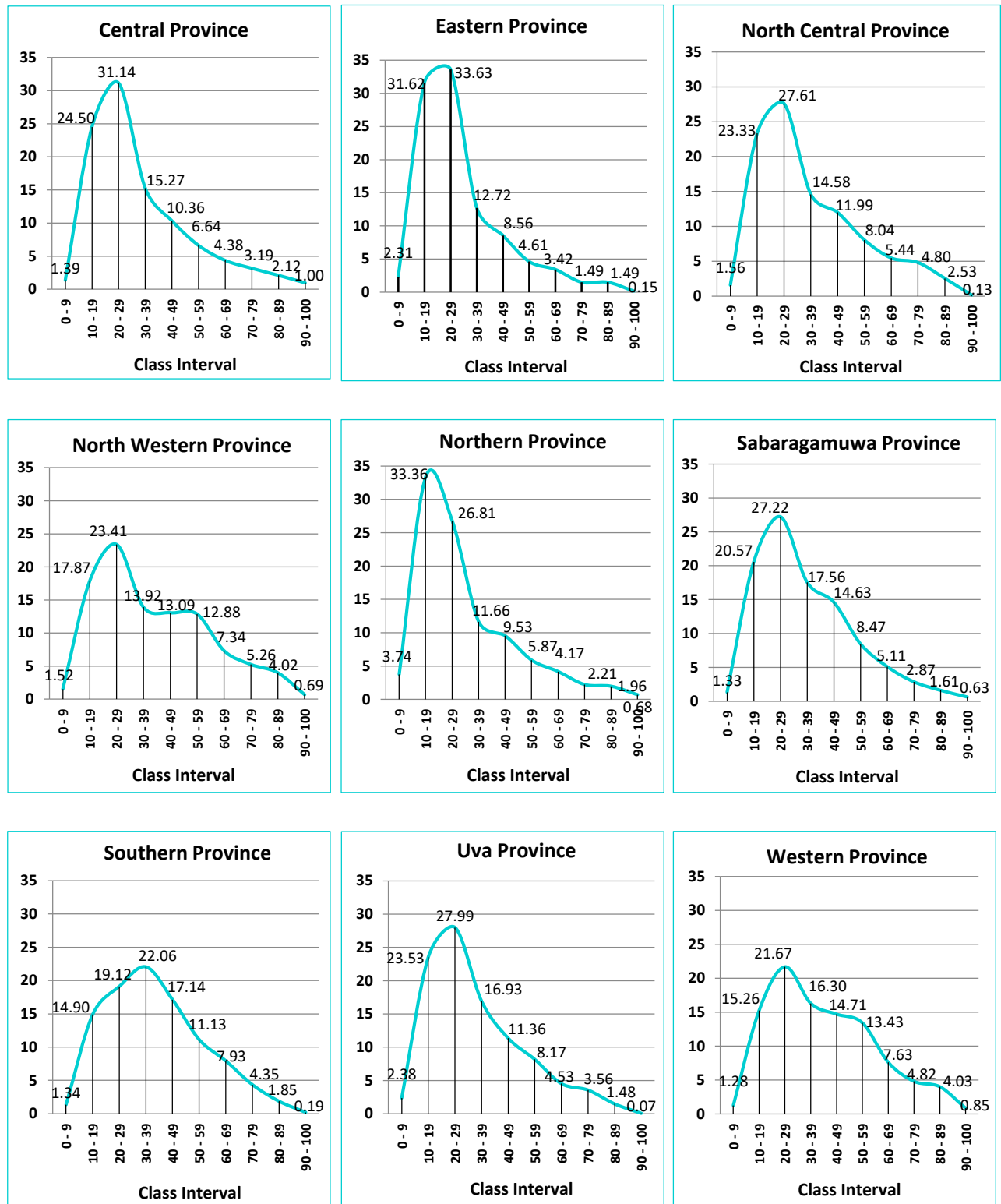


Fig. 3.4: Provincial wise distribution of marks –English Language

Patterns of achievement in the different provinces are further elaborated through the box plot chart.

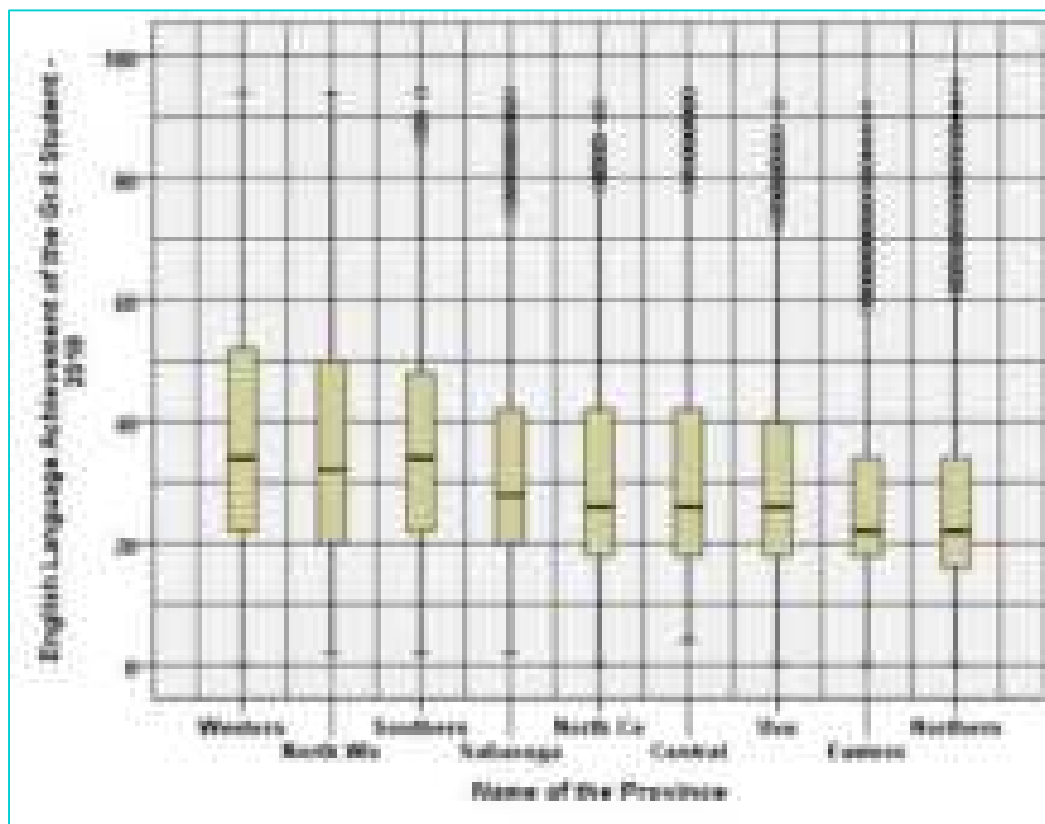


Fig. 3.5: Box and whisker plot representing provincial wise English achievement

This chart also confirms the achievement patterns discussed above. Western and North Western are the two provinces that have similar characteristics: there are no outliers in these two provinces. On the other hand, in all other provinces there are outliers. Northern and the Eastern are the lowest performing districts and they have the highest number of outliers. The diverse nature of the box and whisker plots of different provinces indicates the heterogeneous student performance in the English language among the provinces.

Table 3.3: Percentage of students scoring 50 or above and below for the English language -2019

Province	Below 50	Above or Equal to 50
Central	83.90%	16.10%
Eastern	90.10%	9.90%
North Central	81.30%	18.70%
North Western	73.00%	27.00%
Northern	86.70%	13.30%
Sabaragamuwa	83.10%	16.90%
Southern	77.70%	22.30%
Uva	83.70%	16.30%
Western	72.10%	27.90%
All Island	80.90%	19.10%

As Table 3.3 indicates none of the provinces records over 50% in scoring above 50%. The highest percentage of scoring above 50% is recorded in the two provinces of Western and North Western which have scores of 28 and 27% respectively.

Summary of provincial level analysis

- Achievement wise the provinces fall into three categories.
 Category 1 –Western, North Western and Southern with mean scores above the national mean (34)
 Category 2 – Sabaragamuwa North Central and Central Provinces cluster in the middle.
 Category 3 –The other provinces with mean scores below the national mean.

3.4 Achievement levels by type of school

Table 3.4: English Language achievement according to school type

School Type	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
1AB	40.69	20.339	0.049	0.516	24.00	38.00	54.00
1C	28.72	14.741	0.047	1.073	18.00	24.00	36.00
Type 2	25.79	13.652	0.050	1.324	16.00	22.00	32.00
All Island	34.06	18.797	0.032	0.899	20.00	28.00	46.00

As Table 3.4 and Fig. 3.6 indicate there is a considerable gap between the mean scores of different school types. However, 1AB schools' mean score is above that of the other types and also above the national mean. However, the SD in these school type is also high. This indicates that diversity of student achievement among these schools are also high. On the other hand, the mean scores of Type 2 and 1C schools, are below the national mean. Further, the SDs of these two school types are also similar indicating that student achievement among these schools is more homogeneous.

The difference in mean and median scores is graphically shown in Fig. 3.6

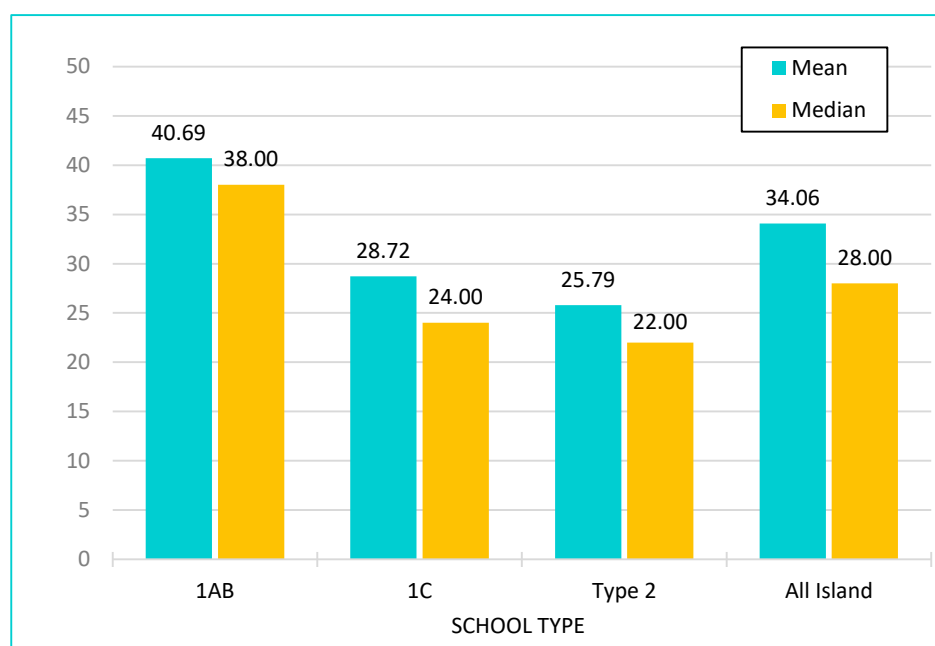


Fig. 3.6: Bar chart representing the mean and median among the school types - English Language

As Fig. 3.6 displays median values of all school types are below the mean values. This means that fifty percent of students in all school types have obtained scores above their mean values. However, 1AB schools mean and median are above the value of other two school types.

On the other hand, according to Table 3.4 the SD of the 1AB schools is quite high compared to the other two school types. Therefore, it could be concluded that there is greater variation among student achievement within 1AB schools.

Variation among students

Variation in student achievement in 1C and Type 2 schools is low. Those values are lower than the all island SD value as well. It reveals that higher number of student achievement lies closer to the mean value. The dispersion from the mean value is very low. Type 2 schools standard deviation value is the lowest among the school types. This indicates that student achievement deviation from the mean is very low.

Disparity in achievement

All school types have obtained positive skewed values. It reveals that in all school types higher number of students has achieved low marks while high marks are obtained by a lower number of students. Highest skewed value has been obtained by Type 2 schools. Next higher value has been obtained by 1C schools. Both values are above the all island skewness value.

The variation in student performance in different types of schools is further highlighted through the frequency distribution graphs.

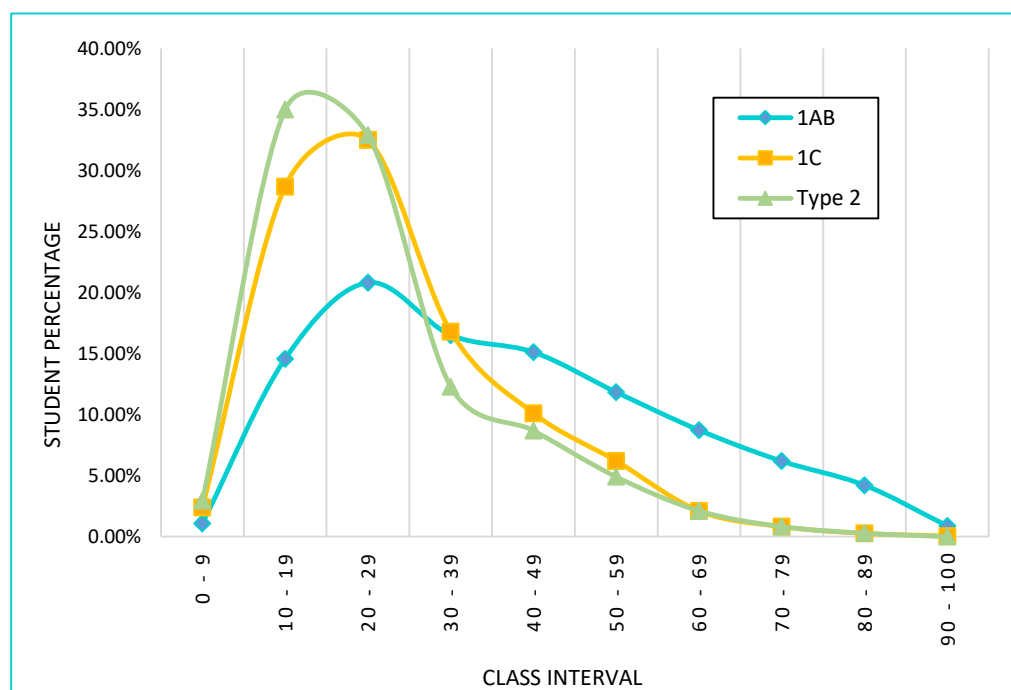


Fig. 3.7: Dispersion of marks by school type– English Language

Fig. 3.7 displays that 1C and Type 2 school curves peak at 20-29 class interval and the curves are quite similar. While in Type 1AB schools even though the peak is at 20-29 class interval the percentage of students scoring this mark range is less. Further, the marks

spreads over three mark intervals indicating that there are also high achievers even though a lesser percentage.

The spread of marks at different mark intervals is further illustrated in the cumulative percentage Table 3.5.

Table 3.5: Cumulative student percentages according to school type- English Language

Class Interval	1AB		1C		Type 2	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.89	100.00	0.05	100.00	0.00	100.00
80 – 89	4.22	99.11	0.27	99.95	0.29	100.00
70 – 79	6.19	94.89	0.82	99.67	0.83	99.71
60 – 69	8.73	88.69	2.11	98.85	2.12	98.88
50 – 59	11.84	79.97	6.20	96.74	4.91	96.75
40 – 49	15.12	68.13	10.12	90.54	8.70	91.84
30 – 39	16.52	53.00	16.81	80.42	12.29	83.13
20 – 29	20.80	36.50	32.50	63.60	32.90	70.90
10 – 19	14.58	15.67	28.69	31.10	34.99	37.94
0 – 9	1.09	1.09	2.41	2.41	2.96	2.96

As Table 3.5 indicates in all school types the highest percentage of students has scored between 20-29. However, while in 1AB schools this percentage is 20.8 in 1C schools it is 32.5 and in Type 2 it is 32.9. On the other hand, in 1AB schools there are also 19% of students scoring above 60%. In the other two school types the percentage of students scoring above 70% is below 5%.

The analysis of data pertaining to the school types indicates disparity in achievement.

This is further illustrated through the box plot.

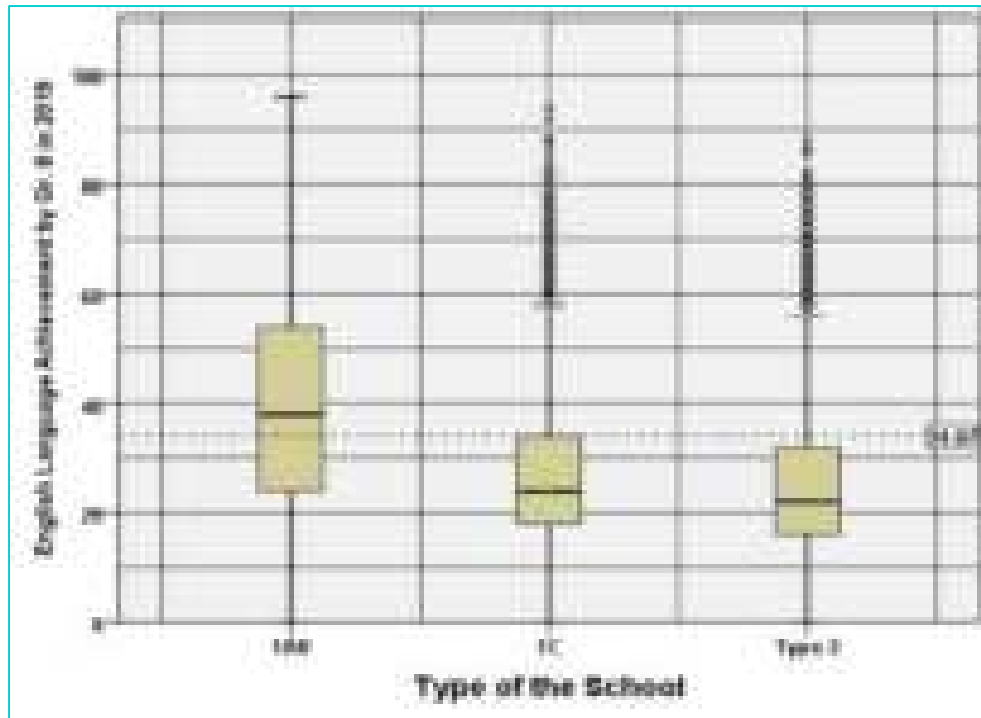


Fig. 3.8: English marks according to school types using box and whisker plot

The box plots of the 1C and Type 2 schools are quite similar. This indicates that their performances are similar. In both school types there are also outliers whose performance is higher than the other students. On the other hand, the 1AB schools performance is different. Their 25th as well as the 75th percentiles are higher than that of the Type 2 and 1C schools. It also indicates that their performance is high. Further, there are no outliers.

Summary

- The achievement in English in 1C and Type 2 schools are relatively similar.
- 1AB schools' performance is quite different and higher than the other two school types.
- The gap in achievement between school types can be seen

3.5 Achievement levels by gender

Table 3.6: English Language achievement according to gender

Gender	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Male	30.02	16.89	0.041	1.213	18.00	24.00	38.00
Female	37.92	19.70	0.047	0.642	22.00	34.00	50.00
All Island	34.06	18.80	0.032	0.899	20.00	28.00	46.00

There is a difference in the achievement of female students over male students. As Table 3.6 indicates, male performance is also lower than the all island mean score, while female performance is above the all island mean.

These differences could also be seen in Fig. 3.9.



Fig. 3.9: Bar chart representing mean and median values according to gender – English language

As Fig. 3.9 indicates when mean and median values are compared the median values of both males and females are below that of the mean values. Therefore 50% of the students has reached the mean values.

Variation among students

As indicated in Table 3.6, variation in achievement among male students is higher than that of the female students. This is indicated by the female students obtaining a higher SD value than the male students (Table 3.6). On the other hand, the male students SD is below the all island SD. Further, the male skewness value is higher than the all island as well as the female value.

Fig. 3.10 graphically illustrates the dispersion of marks according to gender.

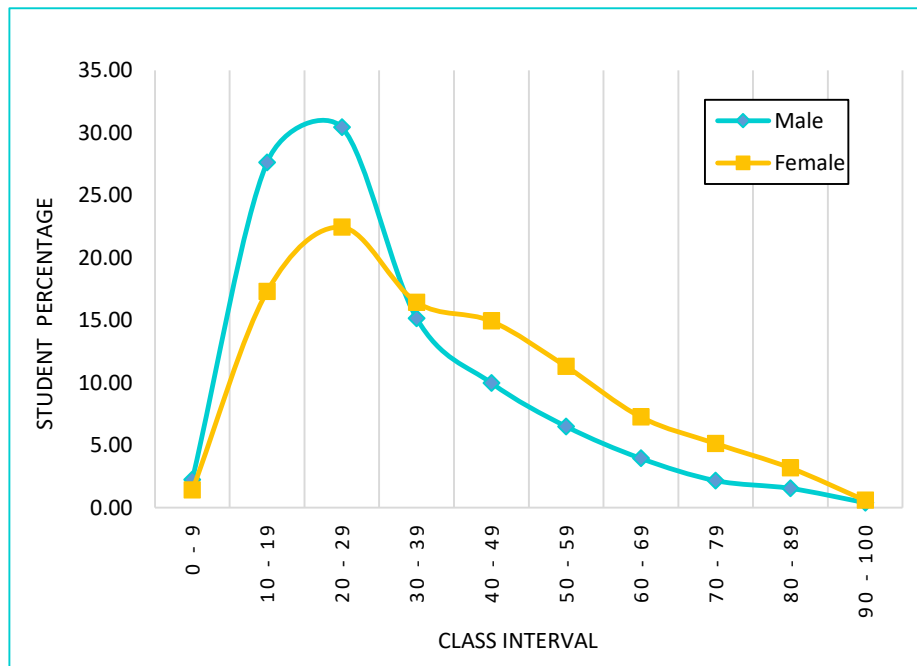


Fig. 3.10: Dispersion of marks by gender – English

Fig. 3.10 displays two curves which are both positively skewed. As can be seen there are more low achievers than high achievers among both males and females. However the pattern of the two curves are slightly different. At the beginning the curves are similar, but the male curve is higher. Then the curves become different and at the 30-39 class interval they cut across. But the female curve then rises above the male curve and finally, both curves become similar again.

The disparity in the male students' achievement can be elaborated better through the cumulative percentages.

Table 3.7: Cumulative student percentages according to the gender –English Language

Class Interval	Male		Female	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.40	100.00	0.58	100.00
80 – 89	1.54	99.60	3.18	99.42
70 – 79	2.16	98.06	5.14	96.24
60 – 69	3.94	95.90	7.26	91.10
50 – 59	6.50	91.96	11.30	83.84
40 – 49	9.98	85.46	14.93	72.54
30 – 39	15.16	75.48	16.44	57.61
20 – 29	30.45	60.32	22.46	41.17
10 – 19	27.63	29.87	17.31	18.71
0 – 9	2.24	2.24	1.40	1.40
Total	100.0		100.0	

According to Table 3.7 and Fig. 3.10 it could be concluded that among both females and males, there are low performing students. The highest percentage (22.5%) of female students' marks fall into the class interval 20-29. The highest percentage of male students' marks, a higher percentage (30.5) falls into the same class interval. Considering 40% as the pass mark 57.6% of female students and 75.5% of male students have not reached the pass mark.

Box plot and whisker for gender wise English achievement shows similarities that has been discussed already.

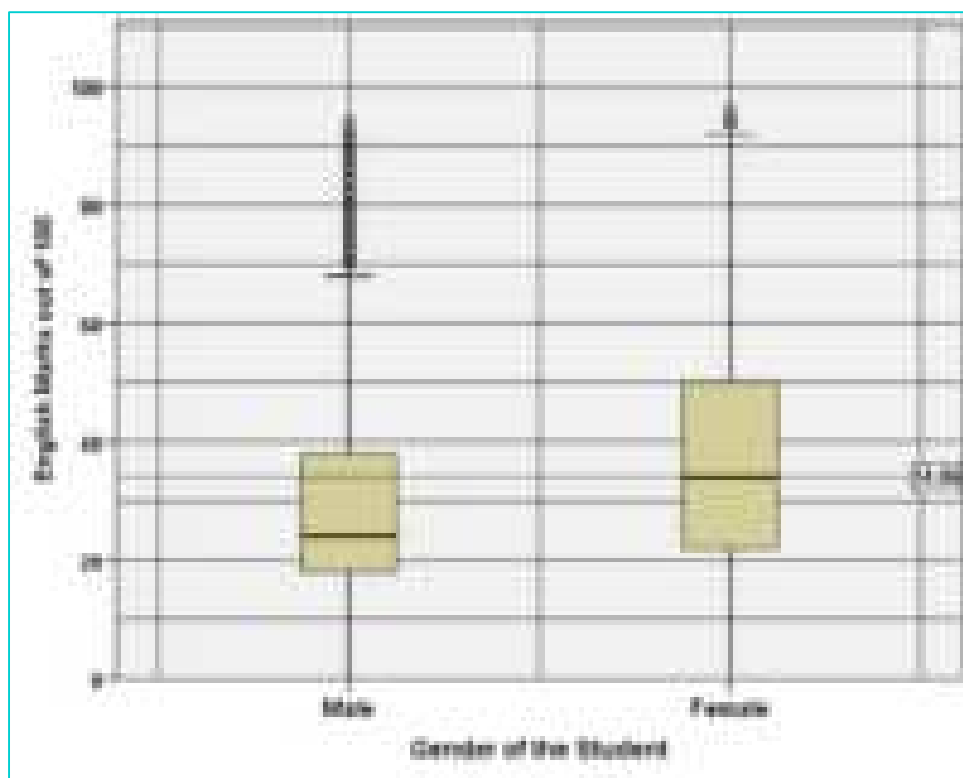


Fig. 3.11: Box and whisker plot representing gender wise English Language marks

Box plot and whisker chart show that male students' 25th and 50th percentile is lower than the female mark range as well as the all island range.

There are outliers among both males and females. However, the number of outliers among the males is greater.

Summary

- Female performance is better than all island and male performance.
- While 57.6% of female students has scored below 40, the male student percentage is 75.5%.

3.6 Achievement levels by medium of instruction

There is disparity between the students belonging to the different medium of instruction. While the Sinhala medium students' mean achievement is above the all island mean value, the Tamil medium students' mean achievement is below the national mean average.

Table 3.8: English Language achievement according to medium of instruction

Medium of Instruction	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Sinhala	35.85	18.935	0.038	0.769	20.00	32.00	48.00
Tamil	29.41	17.602	0.057	1.341	18.00	24.00	38.00
All Island	34.06	18.797	0.032	0.899	20.00	28.00	46.00

These disparities are further highlighted through the bar chart given in Fig. 3.12.

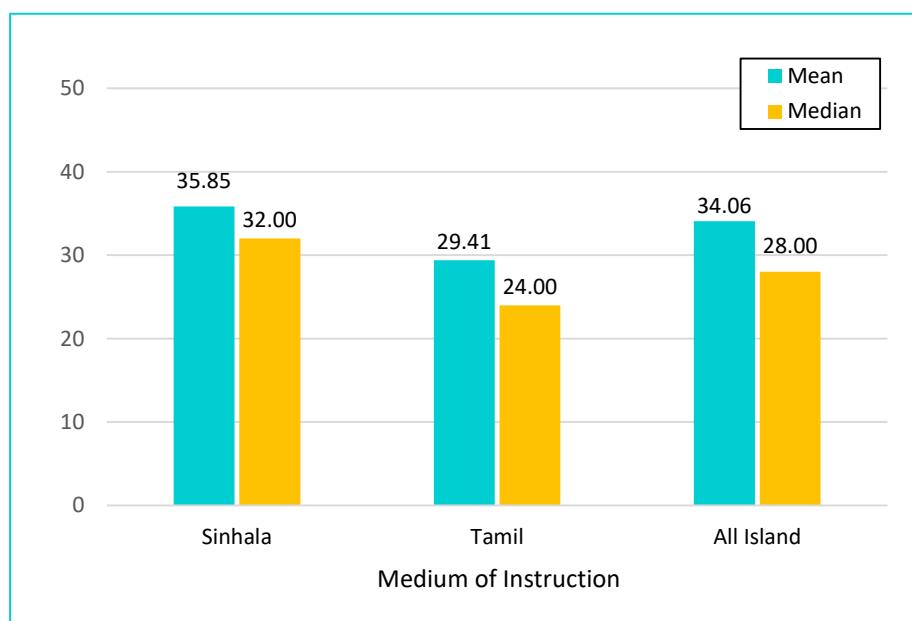


Fig. 3.12: Bar chart representing mean values according to medium of instruction – English language

According to Fig. 3.12 the median values of both media are below that of the mean values. Therefore 50% of the students has reached the mean values.

As Table 3.8 indicates Sinhala medium students SD is higher than the Tamil medium students and is higher than the national SD. Thus there is greater variation in their performance.

Both Sinhala medium as well as Tamil medium students' achievement curves show positive skewness value. This means that majority of the students has scored low marks.

The diversity in achievement scores among the students taught through the different medium of instruction, is further highlighted through the frequency distribution graphs.

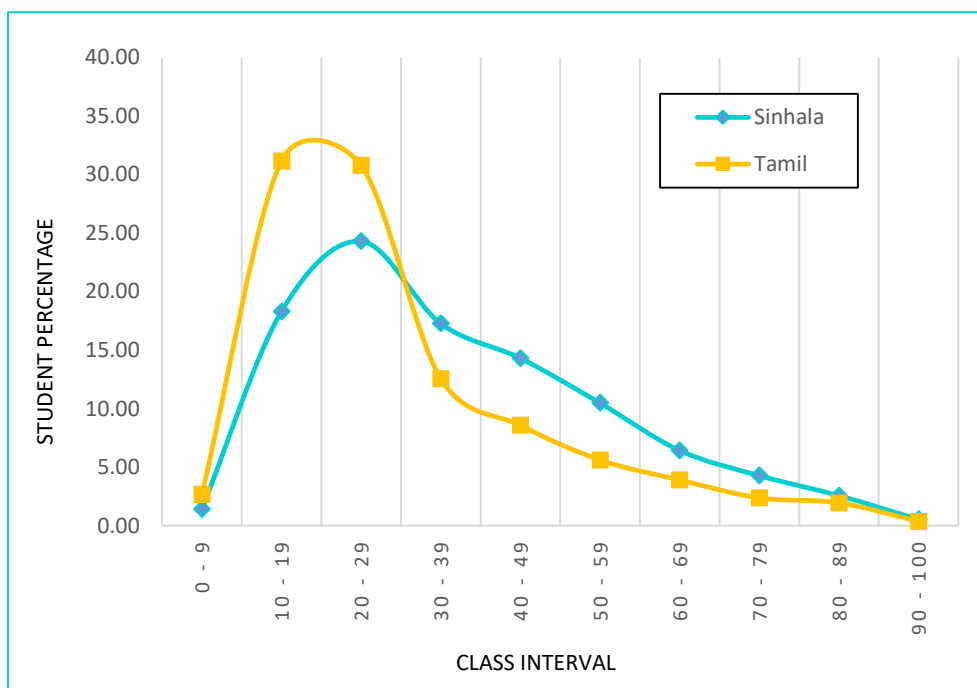


Fig. 3.13: Dispersion of marks by medium of instruction – English

The two curves on Fig. 3.13 has similarities as well as differences, While both curves peak at the class interval 20-29, the percentage of Tamil medium students scoring 20-29 is higher than the Sinhala medium percentage. On the other hand the percentage of students scoring high marks are higher among the Sinhala medium than among the Tamil medium. This pattern can be explained through Table 3.9.

Table 3.9: Cumulative student percentages according to medium of instruction - English Language

Class Interval	Sinhala		Tamil	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.55	100.00	0.37	100.00
80 – 89	2.58	99.45	1.95	99.63
70 – 79	4.29	96.87	2.37	97.67
60 – 69	6.44	92.58	3.91	95.30
50 – 59	10.50	86.14	5.61	91.39
40 – 49	14.32	75.65	8.58	85.78
30 – 39	17.29	61.33	12.56	77.20
20 – 29	24.31	44.04	30.79	64.63
10 – 19	18.31	19.73	31.16	33.84
0 – 9	1.42	1.42	2.67	2.67

As Table 3.9 indicates the highest percentage of the Sinhala medium students' marks is in the range of 20-29. The highest percentage of Tamil medium students marks is also in the range of 20-29.

Considering the pass mark as 40, only 61.3% of Sinhala medium students has scored below the pass mark. On the other hand 77.2% of Tamil medium students has scored below the pass mark.

Box plot for medium wise achievement graphically shows the differences that have been discussed already.

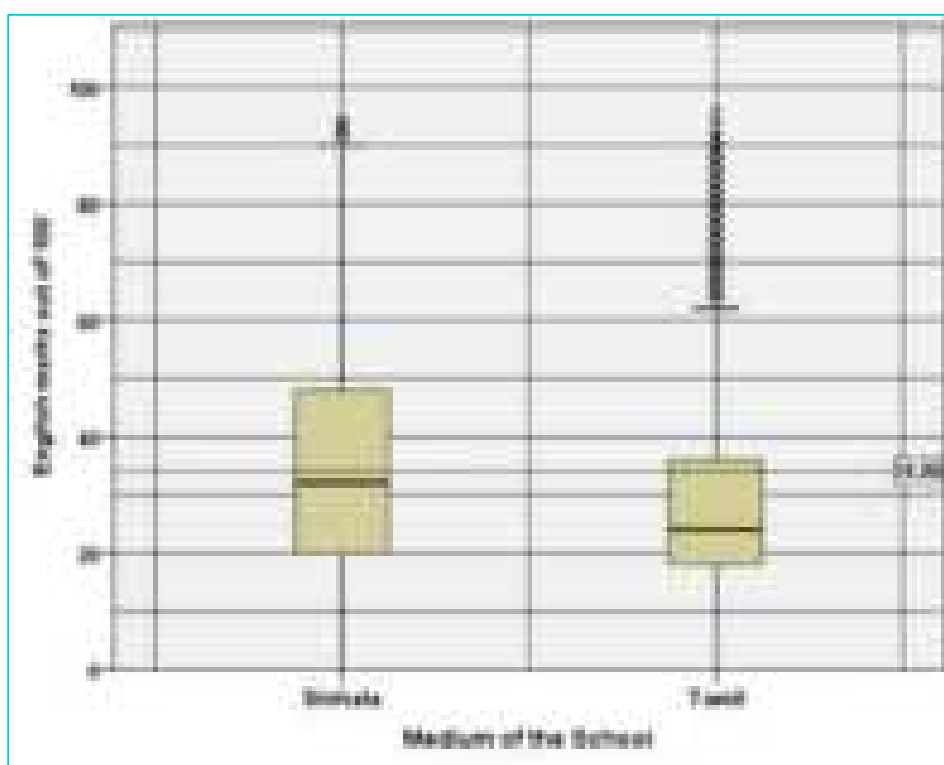


Fig. 3.14: English marks according to medium of instruction using box and whisker plot

Box plot and whisker plot chart shows differences among both media. However, Sinhala medium dispersion of marks in the box plot is less than the Tamil medium students' dispersion of marks. On the other hand, among both groups there are outliers.

Sinhala medium students' 25th, 50th and 75th percentile values are higher than that of the Tamil medium students. Therefore, this confirms that there is disparity between the performance of Tamil and Sinhala medium students in English.

Summary

- There is wide disparity among students belonging to different medium of instruction.
- The Sinhala medium students' mean score is above the national mean while the Tamil medium students' mean is lower.

Students' achievement in relation to the location of the school would be discussed next.

3.7 Achievement levels by location

According to the school census data location of the schools are classified not according to rural /urban categorization but according to the availability of facilities. Accordingly all schools are classified under the following five criteria.

- Very difficult schools
- Difficult schools
- Non convenient schools
- Convenient schools
- Very convenient schools

This classification has been done based on eleven factors mentioned in MoE circular No.2005/01 dated 2005.01.18

Table 3.10 display the English language achievement according to this classification.

Table 3.10: English achievement according to location

Difficulty Level	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Very Difficult	22.39	10.88	0.10	1.45	16.00	20.00	26.00
Difficult	24.11	11.32	0.06	1.22	16.00	22.00	30.00
Non Convenient	26.65	14.49	0.07	1.38	16.00	22.00	34.00
Convenient	33.12	17.16	0.05	0.82	20.00	28.00	44.00
Very Convenient	42.26	20.92	0.06	0.46	24.00	40.00	58.00
All Island	34.06	18.80	0.03	0.90	20.00	28.00	46.00

Table 3.10 clearly indicates the impact of the availability of the facilities in the schools on the achievement level of the students. There is variation in achievement among the schools in the different localities. It is only the schools in the very convenient localities that have performed above the national mean. While the mean value of the schools in the convenient localities are closer to the national mean, in the other three school types performance is below the national level.

According to Table 3.10 the SD also differs in the localities. The SD is greatest in the very convenient localities schools and it is even higher than the national SD indicating greater student heterogeneity in these schools. The SD of the convenient locality schools is closer to the all island SD, suggesting that variation among the student achievement in these schools is similar to the all island achievement patterns. On the other, hand in the other three school types the SDs are very much less than the all island and very convenient locality school SD. The low SD value indicates that there is less variation in student achievement in these schools.

The difference in mean and median values is graphically shown in Fig. 3.15. As Fig.3.15 indicates the median value in all school locations is lower than the mean value.

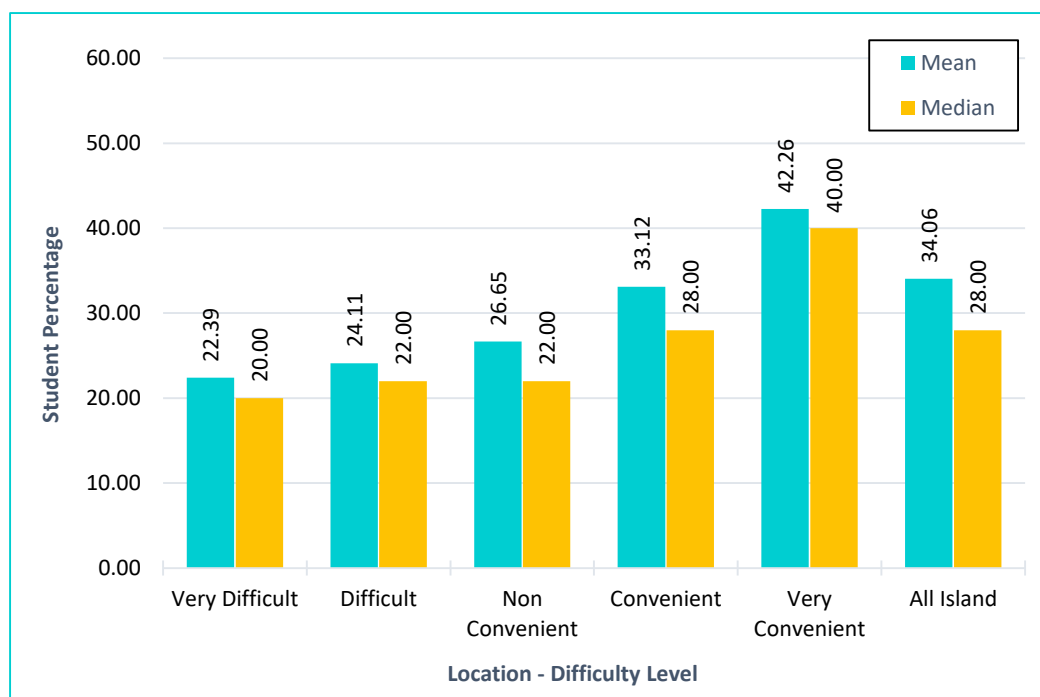


Fig. 3.15: Bar chart representing mean values according to location-English

As Fig. 3.15 indicates in all localities the median value is lower than the mean value. Therefore, 50% of the students has reached the mean value in all localities.

Students' achievement is further elaborated through the frequency distribution graphs in Fig. 3.16.

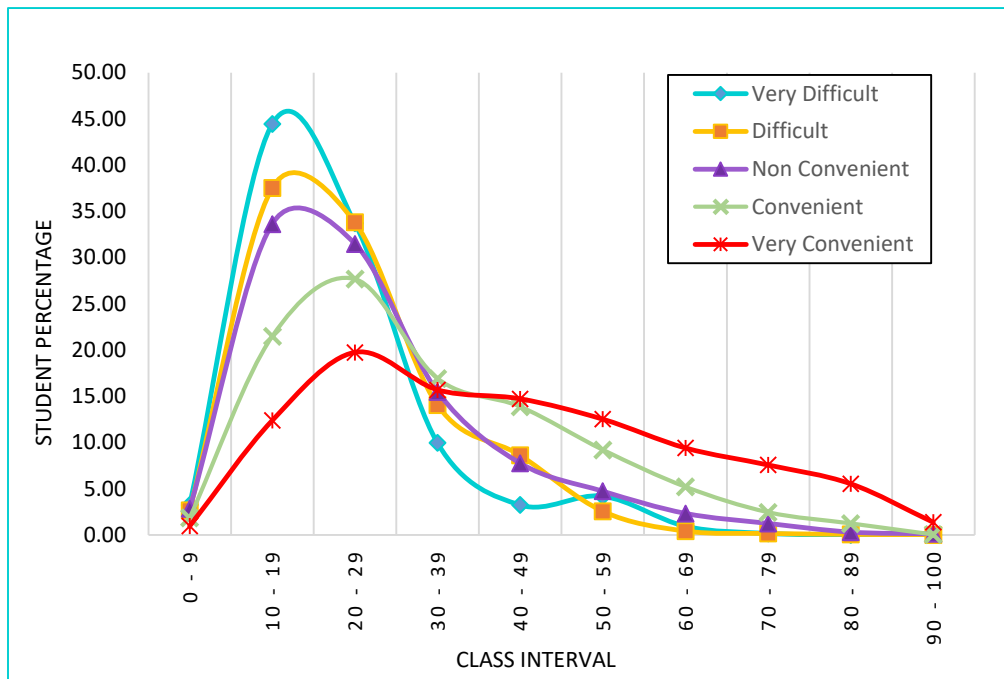


Fig. 3.16: Dispersion of marks by location – English

Fig. 3.16 displays positively skewed graphs. However, there are differences in the shape of the curves. While the very convenient and convenient curves peak at the class interval 20-29 the other three curves peak at class interval 10-19. This difference can be explained using the cumulative percentage Table 3.11.

Table 3.11: Cumulative student percentages according to the location – English Language

Class Interval	Very Difficult		Difficult		Non Convenient		Convenient		Very Convenient	
	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %
90 – 100	0	100.00	0	100.00	0.13	100	0.05	100	1.39	100
80 – 89	0	100.00	0.09	100.00	0.32	99.87	1.25	99.95	5.55	98.61
70 – 79	0.19	100.00	0.18	99.91	1.26	99.56	2.46	98.7	7.58	93.06
60 – 69	0.96	99.81	0.44	99.73	2.34	98.29	5.21	96.24	9.42	85.49
50 – 59	4.21	98.85	2.58	99.29	4.74	95.95	9.21	91.02	12.53	76.07
40 – 49	3.26	94.64	8.63	96.71	7.77	91.21	13.88	81.81	14.73	63.54
30 – 39	9.96	91.38	14.06	88.08	15.49	83.44	16.92	67.93	15.7	48.81
20 – 29	33.72	81.42	33.81	74.02	31.48	67.95	27.67	51.00	19.75	33.11
10 – 19	44.44	47.70	37.54	40.21	33.63	36.47	21.48	23.33	12.39	13.36
0 – 9	3.26	3.26	2.67	2.67	2.84	2.84	1.85	1.85	0.97	0.97

According to Table 3.11 the highest percentage of students in both very convenient and convenient area schools fall into the class interval 20-29. However, in the very convenient area schools the percentage is 19.75 and in the convenient area schools the percentage is 27.67. In addition, in these area schools there are students who have also scored between 30- 100 mark ranges. On the other hand, in the very difficult and difficult area schools there are no students who have scored between 90-100 mark range. While the percentage of students who has scored below 30 marks is 81.42%, 74.02% and 67.9% in the very difficult, difficult and non-convenient schools respectively, in the convenient and very convenient area schools this percentage is only 51.00% and 33.11% respectively. The difference in the shape of the curves is due to the variation in the performance of the students in the different localities as shown by the marks.

The spread of marks is further illustrated through the box plot graph.

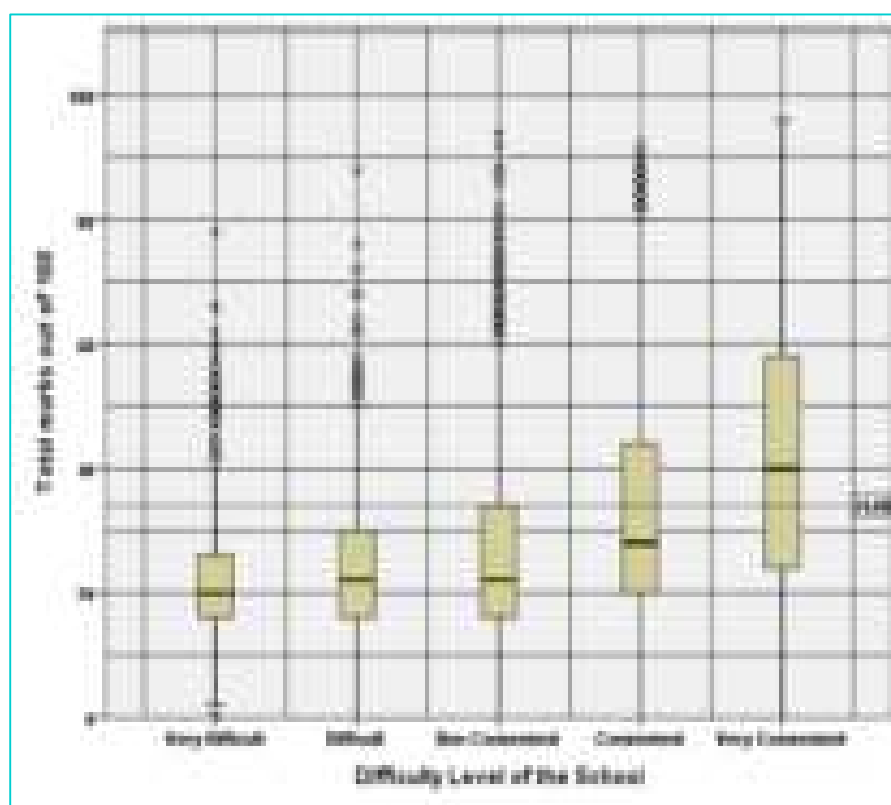


Fig. 3.17: Box and whisker plot representing location wise English marks

According to the box plot the very convenient area schools' performance differs from the rest of the school types. The spread of marks in the five box plots confirms the variation that exists between the performances of the different localities. While there are no outliers in the very convenient areas, there are outliers in all other localities.

Summary

- The performance of the students is linked to the area in which the schools are located.
- The deviation of marks is less in the very difficult and difficult schools while their performance is also low. On the other hand, while the deviation is high in the very convenient and convenient schools their achievement is also high.

Achievement patterns observed in relation to the achievement in English, revealed that there were variations among provinces, school type, gender, medium wise and locality. Students' achievement in relation to subject content will be discussed next.

The next section of the report highlights the analysis of achievement by sub skills.

Part II

3.8 Analysis of achievement by sub skills

In constructing the achievement tests, the test items were designed in relation to the competencies and competency levels identified for grade eight. As discussed in chapter 2, the construct assessed in these studies were the competency levels. Based on the competencies and competency levels table of specification was prepared. In preparing the Table of specification, competencies related to oral skills were excluded as they could not be measured through a written paper.

The English language paper was based on four subskills. That is vocabulary, reading, grammar and writing. Writing comprises of mechanics of writing as well as guided writing. Fig. 3.18 displays students' performance in the subskills except guided writing.

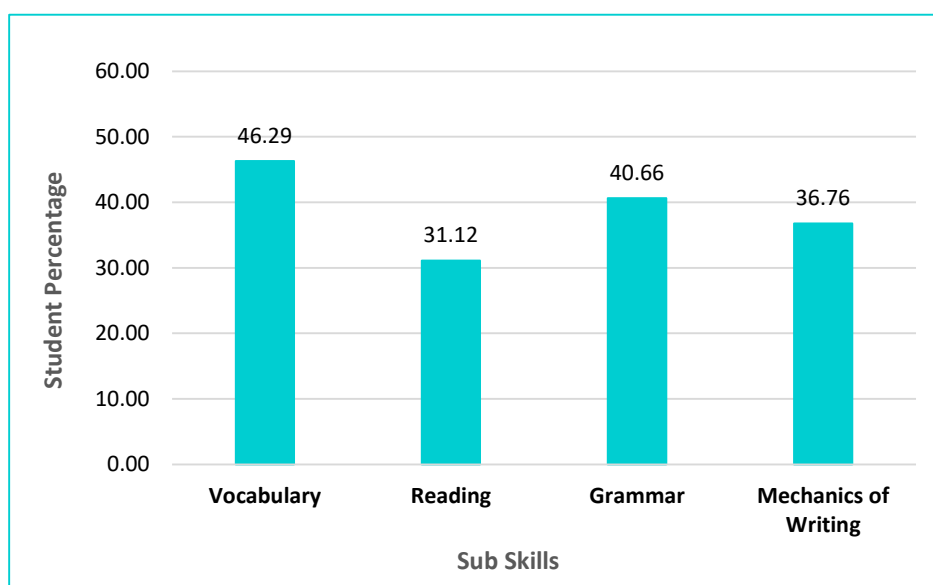


Fig 3.18: Student performance in the subskills

According to Fig. 3.18 students' achievement in the subskills is weakest in reading. On the other hand, they have not achieved above 50% in any of the subskills.

Achievement of competency levels related to the subskills are analyzed in Table 3.12.

Table 3.12: Achievement of competency levels – English language

Competency	Competency Level	Q. No	Percentage
Vocabulary	4.3 Finds synonyms and antonyms for given words	8	51.71
		15	14.16
		17	28.06
	4.4 Uses affixes to change the word class and the meaning of words	12	50.25
		2	52.97
	4.7 Uses collective nouns and compound nouns	1	55.96
Reading	5.5 Reads and responds to simple folk stories /stories	26-35	31.38
	5.6 Extracts the general idea of a text	21-25	30.38
Grammar	6.1 Construct simple sentences using present perfect and passive voice	3	32.30
		5	48.61
		11	43.43
		13	19.56
		18	35.29
	6.2 Uses pronouns appropriately	6	16.42
		20	66.72
	6.3 Uses modals meaningfully	10	44.51
	6.5 Uses contracted forms	4	49.69
	6.6 Uses adjectives appropriately	14	33.42
	6.7 Uses prepositions appropriately	19	22.32
	6.8 Uses conjunctions appropriately	16	35.32
	6.9 Uses adverbs appropriately	7	62.52
Mechanics of Writing	2.5 Uses inverted commas appropriately	9	36.72

As explained in chapter 2, the number of questions in the test paper to test the achievement of competency levels were related to the weightage of activities included in the textbook. Therefore, as indicated in the Table 3.12 there are more than one question to measure the achievement of competency levels. According to Table 3.12 more than 50% of the students has achieved the competency levels related to vocabulary. However, competency level 4.3 had three questions and students' performance in two of the

questions is not satisfactory. While question 15 and 08 both are related to synonyms question 15 involved more, higher order thinking. Question 8 was a simple multiple choice question whereas question 15 was within a passage. On the other hand question 17 related to antonyms.

The achievement of competency levels is graphically depicted in Fig. 3.19.

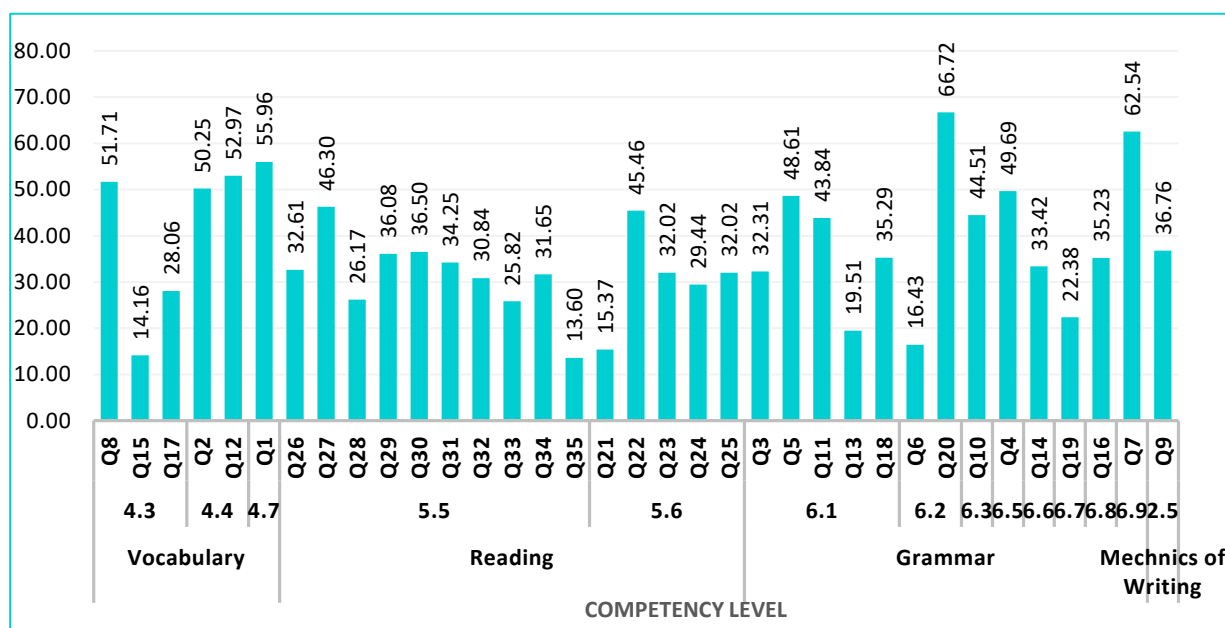


Fig. 3.19: Achievement of competency levels – English language

According to Table 3.12 students' performance in the reading task is not satisfactory. The overall percentage of correct responses for the two tasks is less than 50%. When student performance for individual questions are concerned the lowest performance is for question number 35. This is a question which relates to the passage but goes beyond the text and tests students' higher order thinking skills. Question number 21 is also similar and students' performance is only slightly better.

When the competencies related to grammar are examined, according to Table 3.12 except for competency levels 6.2 and 6.9 in all other competency levels students achievement is less than 50%. However, there were two questions related to competency level 6.2. While students' performance in question 20 is the highest for grammar items, question 6 which measures the same competency, 'use of pronouns' lowest percentage of student' has scored correctly. This could be because question 6 tests students' knowledge of reflexive pronouns whereas question 20 measures their knowledge of personal pronouns.

The writing task would be analysed separately in Table 3.13 and 3.14.

The competency expected to achieve in grade 8 is

“Uses English creatively and innovatively in written communication.”

In order to achieve this competency there are six competency levels. It was decided to test two competency levels in relation to which the text book contains the highest number of activities.

The two competency levels selected were as follows;

7.1 Writes descriptions of things, places and people

7.3 Writes for personal purposes.

Question no.36 related to competency level 7.1. Students had to describe a place they like using the given clues. They were expected to write five sentences. In this task students were not penalized for making grammar mistakes

Criteria for evaluation of this task was as follows

Meaningful sentence even with grammar and spelling errors	1mark
Completely wrong (meaning and grammar)	0 marks
(1x5)	5 marks

Most of the students have not attempted to answer the given questions related to writing task. Table 3.13 shows the performance indicated by the marks obtained for this task.

Table 3.13: Achievement of competency level 7.1

	Not Attempted	Question copied	Attempted Marks Obtained						
Marks			0	1	2	3	4	5	Total
%	32.99	11.99	9.47	1.76	1.45	1.72	3.36	38.07	100

According to Table 3.13, only 38.07% of the students have been able to score the highest mark for this writing task. There had been 54% of students who has not received any mark at all.

Therefore, it could be concluded that students have not achieved competency level 7.1.

The second writing task related to competency level 7.3 “Writes for personal purposes.” This task was a guided letter.

In this task students’ knowledge of the format of the letter as well as grammatical accuracy and meaning of the content were assessed.

The criteria used in evaluation is given below.

- | | |
|------------------------------------|----------|
| 1. Sender's address | 1 mark |
| 2. Appropriate salutation | 1 mark |
| 3. Ending | 1 mark |
| 4. Closing line of the letter | 1 mark |
| 5. Content 3 sentences | 6 marks |
| Total | 10 marks |
| Content marks | |
| Grammatically correct and relevant | 2 marks |
| Relevant but grammatical mistakes | 1 mark |

Table 3.14 indicates students' overall marks in relation to writing a guided letter

Table 3.14: Performance in the guided letter

Marks	%
0	13.94
1	6.58
2	6.77
3	7.49
4	5.61
5	5.60
6	5.54
7	3.98
8	2.46
9	2.55
10	2.46
Question Copied	2.80
Not Attempted	34.20
Total	100.00

In this task too, majority of the students has either not attempted the task, copied the question or obtained no marks. According to Table 3.14 more than 50% of the students belong to this category. Only 2.46 percent of the students has been able to score the total marks for this question.

In order to find out the students' level of understanding of a format of a letter the responses were further analyzed.

Table 3.15 analyzes the responses related to the sender's address.

Table 3.15: Sender's Address

Q37_SA	%
0	32.36
1	33.43
Not Attempted	34.20
Total	100.00

As Table 3.15 indicates only 33.43% of the students could write the sender's address correctly.

Table 3.16 analyzes the responses related to the appropriate salutation.

Table 3.16: Appropriate Salutation

Q37_AS	%
0	35.41
1	30.38
Not Attempted	34.20
Total	100.00

As Table 3.16 indicates only 30.38% of the students could write an appropriate salutation correctly.

Table 3.17 analyzes the responses related to the appropriate ending to the letter.

Table 3.17: Ending

Q37_E	%
0	35.06
1	30.73
Not Attempted	34.21
Total	100.00

As Table 3.17 indicates only 30.73% of the students could write an appropriate ending correctly.

Table 3.18 analyzes the responses related to the closing line of the letter.

Table 3.18: Closing Line

Q37_CL	%
0	56.75
1	9.05
Not Attempted	34.20
Total	100.00

As Table 3.18 indicates only 9.05% of the students could write an appropriate closing line to the letter.

The analysis of the Tables 3.15 -3.18 indicates that majority of the students cannot use the essential features of a letter correctly.

Considering the analysis of students' performance in question number 37 it could be concluded that students have not achieved competency level 7.3.

In general, therefore it could be claimed that achievement of competency levels with regard to writing is not satisfactory.

3.9 Summary

Part I of this chapter described student performance in relation to the achievement of learning outcomes in the English language. The discussion pertained to both national and provincial level. Further, achievement was analyzed according to school type, gender, medium of instruction and location.

Test items designed in line with TOEFL junior to assess students' performance were analyzed in part 2, to assess how far they have been successful in achieving sub skills of the language expected to be achieved by grade 8 pupils and to assess their readiness for International Assessments.

It could be concluded that overall the achievement of learning outcomes in English is not satisfactory, and writing skills achievement appears to be the worst. Therefore, it could be concluded that students are not yet ready to face International assessments.

CHAPTER FOUR

Patterns in Achievement: Mathematics 2019

4.1 Introduction

This chapter presents the patterns in achievement of the students in Mathematics. It comprises of two parts.

Part 1

Patterns in achievement in Mathematics

First, national level student achievement would be discussed in relation to student performance pertaining to Mathematics.

4.2 Patterns of achievement at national level

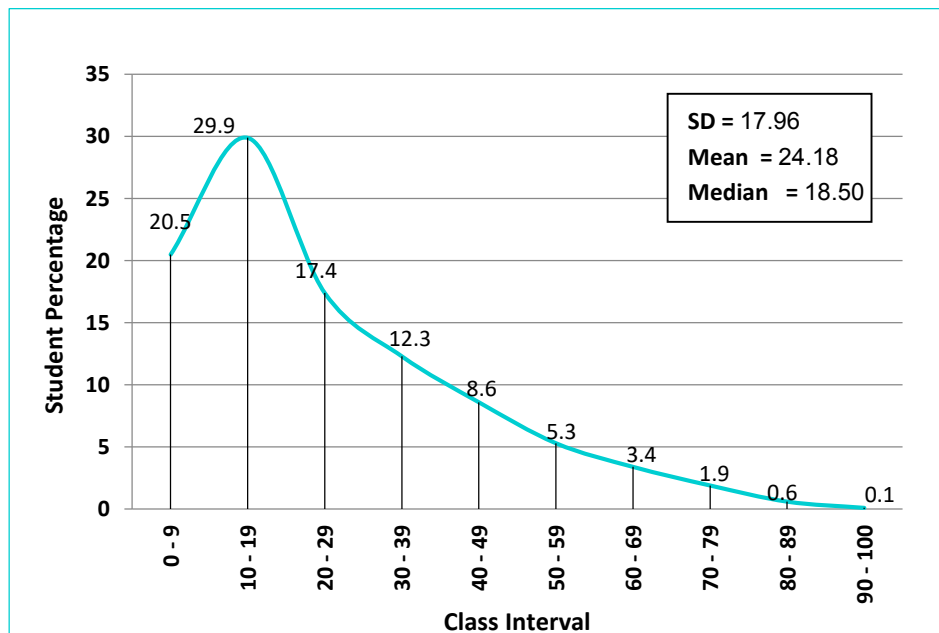


Fig. 4.1: All island achievement in Mathematics 2019 – dispersion of marks

The frequency polygon shown in Fig. 4.1 outlines the total picture of the distribution of marks of grade 8 students in Mathematics. According to this curve the average marks obtained by the students (Mean) is 24.18 and the median is 18.50. Therefore, the achievement in Mathematics cannot be considered as satisfactory.

Fig. 4.1 depicts a positively skewed distribution of marks displaying that majority of the students has scored low marks in Mathematics. The distribution of marks is further clarified in Table 4.1.

Table 4.1: All island achievement in Mathematics 2019– cumulative percentages

Class Interval	Students number	Student Percentage	Cumulative Percentage
90 - 100	14	0.1	100
80 - 89	83	0.6	99.9
70 - 79	252	1.9	99.3
60 - 69	436	3.4	97.4
50 - 59	690	5.3	94.0
40 - 49	1111	8.6	88.7
30 - 39	1597	12.3	80.1
20 - 29	2266	17.4	67.8
10 - 19	3891	29.9	50.4
0 - 9	2662	20.5	20.5
Total	13002	100	

According to this table the highest percent of students (29.9%) has scored between 10-19 marks. Further, 80.1% of students has scored below 40 marks.

Fig. 4.2 illustrates student achievement patterns further.

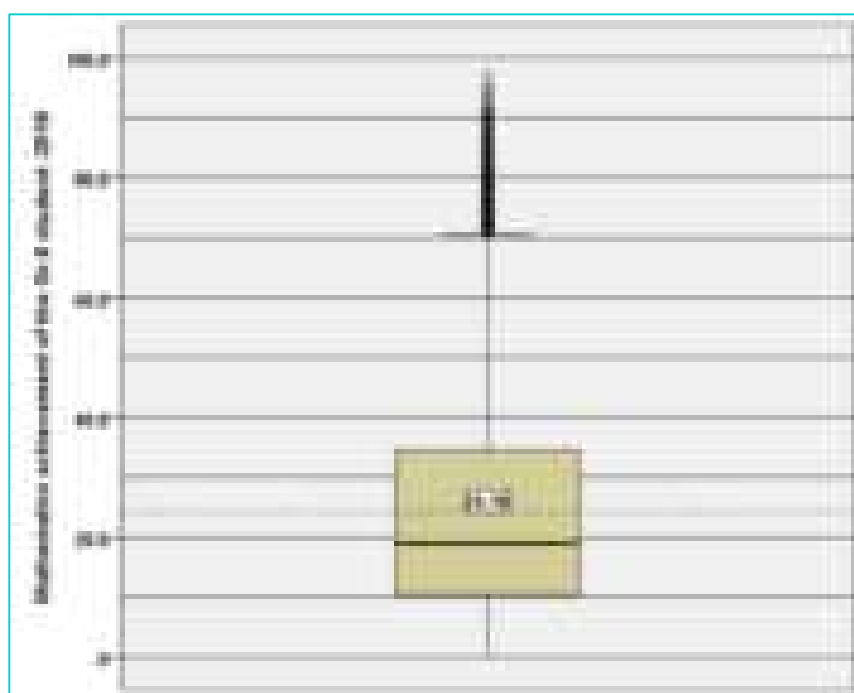


Fig. 4.2: Box and whisker plot representing all island achievement in Mathematics

As Fig. 4.2, the box plot displays average marks (mean) is 24.18. On the other hand the median of the achievement is 18.5. Therefore, more than 50% of the students has achieved values above the average marks.

Summary of national level achievement

- National level mean is 24.18, while the median is 18.5
- The highest number of students falls within the marks range of 10-19.
- 80.1% of students has scored below 40 marks.

Provincial wise student achievement will be discussed next.

4.3 Provincial wise student achievement

The nature of the distribution of scores provincial wise reveals certain patterns. These patterns are discussed based on Table 4.2.

Table 4.2: Provincial achievement in Mathematics 2019 – Summary statistics

Province	Mean	Rank	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Southern	27.86	1	19.76	0.09	0.91	11.50	22.50	39.50
Western	27.43	2	20.10	0.07	0.98	11.00	22.00	40.00
North Western	24.48	3	17.47	0.09	1.01	10.50	19.50	34.50
Sabaragamuwa	23.86	4	16.29	0.09	1.04	11.00	20.00	33.00
North Central	23.77	5	18.14	0.12	1.20	10.00	17.00	33.00
Central	22.14	6	15.94	0.08	1.25	10.00	17.00	29.50
Uva	20.64	7	15.37	0.10	1.37	9.50	15.50	27.50
Northern	20.16	8	15.40	0.11	1.45	9.00	15.00	27.00
Eastern	18.58	9	14.12	0.08	1.45	8.50	14.00	25.00
All Island	24.18		17.96	0.03	1.16	10.00	18.50	34.00

As Table 4.2 indicates based on provincial wise mean achievements Southern Province ranks first. The Western Province is ranked second yet very close to Southern Province. North Western is ranked third.

Achievement wise the provinces fall into three categories. Southern, Western, and North Western Provinces with mean scores above the national mean, fall into the higher category. All the other provinces are below the national mean. However, Sabaragamuwa, North Central and Central Provinces' mean values are closer to the National mean.

Between Southern and Eastern Provinces there is a nine points difference in mean values indicating the disparity in achievement among the Provinces.

The mean and median values for the different provinces are depicted in Fig. 4.3.

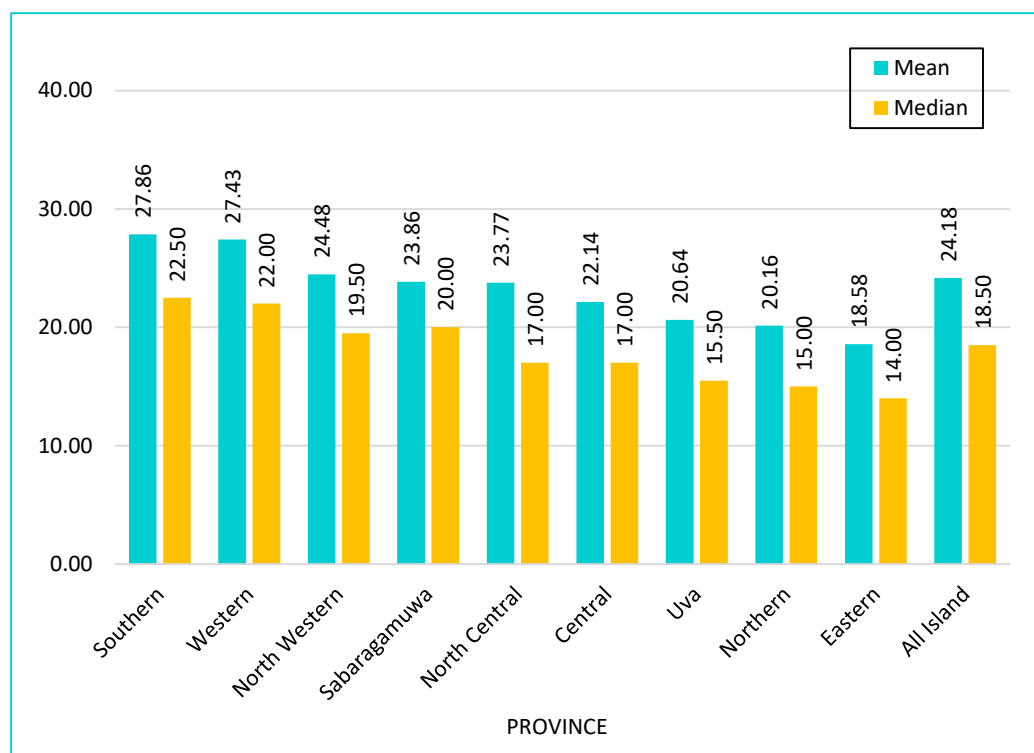


Fig. 4.3: Bar chart to represent mean and median values among the provinces – Mathematics

As Fig. 4.3 displays the median values of all the provinces are below the mean value. Therefore, 50% of the students has scored above the average marks.

Disparity in achievement among provinces

According to Table 4.2 and Fig. 4.3, Southern Province has the highest mean value but it also has a high SD value. Similarly, Western Province which is ranked second also has even a slightly higher SD score. Thus the variation of students' marks is the highest in these two provinces. The SDs of these two provinces are also higher than the all island SD. The SD value is lowest in the Eastern Province indicating that there is less student variation in achievement. However, its mean value is also very low suggesting that all students' performance is weak in this study.

As the Figures on pg. 59 indicate all the provinces have obtained positive skewed values. This indicates that student performance is low.

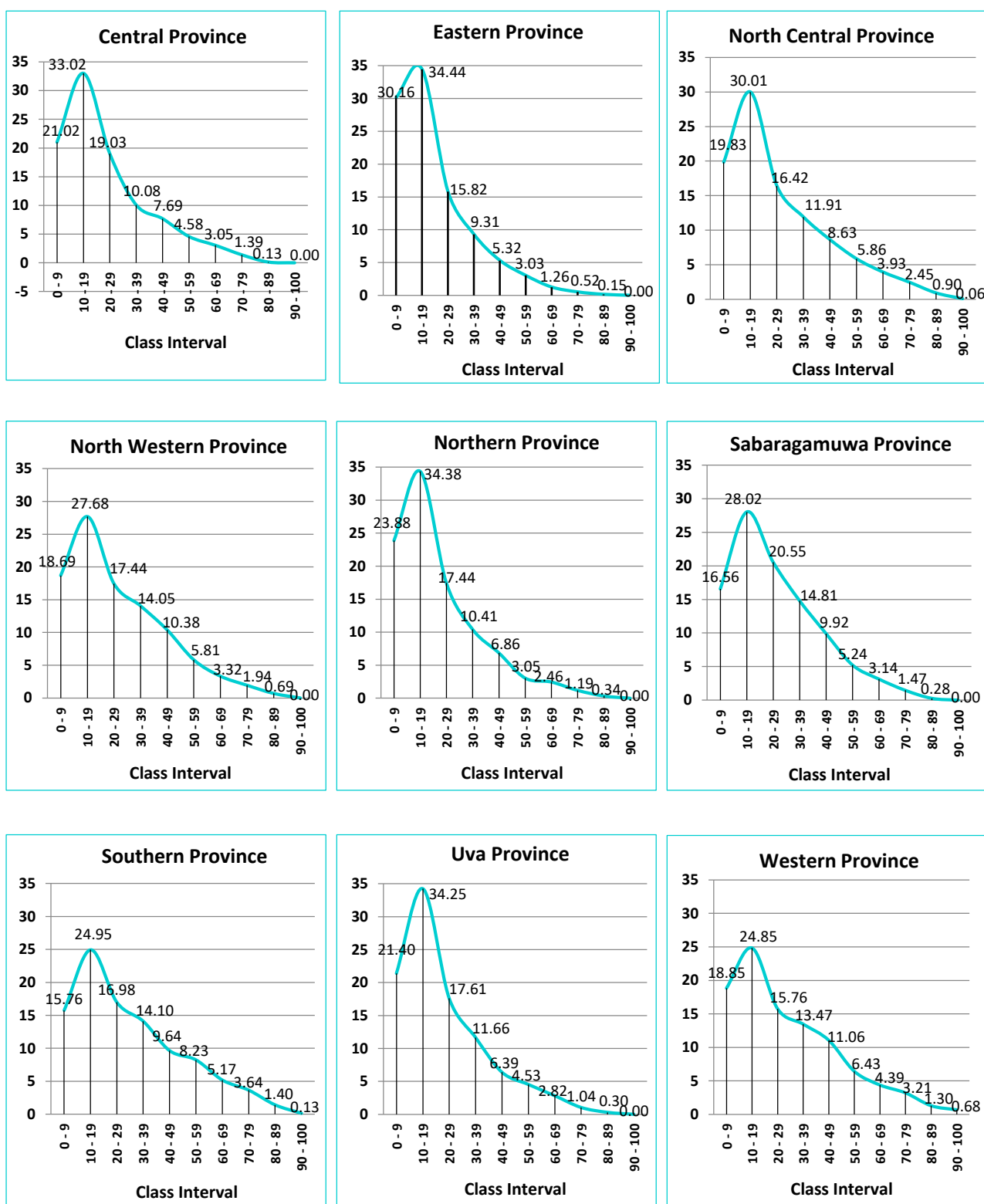


Fig. 4.4: Provincial wise distribution of marks – Mathematics

Patterns of achievement in the different provinces are further elaborated through the box plot chart.

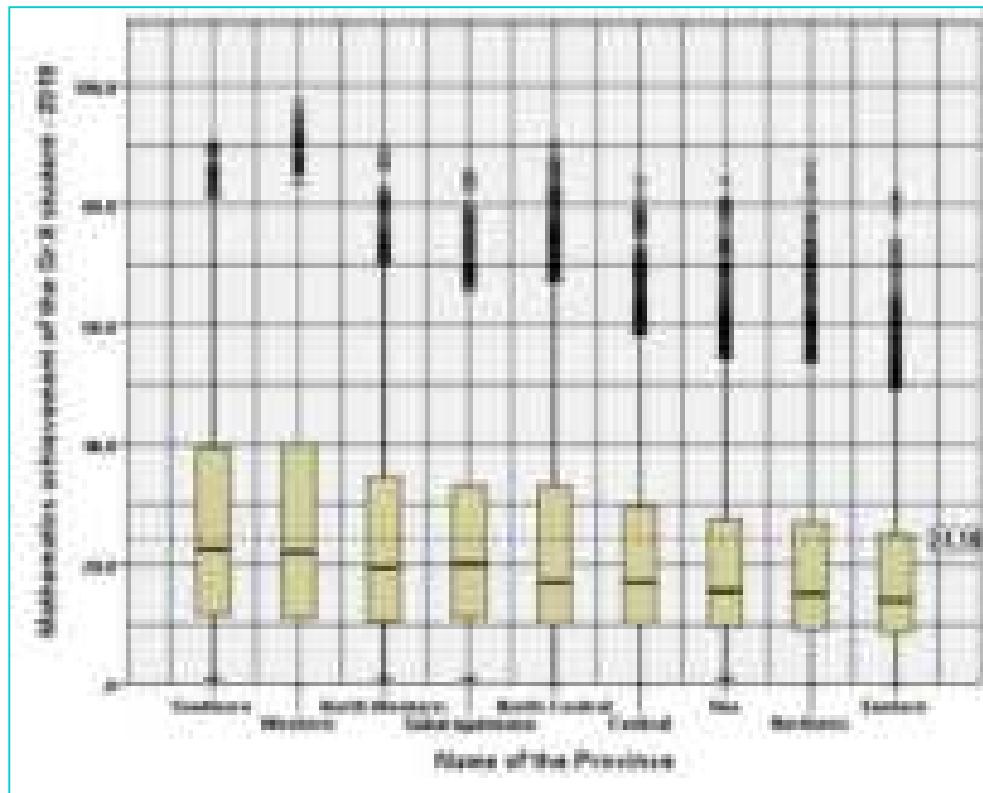


Fig. 4.5: Box and whisker plot representing provincial wise Mathematics achievement

This chart also confirms the achievement patterns discussed above. Southern and Western are the two provinces that have similar characteristics. On the other hand, in all provinces there are outliers. Uva, Northern and the Eastern are the lowest performing districts and they have the highest number of outliers. The diverse nature of the boxplots of different provinces indicates the heterogeneous student performance in Mathematics among the provinces.

Table 4.3: Percentage of students scoring 50 or above and below for Mathematics - 2019

Province	Below 50 (%)	Above or Equal to 50 (%)
Central	91.25	8.75
Eastern	95.57	4.43
North Central	87.12	12.88
North Western	88.51	11.49
Northern	93.14	6.86
Sabaragamuwa	90.15	9.85
Southern	81.88	18.12
Uva	91.75	8.25
Western	84.24	15.76
All Island	89.00	11.00

As Table 4.3 indicates none of the provinces records over 50% in scoring above 50%. The highest percentage of scoring above 50% is recorded in the two province Southern and Western and they have scores of 18.12 and 15.76% respectively.

Summary of provincial level analysis

- Achievement wise the provinces fall into three categories.
 Category 1 – Southern, Western, and North Western with mean scores above the national mean.
 Category 2 – Sabaragamuwa North Central and Central Provinces cluster in the middle.
 Category 3 –The other provinces with mean scores below the national mean.

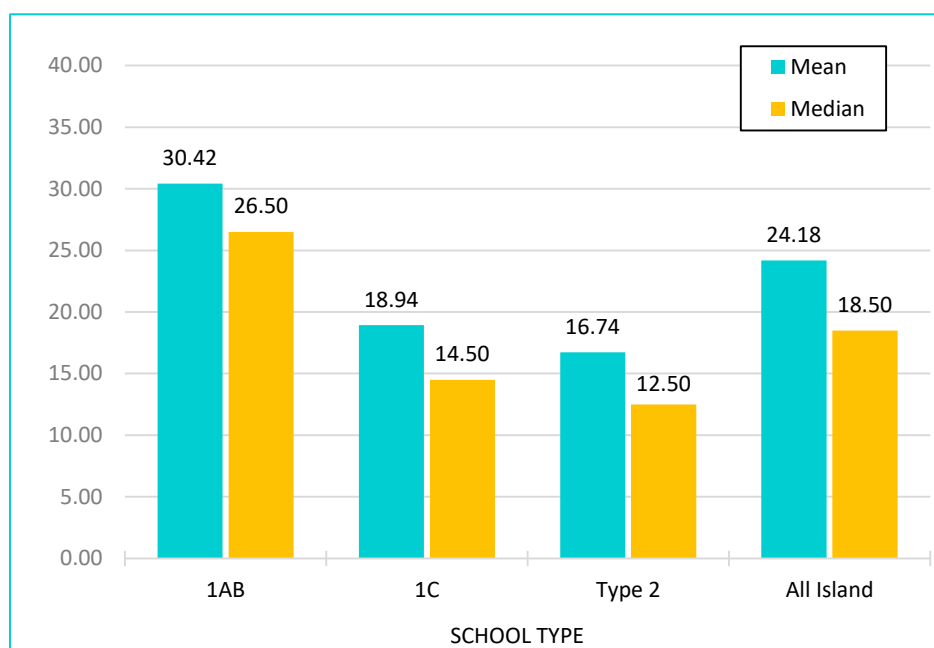
4.4 Achievement levels by type of school

Table 4.4: Mathematics achievement according to school type

School Type	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
1AB	30.42	19.82	0.05	0.74	14.00	26.50	44.00
1C	18.94	13.64	0.04	1.53	9.00	14.50	25.00
Type 2	16.74	12.67	0.05	1.60	8.00	12.50	22.00
All Island	24.18	17.96	0.03	1.16	10.00	18.50	34.00

As Table 4.4 and Fig. 4.6 indicate there is a considerable gap between the mean scores of different school types. However, 1AB schools' mean score is above that of the other types and also above the national mean. However, the SD in these school type is also high. This indicates that diversity of student achievement among these schools are also high. On the other hand, the mean scores of Type 2 and 1C schools, are below the national mean. Further, the SDs of these two school types are also similar indicating that student achievement among these schools is more homogeneous.

The difference in mean and median scores is graphically shown in Fig. 4.6



**Fig. 4.6: Bar chart representing the mean and median among the school types-
Mathematics**

As Fig. 4.6 displays median values of all school types are below the mean values.

This means that fifty percent of students in all school types have obtained scores above their mean values. However, 1AB schools mean and median are above the value of other two school types.

On the other hand, according to Table 4.4 the SD of the 1AB schools is quite high compared to the other two school types. Therefore, it could be concluded that there is greater variation among student achievement within 1AB schools.

Variation among students

Variation in student achievement in 1C and Type 2 schools is low. Those values are lower than the all island SD value as well. It reveals that higher number of student achievement lies closer to the mean value. The dispersion from the mean value is very low. Type 2 schools standard deviation value is the lowest among the school types. This indicates that student achievement deviation from the mean is very low.

Disparity in achievement

All school types have obtained positive skewed values. It reveals that in all school types higher number of students have achieved low marks while higher marks are obtained by a lower number of students. Highest skewed value has been obtained by Type 2 schools. Next higher value has been obtained by 1C schools. Both values are above the all island skewness value.

The variation in student performance in different types of schools is further highlighted through the frequency distribution graphs.

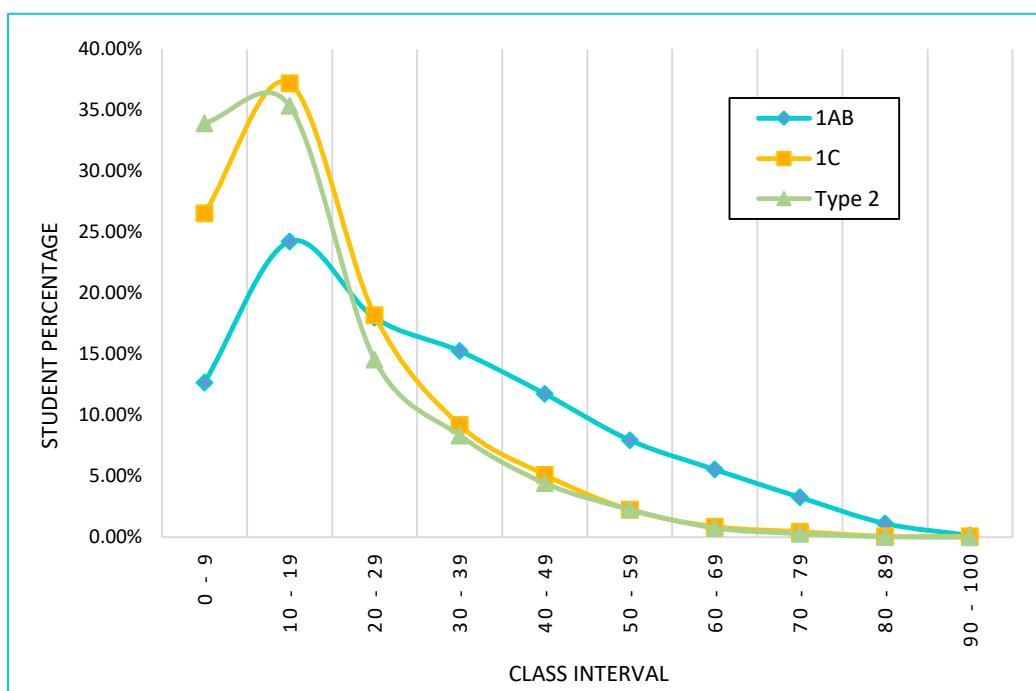


Fig. 4.7: Dispersion of marks by school type– Mathematics

Fig. 4.7 displays that 1C and Type 2 school curves peak at 10-19 class interval and the curves are quite similar. While in Type 1AB schools even though the peak is at 10-19 class interval the percentage of students scoring this mark range is less. Further, the marks spreads over three mark intervals indicating that there are also high achievers even though a lesser percentage.

The spread of marks at different mark intervals is further illustrated in the cumulative percentage Table 4.5.

Table 4.5: Cumulative student percentages according to school type- Mathematics

Class Interval	1AB		1C		Type 2	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.16	100.00	0.08	100.00	0.00	100.00
80 – 89	1.14	99.84	0.08	99.92	0.04	100.00
70 – 79	3.28	98.70	0.46	99.84	0.30	99.96
60 – 69	5.56	95.42	0.87	99.38	0.76	99.66
50 – 59	7.96	89.87	2.25	98.51	2.28	98.90
40 – 49	11.76	81.91	5.13	96.26	4.43	96.62
30 – 39	15.26	70.15	9.20	91.13	8.35	92.19
20 – 29	17.99	54.89	18.21	81.93	14.56	83.84
10 – 19	24.23	36.89	37.18	63.72	35.36	69.28
0 – 9	12.67	12.67	26.54	26.54	33.92	33.92

As Table 4.5 indicates in all school types the highest percentage of students has scored between 10-19. However, while in 1AB schools this percentage is 24.23 in 1C schools it is 37.18 and in Type 2 it is 35.36. On the other hand, in 1AB schools there are also 10.14% of students scoring above 60%. In the other two school types the percentage of students scoring above 60% is below 2%.

The analysis of data pertaining to the school types indicates disparity in achievement. This is further illustrated through the box plot.

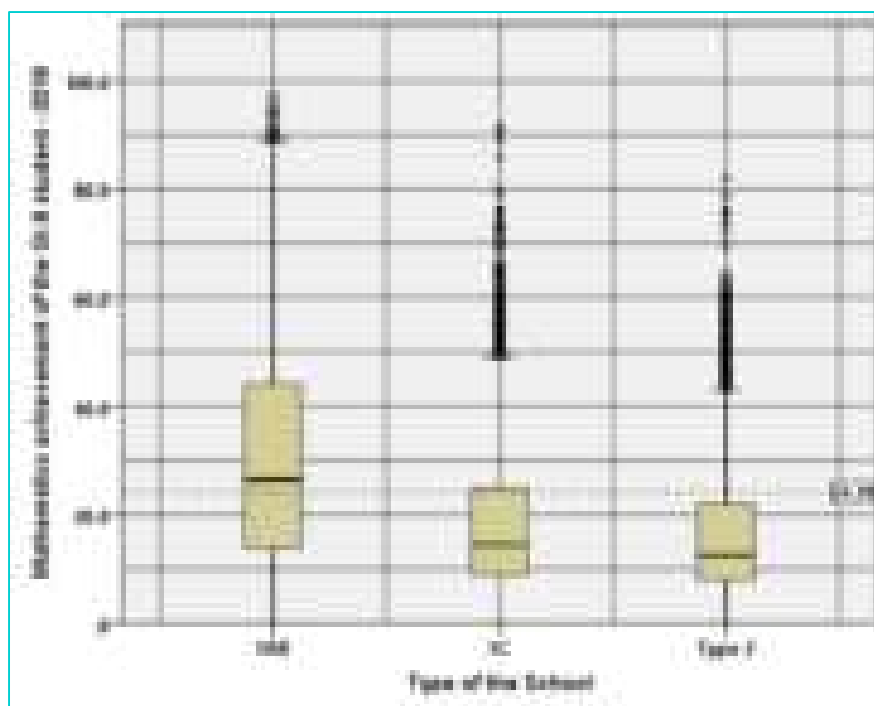


Fig. 4.8: Mathematics marks according to school types using box and whisker plot

The box plots of the 1C and Type 2 schools are quite similar. This indicates that their performances are similar. In both school types there are also outliers whose performance is higher than the other students. On the other hand, the 1AB schools performance is different. Their 25th as well as the 75th percentiles are higher than that of the Type 2 and 1C schools. It also indicates that their performance is high.

Summary

- The achievement in Mathematics in 1C and Type 2 schools are relatively similar.
- 1AB schools' performance is quite different and higher than the other two school types.
- The gap in achievement between school types can be seen

4.5 Achievement levels by gender

Table 4.6: Mathematics achievement according to gender

Gender	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Male	22.23	17.19	0.04	1.27	9.00	16.00	31.00
Female	26.05	18.48	0.04	1.06	11.50	20.50	36.50
All Island	24.18	17.96	0.03	1.16	10.00	18.50	34.00

There is a difference in the achievement of female students over male students. As Table 4.6 indicates, male performance is also lower than the all island mean score, while female performance is above the all island mean. However, the disparity in achievement is more among the females than among the males.

These differences could also be seen in Fig. 4.9.

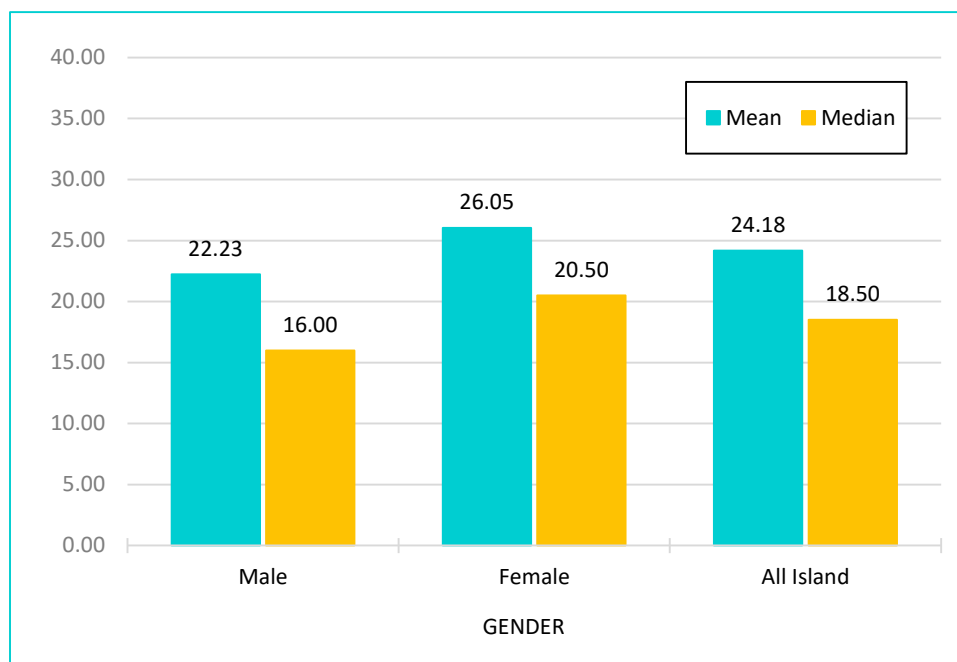


Fig. 4.9: Bar chart representing mean and median values according to gender – Mathematics

As Fig. 4.9 indicates when mean and median values are compared the median values of both males and females are below that of the mean values. Therefore 50% of the students has reached the mean values.

Variation among students

As indicated in Table 4.6, variation in achievement among female students is higher than that of the male students. This is indicated by the female students obtaining a higher SD value than the male students (Table 4.6). On the other hand, the male students SD is slightly below the all island SD. Further, the male skewness value is higher than the all island as well as the female value.

Fig. 4.10 graphically illustrates the dispersion of marks according to gender.

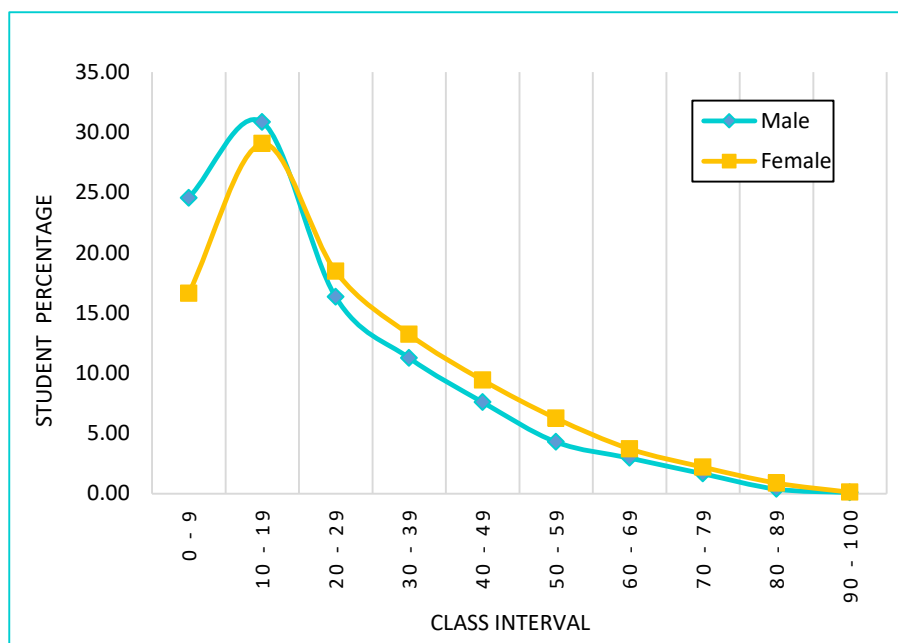


Fig. 4.10: Dispersion of marks by gender – Mathematics

Fig. 4.10 displays two curves which are both positively skewed. As can be seen there are more low achievers than high achievers among both males and females. However the patterns of the two curves are slightly different. At the beginning the curves are similar, but the male curve is higher. Then the curves become similar. The female curve then rises above the male curve and finally, both curves become similar again.

The disparity in the male students' achievement can be elaborated better through the cumulative percentages.

Table 4.7: Cumulative student percentages according to the gender - Mathematics

Class Interval	Male		Female	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.10	100.00	0.12	100.00
80 – 89	0.38	99.90	0.88	99.88
70 – 79	1.65	99.52	2.20	99.00
60 – 69	2.96	97.87	3.72	96.80
50 – 59	4.29	94.91	6.26	93.07
40 – 49	7.60	90.62	9.43	86.82
30 – 39	11.27	83.02	13.23	77.39
20 – 29	16.33	71.74	18.46	64.16
10 – 19	30.85	55.41	29.06	45.70
0 – 9	24.57	24.57	16.64	16.64

According to Table 4.7 and Fig. 4.10 it could be concluded that among both females and males, there are low performing students. The highest percentage (29.06%) of female students' marks fall into the class interval 10-19. The highest percentage of male students' marks, a higher percentage (30.85) falls into the same class interval. Considering 40% as the pass mark 77.39% of female students and 83.02% of male students have not reached the pass mark.

Box and whisker plot for gender wise Mathematics achievement shows similarities that have been discussed already.

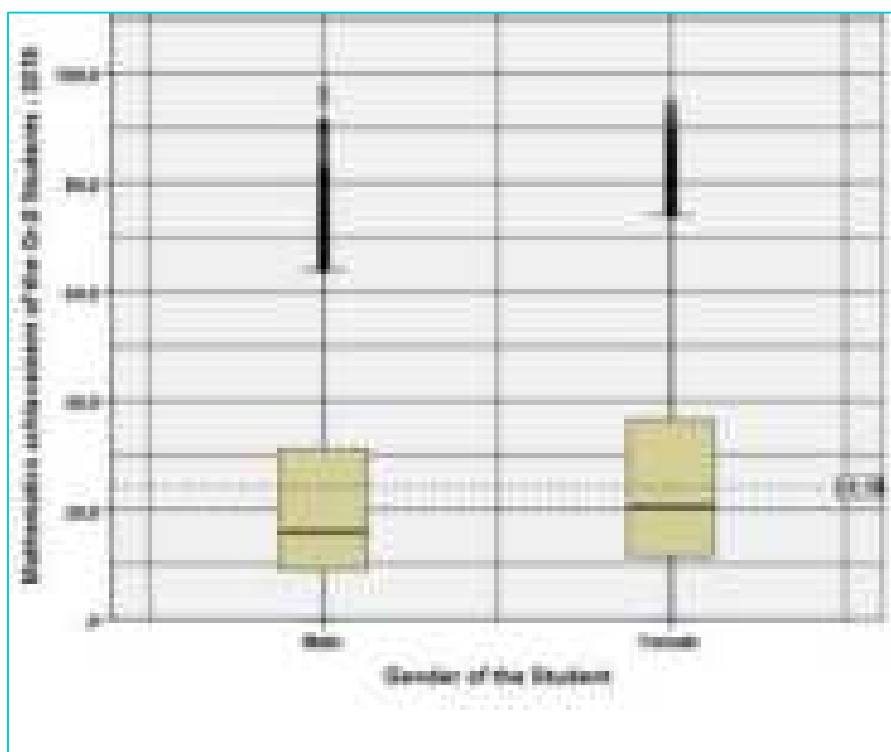


Fig. 4.11: Box and whisker plot representing gender wise Mathematics marks

Box plot and whisker chart show that male students' 25th and 50th percentile is lower than the female mark range as well as the all island range.

There are outliers among both males and females. However, the number of outliers among the males is greater.

Summary

- Female performance is better than all island and male performance.
- While 77.39% of female students has scored below 40, the male student percentage is 83.02%.

4.6 Achievement levels by medium of instruction

There is disparity between the students belonging to the different medium of instruction. While the Sinhala medium students' mean achievement is above the all island mean value, the Tamil medium students' mean achievement is below the national mean average.

Table 4.8: Mathematics achievement according to medium of instruction

Medium of Instruction	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Sinhala	26.45	18.70	0.04	1.02	11.50	21.00	37.50
Tamil	18.29	14.28	0.05	1.51	8.00	13.50	24.00
All Island	24.18	17.96	0.03	1.16	10.00	18.50	34.00

These disparities are further highlighted through the bar chart given in Fig. 4.12.

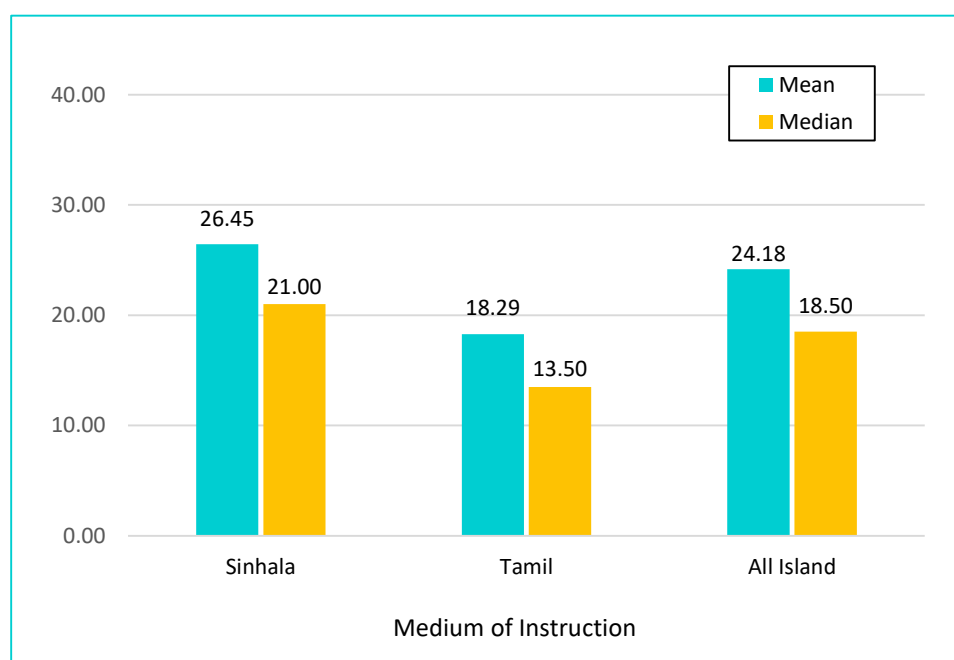


Fig. 4 12: Bar chart representing mean values according to medium of instruction – Mathematics

According to Fig. 4.12 the median values of both media are below that of the mean values. Therefore 50% of the students has reached the mean values.

As Table 4.8 indicates Sinhala medium students SD is higher than the Tamil medium students and is higher than the national SD. Thus there is greater variation in their performance.

Both Sinhala medium as well as Tamil medium students' achievement curves show positive skewness value. This means that majority of the students has scored low marks.

The diversity in achievement scores among the students taught through the different medium of instruction is further highlighted through the frequency distribution graphs.

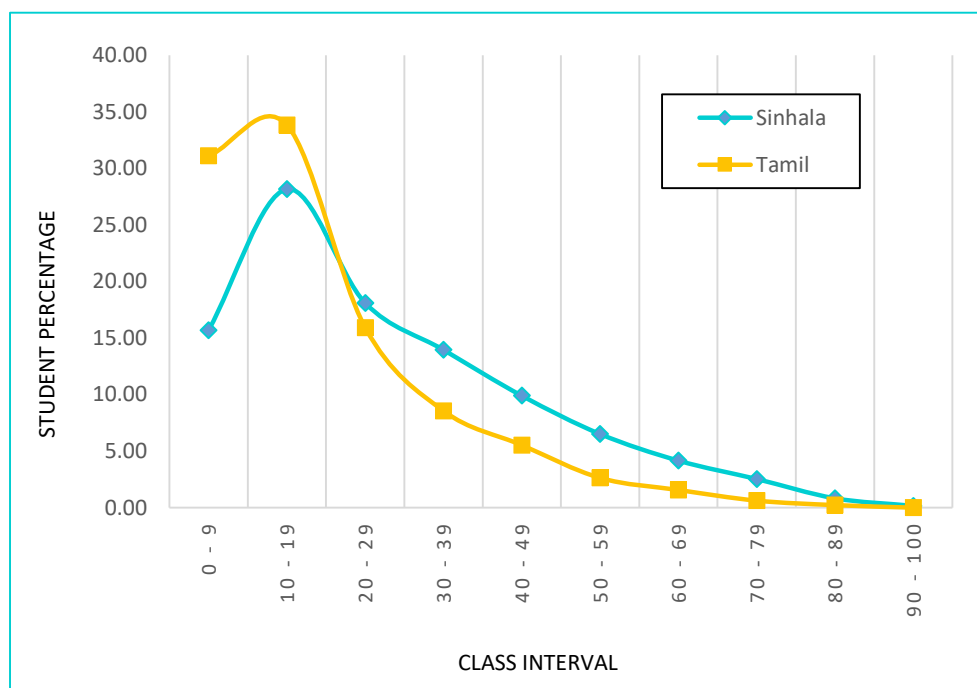


Fig. 4.13: Dispersion of marks by medium of instruction – Mathematics

The two curves on Fig. 4.13 has similarities as well as differences, While both curves peak at the class interval 10-19, the percentage of Tamil medium students scoring 10-19 is higher than the Sinhala medium percentage. On the other hand the percentage of students scoring high marks are higher among the Sinhala medium than among the Tamil medium. This pattern can be explained through Table 4.9.

Table 4.9: Cumulative student percentages according to medium of instruction- Mathematics

Class Interval	Sinhala		Tamil	
	Student (%)	Cumulative (%)	Student (%)	Cumulative (%)
90 – 100	0.16	100.00	0.00	100.00
80 – 89	0.82	99.84	0.22	100.00
70 – 79	2.53	99.02	0.62	99.78
60 – 69	4.16	96.49	1.56	99.16
50 – 59	6.51	92.33	2.63	97.59
40 – 49	9.90	85.82	5.53	94.96
30 – 39	13.96	75.92	8.56	89.43
20 – 29	18.10	61.97	15.93	80.87
10 – 19	28.17	43.86	33.84	64.95
0 – 9	15.70	15.70	31.11	31.11

As Table 4.9 indicates the highest percentage of the Sinhala medium students' marks is in the range of 10-19. The highest percentage of Tamil medium students marks is also in the range of 10-19.

Considering the pass mark as 40, only 75.92% of Sinhala medium students has scored below the pass mark. On the other hand 89.43% of Tamil medium students has scored below the pass mark.

Box plot for medium wise achievement graphically shows the differences that have been discussed already.

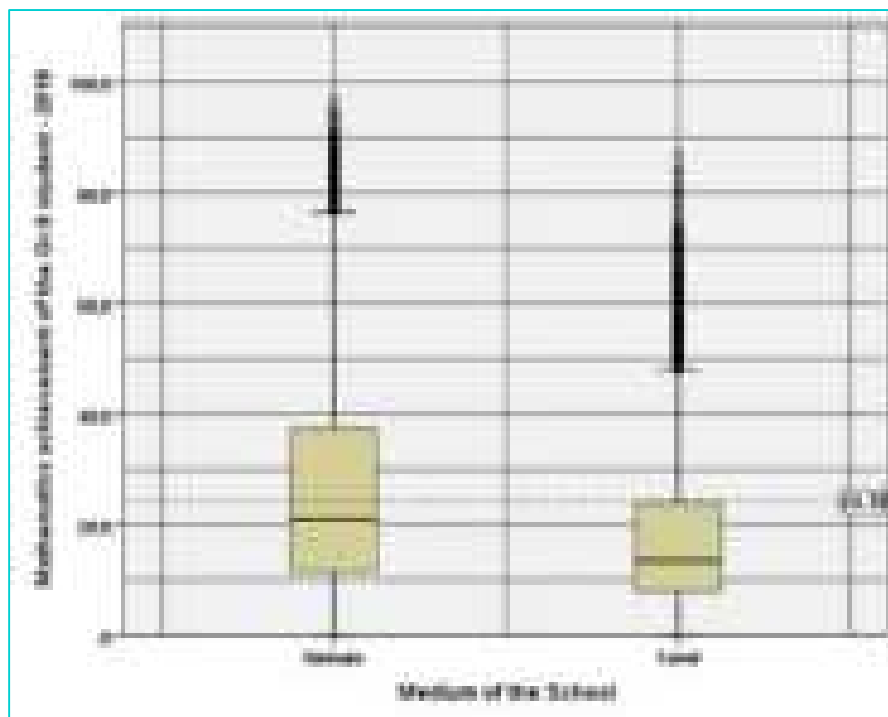


Fig. 4.14: Mathematics marks according to medium of instruction using box and whisker plot

Box plot and whisker plot chart show differences among both media. However, Sinhala medium dispersion of marks in the box plot is less than the Tamil medium students' dispersion of marks. On the other hand, among both groups there are outliers.

Sinhala medium students' 25th, 50th and 75th percentile values are higher than that of the Tamil medium students. Therefore, this confirms that there is disparity between the performance of Tamil and Sinhala medium students in Mathematics.

Summary

- There is wide disparity among students belonging to different medium of instruction.
- The Sinhala medium students' mean score is above the national mean while the Tamil medium students' mean is lower.

Students' achievement in relation to the location of the school would be discussed next.

4.7 Achievement levels by location

According to the school census data location of the schools are classified not according to rural/urban categorization but according to the availability of facilities. Accordingly all schools are classified under the following five criteria.

- Very difficult schools
- Difficult schools
- Non convenient schools
- Convenient schools
- Very convenient schools

This classification has been done based on eleven factors mentioned in MoE circular No.2005/01 dated 2005.01.18

Table 4.10 display the Mathematics achievement according to this classification.

Table 4.10: English achievement according to location

Difficulty Level	Mean	Std. Deviation	Std. Error of Mean	Skewness	Percentile 25	Median	Percentile 75
Very Difficult	14.95	11.42	0.11	1.66	7.50	11.00	20.00
Difficult	16.02	12.12	0.07	1.66	7.50	12.00	20.50
Non Convenient	17.30	13.69	0.06	1.65	8.00	12.50	22.50
Convenient	23.65	16.81	0.05	1.17	10.50	18.50	33.00
Very Convenient	31.01	20.07	0.06	0.74	14.00	26.50	44.50
All Island	24.18	17.96	0.03	1.16	10.00	18.50	34.00

Table 4.10 clearly indicates the impact of the availability of the facilities in the schools on the achievement level of the students. There is variation in achievement among the schools in the different localities. It is only the schools in the very convenient localities that have performed above the national mean. While the mean value of the schools in the convenient localities are closer to the national mean, in the other three school types performance is below the national level.

According to Table 4.10 the SD also differs in the localities. The SD is greatest in the very convenient locality schools and it is even higher than the national SD indicating greater student heterogeneity in these schools. The SD of the convenient locality schools is closer to the all island SD, suggesting that variation among the student achievement in these

schools is similar to the all island achievement patterns. On the other hand, in the other three school types the SDs are very much less than the all island and very convenient locality school SD. The low SD value indicates that there is less variation in student achievement in these schools.

The difference in mean and median values is graphically shown in Fig. 4.15. As Fig.4.15 indicates the median value in all school locations is lower than the mean value.

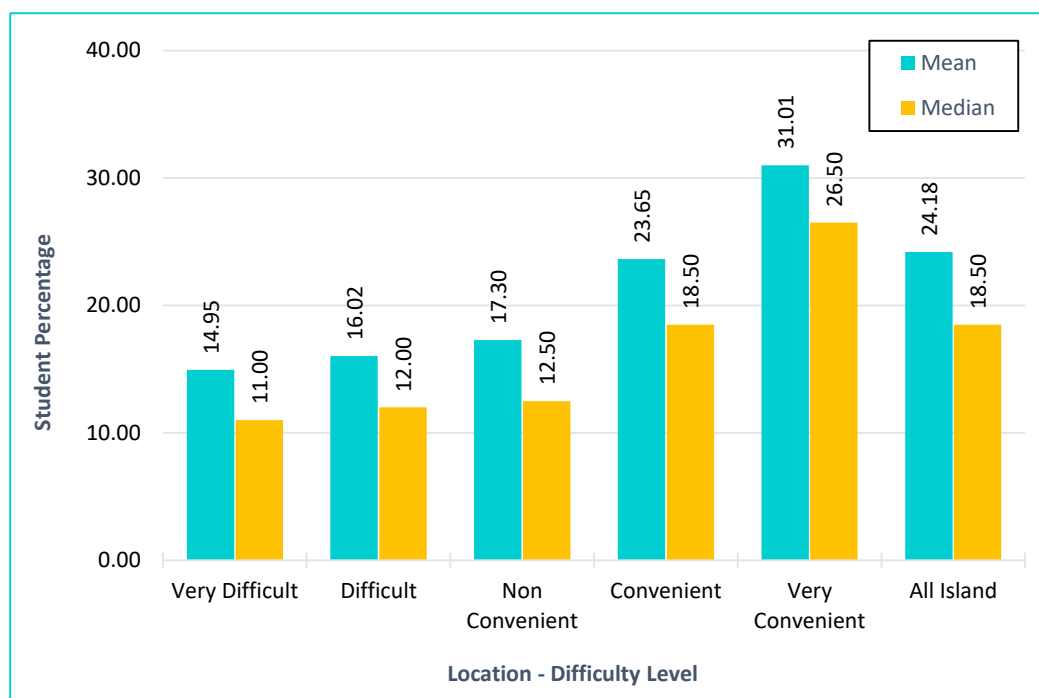


Fig. 4.15: Bar chart representing mean values according to location– Mathematics

As Fig. 4.15 indicates in all localities the median value is lower than the mean value. Therefore, 50% of the students has reached the mean value in all localities.

Students' achievement is further elaborated through the frequency distribution graphs in Fig. 4.16.

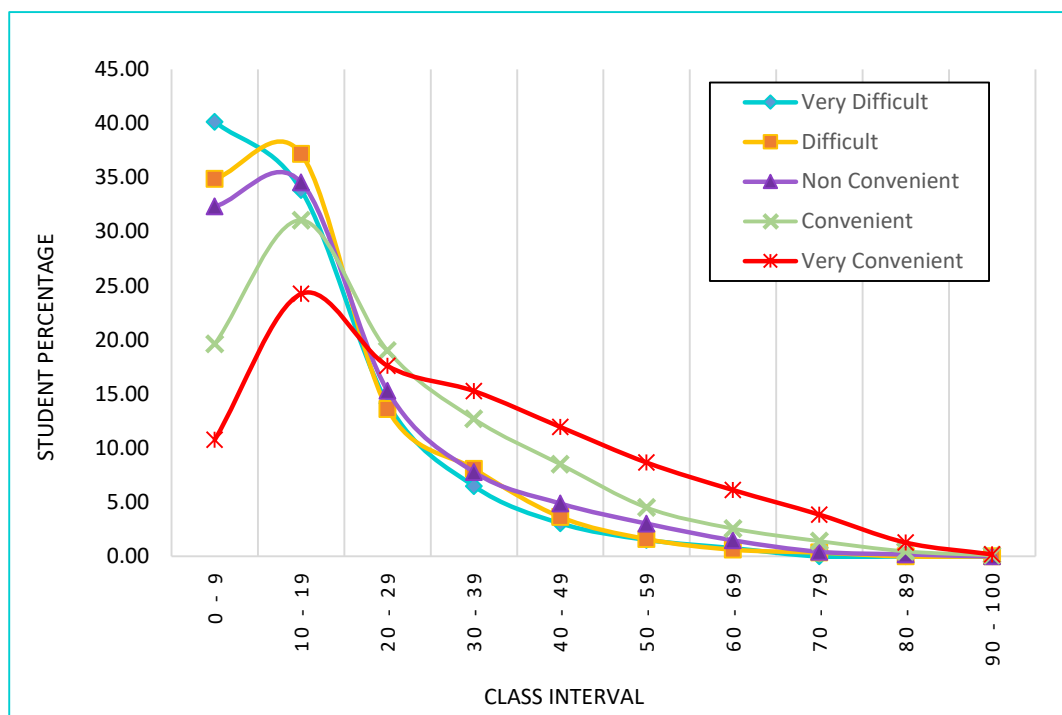


Fig. 4.16: Dispersion of marks by location – Mathematics

Fig. 4.16 displays positively skewed graphs. However, there are differences in the shape of the curves. Except for the very difficult locality curves, all other area curves peak at the class interval 10-19. The very difficult area curve peaks at class, interval 0-9. This difference can be explained using the cumulative percentage Table 4.11.

Table 4.11: Cumulative student percentages according to the location – Mathematics

Class Interval	Very Difficult		Difficult		Non Convenient		Convenient		Very Convenient	
	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %	Stu. %	Cumulative %
90 – 100	0.00	100.00	0.00	100.00	0.00	100.00	0.11	100.00	0.19	100.00
80 – 89	0.00	100.00	0.00	100.00	0.19	100.00	0.47	99.89	1.28	99.81
70 – 79	0.00	100.00	0.36	100.00	0.43	99.81	1.41	99.42	3.86	98.53
60 – 69	0.76	100.00	0.62	99.64	1.49	99.38	2.57	98.01	6.13	94.67
50 – 59	1.53	99.24	1.60	99.02	3.03	97.89	4.51	95.43	8.67	88.54
40 – 49	3.06	97.71	3.65	97.42	4.89	94.86	8.52	90.92	11.96	79.87
30 – 39	6.50	94.65	8.10	93.77	7.80	89.97	12.70	82.40	15.28	67.91
20 – 29	14.15	88.15	13.61	85.68	15.29	82.17	19.01	69.70	17.60	52.63
10 – 19	33.84	74.00	37.19	72.06	34.55	66.87	31.06	50.69	24.25	35.03
0 – 9	40.15	40.15	34.88	34.88	32.32	32.32	19.63	19.63	10.78	10.78

According to Table 4.11 the highest percentage of students in both very convenient and convenient area schools fall into the class interval 10-19. However, in the very convenient area schools the percentage is 24.25 and in the convenient area schools the percentage is 31.06. In addition, in these area schools there are students who have also scored between 30- 100 mark ranges. On the other hand, in the very difficult and difficult area schools there are no students who have scored between 90-100 marks range. While the percentage of students who has scored below 30 marks is 88.15, 85.68 and 62.17% in the very difficult. Difficult and non-convenient schools respectively, in the convenient and very convenient area schools this percentage is only 69.7% and 52.63% respectively. The difference in the shape of the curves is due to the variation in the performance of the students in the different localities as shown by the marks.

The spread of marks is further illustrated through the box plot graph.

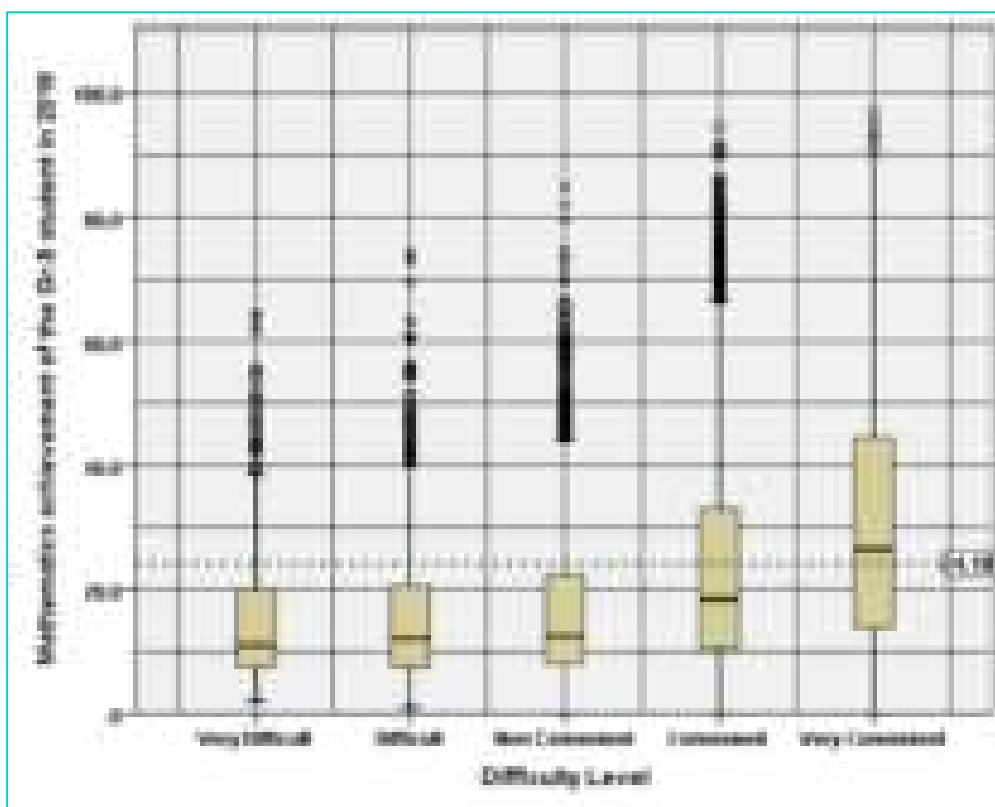


Fig. 4.17: Box and whisker plot representing location wise Mathematics marks

According to the box plot the very convenient area schools' performance differs from the rest of the school types. The spread of marks in the five box plots confirms the variation that exists between the performances of the different localities. There are outliers in all other area schools.

Summary

- The performance of the students is linked to the area in which the schools are located.
- The deviation of marks is less in the very difficult and difficult schools while their performance is also low. On the other hand, while the deviation is high in the very convenient and convenient schools their achievement is also high.

Achievement patterns observed in relation to the achievement in Mathematics, revealed that there were variations among provinces, school type, gender, medium wise and locality.

Students' achievement in relation to subject content will be discussed next.

The next section of the report highlights the analysis of achievement by sub skills.

Part 2

4.8 Analysis of achievement by sub skills

In constructing the achievement tests, the test items were designed in relation to the competencies, competency levels and learning outcomes identified for grade eight.; In preparing the Mathematics paper as discussed in chapter 2 the test construction team adapted the PISA mathematics framework to suit the local curriculum framework. It was decided to first consider the six content areas to assess the students' performance in Mathematics in accordance with the Curriculum in Sri Lanka. . Next as discussed in chapter 2, the construct assessed in these studies were the competency levels and learning outcomes, table of specification was prepared based on the competency levels and learning outcomes.

The Six content areas are

- Numbers
- Measurements
- Algebra
- Geometry
- Statistics
- Sets and Probability

In addition to the content areas, the cognitive processes were also considered. Two broader cognitive processes as (1) Lower Order Thinking skills (LOTs) and (2) Higher Order

Thinking skills (HOTs) were considered. While LOTs included knowledge and skills, and comprehension (communication and relationships), HOTs included reasoning and problem solving.

In order to test the content as well as the cognitive processes, three types of questions were included in the test paper. Given below are the type of questions and the marking scheme to evaluate each item.

1. MCQ types questions

- Traditional MCQ 16 = 16 marks (one each)
- Complex MCQ 02 = 4 marks (two each)

2. Short Response type questions(4)

5 marks each $\times 4 = 20$ marks

3. Structured type questions (6)

- Each consists of three parts
- Each part in Part I - 2 marks
- Each part in Part II - 3 marks
- Each part in Part III- 5 marks

Total marks = $10 \times 6 = 60$ marks

Fig. 4.18 displays students' performance in the content areas.

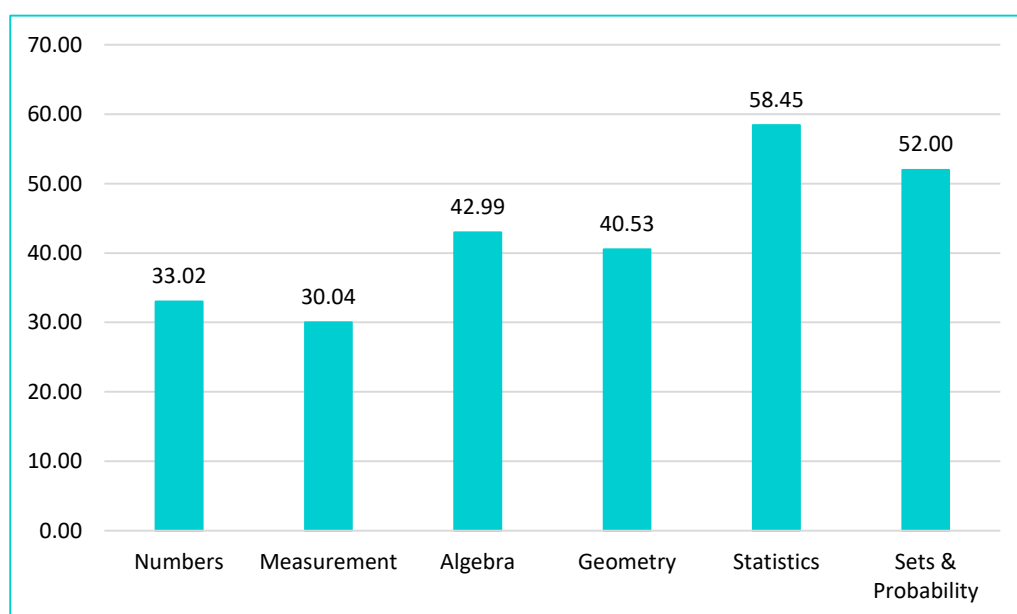


Fig 4.18: Student performance in the subskills

According to Fig. 4.18 lesser percentage of students has achieved the competency levels related to measurement. On the other hand, students have achieved above 50% in the content areas of statistics and sets and probability.

Achievement of competencies related to the subskills are displayed in Fig. 4.19

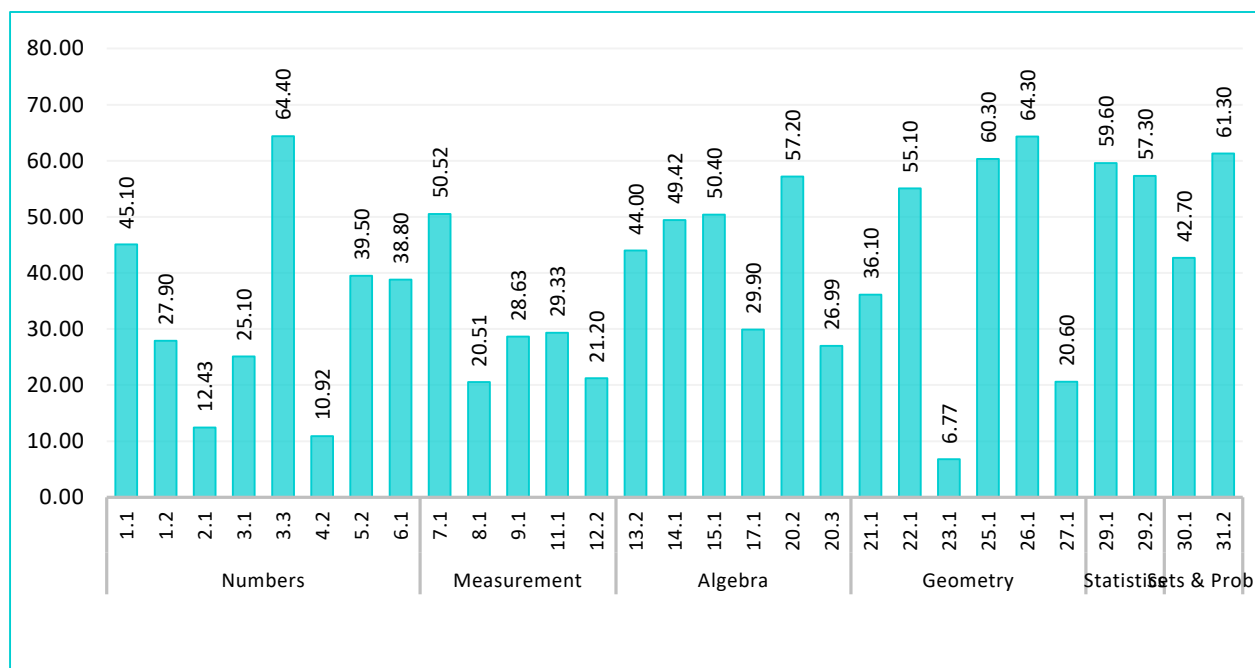


Fig. 4.19: Achievement of competency levels – Mathematics

As Fig. 4.19 indicates, under each domain there are some competency levels of which students' achievement is very weak. On the other hand, under the same domain students' achievement in some competency levels is satisfactory. For example, under the domain numbers while student achievement in competency 4.2 is only 10.92% under competency 3.3 their performance is 64.40%. The reason for this difference can be explained through Table 4.12.

Table 4.12: Achievement of competency levels – Mathematics

Content area	Competency Level	Learning Outcome	Q. No & Q.Type	(%)	Cognitive Processes
Numbers	1.1 Finds the square root of whole square numbers between 1 and 1000 by inspection.	Finds the square root of whole square numbers between 1 and 1000 by inspection.	2 MCQ	45.10	Knowledge
	1.2 Manipulates directed numbers under the basic mathematical operations	Subtract integers using directed numbers.	17 MCQ	27.90	Connection
	2.1 Simplifies problems by analyzing different characteristics and observing relationships among terms of number patterns.	Solves problems related to number patterns.	27 ST	12.43	Knowledge Connection Prob.solving
	3.1 Manipulates units and parts of units under multiplication.	Multiplies a mixed number by a mixed number.	21 SA	25.10	Prob. solving
	3.3 Manipulates decimal numbers under the mathematical operations of multiplication and division	Divides a decimal by a decimal	1 MCQ	64.40	Connection
	4.2 Solves problems constructing relationships between two ratios.	Divides according to a ratio developed by compounding into two quantities.	28 ST	10.92	Connection Reasoning Prob.solving
	5.2 Solves problems related to percentages.	Calculates the total, when the quantity of the scale and the certain percentage are given.	6 MCQ	39.50	Connection
	6.1 Simplifies powers of a product using expansion.	Expands powers with natural numbers when the index of a product of two natural numbers or algebraic terms is not more than three.	15 MCQ	38.80	Knowledge
Measurement	7.1 Satisfies various requirements by investigating the perimeter of rectilinear plane figures.	Finds the area of compound plane figures consisting of plane figures triangles, squares and rectangles similar or dissimilar.	13 MCQ	50.52	Connection
	8.1 Finds the area of compound plane figures in the environment and has an awareness of the space allocated for them.	Solves problems related to compound plane figures consisting of two plane figures namely equilateral triangles, isosceles triangles, squares and rectangles.	26 ST	20.51	Knowledge Reasoning Problem solving

Content area	Competency Level	Learning Outcome	Q. No & Q.Type	(%)	Cognitive Processes
	9.1 Facilitates daily work by investigating large masses	Solves problems related to masses in metric tons.	20 SA	28.63	Problem solving
	11.1 Facilitates daily work by investigating the capacity of liquid containers.	Solves problems relate to volume and capacity.	23 ST	29.33	Knowledge Reasoning Problem solving
	12.2 Investigates the difference in time between countries and finds their relative positions.	Obtains the time, date and the day of other countries compared to the standard time given for any country according to its location.	18 MCQ	21.20	Connection
Algebra	13.2 Describes various locations in the environment using scale drawings	Calculates dimensions of the actual figure using a scale diagram.	10 MCQ	44.00	Knowledge
	14.1 Simplifies algebraic expressions and finds the value by substitution	Multiplies a binomial algebraic expression without parentheses by an algebraic term.	14 MCQ	49.42	Connection
	15.1 Factorizes algebraic expressions	Factorizes an algebraic expression whose common factor is an algebraic term.	5 MCQ	50.40	Knowledge
	17.1 Uses linear equations to solve problems	Solves problems using the knowledge of simple equations.	19 SA	29.90	Problem Solving
	20.2 Illustrates the behavior of a variable pictorially	Writes the inequalities represented on number line in algebraic form	9 MCQ	57.20	Communication
	20.3 Represents location on a Cartesian Plane.	<ul style="list-style-type: none"> • Marks the points $x, y, \in Z(x, y)$ on the Cartesian plane. • Writes a marked point on the Cartesian plane as an ordered pair. • Draws graphs of the form $x=a, y=b$ on the Cartesian plane where $a, b \in Z$ • Writes the equation $x=a$ or $y=b$ for the line parallel to the x axis or y axis. 	24 ST	26.99	Knowledge Reasoning Problem solving

Content area	Competency Level	Learning Outcome	Q. No & Q.Type	(%)	Cognitive Processes
Geometry	21.1 Performs calculations using the relationships between various angles	1. Perform calculations related to angles on a straight line and angles around a point. 2. Sum of the three interior angles of a triangle is 180	25_i, 25_ii ST	36.10	Knowledge Reasoning
	22.1 Creates solids and confirms the relationships between properties	Identifies the geometric shapes of faces of octahedron, dodecahedron and icosahedron and describes its characteristics.	7 MCQ	55.10	Knowledge
	23.1 Inquiries into the relationships between the various angles of rectilinear plane figures.	3.sum of the exterior angles of a Quadrilateral is 360	25_iii ST	6.77	Problem solving
	25.1 Inquiries into the results of a rotation that are based on symmetry.	Writes the order of rotational symmetry for geometrical shapes.	4 MCQ	60.30	Knowledge
	26.1 Studies shapes by creating various patterns that can be used to enhance beauty	States that tessellation using two or more regular shapes is the semi-regular tessellation.	3 MCQ	64.30	Problem solving
	27.1 Constructs the triangles using the awareness of necessary conditions for a triangle	1.Identifies that the sum of triangle is greater than the length of the remaining side. 2. Creates the relevant triangle when the lengths of the three sides are given.	22 SA	20.60	Problem solving
Statistics	29.1 Discusses the dispersion of data using stem and leaf diagram	Decides conclusions on data distribution based on the minimum value, maximum value and the range.	11 MCQ	59.60	Communication
	29.2 Inquiries into numerical representative values of a group of data	Draws conclusions about a raw data set based on the mode, median and mean.	12 MCQ	57.30	Communication

Content area	Competency Level	Learning Outcome	Q. No & Q.Type	(%)	Cognitive Processes
Sets & Probability	30.11 Analyzes the various relationships related to sets	Solves problems related to set notation	16 MCQ	42.70	Knowledge
	31.2 Determines the likelihood of an event occurring by investigating the various methods of finding a suitable value	Solves simple problems related to experimental and theoretical probabilities.	8 MCQ	61.30	Knowledge

* MCQ – Multiple choice question

SA - Short Answers

ST - Structured

According to Table 4.12 students' achievement in question 1 is above 50% (64.40%) for a traditional multiple choice question. This question measured the cognitive process – connection which is a lower order thinking skill (LOT).

On the other hand students' achievement in question 28 which is also in the domain of numbers is below 50% (10.92%) for a structured type question. This question comprised of three parts and measured the cognitive processes – connection which is a lower order thinking skill (LOT) as well as reasoning and problem solving which are Higher Order Thinking skills.

As indicated in Table 4.12 in most of the questions where students had to use Higher Order Thinking skills to solve a problem, their achievement is less. Hence the learning outcomes have not been achieved.

Students' understanding of concepts and processes

Part 2 of the question paper consisted of five short response type questions. These were included to be similar to PISA test items where students' knowledge of concepts as well as the process involved in solving the problem can be identified. In these questions students were expected to give the answer as well as write the steps they followed in obtaining the answer.

In evaluating the responses the following criteria was used.

Understanding of the concept

Fully understood 2 marks

Partially understood 1 mark

Understanding of the process

Fully understood 2 marks

Partially understood 1 mark

Answer

Correct answer 1 mark

Total Marks 5 marks

Table 4.13 analyzes students understanding of concepts and processes based on students' responses to questions 19-21.

Table 4.13: Understanding of concepts and processes

Competency Level	Q. No.	Concept (02)		Process (02)		Answer (01)
		2 Marks	1Mark	2 Marks	1Mark	1 Mark
17.1 Uses linear equations to solve problems.	19	25.90%	6.70%	24.90%	5.60%	26.60%
9.1 Facilitates daily work by investigating large masses.	20	23.70%	8.50%	21.50%	10.70%	21.50%
3.1 Manipulates units and parts of units under multiplication.	21	12.40%	5.20%	9.80%	5.00%	42.90%
		5 marks	2.5 marks	In question 22 only the concepts were evaluated and five marks were given to the complete answer and 2.5 for incomplete answer.		
27.1 Constructs the triangles using the awareness of necessary conditions for a triangle	22	6.0%	14.60%			

As Table 4.13 indicates students' performance in these questions (19-22) is not satisfactory. Students' understanding of both concepts and processes are weak as percentage of correct student responses are below 30% for all five questions.

Part 3 of the question paper consisted of five questions. As discussed in chapter 2, they were similar to open-constructed items in PISA. Each question consisted of three parts and they tested the students' cognitive processes. While part 1 involved Lower Order Thinking skills (LOTs), Part two and three tested Higher Order Thinking Skills (HOTs). Table 4.13 analyzes students' performance in these questions in relation to their cognitive processes.

Table 4.14: Use of cognitive processes

Que. No.	Part_III		Cognitive Process	Content Area
	Correct (%)	Wrong (%)		
Q23_I	71.65	28.3	Knowledge	Measurement
Q23_II	21.78	78.2	Reasoning	
Q23_III	15.57	84.43	Problem Solving	
Q24_I	56.79	43.21	Knowledge	Algebra
Q24_II	44.53	55.47	Reasoning	
Q24_III	20.44	79.56	Problem Solving	
Q25_I	54.63	45.37	Knowledge	Geometry
Q25_II	29.39	70.61	Reasoning	
Q25_III	28.07	71.93	Problem Solving	
Q26_I	53.12	46.88	Knowledge	Measurement
Q26_II	26.92	73.08	Reasoning	
Q26_III	12.35	87.65	Problem Solving	
Q27_I	18.67	81.33	Knowledge	Numbers
Q27_II	25.26	74.74	Connection	
Q27_III	7.91	92.09	Problem Solving	
Q28_I	26.81	73.19	Knowledge	Numbers
Q28_II	9.76	90.24	Reasoning	
Q28_III	6.05	93.95	Problem Solving	

As shown in Table 4.14, percentage of student achievement is higher in part 1 of each question than in part II and III. The reason for such performance could be because part 1 involved LOTs and part II and part III involved HOTs. However, in question 27 students' correct responses to part 1 is less than for part 2. As Table 4.14 indicates the learning outcome for this question is "Solves problems related to number patterns". Since Part I of this question tested students' knowledge it could be assumed that they have not understood the concept of number patterns.

The analysis of the responses to part III, of the question paper indicates as already shown through Table 4.14 Students' Higher Order Thinking skills are weaker.

4.9 Summary

Part I of this chapter described student performance in relation to the achievement of learning outcomes in the Mathematics. The discussion pertained to both national and provincial level. Further, achievement was analyzed according to school type, gender, medium of instruction and location.

Test items similar to PISA used to assess students' performance were analyzed in part 2, to assess how far they have been successful in achieving concepts and processes involved in Mathematics expected to be achieved by grade 8 pupils.

It could be concluded that overall the achievement of learning outcomes in Mathematics is not satisfactory. There is still disparity in achievement provincial wise as well as location and gender wise. The achievement of most competency levels is not satisfactory and use of Higher Order Thinking skills appears to be very weak. Therefore, it could be concluded that students are not yet ready to face International Assessments.

CHAPTER FIVE

Conclusion and the Way Forward

5.1 Introduction

The purpose of this chapter is to discuss the main findings of the study conducted in 2019. These findings will be discussed in relation to the objectives of the study and in accordance with the objectives of a national assessment (Kellaghan and Greaney, 2008) as mentioned in chapter 1.

- 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)?
- 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?,
- Does evidence indicate particular strengths and weaknesses in students' knowledge and skills?
(Kellaghan and Greaney, 2008, p.9).
- How ready are Sri Lankan students to face international assessments?

In order to find the answers to the first question and the first objective "to find out how well students are learning in the system", the extent to which, patterns identified in the achievement of learning outcomes 2019 in English and mathematics, will be discussed at national level

5.2 Achievement of learning outcomes -2019

5.2.1 National level performance

The performance in English is low with a mean value of 34 and the median value of 28. The highest number of students (26%) falls within the marks range of 20 -29. Further, Sixty six percent of students has scored below 40 marks.

The overall performance in **mathematics** is also not satisfactory with a mean score of 24.18 and a median value of 18.50. (29.9%) has scored between 10-19 marks. Further, 80.1% of students has scored below 40 marks.

Therefore, it could be concluded that the majority of the students have scored low marks in both English and Mathematics.

The next objective is to find out whether certain subgroups in the population perform poorly and whether there are disparities in achievement among these sub groups

5.3 Disparity in achievement among the sub groups

5.3.1 Provincial wise performance

The findings of the present study indicate that there are variations in provincial wise achievement in both subjects.

Achievement wise the provinces fall into three categories.

With regards to English achievement Western, North Western and Southern Provinces with mean scores above the national mean, fall into the higher category.

Sabaragamuwa, North Central and Central Provinces mean values are closer to the National mean. While Uva, Eastern, and Northern Provinces achievement is very much below the mean value Between the Western and Northern Provinces there is a ten point difference in mean values indicating the disparity in achievement among the Provinces.

In Mathematics achievement also the provinces fall into three categories. Southern, Western, and North Western Provinces with mean scores above the national mean, fall into the higher category. All the other provinces are below the national mean. However, Sabaragamuwa, North Central and Central Provinces mean values are closer to the National mean. Between Southern and Eastern Provinces there is a nine points difference in mean values indicating the disparity in achievement among the Provinces.

Therefore, it could be concluded that disparities exist among the provinces with relation to both subjects.

5.3.2 Achievement according to School Types

The gap between the achievement of students in 1AB schools and 1C and Type 2 is wide in both subjects.

In both subjects the achievement curves of all school types are positively skewed indicating that majority of the students has scored low marks.

In the achievement of the English language, in all school types the majority of students has scored marks between the range of 20-29. However, in 1AB schools the percentage of students scoring in this mark range is less. Further, the marks spread over three mark intervals indicating that there are also high achievers.

In the achievement of Mathematics also a similar pattern could be observed. In all school types the achievement curves are positively skewed indicating that majority of the students has scored low marks. Further, in all school types the majority of students has scored marks between the range of 10-19. However, in 1AB schools the percentage of students scoring in this mark range is less. Further, the marks spreads over three mark intervals indicating that there are also high achievers.

Therefore, it could be concluded that disparity in achievement exists between 1AB schools and 1C and type 2 schools in the achievement of both English and Mathematics.

5.3.3 Achievement according to gender

In both subjects females have performed better than their male counterparts.

Further, in both subjects while the male performance is lower than the all island mean score, female performance is above the all island mean.

Therefore, there is a gap between male and female performance in the achievement of both English and Mathematics.

5.3.4 Achievement according to medium of instruction

There is wide disparity in achievement among students belonging to different medium of instruction in both subjects.

In both subjects while the Sinhala medium students mean value is above the national mean, the Tamil medium students mean value is below the national mean.

5.3.5 Achievement according to location

Disparity in achievement can also be seen according to the location where the school is situated.

In both subjects the impact of the availability of the facilities in the schools could be seen on the achievement level of the students. There is variation in achievement among the schools in the different localities. It is only the schools in the very convenient localities that have performed above the national mean. While the mean value of the schools in the convenient localities are closer to the national mean, in the other three school types performance is below the national level.

Student heterogeneity also differs in the localities. The SD is greatest in the very convenient locality schools and it is even higher than the national SD indicating greater student heterogeneity in these schools. The SD of the convenient locality schools is closer to the all island SD, suggesting that variation among the student achievement in these schools is similar to the all island achievement patterns. On the other, hand in the other three school types the SDs are very much less than the all island and very convenient locality school SD. The low SD value indicates that there is less variation in student achievement in these schools.

According to the above discussion it could be concluded that disparity in achievement exists among sub groups such as among different provinces, school types, male/ female and students studying in different medium of instruction and availability of resources.

Section 5.4 will discuss the identified particular strengths and weaknesses in students' knowledge and skills

5.4 Strengths and weaknesses in students' knowledge and skills

5.4.1 Achievement of competency levels

English language

As discussed in chapter 2 and 3 the English language paper was designed to measure the sub skills mechanics of writing, vocabulary, grammar, reading, and writing skills. Since writing skills involved not only the evaluation of students' knowledge of concepts but also the process of writing, the evaluation of the achievement of the competencies related to writing was done separately.

When the achievement of the subskills related to mechanics of writing, vocabulary, grammar and reading is considered percentage of correct responses for all subskills are below 50 %. Hence, students' achievement is not satisfactory.

Students' achievement in the writing skill, as discussed in chapter 3 is equally bad. For the two test items there are more than 50% obtaining no marks.

Therefore, students' are weak in all subskills tested in English.

Mathematics

Mathematics paper as discussed in chapter 2 and 4 tested student' knowledge and skills in six content domains. Out of the six content domains students' achievement is above 50% in only two domains – statistics and sets and probability. Therefore, students' achievement in the content domains is not satisfactory.

In addition to the content areas students' use of the cognitive processes- Higher Order and Lower Order Thinking skills were also measured. It was found that the Higher Order Thinking skills were weak.

5.5 Students' readiness for international assessments

As mentioned in chapter 1, the General Education Modernization (GEM) Project was expected to "introduce a regular system of international assessments of learning outcomes that extend the system of national assessments of learning outcomes" (2018.p.11). In order to find out the readiness of the students to international assessments in the 2019 study the assessment tools were designed preparing test items similar to PISA items for mathematics and for English similar to TOEFL Junior.

Students' achievement in Mathematics achievement in the 2016 national assessment when the paper was based only on the local curriculum frame work was 51.11. Where as in the present study when the paper was designed in line with PISA items the achievement is 24.18.

In this context findings of the national assessment of learning outcomes of grade 8 students reveal that much more effort is needed if students are to face international assessments.

There are several reasons for the students' low performance in both subjects. Comparatively English language performance was better than the Mathematics performance. Therefore, Mathematics performance would be discussed first.

5.6 What the findings reveal

Reasons for low performance in Mathematics

PISA is conducted for 15 year old students who have completed their school education and is to enter the world of work. Whereas the Grade 8 students in Sri Lanka who have completed only three years of Junior secondary education and are only 13 years of age. Therefore, the original idea of selecting items from PISA modules were rejected.

Instead the Test construction team adapted the PISA mathematics framework to suit the local curriculum framework. They considered the six content areas to assess the students' performance in Mathematics in accordance with the Curriculum in Sri Lanka. It further used two broader cognitive processes as (1) Lower Order Thinking skills (LOTs) and (2) Higher Order Thinking skills (HOTs).

One reason for the students' low marks was their inability perform well in questions that tested the Higher Order Thinking skills.

Another reason for the low performance could be the type of test items used. As in PISA the study also comprised of four test types.

1. Traditional MCQs
2. Complex MCQs
3. Short response type
4. Structure type (similar to open-constructed item in PISA)

Students' performance in 3rd and 4th type of questions were low as they tested both the concept knowledge as well as the process knowledge. It appears that students are not used to these types of questions.

PISA questions measured more application of knowledge in day to day situations and such activities were less in the local curriculum.

There was an imbalance in the provision of activities in the textbook. Activities for achievement of certain learning outcomes were less and students' may have lacked practice opportunities.

The above stated reasons could explain the low performance in Mathematics.

English language performance

Compared to Mathematics achievement English achievement is better yet not satisfactory. In 2016 the national mean was 35.81 and in 2019 when the test items were similar to TOEFL junior items the mean value is 34.

Reasons for English language performance

As already mentioned in Chapter 2, unlike in the Mathematics paper English paper was not similar to PISA English language paper. The reasons are:

PISA English language paper is given to 15 year olds who had completed school education and tests only reading literacy.

On the other hand, TOEFL junior tests English language skills similar to local curriculum and is meant for 14 year old second/foreign language learners.

Therefore, TOEFL Junior is more suitable for Sri Lankan grade 8 students.

However, there were differences in the test types in the 2016 local paper and the 2019 paper which included TOEFL type questions.

The 2016 paper included only traditional MCQ's to test students' vocabulary, grammar and mechanics of writing. However, the TOEFL Junior includes MCQs in within a text. Therefore, students have to consider the context of the entire passage to choose the response to the MCQ. This involved HOTS whereas the traditional MCQs tested mostly LOTS. Thus students' lack of exposure to such test types could be one reason for low performance.

Reading and writing were the lowest achieved subskills.

In the reading test items the questions for which student's had to give answers going beyond the passage the achievement was low. These items also tested HOTS.

As in previous national assessments writing was the weakest skill achieved. Although, students have scored more marks for grammar items in the writing item the number of students who had written grammatically correct sentences was less. Thus it appears that the application of the grammar knowledge is weak. Students appear to reproduce memorize sentences rather than constructing sentences of their own.

Similar to Mathematics, there was an imbalance in the provision of activities in the textbook. Activities for achievement of certain learning outcomes were less and students' may have lacked practice opportunities.

As discussed in chapter 1, Sri Lanka is also committed to achieve the Sustainable Development Goals, especially Goal 4. That is “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. In other words to “leave no one behind”

However, as discussed in section 5.3 disparity in achievement prevails among the provinces and the subgroups such as school type, gender, medium of instruction and location. Since, the location where the school is located is linked with the availability of resources it could be clearly seen that very convenient and convenient locality schools, students achievement was higher than non- convenient or very difficult area school. Yet among the very convenient schools also there were greater variation in achievement indicating that all students are not provided equitable education.

5.7 The way forward

International Assessments

The analysis of results of this study in 2019, indicates that Sri Lanka is not yet ready to join in international assessments as students are not familiar with the type of test items included in such assessments. Therefore, there is a need for curriculum revision and assessment of learning outcomes at classroom level as well as public examinations. According to the operational manual of the GEM Project “will enable schools to adapt their curriculum implementation activities to the learning framework of the PISA” (p. 19). However, as discussed in section 5.5 PISA does not seem to be a suitable international assessment for 13 year old grade 8 students. It appears that they are not cognitively mature to face PISA type questions. A better option would be TIMSS as there are modules for grade 8 students. Further, in the past NEREC had designed a local TIMSS paper adapting TIMSS items to suit the Sri Lankan context.

Curriculum revision

English language curriculum should also be revised to provide more opportunities to apply the basic concepts learnt in developing reading and writing skills.

In both subjects the curriculum grids should be revised to have a proper balance in the learning outcomes. The learning outcomes and competency levels should enable students to use both LOTS and HOTS.

More authentic activities should be included for students to apply the concepts learned.

In the English Language curriculum special emphasis should be laid to teach the writing skills. Students should be able to identify the difference between first language and second language word order. The main elements of a sentence and the formation of a sentence should be included in the textbooks. In both subjects students do not appear to have understood some concepts. Such concepts should be given more emphasis in the curriculum.

Classroom Assessment and public examinations

Authentic assessment should be conducted in schools. The analysis of the assessment results should lead to remedial teaching. There should be constructive alignment between assessment, learning outcomes and the activities conducted in classrooms.

Public examinations should also follow the international assessment format preferably TIMSS.

Teacher development

Teachers should be trained to conduct activities to develop students' HOTS and LOTs. In keeping with learning outcomes that leads to authentic assessment. Teachers should also be trained to identify the students who are lagging behind in better performing schools such as 1AB, very convenient and convenient schools.

Bridging disparities

As discussed in section 5.5 disparities in achievement in relation to school type, gender, medium of instruction and location continues.

Policy decision should be taken regarding provision of facilities to difficult and very difficult location schools. Special projects should be conducted in these schools to upgrade them.

5.8 Conclusion

The purpose of this study was to a certain extent different to the previous National assessments conducted by NEREC. As requested by the Ministry of Education (Annexure 4) an attempt was made to modernize the national assessment through the incorporation of test items similar to items in international assessment. Findings revealed that students are not yet ready to participate in International Assessment such as PISA. However, if curriculums are adapted to cater to authentic learning and school tests and public examinations also adapt to the international type of testing which caters to authentic

assessment and with proper teacher development programmes such assessment will be possible in the future. Such changes will improve students learning outcomes and Sri Lanka will move towards achieving SDG 4.

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Annexure 1

Matching Activities in Textbook with Competency Levels

#	Competency	Competency Level	Pg. No.	Subject Content
1	Identifies the sounds of English Language	1.1 Pronounces the English words properly.		<p>Help students to identify the pronunciation of the words with silent letters.</p> <p>a) talk, chalk, folk, walk etc. b) know, knew, knee c) honest, honour, hour</p> <p>Help students to identify the pronunciation of the words ending with 'ew'.</p> <p>a) flew, blew, drew, crew, chew etc.</p> <p>Help students to identify the pronunciation difference between 'a' and 'o'.</p> <p>Eg. walk – work, warm – worm, wander – wonder, ward – word etc.</p> <p>Help students to identify the sounds produced by different consonant clusters as shown below.</p> <p>a) <u>s</u>tream, <u>s</u>chool, <u>s</u>creen, <u>s</u>now, <u>s</u>pring, <u>s</u>mall b) <u>g</u>row, <u>g</u>rind, <u>g</u>round, <u>g</u>lass, <u>g</u>lad, <u>g</u>lue, <u>b</u>lue, <u>t</u>rue c) <u>p</u>lay, <u>p</u>rize, <u>p</u>rice, <u>p</u>ress, <u>p</u>retty, <u>p</u>rincipal, <u>p</u>rroud d) <u>b</u>rown, <u>b</u>lack, <u>b</u>lank, <u>b</u>last, <u>b</u>ranch, <u>b</u>reak, <u>b</u>rick, <u>b</u>read e) <u>c</u>ream, <u>c</u>rowd, <u>c</u>lass, <u>c</u>lay, <u>c</u>loud</p> <ul style="list-style-type: none"> Help students to improve their spellings.
2	Uses Mechanics of Writing with Understanding	<p>2.5 Uses inverted commas appropriately.</p> <p>Activity: 10,5, 10.6</p>	109	Help students to identify the places where the inverted comma is used.

#	Competency	Competency Level	Pg. No.	Subject Content
4	Building up vocabulary using words appropriately and accurately to convey precise meaning.	4.3 Finds synonyms and antonyms for given words. Activity 2.2, 2.4, 5.8	14, 17 18, 60	Help the students to identify synonyms and antonyms. Make the students aware that the meanings of these words depend on the context. Synonyms: enough – sufficient, correct – accurate, huge – enormous, lazy – lethargic, weak – feeble, faithful – loyal , house - dwelling
			18, 19	Antonyms: local – foreign simple – complex modern – ancient major – minor majority – minority ascend – descend victory – defeat most – least rural – urban
			19	minimum – maximum import – export construct – demolish etc.
		4.4 Uses affixes to change the word class and the meaning of words. Activity: 2.4, 5.1, 5.2, 5.5	18, 19 51, 52 51, 52 51, 52 55, 56 51,52	Help the students to understand the concepts of changing the word class and the meaning of words using affixes – un-, dis-, im-, -ful, -less, -ily, -ness , -fully, - er, -est, -tion, -ment Adj. - Adj. (opposite) patient – impatient, regular – irregular cooked – uncooked, legal -illegal , polite – impolite fortunate – unfortunate, possible - impossible etc. Help students to from comparative and superlative adjectives using - er, est Adjs. - Comparative Adjs., Superlative Adjs. Eg. Clever - cleverer cleverest High - higher - highest etc. verb - verb (opposite) treat - ill-treat , load – unload do - undo , button – unbutton, tie - untie etc.

#	Competency	Competency Level	Pg. No.	Subject Content
4	Building up vocabulary using words appropriately and accurately to convey precise meaning.	4.4 Uses affixes to change the word class and the meaning of words. Activity: 2.4, 5.1, 5.2, 5.5	51, 52	Verb - Adj. help – helpful help – helpless rest – restless stop – stoppable play -playful etc.
			51, 52	Noun – Adverb day- daily ,week – weekly hour – hourly, fortnight – fortnightly month - monthly , year – yearly, quarter - quarterly etc.
			8	Help the students to form the plurals of countable and uncountable nouns.
		4.5 Forms the plurals of nouns. Activity 1.6, 1.7, 4.5 Activity: 1.6, 1.7 Activity: 3.7	9, 44 8,9 31	Help the students to form the plurals of compound and collective nouns adding - s/es Countable Nouns (Count Nouns): Uncountable nouns (non-count nouns): Collective nouns - singular: Collective nouns - plural:
		4.7 Uses collective nouns and compound Nouns Activity 3.7	32	Help students use the collective nouns and compound nouns.
5	Extracts necessary information from	5.1 Uses visual and contextual clues to derive the meaning of the text. 1.6, 3.7, 4.5, 4.6, 5.4, 5.8, 6.4, 6.5, 7.6, 8.8, 8.9	53, 54, 65, 66, 67, 78, 79, 94	Help the students to study the pictures given in the text book to derive the meaning of that particular text.
			7, 8, 31, 68	Help students to determine the meaning of a new word by looking at a picture and reading the sentence that comes with the word.
			42, 43, 44, 45, 46, 50, 60, 95,	Help students to use both context and picture clues to determine the meaning of new words.

#	Competency	Competency Level	Pg. No.	Subject Content
5	Extracts necessary information from	5.2 Extracts specific information from various types of simple texts Activity: 1.2, 1.4, 1.9, 2.2, 3.2, 3.4, 4.1, 5.1, 6.3, 7.1, 10.2 5.3, 5.8, 6.1, 7.10, 8.6	2, 6, 10, 11, 13, 24, 35 2, 6, 11, 24, 27, 53, 60, 63, 82, 92,	Help students to find specific information from a text. names, dates, days, places etc. responding to questions with 'Wh' question words, what, when, where, who, which.
		5.3 Transfers information into other forms.	14, 15, 16, 17, 22, 37, 41, 55, 76, 79, 80, 87, 93, 94, 95, 103, 107	Help students to transfer the given information into other forms.
		5.4 Reads and responds to simple poems. Activity 1.8, 2.9, 3.9, 4.4, 4.8, 5.7, 5.10	9, 22, 33, 41, 47, 48, 58, 61	Help students to understand the poetic language, techniques, structure and messages given.
		5.5 Reads and responds to simple folk stories. Activity: 3.5, 10.5	29, 108	Help students to read simple folk stories, stories and find the characters, their dress, qualities, message expressed.
		5.6 Extracts the general idea of a text. Activity: 1.2, 1.4 (B), 1.9, 2.2, 3.4 (a), 5.1 (B), 5.8 (6), 6.2, 6.3 (3,4), 6.5, 7.7, 8.6, 10.4	2, 6, 11, 13, 26, 27, 50, 51, 60, 64, 65, 68, 79, 80, 89, 90, 107	

#	Competency	Competency Level	Pg. No.	Subject Content
6	Uses English grammar for the purpose of accurate and effective communication	6.1 Constructs simple sentences – using 'Past Perfect' form Activity: 8.3, 10.2, 10.3	89, 106	Help students to construct simple sentences using : 'Past Perfect' form Help students to identify regular and irregular forms of verb (Present, Past and Past Participle)
		Passive voice present tense Activity: 6.5, 6.6, 6.7	68, 69	Help students to identify the difference between active voice and passive voice sentences. Help students to construct – Present tense - Passive voice sentences.
		Passive voice past tense Activity: 7.1, 7.2, 7.3	73, 74	
		Passive voice future tense. Activity: 8.2, 8.4, 8.5	88, 89	
		6.2 Uses pronouns appropriately. Activity – 1.1, 1.2, 1.3	1,2, 3, 4	Help students to use reflexive pronouns myself, our selves, yourselves, himself, herself, itself, themselves Help students to use indefinite pronouns; all, any, most, none, some
		6.3 Uses modals meaningfully Activity: 2.4, 2.5, 2.6, 2.7	20, 21	Help students to use the modals: must, have to
		6.5 Uses contracted form Activity: 3.6	30	
		6.6 Uses adjectives appropriately Activity: 5.6	57	Help students to use comparative adjectives in simple sentences.
		6.7 Uses prepositions appropriately. Activity: 4,5	42, 43	Help students to use the prepositions appropriately through, across, about, with , without, by, along, on (radio)

#	Competency	Competency Level	Pg. No.	Subject Content
6	Uses English grammar for the purpose of accurate and effective communication	6.8 Uses conjunctions appropriately. Activity: 3.2, 3.3	24, 25, 26	Help the students to use the conjunction given below to join simple sentences using - as, since, so
		6.9 Uses adverbs appropriately Activity: 9.1, 9.2, 9.3, 9.5	97, 98, 99, 100, 101	Help students to use adverbs to describe verbs. Adverbs that formed under C.L.4.4 Proudly, Differently etc. Help students to use frequency adverbs Once, twice, always, usually, never, rarely, often, sometimes
7	Uses English creatively and innovatively in written communication	7.1 Writes descriptions of things, places and people. Activity: 4.2 (b), 5.5, 9.5, 9.7	37, 38 55, 101 103	Help students to write descriptions of; People, Places, things and animals
		7.2 Describes pictures. Activity: 7.12		Help students to describe; photographs and pictures of busy streets, botanical gardens, gardens, pictures ; at the post office, school, bank, birds, clothes
		7.3 Writes for personal purposes. 1.9(b), 7.8, 7.9	11, 80, 81	Help students to write letters of excuse, a letter to a pen friend, note to a friend, a letter to a friend describing a holiday experience.
		7.4 Writes instructions.		Help students to write instructions to make a ragged doll, to post a letter, making compost fertilizer, origami, suitable activities selected from the subject Practical Technological Skills etc.
		7.5 Writes simple compositions on different types of topics Activity: 1.4 (D), 5.3, 8.7	5, 53, 92	Help students to write simple compositions on Health Tips, Our Environment, Public properties, Newspapers, Transport, Independence Day etc. (using 100 words)
		7.6 Writes poems and stories Activity: 5.7, 6.3 (5), 7.12, 10.6	58, 65, 83, 84, 109	Help students to write simple poems on things, people, places, birds etc. mentioned under C.L. 5.2 and 7.1

Annexure 2

Content domain, the respective competency level, learning outcome and the question numbers - Mathematics

Content Domain	Competency Level	Learning Outcome	Question numbers			
			Part I (MCQs)		Part II (Supply type)	
			Traditional	Complex	Short response type	Structure type
Numbers	1.1 Finds the square root of whole square numbers between 1 and 1000 by inspection.	Finds the square root of whole square numbers between 1 and 1000 by inspection.	2			
	1.2 Manipulates directed numbers under the basic mathematical operations	Subtract integers using directed numbers.	17			
	2.1 Simplifies problems by analyzing different characteristics and observing relationships among terms of number patterns.	Solves problems related to number patterns.				27
	3.1 Manipulates units and parts of units under multiplication.	Multiplies a mixed number by a mixed number.			21	
	3.3 Manipulates decimal numbers under the mathematical operations of multiplication and division	Divides a decimal by a decimal	1			
	4.2 Solves problems constructing relationships between two ratios.	Divides according to a ratio developed by compounding into two quantities.				28
	5.2 Solves problems related to percentages.	Calculates the total, when the quantity of the scale and the certain percentage are given.	5			
	6.1 Simplifies powers of a product using expansion.	Expands powers with natural numbers when the index of a product of two natural numbers or algebraic terms is not more than three.	15			
	Sub Total		05	01		02

Content Domain	Competency Level	Learning Outcome	Question numbers			
			Part I (MCQs)		Part II (Supply type)	
			Traditional	Complex	Short response type	Structure type
Measurement	7.1 Satisfies various requirements by investigating the perimeter of rectilinear plane figures.	Finds the area of compound plane figures consisting of plane figures triangles, squares and rectangles similar or dissimilar.		13		
	8.1 Finds the area of compound plane figures in the environment and has an awareness of the space allocated for them.	Solves problems related to compound plane figures consisting of two plane figures namely equilateral triangles, isosceles triangles, squares and rectangles.				26
	9.1 Facilitates daily work by investigating large masses	Solves problems related to masses in metric tons.			20	
	11.1 Facilitates daily work by investigating the capacity of liquid containers.	Solves problems relate to volume and capacity.				23
	12.2 Investigates the difference in time between countries and finds their relative positions.	Obtains the time, date and the day of other countries compared to the standard time given for any country according to its location.	18			
	Sub Total		01	01	01	02
Algebra	13.2 Describes various locations in the environment using scale drawings	Calculates dimensions of the actual figure using a scale diagram.	10			
	14.1 Simplifies algebraic expressions and finds the value by substitution	Multiplies a binomial algebraic expression without parentheses by an algebraic term.		14		
	15.1 Factorizes algebraic expressions	Factorizes an algebraic expression whose common factor is an algebraic term.	5			

Content Domain	Competency Level	Learning Outcome	Question numbers			
			Part I (MCQs)		Part II (Supply type)	
			Traditional	Complex	Short response type	Structure type
	17.1 Uses linear equations to solve problems	Solves problems using the knowledge of simple equations.			19	
	20.2 Illustrates the behavior of a variable pictorially	Writes the inequalities represented on number line in algebraic form	9			
	20.3 Represents location on a Cartesian Plane.	<ul style="list-style-type: none"> • Marks the points x, y, z on the Cartesian plane. • Writes a marked point on the Cartesian plane as an ordered pair. • Draws graphs of the form $x=a, y=b$ on the Cartesian plane where $a, b \in \mathbb{Z}$ • Writes the equation $x=a$ or $y=b$ for the line parallel to the x axis or y axis. 				24
	Sub Total		03	01	01	01
Geometry	21.1 Performs calculations using the relationships between various angles	1. Perform calculations related to angles on a straight line and angles around a point. 2. Sum of the three interior angles of a triangle is 180				25
	22.1 Creates solids and confirms the relationships between properties	Identifies the geometric shapes of faces of octahedron, dodecahedron and icosahedron and describes its characteristics.	7			
	23.1 Inquiries into the relationships between the various angles of rectilinear plane figures.	3.sum of the exterior angles of a Quadrilateral is 360				25

Content Domain	Competency Level	Learning Outcome	Question numbers			
			Part I (MCQs)		Part II (Supply type)	
			Traditional	Complex	Short response type	Structure type
	25.1 Inquiries into the results of a rotation that are based on symmetry.	Writes the order of rotational symmetry for geometrical shapes.	4			
	26.1 Studies shapes by creating various patterns that can be used to enhance beauty	States that tessellation using two or more regular shapes is the semi-regular tessellation.	3			
	27.1 Constructs the triangles using the awareness of necessary conditions for a triangle	1. Identifies that the sum of triangle is greater than the length of the remaining side. 2. Creates the relevant triangle when the lengths of the three sides are given.			22	
	Sub Total		03		01	01
Statistics	29.1 Discusses the dispersion of data using stem and leaf diagram	Decides conclusions on data distribution based on the minimum value, maximum value and the range.	11			
	29.2 Inquiries into numerical representative values of a group of data	Draws conclusions about a raw data set based on the mode, median and mean.	12			
	Sub Total		02			
Sets & Probability	30.11 Analyzes the various relationships related to sets	Solves problems related to set notation	16			
	31.2 Determines the likelihood of an event occurring by investigating the various methods of finding a suitable value	Solves simple problems related to experimental and theoretical probabilities.	8			
	Sub Total		2			
Total			18	02	04	06

Annexure 3

Table of Specification – English Language

Competency	Competency Level	Ques. Nos.	No. of ques.	Marks
Vocabulary	4.3 Finds synonyms and antonyms for given words	15,17,8	3	1
	4.4 Uses affixes to change the word class and the meaning of words	12,2,	2	2
	4.7 Uses collective nouns and compound nouns	1	1	1
Reading	5.5 Reads and responds to simple folk stories /stories	26-35	10	10
	5.6 Extracts the general idea of a text	21-25	5	5
Grammar	6.1 Construct simple sentences using present perfect and passive voice	3, 5, 11, 13, 18	5	5
	6.2 Uses pronouns appropriately	20,6	2	2
	6.3 Uses modals	10	1	1
	6.5 Uses contracted forms	4	1	1
	6.6 Uses adjectives appropriately	14	1	1
	6.7 Uses prepositions appropriately	19	1	1
	6.8 Uses conjunctions appropriately	16	1	1
	6.9 Uses adverbs appropriately	7	1	1
Mechanics of Writing	2.5 Uses inverted commas appropriately	9	1	1
Writing	7.1 Writes descriptions of things, persons and places	36	1	5
	7.3 Writes for personal purposes	37	1	10
Total			37	50

Annexure 4

 අධ්‍යාපන අමාත්‍යාංශය கல்வி அமைச்சு Ministry of Education		Telephone: 011-26124111, 26124112 Fax: 011-26124111, 26124112 Email: info@moed.gov.lk Website: www.moed.gov.lk	
Date: _____ To: _____ From: _____	Date: _____ To: _____ From: _____	Date: _____ To: _____ From: _____	
General Education Modernisation (GEM) Project (2019-2024), Ministry of Education			
Subject: Conduct National Assessment of Learning Outcomes for Grades 4 & 8			
<p>I am pleased to inform you that the MOE, University of Colombo has been selected for conducting national assessment of learning outcomes of the subject of Mathematics and English language in Grade 4 and 8 by the Ministry of Education under the World Bank-funded General Education Modernisation (GEM) Project. Moreover, I would like to extend my sincere thanks for your cooperation in conducting the national assessment of learning outcomes from 2003 through the World Bank-funded projects and programmes.</p>			
<p>As you already aware, the GEM Project will be operationalised from 2014/15 to 2024 and one of the sub-components is 'system level quality assessment'. Under this sub-component, it is expected to modernize the assessment of learning outcomes of the students incorporating international standards like PISA. The main aim of this sub-component is to get an insight information for policy-makers on how well students are learning, to determine to learning outcomes between geographical areas or population subgroups, to track students with the learning levels, and change in learning outcomes over time. The details of this sub-component is attached in Annex 1.</p>			
<p>The assessment has been planned as follows:</p>			
<ul style="list-style-type: none"> Grade 4 Mathematics and English Language – in 2020 and 2022 Grade 8 Mathematics and English Language – in 2020, 2021 and 2022. (details are given in Annex 2) 			
<p>Therefore, you are kindly requested to submit the comprehensive proposal on conducting national assessment of learning outcomes of Mathematics and English language for grades 4 and 8 students during planned period as mentioned to above including the estimated cost no later before December 15, 2019 to the Addl. Secretary, Policy, Planning and Performance Review Division, Ministry of Education.</p>			
<p>Please note that, the proposal need to be approved by the Academic Coordinating Committee which will be constituted by the Secretary, Ministry of Education.</p>			
<p>Your cooperation in this regard is very much appreciated.</p>			
<p>Sd/- /  Dr. (Mrs.) Madura M. Weerakkody Additional Secretary/ Policy, Planning and Performance Review for Secretary, Ministry of Education </p>			
<p>Copy:  Dr. Parshva Narayana, Lead Economist, World Bank</p>			
Tel: 011-26124111 Fax: 011-26124111 Email: info@moed.gov.lk	Tel: 011-26124111 Fax: 011-26124111 Email: info@moed.gov.lk	Tel: 011-26124111 Fax: 011-26124111 Email: info@moed.gov.lk	Tel: 011-26124111 Fax: 011-26124111 Email: info@moed.gov.lk

Series of National Assessments

National Assessment of Achievement of Grade 4 Pupils in Sri Lanka. (2004)

National Assessment of Achievement of Grade 8 and 10 Students in Sri Lanka. (2005)

National Assessment of Achievement of Students Completing Grade 4 in Year 2006 in Sri Lanka.

National Assessment of Achievement of Students Completing Grade 8 in Year 2007 in Sri Lanka.

National Assessment of Achievement of Students Completing Grade 4 in Year 2008 in Sri Lanka.

National Assessment of Achievement of Students Completing Grade 8 in Year 2012 in Sri Lanka.

National Assessment of Achievement of Students Completing Grade 4 in Year 2013 in Sri Lanka.

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

National Assessment of Achievement of Students Completing Grade 4 in Year 2015 in Sri Lanka.

National Assessment of Achievement of Students Completing Grade 8 in Year 2016 in Sri Lanka.